



Tower B: Hospital, Accommodation and Ancillary Uses 12 Frederick Street, St Leonards

Client //	Dexus Projects Pty Ltd
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12 Frederick Street, St Leonards

Transport Impact Assessment

Issue: B 23/06/17

Client: Dexus Projects Pty Ltd

Reference: 16S9001000

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Quality Record

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1. Introduction

1.1 Background

It is understood that a State Significant Development Application (SSD 8499) is to be lodged for the development of hospital, accommodation and ancillary uses, associated with the proposed private hospital at 12 Frederick Street, St Leonards. The proposal, known as 'Tower B', is situated on the northern and eastern sides of the two storey podium of the proposed private hospital (Tower A and Podium, SSD 7543)

GTA Consultants was commissioned by Dexu Projects Pty Ltd in June 2017 to undertake a transport impact assessment for the proposed development.

1.2 Secretary's Environmental Assessment Requirements

The Department of Planning and Environment (DPE) has issued the Secretary's Environmental Assessment Requirements (SEARs) on 7 June 2017 for the preparation of a transport and accessibility assessment for the proposed development. The issues raised in the SEARs have been considered during the preparation of this transport assessment report, as shown in Table 1.1.

Table 1.1: Secretary's Environmental Assessment Requirements

Issues	Report Section
The existing and proposed pedestrian and bicycle routes and facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principles.	Refer to Section 2 and 5.
An estimate of the total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips.	Refer to Section 5.
The adequacy of public transport to meet the likely future demand of the proposed development.	Refer to Section 5.
Impact of the proposed development on existing and future public transport and walking and cycling infrastructure within and surrounding the site.	Refer to Section 5.
Measures to promote travel choices that support sustainable travel such as a location-specific sustainable travel plan, provision of end-of trip facilities, green travel plans and wayfinding strategies.	Refer to Section 6. It is expected that any approval of the proposed development will include a consent condition for a green travel plan to promote environmentally sustainable travel methods to and from the site. As such, this report has provided a framework for a future green travel plan to be prepared prior to the occupation of the development.
The daily and peak (AM, PM and events) vehicle movements impact on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvements works (if required).	Refer to Section 5. Based on the anticipated use of the site, special events are not expected to occur.
The proposed walking and cycling access arrangements and connections to public transport services.	Refer to Section 6.
The proposed access arrangements, including car pick-up/drop-off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and cycle networks.	Refer to Section 3 and 5.

Issues	Report Section
Proposed car and bicycle parking provision, including consideration of the availability of public transport and the requirements of relevant parking codes and Australian Standards.	Refer to Section 4 and 6.
Provision of end of trip facilities (i.e. showers, lockers, change rooms etc.) for the use of employees who choose to walk or cycle to/from work as well as undertake activities during work hours.	Refer to Section 6.
Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times).	Refer to Section 3.
Traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport and the cumulative impact of nearby construction projects, including the preparation of draft Construction Traffic Management Plan to demonstrate the proposed management of the impacts.	Refer to Section 7. This is addressed in a separate report <i>Private Hospital East Tower, 12 Frederick Street St Leonards, CTMP - Main Works</i> (GTA Consultants, 2/03/17).

1.3 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Willoughby City Council Development Control Plan (DCP)
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2002
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- traffic and car parking surveys undertaken as referenced in the context of this report
- plans for the proposed development prepared by DC8 Studio architects
- other documents and data as referenced in this report.

2. Existing Conditions

2.1 Site Description

The subject site is located at 12 Frederick Street, St Leonards, east of the North Shore Private Hospital, and is generally bounded by Frederick Street, Reserve Road and Westbourne Street along the northern, western and southern boundary respectively.

The location of the subject site and its surrounding environs is shown in Figure 2.1.

Figure 2.1: Subject Site and Its Environs



(Reproduced with permission from Sydway Publishing Pty Ltd)

The subject site is currently occupied by a commercial/industrial building with a combined floor area of approximately 15,000m².

Land uses in the vicinity of the subject site are predominately health infrastructure facilities, notably the Royal North Shore Hospital and North Shore Private Hospital to the south and west of the site respectively. Other land uses in the vicinity generally consist of general and light industrial uses.

2.2 Road Network

The subject site is surrounded by a network of roads and has a frontage along Reserve Road, Westbourne Street and Frederick Street to the western, southern and northern boundary, respectively. Below is a description of these roads.

Reserve Road

Reserve Road functions as a two-way collector road between Frederick Street and Jersey Road and is generally aligned in a north-south direction. It is a private road between Frederick Street and Pacific Highway with a posted speed limit of 20 km/h, providing the linkage from Pacific Highway to the Royal North Shore Hospital

No through traffic is permitted to travel via Reserve Road past the roundabout near Westbourne Street. A “restricted staff” parking area relating to the North Shore Hospital is provided past this point. It is noted that southbound vehicles are also not permitted to continue past the restricted staff parking area from the northern end of Reserve Road, as shown in Figure 2.3.

Figure 2.2: Reserve Road / Westbourne Street roundabout (looking north)



Figure 2.3: Reserve Road (looking south)



Westbourne Street

Westbourne Street functions as a two-way private road and is generally aligned in an east-west direction. 90 degree parking is made available on the north side of the road, accommodating for up to approximately 75 spaces. This road provides linkage between Herbert Street and Reserve Road with a pedestrian crossing provided on both ends of Westbourne Street.

Figure 2.4: Westbourne Street (looking west)



Frederick Street

Frederick Street functions as a two-way collector road and aligns in an east-west direction to the northern boundary of the site. Kerbside parking is permitted on both sides of the road and is generally well-utilised based on site observations. Vehicle access to the subject site is provided directly off Frederick Street via the existing driveway, as shown in Figure 2.6.

Figure 2.5: 12 Frederick Street (subject site)



Figure 2.6: Frederick Street (looking towards the internal access road)



2.2.1 Surrounding Intersections

The following intersections currently exist in the vicinity of the site:

- Campbell Street / Pacific Highway (signalised)
- Herbert Street / Cleg Street (signalised)
- Herbert Street / Frederick Street (signalised)
- Herbert Street / Pacific Highway (signalised)
- Herbert Street / Westbourne Street (unsignalised)
- Reserve Road / Campbell Street (signalised)
- Reserve Road / Frederick Street (unsignalised)

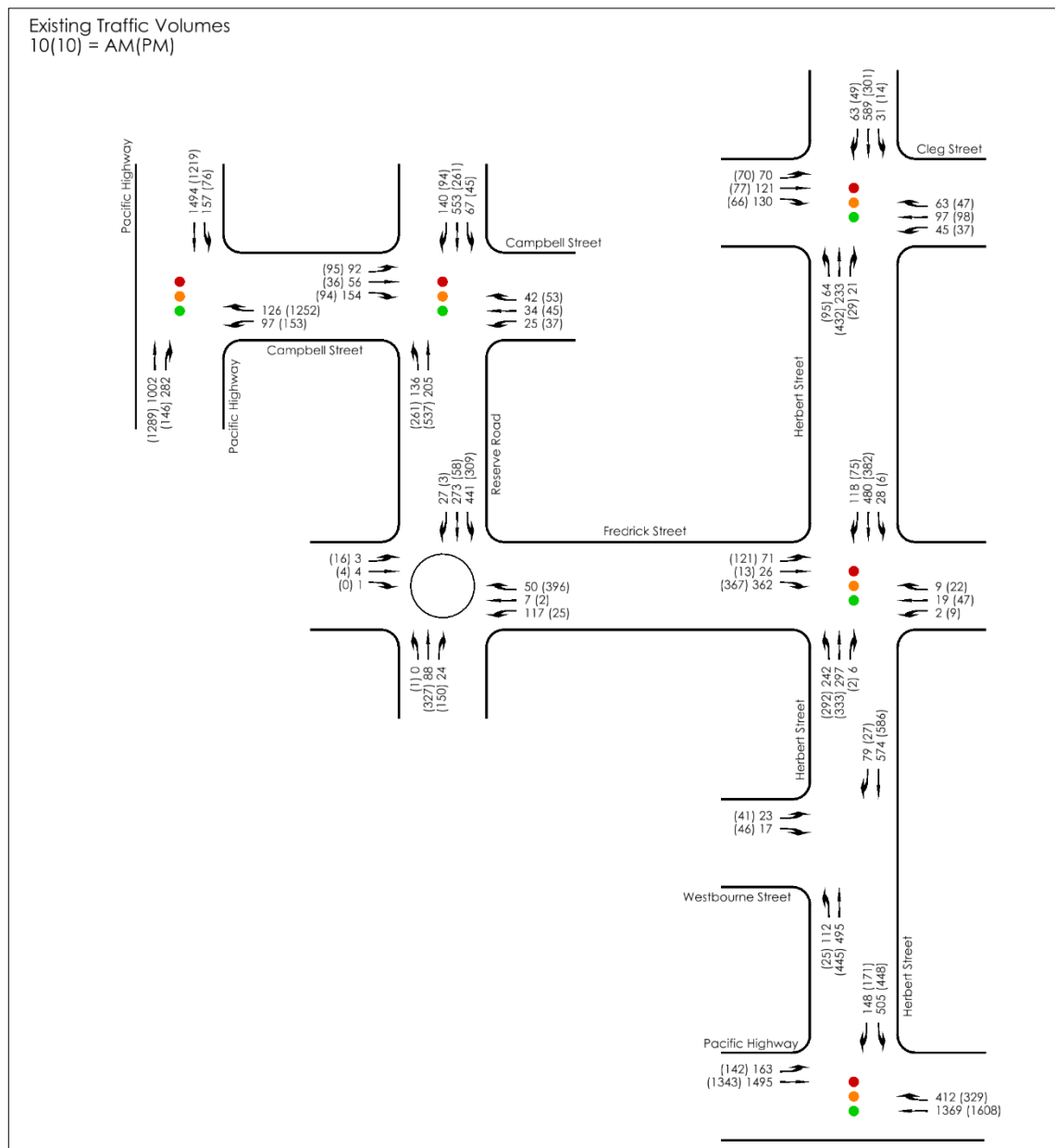
2.3 Traffic Volumes

GTA Consultants commissioned traffic movement counts on abovementioned seven (7) intersections on a normal weekday during the following peak periods:

- 7:00am and 9:00am (morning peak)
- 4:00pm and 6:00pm (evening peak)

The AM and PM peak hour traffic volumes are summarised in Figure 2.7.

