488-492 Old South Head Road and 30 Albemarle Avenue, Rose Bay

Transport Assessment

Prepared for:

Fabcot Pty Ltd

31 March 2023

PROJECT INFORMATION

Project Name:	488-492 Old South Head Road and 30 Albemarle Avenue, Rose Bay
Client:	Fabcot Pty Ltd
Project Number:	2147
Prepared By:	JMT Consulting

DOCUMENT HISTORY

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1 Introduction

1.1 Background

JMT Consulting has prepared this document on behalf of Fabcot Pty Ltd to support a proposed Woolworths mixed use development to be located at 488-492 Old South Head Road & 30 Albemarle Avenue, Rose Bay. The site has a combined area of approximately 2,257sqm and has a frontage of approximately 40 metres to Old South Head Road and 70 metres to Albemarle Avenue. It is irregular in shape.

The site sits across two blocks, being the previous Caltex service station site on the corner of Old South Head Road and Albemarle Avenue and the adjoining residential block to the north-west, acquired by Fabcot Pty Ltd.

The location of the site is presented in Figure 1 below.

Figure 1 Site location

1.2 Report purpose

This report has been prepared to summarise the transport implications of the proposal, including:

- Summary of existing transport conditions in the vicinity of the site
- Expected travel demand generated by the proposed metro store
- Traffic movements generated by the proposal, with consideration of the site's previous use as a Caltex service station
- Parking demand generated by the proposal
- Access by public transport, walking and cycling.

1.3 Description of the proposal

1.3.1 Proposed planning controls

The broad intent of the Planning Proposal is to achieve a mixed-use development outcome including a supermarket of a suitable size to match locally identified retail demand with supporting residential land uses, which facilitates a suitable urban form to support the strengthening of the Rose Bay South local centre.

The Planning Proposal at 488-492 Old South Head Road and 30 Albemarle Avenue, Rose Bay seeks amendments to the Woollahra LEP 2014 to support the Planning Proposal and proposed redevelopment.

The Planning Proposal seeks to amend the Woollahra Local Environmental Plan 2014 (Woollahra LEP 2014) to permit future development on the site including a Woolworths supermarket comprising of approximately 2,168m^2 GFA as well as 14 residential apartments. Entrance to the site will be via a driveway on Albemarle Avenue which would service vehicles accessing both the residential and retail car parking areas. A separate driveway access point on Albemarle Avenue for service vehicles would also be provided.

1.3.2 Indicative reference scheme

The proposed development at 488-492 Old South Head Road and 30 Albemarle Avenue involves the demolition of existing structures on the site and the construction of a four (4) storey mixed use building. Specifically, the proposed development is planned to comprise:

- A total Gross Floor Area (GFA) of 4,173m^2 comprising 2,168m^2 of supermarket floorspace located within the Ground Floor and part of the Level 1 area, and 2,005m^2 of residential floorspace, comprising a total of 14 apartments provided in 1, 2 and 3 bedroom dwelling configurations located at Levels 1 to 3.
- Rooftop lift overruns, stair access, plant equipment and PV cells.
- A 3 level basement comprising up to 70 supermarket parking spaces, 19 residential vehicles spaces, 3 residential visitor parking spaces (including a car wash bay), as well as motorcycle and bicycle spaces.
- A ground level landscaped buffer zone – providing a 9m wide visual and acoustic buffer to the residential precinct and provides opportunity for deep soil planting, community seating, e-bike charging and public art.

The site plan under the reference scheme is presented in Figure 2.

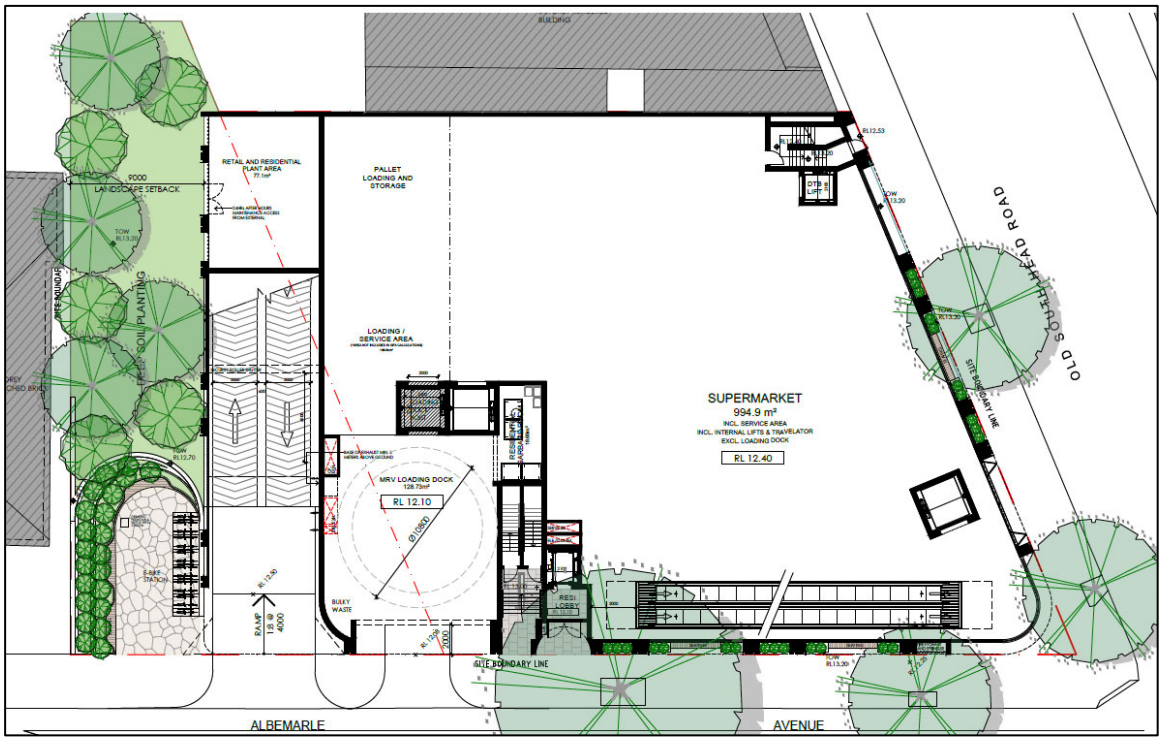

Figure 2 Proposed site plan

Source: PBD Architects

2 Existing Transport Conditions

2.1 Site context

The site is partially located in the Rose Bay South local centre which contains a broad range of shops and services for the local community. The centre is zoned B4 Mixed Use. Immediately to the north along Old South Head Road are a range of mixed use developments, including three storey shop top housing and mixed use developments. The commercial uses on Old South Head Road consist of a mix of restaurants, cafes, shops and services. Immediately south, on the other side of Albemarle Avenue, is a single storey retail building with one to two-storey detached residential dwellings beyond.

2.2 Vehicle site access arrangements

When the site operated as a Caltex service station, vehicle access was provided via one of two driveways along Albemarle Avenue, with access also available directly via Old South Head Road as shown in Figure 3 below.

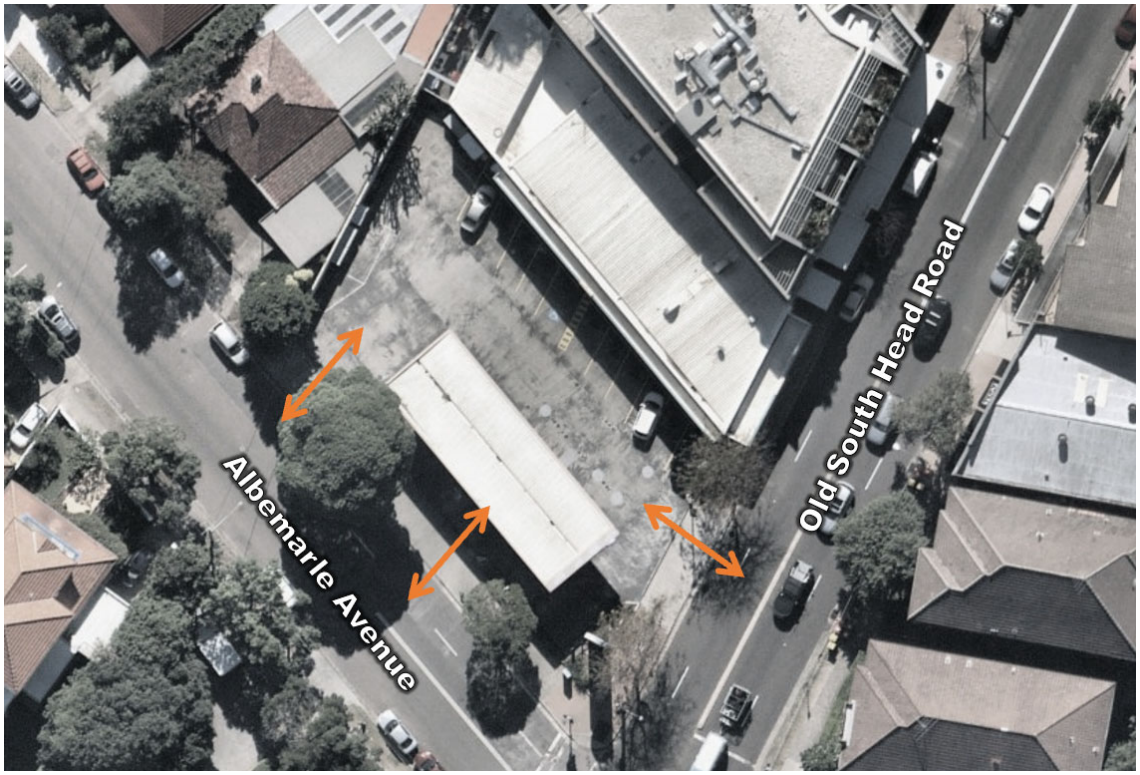

Figure 3 Previous site access arrangements

2.3 Existing traffic volumes

Through to the start of 2020 the site previously operated as a Caltex Service station providing on-site parking and six petrol bowsers. Caltex collected information on the number of customers using the petrol bowsers between the period March 2019 through to November 2019, with the results shown in Figure 4 below. This indicates that typically the service station would generate between 1,000 and 1,200 vehicles per day. This would equate to approximately 80-90 vehicles per hour entering the site during peak periods (160-180 two way movements).