Figure 2.7: Existing AM/ PM Peak Hour Traffic Volumes



2.4 Intersection Operation

The operation of the key intersections within the study area have been assessed using SIDRA INTERSECTION¹, a computer based modelling package which calculates intersection performance.

The commonly used measure of intersection performance, as defined by the RMS, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 2.1 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

¹ Program used under license from Akcelik & Associates Pty Ltd.

Table 2.1: SIDRA INTERSECTION Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

In terms of the intersection analysis results reported, the following typical approach is adopted for the purposes of documenting intersection performance:

- Signalised Intersections – The overall intersection performance is recorded
- Unsignalised intersections – The worst leg of the intersection is recorded

2.4.1 Pre-Development Analysis

An intersection analysis of the nominated study intersections has been conducted for the existing conditions. Table 2.2 presents a summary of the existing operation of the intersection, with full results presented in Appendix A of this report. It is noted that these results may vary slightly from previous analysis by GTA Consultants as the latest software version has been adopted.

Table 2.2: Existing Operating Conditions

Intersection	Priority Type	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Campbell St/ Pacific Hwy	Signalised	AM	0.87	20	165	B
		PM	0.55	16	103	B
Herbert St/ Cleg St	Signalised	AM	0.83	14	74	A
		PM	0.47	11	33	A
Herbert St/ Frederick St	Signalised	AM	0.90	28	136	B
		PM	0.87	24	109	B
Herbert St/ Pacific Hwy	Signalised	AM	0.76	28	198	B
		PM	0.74	27	181	B
Herbert St/ Westbourne St	Give way	AM	0.69	4	79	A
		PM	0.62	3	53	A
Reserve Rd/ Campbell St	Signalised	AM	0.83	23	147	B
		PM	0.9	30	114	C
Reserve Rd/ Frederick St	Roundabout	AM	0.51	7	31	A
		PM	0.53	8	34	A

Based on the above assessment, the nominated study intersections currently operate satisfactorily at a Level of Service of C or better.

2.5 Car Parking

Ticketed on-street parking is provided along Westbourne Road and Herbert Street, typically restricted to 2 to 4 hour duration parking. Unrestricted parking is provided along Frederick Street accommodating for up to approximately 45 vehicles along both sides of the street between Herbert Street and Reserve Road. Based on site observations, parking demand in the vicinity was observed to be generally moderate to high with a relatively low turnover rate.

Further, it is noted that there are numerous off-street public car parks made available in the vicinity, notably the multi-storey Royal North Shore Hospital Car Park operated by Wilson Parking.

Overall, parking in the vicinity of the subject site is generally restricted to short-term parking, with parking observed to be in high demand. It is noted that there are limited long-term on-street parking made available in the area.

2.6 Public Transport

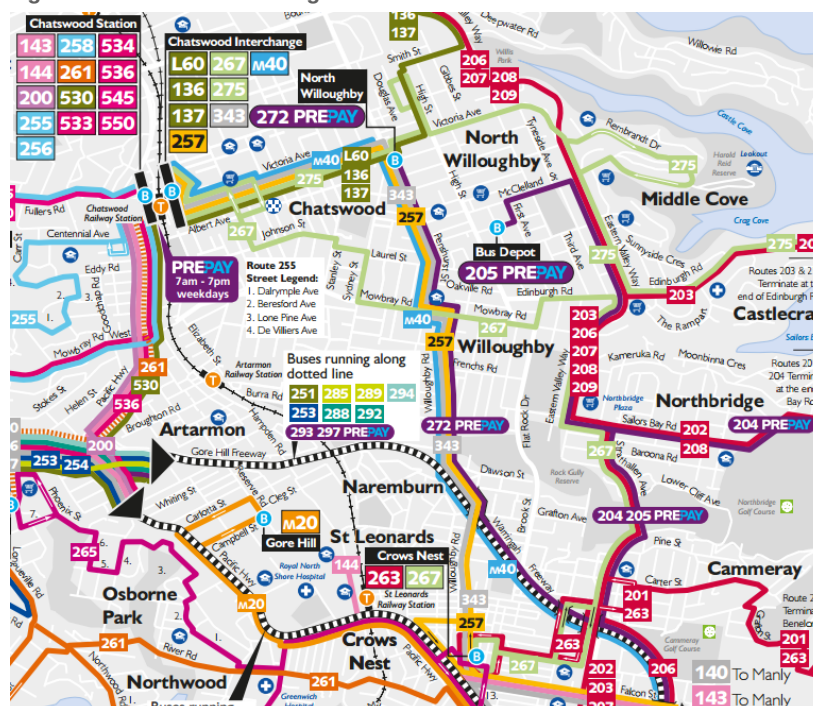
The subject site is well serviced by high frequency public transport services, being located well within the typical 800m catchment radius of a Railway Station, that being 500m from the St Leonards Railway Station.

The St Leonards Railway Station is serviced by the T1 Line, providing linkage to Richmond / Emu Plains / Epping and Chatswood / Hornsby / Berowra areas. These train services generally operate at a frequency of about 3 minutes during peak times and 5-10 minutes out of peak times.

Further to this, numerous bus services operate within the vicinity of the subject site, including the metrobus M20 which operates every 10 minutes during the peak periods and every 15-20 minutes out of peak.

A review of the public transport available in the vicinity of the site is summarised in Figure 2.8.

Figure 2.8: State Transit Region Guide



Source: State Transit, Sydney Buses – Region Guide Northern Beaches & Lower North Shore

Notwithstanding this, the Hillsbus also operates four routes via St Leonards, providing linkage to Rouse Hill, Riley T-way, Dural and West Pennant Hills.

Overall, high frequency public transport services are provided in the vicinity of the subject site. Additionally, Council operates a free shuttle bus within the Artarmon area, providing linkage through St Leonards Station to the Artarmon industrial area. This service encourages the use of public transport for staff and visitors to the area, notably for Hospital staff.

2.7 Pedestrian and Cycle Infrastructure

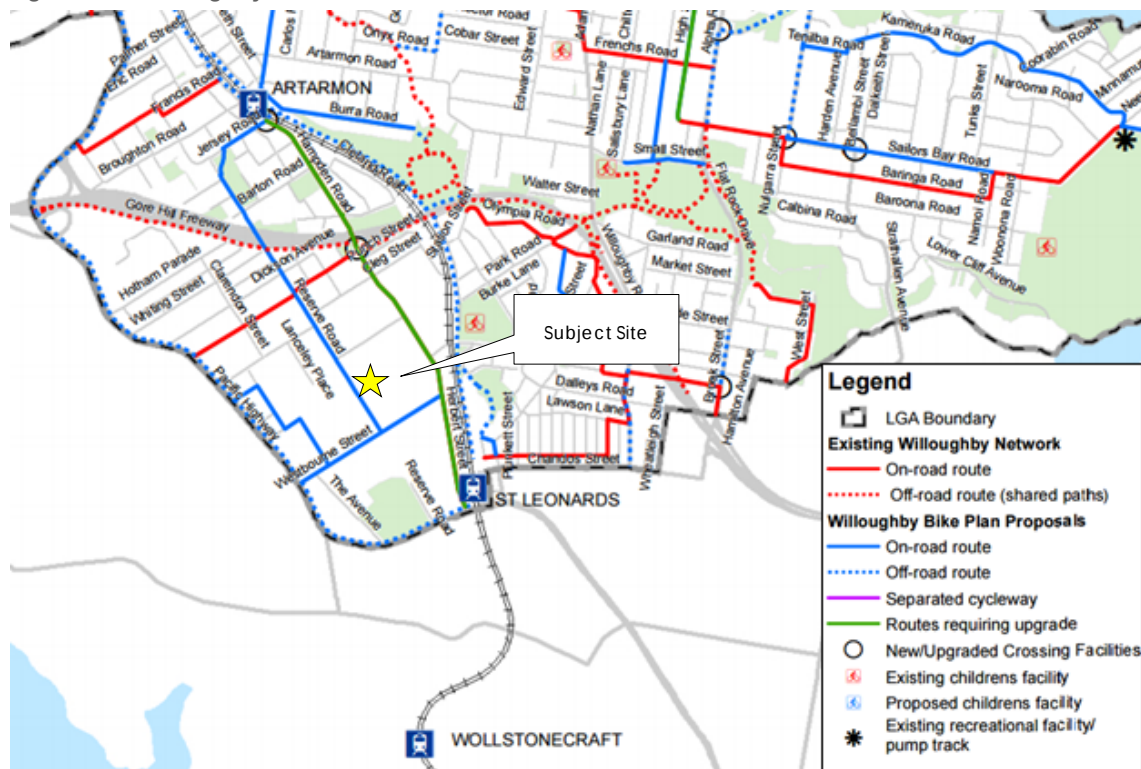
In the immediate vicinity of the site, pedestrian paths are located as follows:

- Frederick Street (both sides) – 1.5-3.5m wide path, providing access to the retail and commercial uses in the vicinity of the site
- Westbourne Street (both sides) – 1.5-3.0m wide path, providing linkage to the Royal North Shore and North Shore Private Hospitals and to the TAFE NSW St Leonards Campus
- Reserve Road (both sides) – 1.5-2.0m wide path, predominately providing access to the Royal North Shore Hospital and other local points of interest including bus stops.

In addition, it is noted that there are several pedestrian crossings currently installed along Westbourne Street, near the intersection with Reserve Road, providing pedestrians with right of way at these locations.

Further, there are currently limited cycle routes made available in the vicinity of the site. However, as part of Willoughby City Council's Bike Plan, several new cycle routes are proposed to be implemented in the near future. An extract of Council's proposed bike network is shown in Figure 2.9.

Figure 2.9: Willoughby Bike Plan



Source: Willoughby City Council –Proposed Bike Network 2012 (extract)

3. Development Proposal

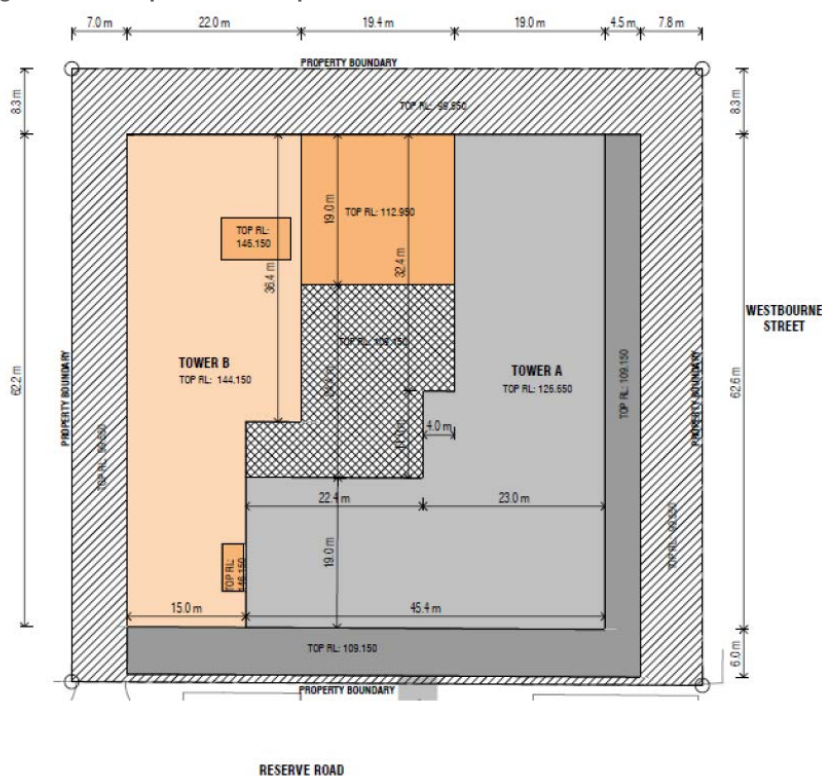
3.1 Proposal Description

The project involves a Concept Proposal for the following:

- building envelope for a new tower, known as 'Tower B', situated on the northern and eastern sides of the 2 storey podium of the proposed private hospital (Tower A and Podium, SSD 7543) on the site. The building envelope is a single storey on eastern side of podium and 8-storeys on northern side of podium, with a gross floor area (GFA) of 7,655 m²
- uses associated with the proposed private hospital, including (but not necessarily limited to):
 - medical consulting rooms
 - operating and procedure rooms
 - approximately 185 accommodation rooms consisting of surgery recovery, post-natal suites, as well as health care worker, patient and visitor accommodation
 - education and conference meeting rooms
 - gymnasium
- additional car parking, to be accommodated in the basement car park of the private hospital.

The proposed development envelope shown in Figure 3.1.

Figure 3.1: Proposed Envelope Plan



Source: DC8 Studio

3.2 Vehicle Access

Currently, vehicle access to the site is provided off the internal private access road via the existing driveway at Frederick Street. As part of the proposal, three new vehicular crossovers are proposed, two on Westbourne Street and one on Reserve Road.

A new single 7.6m wide two-way vehicular crossover is proposed off Westbourne Street, near the south-east corner of the site, providing vehicular access to the basement car parks. It is noted that all service vehicles would access the site to the loading dock area via this vehicular crossover from Westbourne Street.

In addition, a drop-off area is proposed to be implemented adjacent to the main entry near the southern boundary along Westbourne Street. Vehicle access to the drop-off area is proposed via a new 9.0m wide vehicular crossover on Westbourne Street at the south-west corner. Tower A, Tower B and the podium are expected to all utilise this drop-area and associated driveway crossover.

3.3 Loading Areas

There are three loading bays currently proposed within the site, each accommodating vehicles up to and including 12.5m long Heavy Rigid Vehicles (HRV). Additionally, it is anticipated that waste collection activities would be undertaken on-site within the dedicated loading bays. It is proposed that given the separation of waste uses (i.e. clean and soiled linen, sharps and gas bottles) within the loading dock area, it would be feasible to accommodate loading and service vehicle access for Tower A, Tower B and podium in the same loading area. As such, with appropriate dock management to address the timing of vehicle deliveries and interaction with car park operation, the loading area as previously reported in SSD 7543 would be sufficient to service Tower B as well.

The loading bay has been designed to cater for a 12.5m HRV to reverse into and exit in a forward direction. The swept path assessment of a 12.5m HRV accessing and exiting the site in a forward direction was submitted as part of SSD 7543.

4. Car Parking

4.1 Car Parking Requirements

The car parking requirements for different development types are set out in the Willoughby City Council DCP 2006. Car parking requirements for the development have been calculated by treating the 185 accommodation rooms as a typical hospital land use, as summarised in Table 4.1. This is likely to be conservative with respect to accommodation for visitors and health care workers and should be treated as a maximum requirement in any future DA.

It is also noted that the range in accommodation room numbers relates to room sizes to suit specific uses within the same overall building GFA. On this basis, staff numbers would remain constant

Table 4.1: DCP 2006 Parking Requirements

Use	Type	Size	DCP Parking Rate	DCP Parking Requirement
Hospital	Staff Parking	○ 185 hospital beds ○ 14 medical officers ○ 96 other employees	1 space per registered practitioner, plus 1 space per 2 other employees.	62 spaces
	Visitor Parking		1 space per 3 beds for visitors.	61 spaces
Total				123 spaces

On the above basis, the required parking supply would be 123 spaces for a hospital use of 185 beds and corresponding staffing estimates. It is envisaged that this additional parking, over and above the 220 spaces proposed for Tower A and the two storey podium (SSD 7543), can be accommodated within two additional basement levels. The proposed development would therefore meet the DCP 2006 parking requirements.

In addition to the accommodation rooms and hospital facilities (operating theatres and consulting rooms), several other uses have been identified within the Concept Proposal, including education and conference meeting rooms and a gymnasium. These uses would be ancillary to hospital operations and not generate any further parking or traffic demand.

4.2 Bicycle Parking

Bicycle parking for hospitals is not specified in the Willoughby DCP 2006. As such, reference to the Cycling Aspects of Austroads Guides (Austroads, 2014) has been made which sets out recommendations for bicycle parking on relevant land uses. This has been assessed and summarised in Table 4.2.

Table 4.2: Austroads Bicycle Parking Requirements

Use	Size	Austroads Bicycle Parking Rate	Austroads Bicycle Parking Requirement
Hospital	○ 185 beds	○ 1 space per 15 beds for employees ○ 1 space per 30 beds for visitors	○ 13 bicycle lockers ○ 7 bicycle rails/ racks

Based on the above requirements and in-line with AS2890.3-2015, a total of 13 bicycle lockers or similar secure storage facility would be required for employee use, with a further 7 bicycles

accommodated by rails or racks in a publicly accessible location for visitor use. The appropriate bicycle provisions would be installed within the ground floor and basement levels.

DCP 2006 requires that shower and change facilities be provided where there are three or more bicycle lockers provided. Any such facilities would be easily combined with other hospital requirements.

5. Traffic Impact Assessment

5.1 Traffic Generation

Traffic generation estimates for the proposed development have been sourced from the *Guide to Traffic Generating Developments* (RMS, 2002).

The following design trip rates have been used to calculate the anticipated traffic generation of the subject development (i.e. for a private hospital). Private hospital traffic generation is based on number of beds and number of staff in a day and evening shift. The morning and evening peak generation rates are as follows:

- Morning Peak

$$-10.21 + 0.47 \times \text{No. of Beds} + 0.06 \times \text{No. of Day Staff}$$

- Evening Peak

$$-2.84 + 0.25 \times \text{No. of Beds} + 0.40 \times \text{No. of Day Staff}$$

As noted earlier, the development accommodates the following:

- 185 hospital beds
- 110 staff members.

On the above basis, the traffic generation of the development have been summarised in Table 5.1. Ancillary and/or future uses have not been considered in the traffic generation estimates, but would have a negligible impact on peak period traffic volumes.