This number of traffic movements aligns with the typical level of traffic generation associated with service stations, with recent TfNSW surveys indicating the following average generation rates:

- 113 vehicle trips (two way) during the AM peak hour
- 144 vehicle trips (two way) during the PM peak hour

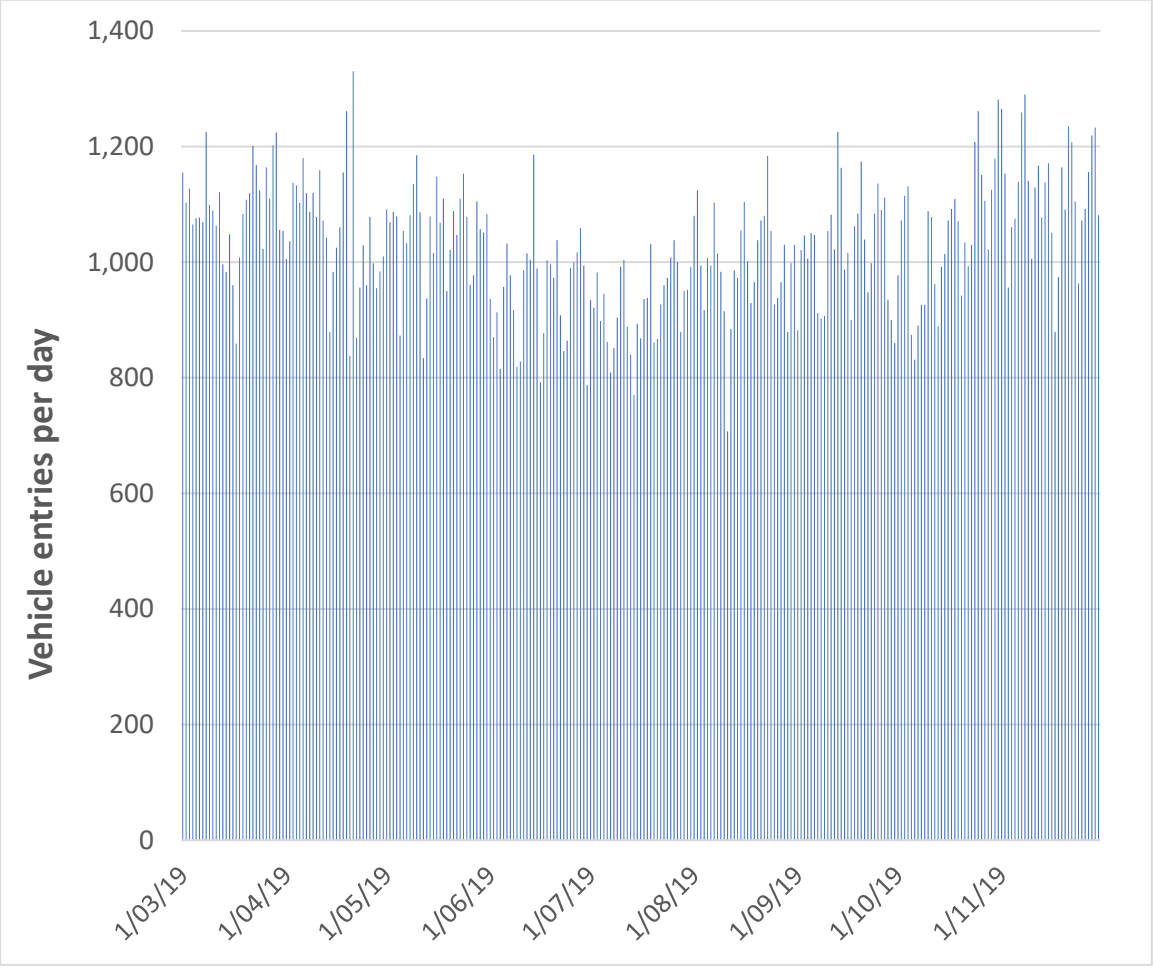

Figure 4 Daily vehicle entries –Rose Bay Caltex service station

2.4 Road network

The road network in the vicinity of the site comprises of a mix of State Roads (Old South Head Road / New South Head Road) as well as a number of local roads under the control of Woollahra Council. This road network is presented in Figure 5.

Old South Head Road fronting the site comprises of two lanes of traffic in each direction, with one lane generally reserved for car parking and the other for through traffic movements. Old South Head Road provides connections to many areas in the Eastern Suburbs including Watsons Bay in the north to Bondi Junction to the south.

Albemarle Avenue is a two way local street which provides local road access, connecting to Newcastle Street and New South Head Road towards Double Bay and the Sydney CBD.

All traffic movements are permitted into and out of the Old South Head Road / Albemarle Avenue intersection which is controlled by traffic lights.

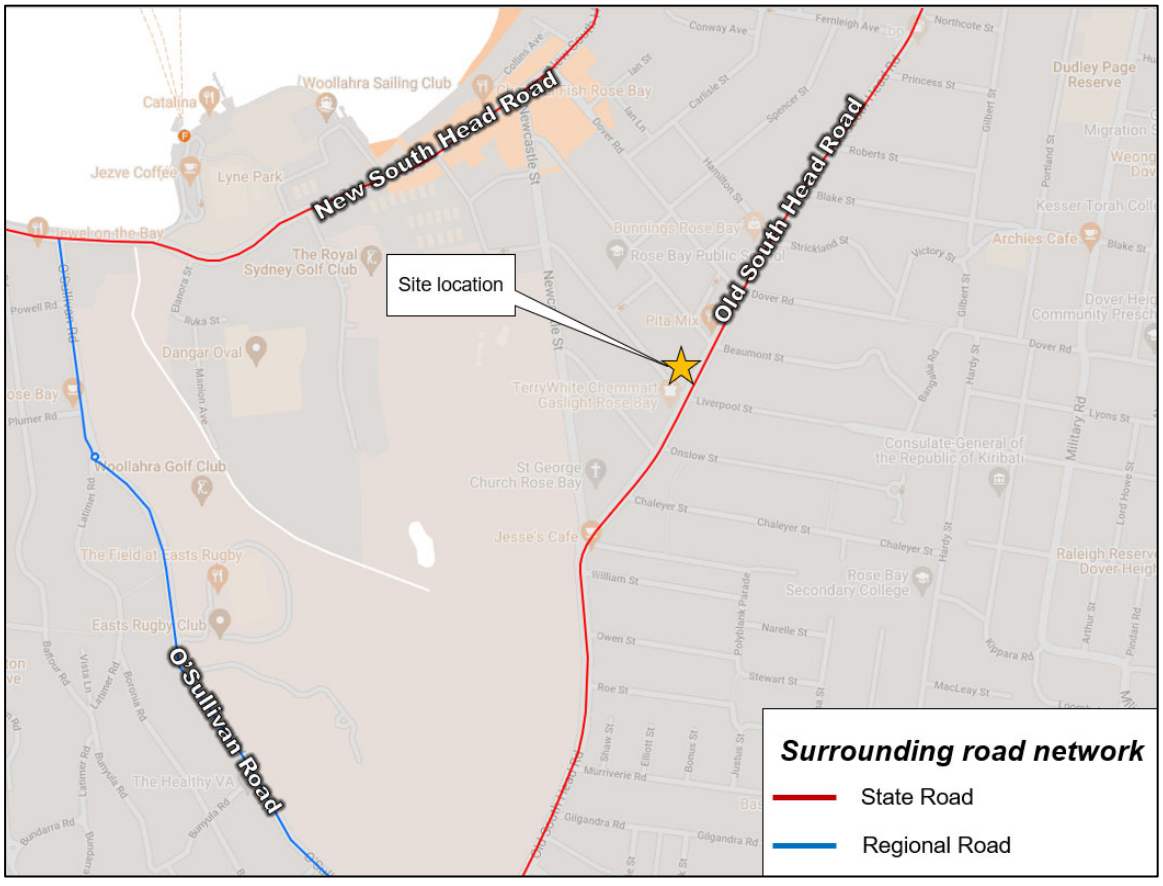

Figure 5 Surrounding road network

2.5 Public transport services

The site is accessible from a number of nearby bus stops located along Old South Head Road. The closest bus stops are at the corner of Wilberforce Avenue and Old South Head Road (approximately 75m) and at the corner of Onslow Street and Old South Head Road (approximately 125m). Bus services connect the site to the Bondi Junction Strategic Centre which provides access to train services including the T4 Eastern Suburbs and Illawarra Line services, and the NSW TrainLink South Coast Line Services.

The bus services running along Old South Head Road in close proximity to the site are as follows:

- 362 (Coogee to Rose Bay)
- 386 (Vaucluse to Bondi Junction)
- 387 (South Head Cemetery to Bondi Junction)

The Rose Bay ferry wharf is approximately 1.4km (15 minute walk) away from the site, where direct services to Circular Quay can be obtained.