Table 5.1: Traffic Generation Estimates

Use	Size	Morning Peak	Evening Peak
Tower B Private Hospital Use	185 hospital beds 110 day staff members	83 vehicle trips	87 vehicle trips

Based on the indicative trip generation estimates, the proposed development, would generate an additional 83 and 87 vehicle movements in the morning and evening peak respectively. When considering the cumulative impacts of Tower A and the two storey podium (SSD 7543), the total additional traffic would be 145 and 167 vehicle movements in the morning and evening peak respectively. This equates to approximately two and three vehicles per minute in the morning peak and evening peak, respectively.

5.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- i configuration of the arterial road network in the immediate vicinity of the site
- ii existing operation of intersections providing access between the local and arterial road network
- iii distribution of households in the vicinity of the site
- iv configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed:

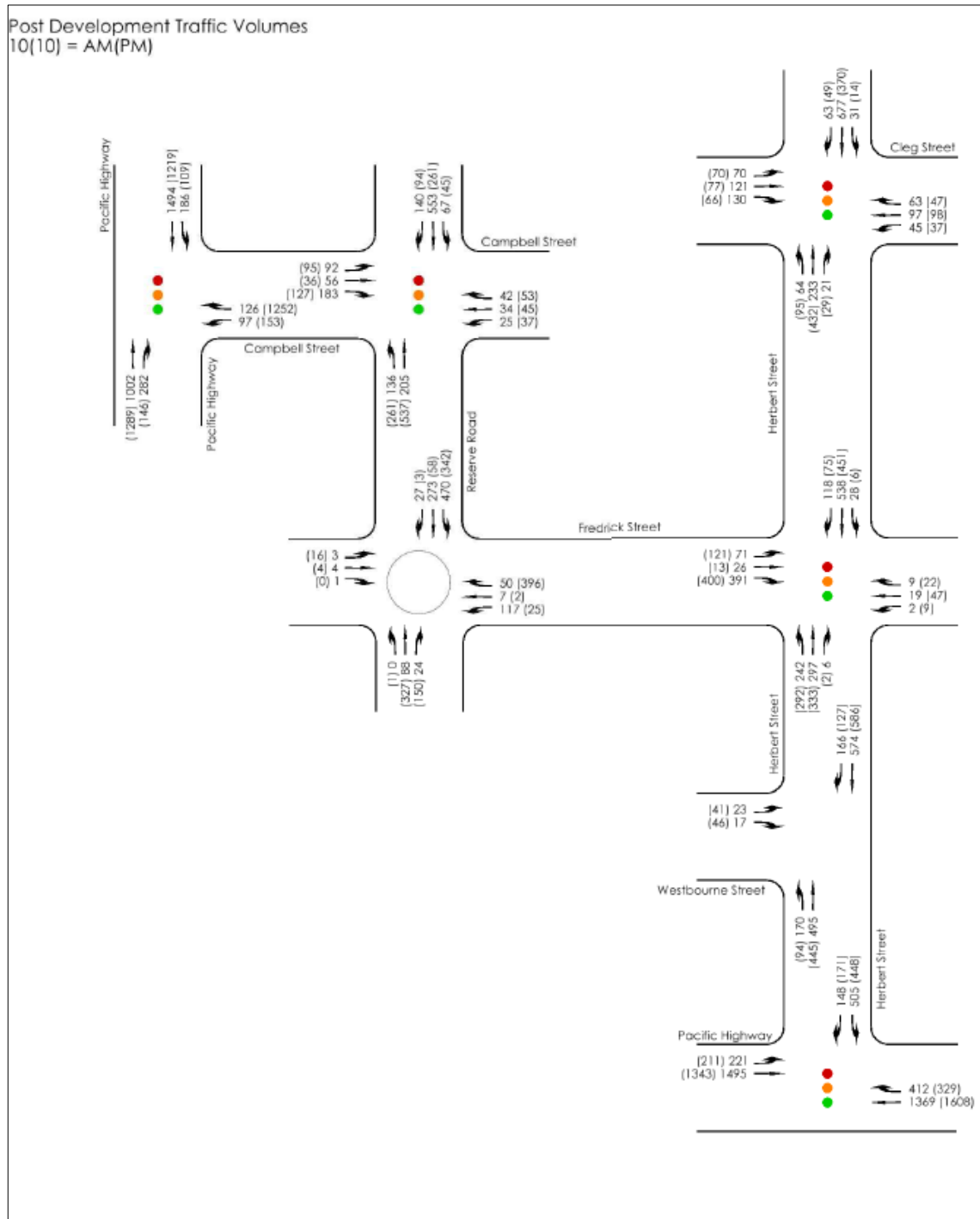
- Pacific Highway 40%
- Herbert Street 40%
- Campbell Street 20%

Furthermore, it has been assumed that all traffic movements associated with the site are inbound vehicle movements both in the morning and evening network peak times. The cumulative additional traffic associated with the proposed private hospital at each study intersection results in a maximum of 100 additional vehicles an hour (or just over 1 vehicle every minute) on any intersection movement.

Notwithstanding the above, it is noted that a small portion of vehicles may potentially travel via Westbourne Street from Pacific Highway (i.e. impacting upon the Westbourne Street/ Reserve Road intersection). However, this route is not expected to generate high usage due to the “Left Turn Only” restrictions at the Westbourne Street/ Reserve Road intersection for eastbound vehicles, as well as the general Westbourne Street layout and signage. Thus, any traffic associated with the development travelling via the Westbourne Street/ Reserve Road intersection would be low, with negligible impacts and could not be expected to result in any operational or safety issues at this intersection, given the low to moderate existing traffic volumes.

The surrounding local road network following the full development of the site is shown in Figure 5.1.

Figure 5.1: Post Development AM / PM Peak Hour Site Generated Traffic Volumes



5.3 Traffic Impact

5.3.1 Post-Development Analysis

The anticipated development traffic associated with the proposed development has been examined using SIDRA INTERSECTION to assess the intersection performance at the seven nominated study intersections. The results of the analysis have been summarised Table 5.2.

Table 5.2: Future Operating Conditions

Intersection	Priority Type	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Campbell St/ Pacific Hwy	Signalised	AM	0.88	20	169	B
		PM	0.55	16	106	B
Herbert St/ Cleg St	Signalised	AM	0.82	14	89	A
		PM	0.47	11	40	A
Herbert St/ Frederick St	Signalised	AM	0.99	38	198	C
		PM	0.94	27	143	B
Herbert St/ Pacific Hwy	Signalised	AM	0.76	28	198	B
		PM	0.74	27	181	B
Herbert St/ Westbourne St	Give-way	AM	0.82	7	140	A
		PM	0.74	5	98	A
Reserve Rd/ Campbell St	Signalised	AM	0.83	24	147	B
		PM	0.90	30	113	C
Reserve Rd/ Frederick St	Roundabout	AM	0.53	7	33	A
		PM	0.54	8	34	A

The assessment of post development traffic conditions of the site indicate that the nominated study intersections would continue to operate satisfactorily at a Level of Service of C or better.

As noted previously, a small portion of development traffic may travel via Westbourne Street/ Reserve Road intersection and therefore, this assessment has undertaken a conservative assessment by assuming all development traffic from the subject site would travel via the above seven nominated intersections.

Therefore, the proposed development is not anticipated to generate any adverse traffic impacts or any operational or safety issues on the surrounding local network.

5.3.2 Intersection Performance Comparison

A comparison between the pre-development and post-development conditions is summarised in Table 5.3. As noted previously, the nominated intersections will continue to operate satisfactorily (and typically at the same performance levels) following the full development of the site. There are minor additional queues and delays at some intersections that would typically not be noticeable to drivers.

Table 5.3: Pre and Post Development Intersection Performance Comparison

Intersection	Priority Type	Peak	Degree of Saturation (DOS)	Average Delay (sec)	95 th Percentile Queue (m)	Level of Service (LOS)
Campbell St/ Pacific Hwy	Signalised	AM	+ 0.01	0	+4	B
		PM	0	0	+3	B
Herbert St/ Cleg St	Signalised	AM	-0.01	0	+15	B
		PM	0	0	+7	A
Herbert St/ Frederick St	Signalised	AM	+ 0.09	+10	+62	B → C
		PM	+ 0.07	+3	+34	B
Herbert St/ Pacific Hwy	Signalised	AM	0	0	0	B
		PM	0	0	0	B
Herbert St/ Westbourne St	Roundabout	AM	+ 0.13	+3	+61	A
		PM	+ 0.12	+2	+45	A
Reserve Rd/ Campbell St	Signalised	AM	0	+1	0	B
		PM	0	0	-1	B
Reserve Rd/ Frederick St	Roundabout	AM	+ 0.02	0	+2	A
		PM	+0.01	0	0	B

5.4 Transport Impact

The proposed development is expected to generate a moderate level of public transport, pedestrian and cycle trips, typically from staff and employee trips to the development. Based on the anticipated use of the site (i.e. a private hospital), it can be expected that a majority of visitor trips made to the site would be via car travel.

Notwithstanding the above, the Bureau of Transport Statistics indicates that based on 2011 Journey to Work (JTW) data the mode shares for employed residents living in Chatswood and St Leonards are as follows:

- Vehicle driver / passenger – 45%
- Train – 33%
- Bus – 7%
- Walk – 13%
- Other – 2%.

Based on a daily average of 110 staff for Tower B, the expected public transport and pedestrian trips is summarised in Table 5.4.