Figure 6 Public transport stops on Old South Head Road

2.6 Public transport accessibility

A key indicator of the level of public transport accessibility a site contains is the number of locations accessible within a 30 minute public transport catchment. A key objective of the Greater Sydney Commission's Greater Sydney Region Plan is to deliver a 30-minute city where jobs, services and quality public transport spaces are in easy reach of residences.

As illustrated in Figure 7 a number of key employment centres across Sydney can be reached within 30 minutes public transport travel time of the site, including Central / Redfern, Sydney CBD, Randwick Health and Education Precinct and Bondi Junction. The highly accessible nature of the site will facilitate the use of public transport, particularly the Old South Head Road bus corridor.

Figure 7 30 minute public transport catchment from site

Source: https://www.mapnificent.net/sydney

2.7 Walking and cycling

Good quality footpaths are provided along all streets in the vicinity of the site. This includes signalised pedestrian crossings at the signalised intersection at Old South Head Road / Albemarle Avenue. 'Pedestrian protection' is provided for pedestrians walking across Old South Head Road at this intersection, with right turning vehicles from Albemarle Avenue held back (via a right turn arrow) to allow people to safely cross the road.

The section of Old South Head Road in the vicinity of the site is part of the Waverley and Woollahra Bicycle Network, which connects local centres, open spaces and residential areas throughout the LGA. It is identified in the *Woollahra Bicycle Strategy 2009*. This existing network of bicycle routes is shown in Figure 8 below.

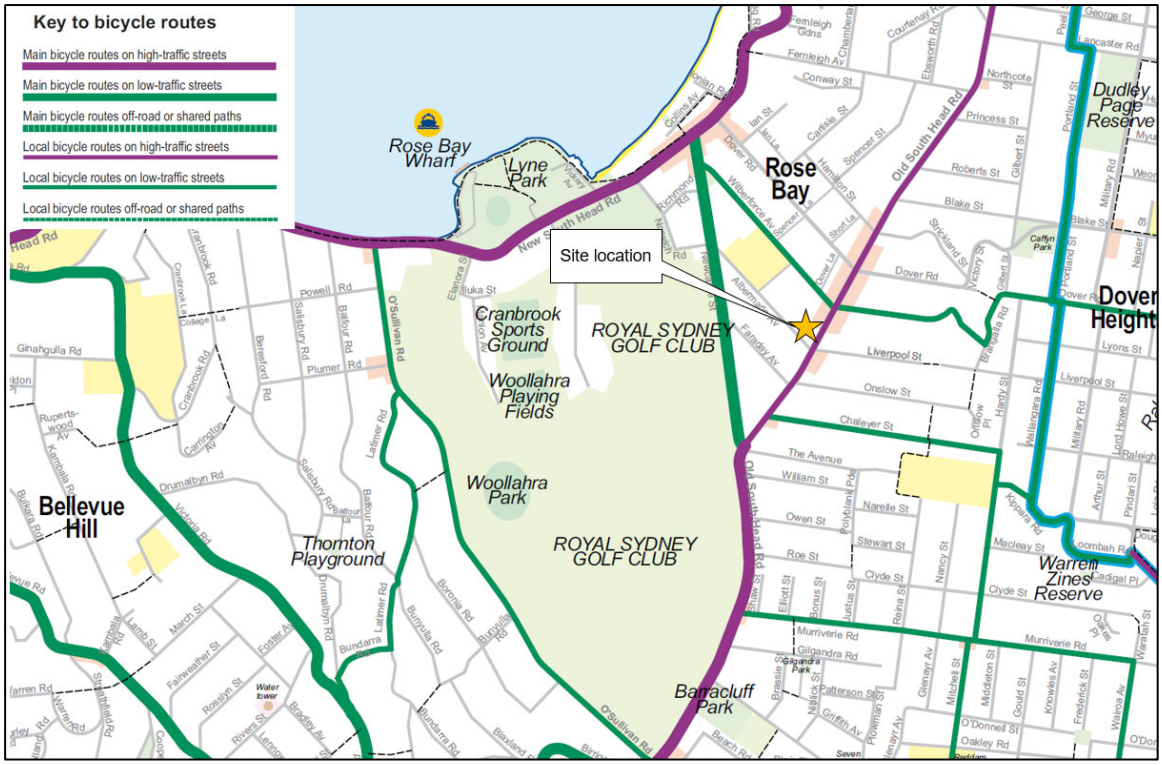

Figure 8 Existing bicycle routes

Source: Woollahra Council

3 Transport Assessment

3.1 Proposed site access arrangements

The proposed vehicle access would reduce the extent of vehicle access points compared to previous conditions as noted in Figure 9. This will include the removal of all vehicle driveways from Old South Head Road, with access for all vehicles to be exclusively via the western end of Albemarle Avenue. In response to feedback from Transport for NSW (TfNSW) and Council the proposed egress only driveway for direct to boot vehicles on Old South Head Road has been removed from the plans, with all direct to boot vehicles to instead utilise the first level basement area. The primary site driveway on Albemarle Avenue is located as far away from the Old South Head Road traffic lights as possible, ensuring safe and efficient access for vehicles.

The removal of vehicle access points from Old South Head Road as envisaged under the Planning Proposal provides for a significant improvement to the road and pedestrian environment around the site compared to previous operating conditions for the Caltex service station.

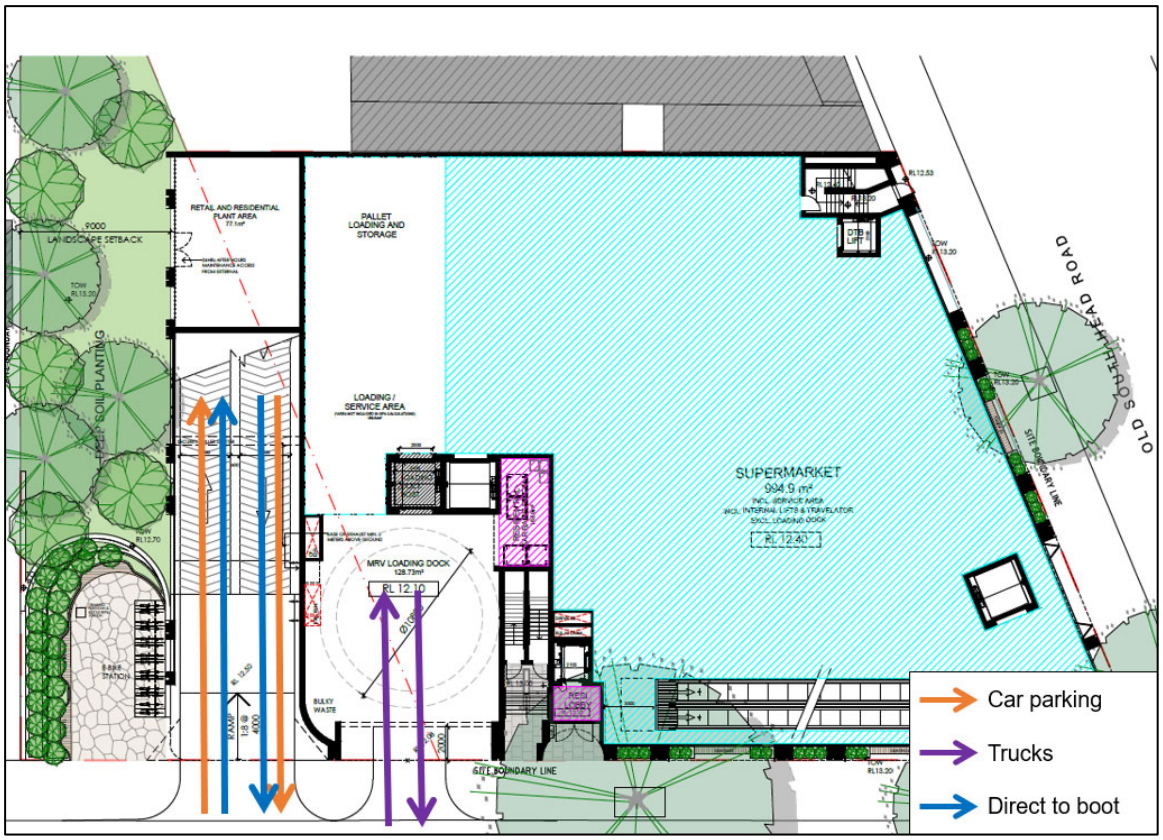

Figure 9 Proposed site access

3.2 Loading dock

The reference scheme includes an on-site loading dock which can accommodate a Medium Rigid Vehicle (MRV) equivalent to a Council garbage truck or a typical Woolworths supermarket delivery vehicle. Although the ground floor loading dock is intended to be the primary servicing point for all site uses, the reference scheme also includes a service vehicle bay within the basement car park suitable for large vans / utes which can be utilised for servicing of the residential apartments if needed. This loading provision is considered suitable to accommodate the needs of the site based on the development yields associated with the reference scheme.

The loading dock is located on the ground floor at the southern end of the site accessed via Albemarle Avenue. As indicated in the swept paths shown in the figure below, all vehicles have the ability to enter and exit Albemarle Avenue in a forwards direction through the use of a turntable. All loading / unloading activities is to occur on-site and not in public streets.

The loading dock has been designed in accordance with the requirements outlined in the relevant Australian Standard (AS2890.2, 2018). The final design of the loading dock will be carried out at the Development Application stage of the project.