Table 5.4: Estimated Public Transport and Pedestrian Trips

Mode of Travel	No. of Staff Trips
Train	36 trips
Bus	8 trips
Pedestrian	14 trips
Total	58 trips

Table 5.4 indicates that the proposed development would generate approximately 44 public transport trips (i.e. 36 train trips and 8 bus trips) and 14 pedestrian trips. It is noted that these are two way trips and therefore, it can be expected that there would approximately 29 public transport and pedestrian trips in both morning and evening peak times.

Thus, it is expected that existing infrastructure would have adequate capacity to accommodate this moderate demand in public transport and pedestrian trips associated with the proposed development.

5.5 Agency Consultation

As required by the Secretary's Environmental Assessment Requirements, the Tower A and two-storey podium development (SSD 7543) was previously discussed with Roads and Maritime Services in early 2015 during the development of the site layout and initial assessment of transport impacts. No specific comments were received at the time (noting the minor transport impacts as detailed above).

Both Transport for NSW and Roads and Maritime Services have been contacted with respect to the Tower B proposal (SSD 8499), with a summary of the traffic and parking implications provided. No response has been received at the time of this report.

As part of the assessment process for Tower A and two-storey podium development (SSD 7543), submissions from Transport for NSW and Roads and Maritime Services have subsequently been received (dated 15 June 2017 and 22 May 2017 respectively). In addition to the request for typical consent conditions relating to detailed design compliance with standards and guidelines, the following items have been raised:

- Use of Herbert Street and Frederick Street by rail replacement buses as part of the Temporary Transport Plan (TTP) during the construction of the Sydney Metro between Epping and Chatswood.
- Provision of bicycle parking and end of trip facilities.

The Construction Traffic Management Plan would be updated once a contractor has been appointed and further construction staging and timing specifics are known. This would include consultation with Transport for NSW regarding the Sydney Metro rail replacement bus services and appropriate construction traffic provisions to suit the period of overlap between the two projects (and any other known cumulative impacts at the time).

It is anticipated that Transport for NSW and Roads and Maritime Services would also be consulted further during design development and in relation to the anticipated conditions of consent (including preparation of the Green Travel Plan).

The relevant bicycle parking and end of trip provisions would be incorporated, as discussed in Section 4.2.

6. Green Travel Plan

6.1 Introduction

The Secretary's Environmental Assessment Requirements state that the proposed private hospital development at 12 Frederick Street, St Leonards, is to implement the design of ecologically sustainable development by including measures that promote travel choices that support sustainable travel, such as the following:

- *Location-specific sustainable travel plan*
- *Provision of end-of-trip facilities*
- *Green travel plans and wayfinding strategies.*

Thus, it is expected that any approval of the proposed development would include a consent condition requiring a green travel plan to be prepared to promote sustainable travel. As such, a green travel plan applicable to tenants and staff working on the site would be prepared prior to the occupation of the development. The section below provides a framework for the implementation of such a travel plan.

6.2 Travel Plan Framework

Transport is a necessary part of life, but it has economic, public health and environmental consequences. The transport sector is one of the fastest growing emissions sectors in Australia, and therefore is one of the key opportunities for reducing greenhouse gases. As well as delivering better environmental outcomes, providing a range of travel choices with a focus on walking, cycling and public transport will have major public health benefits and will ensure a strong and prosperous community.

The physical infrastructure being provided as part of the development is only part of the solution. A green travel plan will ensure that the transport infrastructure, services and policies both within and external to the site are tailored to the users and co-ordinated to achieve the most sustainable outcome possible.

6.3 What is a Green Travel Plan?

A green travel plan is a package of measures aimed at promoting sustainable travel and reducing reliance on the private car. It is not designed to be 'anti-car', but will encourage and support people's aspirations for carrying out their daily business in a more sustainable way. Travel plans can provide both:

- measures which restrict car use (disincentives or 'sticks')
- measures which encourage or support sustainable travel, reduce the need to travel or make travelling more efficient (incentives or 'carrots').

The travel plan would promote the use of transport, other than the private car, provide choice for staff to travel to and from the site, which is more sustainable and environmentally friendly.

Indeed, there are a range of "non-car" transport options that are available at the site which have been described in this report.

6.4 Key Objectives

The aim of the green travel plan is to bring about better transport arrangements for working at the site. The key objectives of the travel plan are:

- to encourage walking
- to encourage cycling
- to encourage the use of public transport
- to reduce the use of the car, in particular single car occupancy
- where it is necessary to use the car, encourage more efficient use.

It is the intention therefore that the travel plan will deliver the following benefits:

- enable higher mode share targets to be achieved
- contribute to greenhouse gas emission reductions and carbon footprint minimisation
- contribute to healthy living for all
- contribute to social equity and reduction in social exclusion
- improve knowledge and contribute to learning.

6.5 Site Specific Measures

The location of the site, in terms of its close proximity to a wide range of sustainable transport, is a key attribute in the justification of the development. The GTP will then put in place measures to raise awareness and further influence the travel patterns of those people working or visiting the development with a view to encouraging modal shift away from cars.

The following measures are proposed to encourage staff and visitors to reduce travel by private cars and adopt alternative and more sustainable travel modes:

- Compliance with the stringent parking controls applicable to the site
- Provision of a Travel Access Guide (TAG) which would be given to all staff and visitors. This document has been based upon facilities currently available at the site
- Public transport information boards to make staff and visitors more aware of the alternative transport options available (the format of such information boards would be based upon the travel access guide)
- Promotion of the availability of car sharing pods for trips that require the use of private vehicles
- Provision of bicycle facilities including secure bicycle parking for staff, bicycle racks for visitors and shower and change room facilities
- Connect staff working at the site to carpool together by creating a Carpooling club
- Replacement of existing GoGet car share pods within the site.

6.6 Travel Access Guide

A Travel Access Guide (TAG) provides information to staff and visitors on how to travel to the site using sustainable transport modes such as walking and public transport. The information is presented visually in the format of a map showing the site location and nearby transport nodes highlighting available pedestrian and cycle routes. The information is usually presented as a brochure to be included in a welcome pack, available from reception or printed on the back of hospital stationery.

6.7 Information and Communication

Several opportunities exist to provide staff and visitors with information about nearby transport options. Connecting staff and visitors with information would help to facilitate journey planning and increase their awareness of convenient and inexpensive transport options which support change in travel behaviour. These include:

- Transport NSW provides Bus, train and ferry routes, timetables and journey planning are provided by Transport for New South Wales through their Transport Info website: <http://www.transportnsw.info>
- City of Sydney provides a number of services and a range of information to encourage people of all levels of experience to travel by bicycle: <http://sydneycycleways.net/>.

Connecting staff and visitors via social media may provide a platform to informally pilot new programs or create travel-buddy networks and communication.

6.8 Monitoring of the GTP

There is no standard methodology for this but it is suggested that the GTP be monitored to ensure that it is achieving the desired benefits and modify it if required. It will not be possible at this stage to state what additional modifications might be made as this will be dependent upon the particular circumstances prevailing at that time.

The GTP should be monitored on a regular basis, e.g. yearly, by carrying out travel surveys. Travel surveys will allow the most effective initiatives of the GTP to be identified, and conversely less effective initiatives can be modified or replaced to ensure the best outcomes are achieved. It will clearly be important to understand people's reasons for travelling the way they do, any barriers to changing their behaviour, and their propensity to change.

To ensure the successful implementation of the GTP, a Travel Plan Coordinator (TPC) should be appointed to ensure the successful implementation of the GTP.

6.9 Summary

Future building owners/managers should be required to develop and utilise a travel plan to increase the use of sustainable transport by the staff working in the development. Although it is difficult to predict what measures might be achievable until the building is occupied, the above measures provide a framework for the development and implementation of a future travel plan for the site.

It is considered that it is appropriate that any development consent is conditioned to ensure that a travel plan is implemented prior to occupation of the development.

7. Construction Traffic Management

A preliminary construction traffic management plan (CTMP) was prepared as part of the Tower A and two storey podium (SSD 7543) Concept Proposal. The report examined the impacts on traffic (i.e. vehicles and pedestrians) on the local road network and provided mitigation measures to address any traffic and/or transport implications associated with the development.

The overall principles of traffic management during the construction activity are to:

- provide an appropriate and convenient environment for pedestrians
- minimise the impact on pedestrian movements
- maintain appropriate capacity for pedestrians at all times on footpaths around the site
- maintain appropriate public transport access
- restrict construction vehicle movements to designated routes to/ from the site
- manage and control construction vehicle activity in the vicinity of the site
- minimise impacts to general traffic in the vicinity of the site.

The key construction activities and anticipated staging of the works, as previously prepared for the proposed private hospital, is summarised in Table 7.1.

Table 7.1: Construction Activities and Staging

Phase	Anticipated Duration
Site Establishment and Demolition	2 months
Excavation and Piling	6 months
Ground Slabs and Concrete Structure	9 months
Roof, Ceiling and Facade	5 months
Internal Fitout and Finishes	7 months

It is envisaged that the Tower B proposal would be constructed in a similar manner and most likely concurrently with the Tower A and podium construction, noting that this may increase the construction timeframe and/or construction traffic volumes slightly.

On the basis of the above, the document *Private Hospital East Tower, 12 Frederick Street St Leonards, CTMP – Main Works* (GTA Consultants, 2/3/17) appropriately addresses construction traffic management for the Tower B Concept Proposal. Further CTMPs would also be prepared for future stage development applications for Tower B.

8. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- i The proposed development generates a DCP 2006 parking requirement of 123 additional parking spaces, for indicative 185 accommodation rooms and hospital beds. These rates are considered conservative given the available public transport access in St Leonards and complementary nature of supporting/ co-located medical facilities.
- ii The above parking can be accommodated within 2 additional basement levels as part of the overall private hospital development, utilising the same access points previously assessed as part of SSD 7543. The additional parking would be designed in accordance with the Australian/New Zealand Standard for Off Street Car Parking (AS/NZS 2890.1:2004 and AS/NZS2890.6:2009).
- iii With appropriate dock management to address the timing of vehicle deliveries and interaction with car park operation, the loading area as previously reported in SSD 7543 would be sufficient to service Tower B as well.
- iv Three loading bays are provided within the site to accommodate vehicles up to and including 12.5m Heavy Rigid Vehicles (HRV). All vehicles, including service and waste collection vehicles, will enter and exit the site in a forward direction.
- v Tower B is expected to generate up to 83 and 87 vehicle movements in the morning and evening peak hours respectively. The cumulative traffic impact of Tower A, Tower B and the two storey podium would be 145 and 165 vehicle movements in the morning and evening peak hours respectively.
- vi There is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development.
- vii Provision is made for all access arrangements to operate safely and efficiently into the future.
- viii A green travel plan should be prepared for the development prior to commencement of work.
- ix Construction traffic management would be consistent with the Construction Traffic Management Plan prepared for Tower A and the two storey podium (SSD7543), noting the construction timeframe and/or construction traffic volumes may increase slightly and relevant agency comments would be incorporated prior to construction.

Overall, the traffic and parking implications associated with the Tower B Concept Proposal and cumulative private hospital development at 12 Frederick Street, St Leonards are considered minor and is not anticipated to result in any operational or safety issues on the surrounding local network.

Appendix A

SIDRA INTERSECTION Analysis Results

MOVEMENT SUMMARY

Site: 1 [Herbert St/Cleg St (PD-AM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Coordinated Cycle Time = 60 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Herbert St - S											
1	L2	67	6.3	0.067	11.9	LOS A	0.9	6.5	0.47	0.67	48.9
2	T1	245	0.9	0.281	4.9	LOS A	2.6	18.3	0.35	0.33	55.2
3	R2	22	9.5	0.281	10.6	LOS A	2.6	18.3	0.35	0.33	53.4
Approach		335	2.5	0.281	6.7	LOS A	2.6	18.3	0.37	0.40	53.7
East: Cleg St - E											
4	L2	47	4.4	0.108	11.9	LOS A	0.6	4.5	0.65	0.66	49.8
5	T1	102	2.1	0.540	21.7	LOS B	4.2	30.2	0.89	0.75	42.9
6	R2	66	3.2	0.540	29.7	LOS C	4.2	30.2	0.93	0.77	40.9
Approach		216	2.9	0.540	22.0	LOS B	4.2	30.2	0.85	0.74	43.6
North: Herbert St - N											
7	L2	33	0.0	0.124	11.1	LOS A	1.8	12.5	0.46	0.45	52.6
8	T1	713	0.6	0.622	7.9	LOS A	12.6	88.8	0.65	0.61	52.6
9	R2	66	0.0	0.622	13.9	LOS A	12.6	88.8	0.69	0.64	51.1
Approach		812	0.5	0.622	8.5	LOS A	12.6	88.8	0.65	0.60	52.5
West: Cleg St - W											
10	L2	74	1.4	0.167	16.3	LOS B	1.8	12.8	0.73	0.69	47.2
11	T1	127	2.5	0.823	26.6	LOS B	7.8	56.2	0.93	0.93	40.2
12	R2	137	4.6	0.823	37.1	LOS C	7.8	56.2	1.00	1.00	37.4
Approach		338	3.1	0.823	28.6	LOS C	7.8	56.2	0.91	0.90	40.3
All Vehicles		1700	1.7	0.823	13.9	LOS A	12.6	88.8	0.67	0.64	48.5

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.

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	9.7	LOS A	0.1	0.1	0.57	0.57	
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
P4	West Full Crossing	53	8.0	LOS A	0.0	0.0	0.52	0.52	
All Pedestrians		211	16.6	LOS B			0.72	0.72	

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

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

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

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MOVEMENT SUMMARY

Site: 1 [Herbert St/Cleg St (PD-PM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Coordinated Cycle Time = 60 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Herbert St - S											
1	L2	100	4.2	0.098	12.0	LOS A	1.3	9.7	0.48	0.68	48.9
2	T1	455	1.2	0.449	4.3	LOS A	4.7	33.0	0.35	0.33	55.8
3	R2	31	0.0	0.449	9.8	LOS A	4.7	33.0	0.35	0.33	54.3
Approach		585	1.6	0.449	5.9	LOS A	4.7	33.0	0.37	0.39	54.4
East: Cleg St - E											
4	L2	39	2.7	0.083	12.6	LOS A	0.6	4.6	0.63	0.65	49.3
5	T1	103	4.1	0.416	21.3	LOS B	3.8	27.0	0.88	0.74	43.3
6	R2	49	0.0	0.416	28.4	LOS B	3.8	27.0	0.91	0.75	41.8
Approach		192	2.7	0.416	21.4	LOS B	3.8	27.0	0.83	0.72	44.0
North: Herbert St - N											
7	L2	15	0.0	0.076	10.9	LOS A	1.1	7.5	0.44	0.41	53.0
8	T1	389	0.8	0.382	6.5	LOS A	5.6	39.8	0.53	0.50	53.6
9	R2	52	0.0	0.382	12.3	LOS A	5.6	39.8	0.55	0.52	52.1
Approach		456	0.7	0.382	7.3	LOS A	5.6	39.8	0.53	0.50	53.4
West: Cleg St - W											
10	L2	74	1.4	0.095	7.2	LOS A	0.4	2.7	0.34	0.64	52.4
11	T1	81	2.6	0.466	22.8	LOS B	4.0	29.1	0.90	0.76	42.3
12	R2	69	6.1	0.466	28.9	LOS C	4.0	29.1	0.92	0.77	41.1
Approach		224	3.3	0.466	19.6	LOS B	4.0	29.1	0.72	0.72	44.8
All Vehicles		1457	1.7	0.466	10.5	LOS A	5.6	39.8	0.54	0.52	50.8

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	9.7	LOS A	0.1	0.1	0.57	0.57	
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
P4	West Full Crossing	53	8.0	LOS A	0.0	0.0	0.52	0.52	
All Pedestrians		211	16.6	LOS B			0.72	0.72	

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

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

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

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MOVEMENT SUMMARY



Site: 1 [Herbert St/Frederick St (PD-AM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 70 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Herbert St - S											
1	L2	255	8.3	0.203	9.2	LOS A	2.9	21.6	0.36	0.67	50.6
2	T1	313	1.7	0.423	16.5	LOS B	7.9	56.4	0.77	0.66	47.2
3	R2	6	0.0	0.423	22.0	LOS B	7.9	56.4	0.77	0.66	46.1
Approach		574	4.6	0.423	13.3	LOS A	7.9	56.4	0.59	0.67	48.6
East: Carpark Access - E											
4	L2	2	0.0	0.016	39.6	LOS C	0.1	0.5	0.95	0.61	35.8
5	T1	20	5.3	0.157	32.8	LOS C	1.0	7.0	0.95	0.69	38.3
6	R2	9	0.0	0.157	38.3	LOS C	1.0	7.0	0.95	0.69	37.6
Approach		32	3.3	0.157	34.9	LOS C	1.0	7.0	0.95	0.69	37.9
North: Herbert St - N											
7	L2	29	3.6	0.296	20.4	LOS B	5.4	37.9	0.71	0.62	46.7
8	T1	566	1.1	0.987	48.6	LOS D	27.9	198.2	0.89	1.12	33.1
9	R2	124	3.4	0.987	73.1	LOS F	27.9	198.2	1.00	1.41	27.8
Approach		720	1.6	0.987	51.7	LOS D	27.9	198.2	0.90	1.15	32.4
West: Frederick St - W											
10	L2	75	7.0	0.253	30.1	LOS C	2.9	21.5	0.86	0.74	40.0
11	T1	27	0.0	0.253	24.5	LOS B	2.9	21.5	0.86	0.74	40.9
12	R2	412	2.6	0.929	52.1	LOS D	18.9	134.9	1.00	1.09	31.8
Approach		514	3.1	0.929	47.5	LOS D	18.9	134.9	0.97	1.02	33.2
All Vehicles		1839	3.0	0.987	38.2	LOS C	27.9	198.2	0.82	0.96	36.5

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.