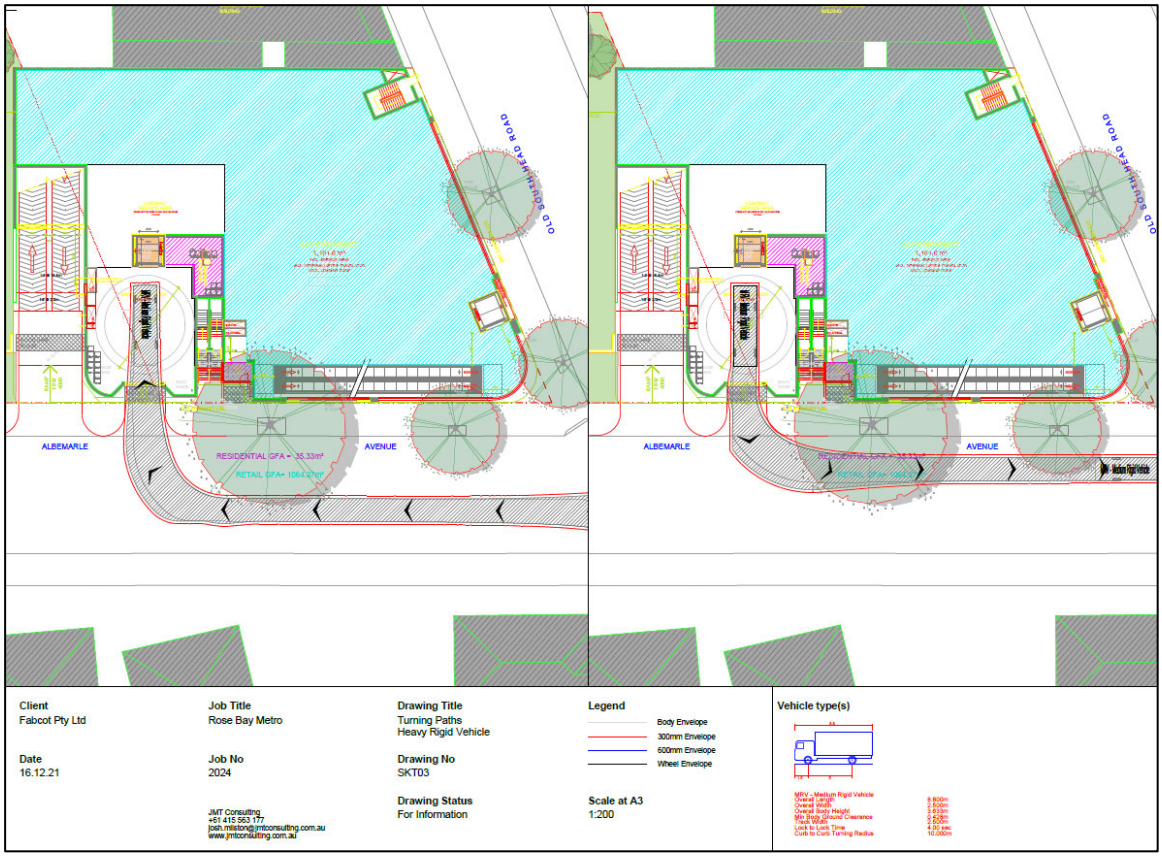

Figure 10 Vehicle swept paths – loading dock

At the request of TfNSW additional swept path analysis was carried out to confirm that an MRV can safely turn into and out of Albemarle Avenue from Old South Head Road. This analysis is presented in Figure 11.

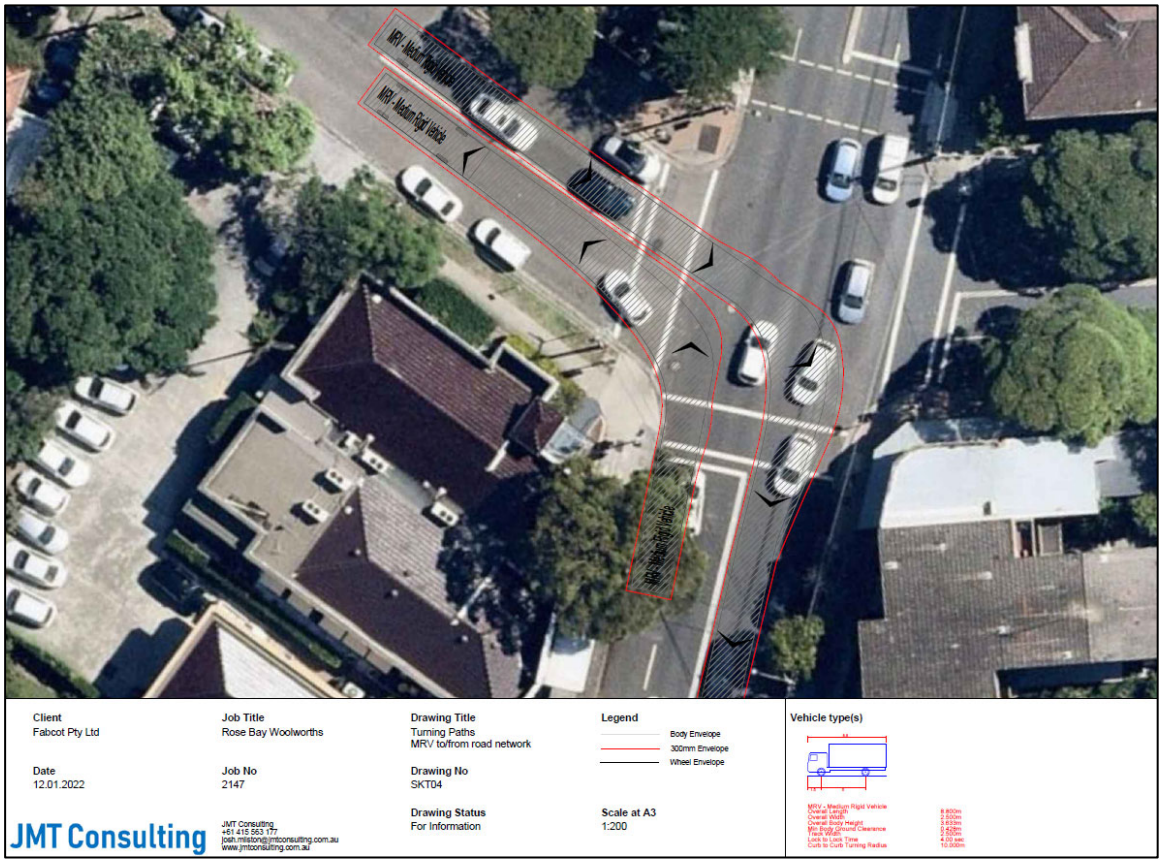

Figure 11 Vehicle swept paths to/from Old South Head Road

Deliveries will occur on the site between 7am and 9pm, seven days per week. It is expected that the store will generate 2 to 4 major deliveries per day using the 8.8m MRV trucks, with a small number of minor deliveries to be undertaken by vans on top of this. As the project progresses a traffic management plan will be developed to minimise the impact of truck movements on the surrounding street network, including limiting (where practical) truck movements during school pick up and drop off times.

3.3 Car park access and design

As part of the reference scheme developed for the Planning Proposal a basement car park has been designed to facilitate the future development. The car park and associated elements such as car parking space dimensions, circulation aisles and ramp would be designed in accordance with the relevant Australian Standard for car parking facilities, namely AS2890.1: 2004 and AS2890.6:2009.

Car parking spaces have been designed to comply with a Class 1 car park facility for the residential uses as specified in the Australian Standard (generally low turnover long term parking) with 2.4m wide spaces and aisle widths of 5.8m. For the retail car parking areas 2.6m wide spaces with 6.2m aisles have been provided in accordance with the requirements of Class 3 parking areas.

The final design of the car park will be carried out at the Development Application stage of the project.

3.4 Direct to boot operations

The reference scheme includes five direct to boot parking spaces provided at basement level. Customers will place their order online and be allocated a time window (generally one hour) by Woolworths in which they can pick up their order. Woolworths staff members would deliver the shopping directly to the boot of the customer's car. Using this system Woolworths have the ability to limit the number of online order pick ups during certain times of the day to manage demand and ensure parking spaces are always available for customers.

The online order pick up offering will assist in increasing parking turnover as customers will only be on-site for a matter of minutes, rather than a typical shopping trip which can be 30 to 60 minutes. This will contribute to reducing parking demand on site compared to a store that did not provide the online pick up service.

Based on data provided by Woolworths it is expected that between 80 and 120 vehicles per day will utilise the direct to boot service at the future Rose Bay Store. This equates to approximately 10 to 15 vehicles per hour using the service, with all vehicles to enter and exit via Albemarle Avenue.

3.5 Car park and pedestrian management

With regards to management of the car park it will be controlled by boom gates and a pricing structure implemented to discourage all day parking. The car park ramp will be designed in accordance with Australian Standards including the mandatory maximum gradient of 5% for the first 6m from the property boundary so drivers are afforded good sight lines to pedestrians on Albemarle Avenue. A warning system will also be in place (e.g. flashing lights) to make pedestrians aware of vehicles exiting the car park and travelling up to street level.

To emphasise pedestrian priority along Albemarle Avenue the access driveway will be fully integrated with the adjoining footpath, at one continuous level. The treatment will therefore be an area which is designed for pedestrians, across which vehicles can pass slowly. Drivers of vehicles will be guided and encouraged to give way to pedestrians on the footpath as required by law. The crossings would also be designed with consistent pavement material.

3.6 Car parking

The proposal involves the following car parking provision as outlined in Table 1 below. The spaces provided as part of the reference scheme is compliant with the requirements with the Woollahra Council DCP parking rates.

Table 1 Car parking provision

Unit Type	No. of dwellings / GFA	DCP Parking Rate*	No. of Spaces Required	Spaces Provided
1 bed	1	0.5 / dwelling	0.5	19
2 bed	3	1.0 / dwelling	3	
3 bed	10	1.5 / dwelling	15	
Total	***14***	-	***18.5***	
Visitor	-	0.2 / dwelling	3	3
Sub-total - Residential			**21.5**	**22**
Supermarket	2,168m^2	2.45 / 100m^2 GFA[1]	**53**	**70[2]**
Total			**80**	**91**

* As per the Woollahra Council DCP maximum rates are in force for residential uses and minimum rates apply to supermarket uses

The current reference scheme proposes 70 parking spaces for the use of the Woolworths supermarket which is higher than the minimum of 53 required under the DCP – therefore complying with Council's controls. Providing an appropriate level of on-site car parking to meet customer needs will reduce demand for parking on surrounding streets and encourages customers to park in the basement.

It should be noted that the reference scheme is conceptual in nature and further investigations will need to be undertaken at subsequent stages to confirm the final parking number and layout. The final car parking requirements and provision for the site will be confirmed at the Development Application (DA) stage of the project.

[1] The standard DCP parking rate for supermarket uses is 3.5 spaces / 100m^2 GFA, however a 'multiplier' of 0.7 has been applied given the location of the site within the Rose Bay South local centre

[2] Inclusive of five direct to boot parking spaces located at basement level

3.7 Bicycle parking

The reference scheme developed for the Planning Proposal includes a 9m landscape setback on the western boundary of the site to facilitate deep soil planting along with a public bicycle parking area. Approximately 14 bicycle parking spaces are envisaged under the reference scheme as indicated in Figure 12, with this number to be confirmed at subsequent design stages. The area would be open to the general public (not only site users) and encompass both traditional bicycle parking as well as parking for E-Bikes, including charging points. This facility will offer a public benefit given no similar public bicycle parking facility for E-Bikes is currently available within the Woollahra LGA. It will also complement the objective of the Woollahra Integrated Transport Strategy (released 2021) to increase the uptake of active transport (walking and cycling) to 14 per cent by 2026.

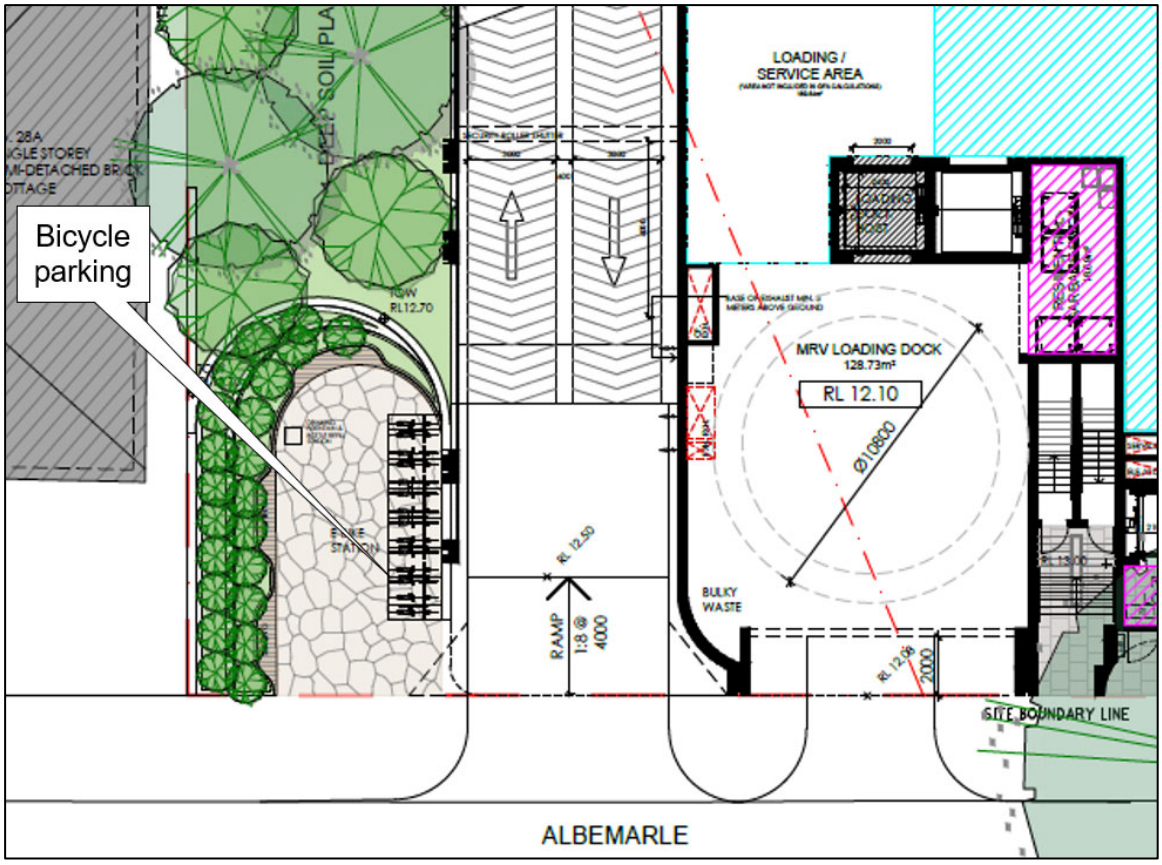

Figure 12 Public bicycle parking area

The Woollahra DCP outlines minimum bicycle parking requirements for new developments. Table 2 below summarises the potential bicycle parking provision based on the reference design prepared for the Planning Proposal. The reference scheme developed for the Planning Proposal provides a higher number of bicycle parking spaces than required under the DCP which will support access via this mode of transport.

Table 2 Potential bicycle parking requirements

Land Use	No. of units / GFA	User Type	Potential bicycle parking requirement		
			Rate	Number Required	Number Provided
Residential	14 units	Residents	1 per unit	14	18
		Visitors	1 per 10 units	2	2
Shopping centre	2,168m^2	Staff	1 per 200 m^2	11	12
		Visitors	1 per 1000m^2	2	14

For residents and staff bicycle parking will be located in a secure location only accessible via key or swipe card. This will either be in individual storage units (Class 1 facility) or a large secure bicycle parking room within the site boundary (Class 2 facility). For retail and residential visitors class 3 bike parking (i.e. bike rails) will be provided in a publicly accessible location with good passive surveillance.

The final bicycle parking requirements and provision for the site will be confirmed at the Development Application (DA) stage of the project.

3.8 Green travel plan

3.8.1 Background

A Green Travel Plan (GTP) is a package of measures put in place by the development occupants to try and encourage more sustainable travel. It is a means for a development to demonstrate a commitment and take a pro-active step towards improving the environmental sustainability of its activities.

More generally, the principles of a GTP are applied to all people travelling to and from a site. Government authorities are placing increasing emphasis on the need to reduce the number and lengths of motorised journeys and in doing so encourage greater use of alternative means of travel with less negative environmental impacts than the car.

3.8.2 Objectives

The main objectives of the GTP are to reduce the need to travel and promotion of sustainable means of transport. The more specific objectives include:

- High mode share for public transport, cycling and walking to work journeys;
- Ensuring adequate facilities are provided at the site to enable the tenants and visitors of the development to commute by sustainable transport modes;
- Reduce the number of car journeys associated with business travel;
- Facilitate the sustainable and safe travel of occupants; and
- Raise awareness of sustainable transport amongst tenants of the development.

3.8.3 Potential measures

A suite of potential measures is described below to be implemented as part of the GTP, which can be developed further as the Planning Proposal progresses.

Table 3 List of potential GTP measures

Action	Responsibility
Cycling	
Provide sufficient cycle parking to meet needs, which is easily accessible and secure	Developer
Provide adequate cycle parking facilities for staff, residents and visitors (final number to be confirmed during the DA stage of the project)	Developer
Public E-Bike charging station provided as a concept in the indicative reference scheme as a public benefit	Developer
Ensure cycle parking is clearly visible or provide signage to direct people to cycle bays	Building manager
Produce a map showing cycle routes and bike stands in the area	Building manager

Action	Responsibility
Supply a communal toolkit for staff consisting of puncture repair equipment, a bike pump, a spare lock and lights.	Building manager
Promote the participation in annual events such as 'Ride to Work Day'	Tenants
Walking	
Identify tenants living near work that may be interested in walking to work	Building manager
Identify through the travel survey what incentives might need to be put in place for non-walkers to consider a mode shift	
Public Transport	
Develop a map showing public transport routes in the area	Building manager
Put up a noticeboard with leaflets and maps showing the main public transport routes to and from the site	Building manager
Carshare / Carpooling	
Establish a car pooling program to help people find someone to share in their daily commute.	Building manager and tenants
Develop a map showing car-share spots in the area to encourage staff and visitors to use a shared car (e.g. GoGet) if they are required to drive	Building manager and tenants
General actions	
Promotion including: • Allow staff the flexibility to commute outside peak periods to reduce overall congestion and travel time. • Identify a tenant/champion to complete travel coordinator duties • Provide a welcome pack upon initial occupation of each tenant which includes details around sustainable travel options	Tenants

3.8.4 Monitoring and review

In order for the GTP to be effective, it must be reviewed on a regular basis. It is important to ensure that the GTP is meeting its objectives and having the intended impact on car use and transport choices. The GTP should be reviewed on a yearly basis by undertaking travel surveys. It is recommended that the mode shares are first reviewed at least 18 months after occupation, to allow activity levels to settle at the site.