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	29.3	LOS C	0.1	0.1	0.92	0.92	
P2	East Full Crossing	53	18.6	LOS B	0.1	0.1	0.73	0.73	
P3	North Full Crossing	53	28.4	LOS C	0.1	0.1	0.90	0.90	
P4	West Full Crossing	53	18.6	LOS B	0.1	0.1	0.73	0.73	
All Pedestrians		211	23.7	LOS C			0.82	0.82	

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

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

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

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MOVEMENT SUMMARY



Site: 1 [Herbert St/Frederick St (PD-PM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 70 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Herbert St - S											
1	L2	307	6.5	0.242	9.3	LOS A	3.6	26.6	0.37	0.68	50.6
2	T1	351	0.9	0.445	16.0	LOS B	8.7	61.6	0.77	0.66	47.5
3	R2	2	0.0	0.445	21.5	LOS B	8.7	61.6	0.77	0.66	46.5
Approach		660	3.5	0.445	12.9	LOS A	8.7	61.6	0.58	0.67	48.9
East: Carpark Access - E											
4	L2	9	11.1	0.077	40.7	LOS C	0.3	2.5	0.96	0.67	35.2
5	T1	49	4.3	0.385	33.9	LOS C	2.5	17.8	0.97	0.75	37.8
6	R2	23	0.0	0.385	39.5	LOS C	2.5	17.8	0.97	0.75	37.2
Approach		82	3.8	0.385	36.3	LOS C	2.5	17.8	0.97	0.74	37.3
North: Herbert St - N											
7	L2	6	33.3	0.212	20.1	LOS B	3.7	26.3	0.68	0.56	46.4
8	T1	475	0.4	0.705	19.6	LOS B	12.2	86.4	0.83	0.74	45.0
9	R2	79	6.7	0.705	28.0	LOS B	12.2	86.4	0.91	0.84	42.3
Approach		560	1.7	0.705	20.8	LOS B	12.2	86.4	0.84	0.75	44.6
West: Frederick St - W											
10	L2	127	0.8	0.352	30.7	LOS C	4.2	29.6	0.88	0.77	39.4
11	T1	14	7.7	0.352	25.2	LOS B	4.2	29.6	0.88	0.77	40.1
12	R2	421	1.5	0.944	55.7	LOS D	20.1	142.6	1.00	1.12	30.9
Approach		562	1.5	0.944	49.3	LOS D	20.1	142.6	0.97	1.03	32.7
All Vehicles		1864	2.4	0.944	27.3	LOS B	20.1	142.6	0.79	0.81	41.0

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	29.3	LOS C	0.1	0.1	0.92	0.92	
P2	East Full Crossing	53	18.6	LOS B	0.1	0.1	0.73	0.73	
P3	North Full Crossing	53	28.4	LOS C	0.1	0.1	0.90	0.90	
P4	West Full Crossing	53	18.6	LOS B	0.1	0.1	0.73	0.73	
All Pedestrians		211	23.7	LOS C			0.82	0.82	

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

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

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

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MOVEMENT SUMMARY

▽ Site: 1 [Herbert St/Westbourne St (PD-AM)]

16S9001000 - 12 Frederick St, St Leonards
Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Herbert St - S											
1	L2	179	0.0	0.413	5.9	LOS A	1.6	12.2	0.11	0.15	56.6
2	T1	521	9.1	0.413	0.1	LOS A	1.6	12.2	0.11	0.15	58.1
Approach		700	6.8	0.413	1.6	NA	1.6	12.2	0.11	0.15	57.7
North: Herbert St - N											
8	T1	604	2.1	0.822	8.2	LOS A	19.7	139.9	0.54	0.74	50.4
9	R2	175	0.0	0.822	22.8	LOS B	19.7	139.9	0.54	0.74	48.8
Approach		779	1.6	0.822	11.5	NA	19.7	139.9	0.54	0.74	50.0
West: Westbourne St - W											
10	L2	24	0.0	0.200	8.3	LOS A	0.4	2.6	0.71	0.87	47.4
12	R2	18	0.0	0.200	22.8	LOS B	0.4	2.6	0.71	0.87	47.0
Approach		42	0.0	0.200	14.5	LOS A	0.4	2.6	0.71	0.87	47.2
All Vehicles		1521	3.9	0.822	7.0	NA	19.7	139.9	0.34	0.47	53.2

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

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

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

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MOVEMENT SUMMARY

▽ Site: 1 [Herbert St/Westbourne St (PD-PM)]

16S9001000 - 12 Frederick St, St Leonards
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: Herbert St - S											
1	L2	99	1.1	0.320	5.8	LOS A	0.9	6.2	0.07	0.10	57.1
2	T1	468	3.8	0.320	0.1	LOS A	0.9	6.2	0.07	0.10	58.7
Approach		567	3.3	0.320	1.1	NA	0.9	6.2	0.07	0.10	58.5
North: Herbert St - N											
8	T1	617	0.7	0.736	4.9	LOS A	13.9	97.8	0.52	0.56	53.9
9	R2	134	0.0	0.736	15.8	LOS B	13.9	97.8	0.52	0.56	52.1
Approach		751	0.6	0.736	6.9	NA	13.9	97.8	0.52	0.56	53.6
West: Westbourne St - W											
10	L2	43	0.0	0.404	10.3	LOS A	0.9	6.3	0.71	0.94	46.2
12	R2	48	0.0	0.404	22.0	LOS B	0.9	6.3	0.71	0.94	45.8
Approach		92	0.0	0.404	16.4	LOS B	0.9	6.3	0.71	0.94	46.0
All Vehicles		1409	1.6	0.736	5.2	NA	13.9	97.8	0.35	0.40	54.8

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.

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MOVEMENT SUMMARY

Site: 1 [Herbert St/Pacific Hwy (PD-AM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Pacific Highway - E											
5	T1	1441	4.0	0.498	19.7	LOS B	20.0	145.0	0.67	0.59	45.4
6	R2	434	2.2	0.624	57.0	LOS E	13.4	95.5	0.96	0.82	30.7
Approach		1875	3.6	0.624	28.3	LOS B	20.0	145.0	0.74	0.65	40.8
North: Herbert St - N											
7	L2	532	2.4	0.760	41.9	LOS C	27.8	198.3	0.89	0.85	34.9
9	R2	156	2.7	0.654	65.5	LOS E	9.7	69.6	1.00	0.82	28.7
Approach		687	2.5	0.760	47.2	LOS D	27.8	198.3	0.92	0.84	33.3
West: Pacific Highway - W											
10	L2	233	6.8	0.213	13.2	LOS A	5.0	37.0	0.47	0.70	48.1
11	T1	1574	5.6	0.558	20.4	LOS B	23.2	170.5	0.69	0.62	44.9
Approach		1806	5.7	0.558	19.5	LOS B	23.2	170.5	0.67	0.63	45.3
All Vehicles		4368	4.3	0.760	27.6	LOS B	27.8	198.3	0.73	0.67	41.1

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	
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.55	0.55	
P4	West Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96	
All Pedestrians		105	39.3	LOS D			0.75	0.75	

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 [Herbert St/Pacific Hwy (PD-PM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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
East: Pacific Highway - E											
5	T1	1693	3.9	0.582	20.9	LOS B	25.0	181.0	0.71	0.64	44.7
6	R2	346	0.6	0.493	55.5	LOS D	10.4	72.9	0.93	0.81	31.1
Approach		2039	3.3	0.582	26.8	LOS B	25.0	181.0	0.75	0.67	41.6
North: Herbert St - N											
7	L2	472	0.9	0.577	40.5	LOS C	23.7	167.0	0.86	0.84	35.4
9	R2	180	0.0	0.741	67.7	LOS E	11.6	81.1	1.00	0.86	28.3
Approach		652	0.6	0.741	48.0	LOS D	23.7	167.0	0.90	0.84	33.1
West: Pacific Highway - W											
10	L2	222	6.6	0.204	13.1	LOS A	4.7	35.0	0.47	0.70	48.1
11	T1	1414	2.5	0.487	19.5	LOS B	19.6	140.3	0.66	0.59	45.5
Approach		1636	3.1	0.487	18.6	LOS B	19.6	140.3	0.63	0.60	45.8
All Vehicles		4326	2.8	0.741	26.9	LOS B	25.0	181.0	0.73	0.67	41.4

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.

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	
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.55	0.55	
P4	West Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96	
All Pedestrians		105	39.3	LOS D			0.75	0.75	

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 [Reserved Rd/Frederick St (PD-AM)]**

16S9001000 - 12 Frederick St, St Leonards
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Reserved Rd - S											
2	T1	93	3.4	0.119	6.6	LOS A	0.7	5.2	0.50	0.59	52.8
3	R2	25	0.0	0.119	9.8	LOS A	0.7	5.2	0.50	0.59	52.5
Approach		118	2.7	0.119	7.2	LOS A	0.7	5.2	0.50	0.59	52.7
East: Frederick St - E											
4	L2	123	0.9	0.395	6.9	LOS A	2.6	19.3	0.48	0.67	50.8
5	T1	7	0.0	0.395	7.2	LOS A	2.6	19.3	0.48	0.67	51.8
6	R2	263	9.6	0.395	10.8	LOS A	2.6	19.3	0.48	0.67	51.0
Approach		394	6.7	0.395	9.5	LOS A	2.6	19.3	0.48	0.67	51.0
North: Reserved Rd - N											
7	L2	495	2.6	0.531	4.7	LOS A	4.6	32.9	0.17	0.49	53.6
8	T1	287	0.0	0.531	5.0	LOS A	4.6	32.9	0.17	0.49	54.8
9	R2	28	18.5	0.531	8.5	LOS A	4.6	32.9	0.17	0.49	53.5
Approach		811	2.2	0.531	5.0	LOS A	4.6	32.9	0.17	0.49	54.0
West: Enterprise Centre - W											
10	L2	3	33.3	0.010	7.3	LOS A	0.1	0.4	0.52	0.55	50.8
11	T1	4	0.0	0.010	6.7	LOS A	0.1	0.4	0.52	0.55	53.1
12	R2	1	0.0	0.010	10.0	LOS A	0.1	0.4	0.52	0.55	52.7
Approach		8	12.5	0.010	7.3	LOS A	0.1	0.4	0.52	0.55	52.2
All Vehicles		1331	3.6	0.531	6.5	LOS A	4.6	32.9	0.29	0.56	52.9

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.