4 Traffic Impact Assessment

The following section summarises the traffic assessment undertaken to consider the road network impacts of the Planning Proposal.

4.1 Traffic generation

4.1.1 Residential traffic generation

The forecast traffic generation for the residential uses has been determined based on the Sydney wide average traffic generation rates for high density residential uses as published by TfNSW which are as follows:

- AM peak hour: 0.15 vehicle trips per unit
- PM peak hour: 0.19 vehicle trips per unit
- Saturday peak hour: 0.22 vehicle trips per unit

4.1.2 Retail traffic generation

Recent traffic surveys undertaken at Woolworths stores in Redfern and Neutral Bay have been utilised to determine a suitable traffic generation rate for the proposed supermarket use. These stores are located in established centres adjacent to key road corridors and therefore have similar characteristics to the proposed store at Rose Bay. The surveys indicated the following rates of traffic generation for similar supermarket uses:

- Weekday AM peak hour: 1.6 vehicle movements / parking space
- Weekday PM peak hour: 2.3 vehicle movements / parking space
- Saturday peak hour: 2.5 vehicle movements / parking space

These rates of traffic generation are similar to those noted in TfNSW guidelines and have therefore been used to inform the forecast level of traffic movements for the site.

The RMS "*Guide to Traffic Generating Developments*" document suggests that some 25% of visits to retail centres are likely to be passing trade, i.e. customers who would have driven past the development regardless of their visit to the development.

4.1.3 Net traffic generation

Considering the various uses envisaged within the Planning Proposal the overall increase in traffic generation is summarised in Table 4.

Table 4 Forecast increase in traffic movements

Use	Forecast increase in traffic movements (two-way)		
	AM Peak Hour	PM Peak Hour	Saturday Peak Hour
Retail	84	121	131
Residential	3	3	4
Total	**87**	**124**	**135**

The traffic modelling has taken the conservative approach of considering the increase in traffic movements from the site compared to current conditions. As documented in Section 2.3 a typical service station, similar to the Caltex service station which only ceased operating in early 2020, generates significant traffic flows at all hours of the day. A summary of the traffic movements generated by a typical service station compared to that forecast under the Planning Proposal is provided in Table 5 below. This indicates that fewer traffic movements would be generated under the proposed use of the site in comparison to the previous service station use. The traffic impacts of the Planning Proposal should be considered in this context.

Table 5 Comparison of previous and forecast traffic movements

Scenario	Forecast traffic movements (two-way)		
	AM Peak Hour	PM Peak Hour	Saturday Peak Hour
Proposed mixed use development under Planning Proposal	87	124	135
Typical service station[3] as per former use	113	144	156
Difference	**-26**	**-20**	**-29**

[3] Based on typical rates of traffic generation for service stations as documented in the RMS trip generation analysis report for service stations (June 2013)

4.2 Traffic distribution

Development traffic has been distributed evenly between the following three directions:

- Approaching the site from the north via Old South Head Road
- Approaching the site from the south via Old South Head Road
- Approaching the site from the west via Albemarle Avenue

4.3 Traffic modelling

4.3.1 Traffic model calibration

The SIDRA traffic model was calibrated via the use of video footage of the intersection – with this video footage corresponding to the date of the original traffic surveys. The video footage was used to calibrate the model in the following ways:

- Traffic light phasing arrangements
- Typical phase and cycle times of the traffic lights
- Impact of pedestrian crossing movements to delays for left and right turning vehicles from Albemarle Avenue
- Extent of typical queues and delays for vehicles turning right from Old South Head Road to Albemarle Avenue
- Number of cars able to turn right from Albemarle Avenue onto Old South Head Road in a typical signal cycle
- Screenshots of the video footage from the morning, afternoon and Saturday survey periods are provided on the following page of this document.

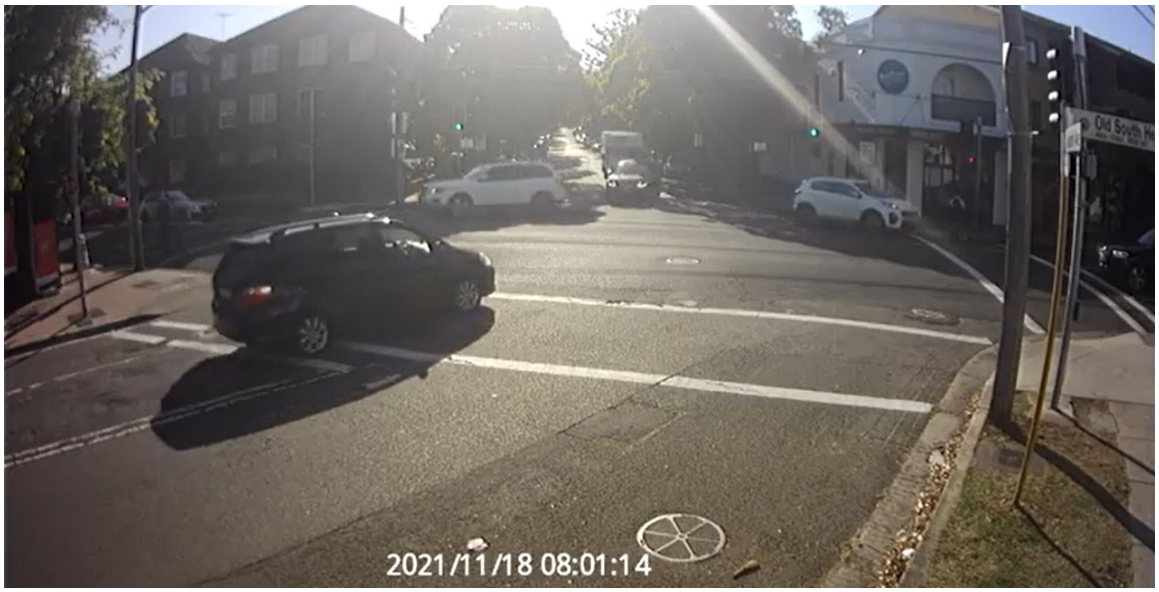

Figure 13 Old South Head Road / Albemarle Avenue – AM peak hour

Figure 14 Old South Head Road / Albemarle Avenue – PM peak hour

Figure 15 Old South Head Road / Albemarle Avenue – Saturday peak hour

4.3.2 Background traffic growth

With respect to background traffic growth on Old South Head Road, it is noted that a recent study undertaken by Council for the Edgecliff centre assumed no background traffic growth in their modelling. Another recent study undertaken by Council for the nearby Double Bay centre assumed a minor rate of growth of 0.15% per annum. It should be noted that New South Head Road through Double Bay acts as more of a regional traffic route in comparison to Old South Head Road in Rose Bay and therefore background traffic growth along Old South Head Road would be lower in comparison.

Application of a background growth rate of 0.15% per annum over a 10 year period, consistent with that adopted by Council for the Double Bay centre, would

result in a minor increase in traffic movements of approximately 10 vehicles per hour in each direction on Old South Head Road. This minor traffic increase, taking into consideration potential background traffic growth, has been considered in the traffic modelling undertaken for this assessment as a conservative assumption.

4.3.3 Traffic modelling inputs

Following discussions with Council's appointed transport consultants the following inputs were adjusted in the traffic modelling:

- All approach and departure speeds on Old South Head Road and Albemarle Avenue set to 50km/h
- Gap acceptance factors for right turning vehicles adjusted from the SIDRA default settings to the relevant factors noted in Table 3.5 of AUSTROADS Guide to Road Design Part 4A: Unsignalised and Signalised Intersections

4.3.4 Traffic modelling findings

The traffic modelling metric used to analyse the performance of the road network is Level of Service (LOS). Level of Service is a measure that uses the average delay experienced by vehicles to categorically assign each approach and movement with a qualitative ordinal grade (A through F, with A being the best and F being the worst). RMS Traffic Modelling Guidelines indicate the average delay relating to each grade, this is outlined in Table 6. In typical urban environments it is typical for intersections to operate at Level of Service D or E and still remain within acceptable performance levels.

Table 6 Level of service grades / description

Level of service grade	Average delay (seconds)	Description
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity. At signals, incidents will cause excessive delays. Roundabouts require other control mode
F	Greater than 71	Unsatisfactory with excessive queuing

The traffic modelling undertaken to support the proposal has been conducted using the TfNSW approved 'SIDRA Network' modelling package. SIDRA Network, unlike SIDRA Intersection, considers the operation of intersections in a coordinated manner including downstream and upstream queuing effects.

The traffic modelling results are presented in Table 7. This indicates that the Planning Proposal would not result in any adverse impacts on the nearby signalised intersection at Old South Head Road / Albemarle Avenue – with this intersection forecast to retain an acceptable level of service during the weekday morning, weekday afternoon and weekend peak hours.

As part of a future detailed Development Application for the site there is the opportunity to consider the introduction of additional on-street car parking on the eastern side of Old South Head Road which will be facilitated through the removal of the existing layback serving the previous Caltex service station – offering a benefit to the broader public.

Table 7 Traffic modelling results

Old South Head Road / Albemarle Avenue Intersection	Existing Conditions		Existing + Background Growth + Proposal	
	LOS	DOS	LOS	DOS
AM Peak Hour	B	0.79	C	0.86
PM Peak Hour	B	0.84	C	0.87
Weekend Peak Hour	B	0.70	B	0.74

LOS – Level of Service DOS – Degree of Saturation

5 Summary

This transport assessment report has been undertaken by JMT Consulting to support a Planning Proposal for the site at 488-492 Old South Head Road & 30 Albemarle Avenue, Rose Bay. The proposal seeks to amend the Woollahra Local Environmental Plan to increase maximum height and density controls on the site, facilitating the future development of a mixed-use site including retail and residential floor space. Key findings of the transport assessment are as follows:

- Vehicle access to the site for all vehicles would be provided on Albemarle Avenue, with no access to be obtained from Old South Head Road. The removal of vehicle access points from Old South Head Road provides for a significant improvement to the road and pedestrian environment around the site compared to previous operating conditions for the Caltex service station.
- Service vehicle access to an on-site loading dock is to be provided via a separate access point on Albemarle Avenue to segregate cars in the basement and trucks using the loading dock – providing a strong safety outcome.
- The reference scheme includes the provision of a turntable which allows all trucks to enter and exit the site in a forwards direction.
- Car parking and bicycle parking on the site for all uses under the reference scheme is in accordance with the parking rates outlined in the Woollahra DCP, with the final number of spaces to be determined at the Development Application stage of the project subject to constraints identified during the detailed design process.
- The reference scheme includes a publicly accessible bicycle parking area including an E-Bike charging station – complementing the objectives of the Woollahra Integrated Transport Strategy.
- The previous Caltex service station use, which only ceased operating in early 2020, previously generated significant traffic flows at all hours of the day. Fewer traffic movements would be generated under the proposed use of the site in comparison to the previous service station use. The traffic impacts of the Planning Proposal should be considered in this context.
- Traffic modelling undertaken indicates that the proposal is not anticipated to result in unacceptable traffic impacts on the surrounding road network subject to the implementation of appropriate mitigation measures.

In the above context, the traffic and transport impacts arising from the proposal are considered acceptable.

Appendix A: Traffic Modelling Outputs

MOVEMENT SUMMARY

Site: 101 [Sat Future (Site Folder: Future Conditions)]

Old South Head Road / Albemarle Avenue
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Old South Head Road (S)														
1	L2	47	0	49	0.0	0.160	17.7	LOS B	4.7	33.1	0.51	0.50	0.51	41.4
2	T1	654	10	688	1.5	0.743	17.7	LOS B	23.2	164.4	0.68	0.63	0.68	40.2
3	R2	36	0	38	0.0	* 0.743	22.9	LOS B	23.2	164.4	0.72	0.66	0.72	39.5
Approach		737	10	776	1.4	0.743	17.9	LOS B	23.2	164.4	0.67	0.62	0.67	40.2
East: Liverpool Street (E)														
4	L2	32	0	34	0.0	0.104	50.9	LOS D	1.7	11.7	0.87	0.72	0.87	29.6
5	T1	14	1	15	7.1	0.130	48.4	LOS D	1.6	11.7	0.90	0.70	0.90	29.5
6	R2	16	0	17	0.0	0.130	53.0	LOS D	1.6	11.7	0.90	0.70	0.90	29.3
Approach		62	1	65	1.6	0.130	50.9	LOS D	1.7	11.7	0.89	0.71	0.89	29.5
North: Old South Head Road (N)														
7	L2	20	0	21	0.0	0.295	14.6	LOS B	9.2	65.1	0.47	0.43	0.47	43.5
8	T1	692	11	728	1.6	0.688	15.3	LOS B	17.0	120.7	0.59	0.54	0.59	41.4
9	R2	66	1	69	1.5	0.688	23.4	LOS B	17.0	120.7	0.69	0.64	0.69	39.1
Approach		778	12	819	1.5	0.688	16.0	LOS B	17.0	120.7	0.60	0.55	0.60	41.2
West: Albermarle Avenue (W)														
10	L2	66	0	69	0.0	0.299	58.6	LOS E	3.8	26.5	0.95	0.76	0.95	27.9
11	T1	11	0	12	0.0	0.722	58.4	LOS E	8.0	56.6	1.00	0.87	1.13	27.0
12	R2	115	1	121	0.9	* 0.722	62.9	LOS E	8.0	56.6	1.00	0.87	1.13	26.8
Approach		192	1	202	0.5	0.722	61.2	LOS E	8.0	56.6	0.98	0.83	1.07	27.2
All Vehicles		1769	24	1862	1.4	0.743	22.9	LOS B	23.2	164.4	0.68	0.62	0.69	38.2

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Old South Head Road (S)												
P1	Full	42	44	54.2	LOS E	0.1	0.1	0.95	0.95	219.8	215.2	0.98
East: Liverpool Street (E)												
P2	Full	59	62	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
North: Old South Head Road (N)												
P3	Full	17	18	54.2	LOS E	0.1	0.1	0.95	0.95	219.7	215.2	0.98

MOVEMENT SUMMARY

Site: 101 [PM Existing (Site Folder: Existing Conditions)]

Old South Head Road / Albemarle Avenue
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Old South Head Road (S)														
1	L2	35	1	37	2.9	0.160	18.2	LOS B	4.7	33.7	0.51	0.49	0.51	41.3
2	T1	639	27	673	4.2	0.741	19.4	LOS B	22.7	164.1	0.70	0.64	0.70	39.5
3	R2	25	0	26	0.0	0.741	25.1	LOS B	22.7	164.1	0.74	0.67	0.74	38.7
Approach		699	28	736	4.0	0.741	19.6	LOS B	22.7	164.1	0.69	0.63	0.69	39.5
East: Liverpool Street (E)														
4	L2	21	0	22	0.0	0.062	49.3	LOS D	1.1	7.4	0.85	0.69	0.85	30.2
5	T1	9	0	9	0.0	0.127	46.5	LOS D	1.7	11.6	0.89	0.70	0.89	29.8
6	R2	22	0	23	0.0	0.127	51.1	LOS D	1.7	11.6	0.89	0.70	0.89	29.6
Approach		52	0	55	0.0	0.127	49.6	LOS D	1.7	11.6	0.87	0.70	0.87	29.9
North: Old South Head Road (N)														
7	L2	26	0	27	0.0	0.168	15.4	LOS B	4.8	34.8	0.46	0.43	0.46	42.9
8	T1	733	30	772	4.1	0.840	24.3	LOS B	31.9	230.4	0.73	0.72	0.79	37.5
9	R2	54	0	57	0.0	* 0.840	32.1	LOS C	31.9	230.4	0.81	0.80	0.88	35.9
Approach		813	30	856	3.7	0.840	24.6	LOS B	31.9	230.4	0.73	0.71	0.78	37.6
West: Albermarle Avenue (W)														
10	L2	58	0	61	0.0	0.232	56.0	LOS D	3.2	22.6	0.93	0.75	0.93	28.5
11	T1	18	0	19	0.0	0.794	59.9	LOS E	10.3	72.3	1.00	0.93	1.20	26.7
12	R2	139	0	146	0.0	* 0.794	64.5	LOS E	10.3	72.3	1.00	0.93	1.20	26.5
Approach		215	0	226	0.0	0.794	61.8	LOS E	10.3	72.3	0.98	0.88	1.13	27.0
All Vehicles		1779	58	1873	3.3	0.840	27.8	LOS B	31.9	230.4	0.75	0.70	0.79	36.3

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Old South Head Road (S)												
P1	Full	42	44	54.2	LOS E	0.1	0.1	0.95	0.95	219.8	215.2	0.98
East: Liverpool Street (E)												
P2	Full	59	62	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
North: Old South Head Road (N)												
P3	Full	17	18	54.2	LOS E	0.1	0.1	0.95	0.95	219.7	215.2	0.98

MOVEMENT SUMMARY

Site: 101 [AM Existing (Site Folder: Existing Conditions)]

Old South Head Road / Albemarle Avenue
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Old South Head Road (S)														
1	L2	43	2	45	4.7	0.136	17.1	LOS B	4.1	29.7	0.47	0.48	0.47	41.7
2	T1	626	26	659	4.2	0.631	15.3	LOS B	20.6	149.4	0.60	0.55	0.60	41.3
3	R2	18	0	19	0.0	0.631	20.1	LOS B	20.6	149.4	0.62	0.57	0.62	40.8
Approach		687	28	723	4.1	0.631	15.5	LOS B	20.6	149.4	0.59	0.55	0.59	41.3
East: Liverpool Street (E)														
4	L2	23	1	24	4.3	0.079	54.4	LOS D	1.3	9.3	0.87	0.70	0.87	28.9
5	T1	8	0	8	0.0	0.139	54.0	LOS D	1.7	11.7	0.91	0.71	0.91	28.1
6	R2	20	0	21	0.0	0.139	58.5	LOS E	1.7	11.7	0.91	0.71	0.91	27.9
Approach		51	1	54	2.0	0.139	56.0	LOS D	1.7	11.7	0.89	0.71	0.89	28.3
North: Old South Head Road (N)														
7	L2	18	1	19	5.6	0.158	13.8	LOS A	4.6	33.7	0.41	0.38	0.41	43.8
8	T1	669	36	704	5.4	0.789	18.0	LOS B	26.8	195.0	0.66	0.62	0.67	40.1
9	R2	80	0	84	0.0	* 0.789	24.9	LOS B	26.8	195.0	0.74	0.70	0.75	38.6
Approach		767	37	807	4.8	0.789	18.6	LOS B	26.8	195.0	0.66	0.62	0.67	40.0
West: Albermarle Avenue (W)														
10	L2	72	1	76	1.4	0.335	63.4	LOS E	4.5	31.9	0.96	0.76	0.96	26.9
11	T1	10	0	11	0.0	0.668	61.4	LOS E	7.7	54.5	1.00	0.84	1.07	26.4
12	R2	104	2	109	1.9	* 0.668	66.0	LOS E	7.7	54.5	1.00	0.84	1.07	26.2
Approach		186	3	196	1.6	0.668	64.8	LOS E	7.7	54.5	0.98	0.81	1.02	26.5
All Vehicles		1691	69	1780	4.1	0.789	23.5	LOS B	26.8	195.0	0.68	0.62	0.68	37.9

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Old South Head Road (S)												
P1	Full	155	163	59.5	LOS E	0.6	0.6	0.96	0.96	225.1	215.2	0.96
East: Liverpool Street (E)												
P2	Full	83	87	59.4	LOS E	0.3	0.3	0.96	0.96	224.9	215.2	0.96
North: Old South Head Road (N)												
P3	Full	47	49	59.3	LOS E	0.2	0.2	0.96	0.96	224.8	215.2	0.96

MOVEMENT SUMMARY

Site: 101 [Sat Existing (Site Folder: Existing Conditions)]

Old South Head Road / Albemarle Avenue
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Old South Head Road (S)														
1	L2	25	0	26	0.0	0.150	15.3	LOS B	4.3	30.5	0.46	0.43	0.46	42.9
2	T1	644	10	678	1.6	0.696	16.0	LOS B	20.8	147.3	0.63	0.58	0.63	41.0
3	R2	36	0	38	0.0	* 0.696	21.7	LOS B	20.8	147.3	0.68	0.63	0.68	40.0
Approach		705	10	742	1.4	0.696	16.3	LOS B	20.8	147.3	0.63	0.58	0.63	41.0
East: Liverpool Street (E)														
4	L2	32	0	34	0.0	0.115	53.3	LOS D	1.7	11.9	0.89	0.72	0.89	29.2
5	T1	14	1	15	7.1	0.132	48.5	LOS D	1.6	11.8	0.90	0.70	0.90	29.5
6	R2	16	0	17	0.0	0.132	53.0	LOS D	1.6	11.8	0.90	0.70	0.90	29.3
Approach		62	1	65	1.6	0.132	52.1	LOS D	1.7	11.9	0.90	0.71	0.90	29.3
North: Old South Head Road (N)														
7	L2	20	0	21	0.0	0.135	13.1	LOS A	3.7	25.9	0.41	0.38	0.41	44.1
8	T1	682	11	718	1.6	0.675	14.6	LOS B	22.1	156.8	0.62	0.57	0.62	41.6
9	R2	43	1	45	2.3	0.675	20.4	LOS B	22.1	156.8	0.67	0.62	0.67	40.6
Approach		745	12	784	1.6	0.675	14.9	LOS B	22.1	156.8	0.61	0.57	0.61	41.6
West: Albermarle Avenue (W)														
10	L2	44	0	46	0.0	0.230	60.0	LOS E	2.6	17.9	0.95	0.74	0.95	27.6
11	T1	11	0	12	0.0	0.658	58.3	LOS E	6.5	45.7	1.00	0.84	1.08	27.0
12	R2	92	1	97	1.1	* 0.658	62.9	LOS E	6.5	45.7	1.00	0.84	1.08	26.8
Approach		147	1	155	0.7	0.658	61.7	LOS E	6.5	45.7	0.99	0.81	1.04	27.1
All Vehicles		1659	24	1746	1.4	0.696	21.0	LOS B	22.1	156.8	0.66	0.60	0.67	38.9

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Old South Head Road (S)												
P1	Full	42	44	54.2	LOS E	0.1	0.1	0.95	0.95	219.8	215.2	0.98
East: Liverpool Street (E)												
P2	Full	59	62	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
North: Old South Head Road (N)												
P3	Full	17	18	54.2	LOS E	0.1	0.1	0.95	0.95	219.7	215.2	0.98

MOVEMENT SUMMARY

Site: 101 [AM Future (Site Folder: Future Conditions)]

Old South Head Road / Albemarle Avenue
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Old South Head Road (S)														
1	L2	58	2	61	3.4	0.145	18.1	LOS B	4.5	32.2	0.49	0.52	0.49	41.1
2	T1	635	26	668	4.1	0.672	16.7	LOS B	22.5	162.7	0.63	0.59	0.63	40.6
3	R2	18	0	19	0.0	0.672	21.6	LOS B	22.5	162.7	0.66	0.60	0.66	40.2
Approach		711	28	748	3.9	0.672	17.0	LOS B	22.5	162.7	0.62	0.58	0.62	40.6
East: Liverpool Street (E)														
4	L2	23	1	24	4.3	0.079	54.5	LOS D	1.3	9.3	0.87	0.70	0.87	28.9
5	T1	8	0	8	0.0	0.149	56.0	LOS D	1.7	12.0	0.93	0.71	0.93	27.6
6	R2	20	0	21	0.0	0.149	60.6	LOS E	1.7	12.0	0.93	0.71	0.93	27.5
Approach		51	1	54	2.0	0.149	57.1	LOS E	1.7	12.0	0.90	0.71	0.90	28.1
North: Old South Head Road (N)														
7	L2	18	1	19	5.6	0.172	13.5	LOS A	5.0	36.4	0.41	0.38	0.41	44.0
8	T1	679	36	715	5.3	0.860	26.0	LOS B	33.6	244.2	0.69	0.70	0.76	36.8
9	R2	95	0	100	0.0	* 0.860	36.2	LOS C	33.6	244.2	0.80	0.82	0.90	34.4
Approach		792	37	834	4.7	0.860	26.9	LOS B	33.6	244.2	0.70	0.71	0.77	36.7
West: Albermarle Avenue (W)														
10	L2	88	1	93	1.1	0.409	64.1	LOS E	5.6	39.3	0.97	0.78	0.97	26.8
11	T1	10	0	11	0.0	0.769	65.0	LOS E	9.2	65.4	1.00	0.90	1.18	25.7
12	R2	121	2	127	1.7	* 0.769	69.6	LOS E	9.2	65.4	1.00	0.90	1.18	25.5
Approach		219	3	231	1.4	0.769	67.2	LOS E	9.2	65.4	0.99	0.85	1.09	26.0
All Vehicles		1773	69	1866	3.9	0.860	28.8	LOS C	33.6	244.2	0.71	0.67	0.76	35.9

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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Old South Head Road (S)												
P1	Full	155	163	59.5	LOS E	0.6	0.6	0.96	0.96	225.1	215.2	0.96
East: Liverpool Street (E)												
P2	Full	83	87	59.4	LOS E	0.3	0.3	0.96	0.96	224.9	215.2	0.96
North: Old South Head Road (N)												
P3	Full	47	49	59.3	LOS E	0.2	0.2	0.96	0.96	224.8	215.2	0.96

MOVEMENT SUMMARY

Site: 101 [PM Future (Site Folder: Future Conditions)]

Old South Head Road / Albemarle Avenue
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Old South Head Road (S)														
1	L2	56	1	59	1.8	0.165	19.8	LOS B	4.8	34.4	0.54	0.54	0.54	40.3
2	T1	648	27	682	4.2	0.762	19.3	LOS B	24.1	174.6	0.71	0.66	0.71	39.5
3	R2	25	0	26	0.0	0.762	24.4	LOS B	24.1	174.6	0.74	0.68	0.74	39.0
Approach		729	28	767	3.8	0.762	19.5	LOS B	24.1	174.6	0.70	0.65	0.70	39.5
East: Liverpool Street (E)														
4	L2	21	0	22	0.0	0.060	48.1	LOS D	1.0	7.3	0.84	0.69	0.84	30.4
5	T1	9	0	9	0.0	0.129	46.6	LOS D	1.7	11.6	0.89	0.70	0.89	29.7
6	R2	22	0	23	0.0	0.129	51.1	LOS D	1.7	11.6	0.89	0.70	0.89	29.6
Approach		52	0	55	0.0	0.129	49.1	LOS D	1.7	11.6	0.87	0.70	0.87	29.9
North: Old South Head Road (N)														
7	L2	26	0	27	0.0	0.375	16.4	LOS B	11.1	80.1	0.52	0.48	0.52	42.5
8	T1	744	30	783	4.0	0.874	26.7	LOS B	26.4	190.1	0.66	0.68	0.76	36.8
9	R2	74	0	78	0.0	* 0.874	43.0	LOS D	26.4	190.1	0.78	0.86	0.97	32.4
Approach		844	30	888	3.6	0.874	27.8	LOS B	26.4	190.1	0.67	0.69	0.77	36.5
West: Albermarle Avenue (W)														
10	L2	78	0	82	0.0	0.295	55.8	LOS D	4.4	30.5	0.93	0.76	0.93	28.5
11	T1	18	0	19	0.0	0.857	64.5	LOS E	12.3	86.0	1.00	0.99	1.31	25.8
12	R2	159	0	167	0.0	* 0.857	69.0	LOS E	12.3	86.0	1.00	0.99	1.31	25.7
Approach		255	0	268	0.0	0.857	64.7	LOS E	12.3	86.0	0.98	0.92	1.20	26.5
All Vehicles		1880	58	1979	3.1	0.874	30.2	LOS C	26.4	190.1	0.73	0.70	0.80	35.5

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Old South Head Road (S)												
P1	Full	42	44	54.2	LOS E	0.1	0.1	0.95	0.95	219.8	215.2	0.98
East: Liverpool Street (E)												
P2	Full	59	62	54.3	LOS E	0.2	0.2	0.95	0.95	219.8	215.2	0.98
North: Old South Head Road (N)												