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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MOVEMENT SUMMARY

 **Site: 1 [Reserved Rd/Frederick St (PD-PM)]**

16S9001000 - 12 Frederick St, St Leonards
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Reserved Rd - S											
1	L2	1	0.0	0.535	8.5	LOS A	4.8	33.9	0.78	0.73	50.5
2	T1	344	0.6	0.535	8.8	LOS A	4.8	33.9	0.78	0.73	51.4
3	R2	158	1.3	0.535	12.1	LOS A	4.8	33.9	0.78	0.73	51.1
Approach		503	0.8	0.535	9.8	LOS A	4.8	33.9	0.78	0.73	51.3
East: Frederick St - E											
4	L2	26	4.0	0.335	4.9	LOS A	2.2	16.2	0.21	0.61	51.2
5	T1	2	0.0	0.335	5.1	LOS A	2.2	16.2	0.21	0.61	52.3
6	R2	417	7.6	0.335	8.6	LOS A	2.2	16.2	0.21	0.61	51.7
Approach		445	7.3	0.335	8.3	LOS A	2.2	16.2	0.21	0.61	51.7
North: Reserved Rd - N											
7	L2	360	2.9	0.370	5.6	LOS A	2.4	16.9	0.38	0.57	53.1
8	T1	61	1.7	0.370	5.9	LOS A	2.4	16.9	0.38	0.57	54.2
9	R2	3	33.3	0.370	9.9	LOS A	2.4	16.9	0.38	0.57	52.4
Approach		424	3.0	0.370	5.7	LOS A	2.4	16.9	0.38	0.57	53.2
West: Enterprise Centre - W											
10	L2	17	6.3	0.041	12.7	LOS A	0.3	2.2	0.87	0.70	48.2
11	T1	4	0.0	0.041	12.6	LOS A	0.3	2.2	0.87	0.70	49.3
12	R2	1	0.0	0.041	15.9	LOS B	0.3	2.2	0.87	0.70	49.0
Approach		22	4.8	0.041	12.8	LOS A	0.3	2.2	0.87	0.70	48.5
All Vehicles		1395	3.6	0.535	8.1	LOS A	4.8	33.9	0.48	0.64	51.9

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.

Roundabout Capacity Model: SIDRA Standard.

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

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

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

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MOVEMENT SUMMARY

Site: 1 [Reserve Rd/Campbell St (PD-AM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 65 seconds (Minimum Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Reserved Rd - S											
1	L2	143	14.0	0.240	13.7	LOS A	2.8	21.8	0.68	0.70	48.4
2	T1	216	5.9	0.240	14.6	LOS B	3.9	29.0	0.74	0.63	47.9
Approach		359	9.1	0.240	14.3	LOS A	3.9	29.0	0.71	0.66	48.1
East: Bunning Access - E											
4	L2	26	0.0	0.142	36.7	LOS C	0.8	5.7	0.95	0.71	36.8
5	T1	36	0.0	0.422	32.5	LOS C	2.6	18.2	0.99	0.76	37.9
6	R2	44	0.0	0.422	38.0	LOS C	2.6	18.2	0.99	0.76	37.1
Approach		106	0.0	0.422	35.9	LOS C	2.6	18.2	0.98	0.74	37.3
North: Reserved Rd - N											
7	L2	71	1.5	0.223	16.9	LOS B	3.9	28.1	0.64	0.61	48.1
8	T1	582	2.4	0.834	21.0	LOS B	20.3	147.3	0.92	0.92	43.9
9	R2	147	10.0	0.834	29.5	LOS C	20.3	147.3	1.00	1.01	41.4
Approach		800	3.7	0.834	22.2	LOS B	20.3	147.3	0.91	0.91	43.7
West: Campbell St - W											
10	L2	97	30.4	0.238	27.9	LOS B	2.6	22.6	0.84	0.76	39.8
11	T1	59	0.0	0.726	30.0	LOS C	8.3	59.6	1.00	0.90	38.4
12	R2	193	4.4	0.726	35.6	LOS C	8.3	59.6	1.00	0.90	37.7
Approach		348	10.9	0.726	32.5	LOS C	8.3	59.6	0.96	0.86	38.4
All Vehicles		1614	6.2	0.834	23.5	LOS B	20.3	147.3	0.88	0.83	42.8

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	
P2	East Full Crossing	53	10.6	LOS B	0.1	0.1	0.65	0.65	
P3	North Full Crossing	53	22.5	LOS C	0.1	0.1	0.91	0.91	
P4	West Full Crossing	53	17.0	LOS B	0.1	0.1	0.80	0.80	
All Pedestrians		158	16.7	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 [Reserve Rd/Campbell St (PD-PM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 60 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Reserved Rd - S											
1	L2	275	5.7	0.896	36.7	LOS C	15.6	113.1	1.00	1.13	37.6
2	T1	568	2.8	0.896	33.6	LOS C	15.6	113.1	0.98	1.11	38.2
Approach		843	3.7	0.896	34.6	LOS C	15.6	113.1	0.98	1.12	38.0
East: Bunning Access - E											
4	L2	39	0.0	0.210	34.2	LOS C	1.1	7.9	0.95	0.72	37.8
5	T1	47	0.0	0.543	30.1	LOS C	3.1	21.9	0.99	0.78	38.9
6	R2	56	0.0	0.543	35.6	LOS C	3.1	21.9	0.99	0.78	38.1
Approach		142	0.0	0.543	33.4	LOS C	3.1	21.9	0.98	0.77	38.2
North: Reserved Rd - N											
7	L2	47	0.0	0.174	16.2	LOS B	2.6	18.5	0.63	0.58	48.7
8	T1	275	3.8	0.652	17.9	LOS B	7.4	53.4	0.83	0.76	45.2
9	R2	99	5.3	0.652	27.7	LOS B	7.4	53.4	0.95	0.86	41.9
Approach		421	3.8	0.652	20.0	LOS B	7.4	53.4	0.84	0.76	44.8
West: Campbell St - W											
10	L2	100	12.6	0.176	21.2	LOS B	2.1	16.4	0.74	0.74	43.3
11	T1	38	0.0	0.618	27.8	LOS B	5.1	36.1	0.98	0.83	39.3
12	R2	134	2.4	0.618	33.4	LOS C	5.1	36.1	0.98	0.83	38.5
Approach		272	5.8	0.618	28.1	LOS B	5.1	36.1	0.90	0.79	40.3
All Vehicles		1678	3.8	0.896	29.8	LOS C	15.6	113.1	0.93	0.95	39.9

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.

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	
P2	East Full Crossing	53	13.4	LOS B	0.1	0.1	0.67	0.67	
P3	North Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
P4	West Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90	
All Pedestrians		158	20.7	LOS C			0.82	0.82	

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: 101 [Campbell St/Pacific Hwy (PD-AM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Pacific Hwy - S											
2	T1	1055	4.8	0.355	4.4	LOS A	9.7	70.9	0.32	0.29	56.0
3	R2	297	4.3	0.882	81.1	LOS F	23.2	168.7	1.00	1.20	24.7
Approach		1352	4.7	0.882	21.2	LOS B	23.2	168.7	0.47	0.49	43.8
East: Campbell St - E											
4	L2	102	5.2	0.190	40.7	LOS C	4.8	34.9	0.78	0.74	33.3
6	R2	133	6.3	0.285	60.7	LOS E	3.9	28.6	0.94	0.76	28.2
Approach		235	5.8	0.285	52.0	LOS D	4.8	34.9	0.87	0.75	30.2
North: Pacific Hwy - N											
7	L2	196	4.3	0.516	19.5	LOS B	19.7	145.1	0.58	0.61	43.8
8	T1	1573	7.4	0.516	14.6	LOS B	20.7	154.0	0.60	0.57	48.1
Approach		1768	7.0	0.516	15.2	LOS B	20.7	154.0	0.60	0.57	47.6
All Vehicles		3355	6.0	0.882	20.2	LOS B	23.2	168.7	0.57	0.55	44.3

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	59.3	LOS E	0.2	0.2	0.96	0.96	
P2	East Full Crossing	53	13.9	LOS B	0.1	0.1	0.46	0.46	
All Pedestrians		105	36.6	LOS D			0.71	0.71	

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: 101 [Campbell St/Pacific Hwy (PD-PM)]

16S9001000 - 12 Frederick St, St Leonards

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Phase Times)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Pacific Hwy - S											
2	T1	1357	3.9	0.455	4.9	LOS A	14.0	101.6	0.36	0.33	55.5
3	R2	154	6.2	0.390	20.8	LOS B	6.2	45.5	0.69	0.78	41.6
Approach		1511	4.1	0.455	6.5	LOS A	14.0	101.6	0.40	0.38	53.7
East: Campbell St - E											
4	L2	161	0.7	0.290	41.9	LOS C	7.8	54.8	0.81	0.77	33.0
6	R2	265	2.0	0.554	63.1	LOS E	8.1	57.6	0.99	0.80	27.7
Approach		426	1.5	0.554	55.1	LOS D	8.1	57.6	0.92	0.79	29.5
North: Pacific Hwy - N											
7	L2	115	1.8	0.398	18.3	LOS B	14.2	102.3	0.53	0.54	44.7
8	T1	1283	3.4	0.398	13.2	LOS A	14.8	106.4	0.54	0.50	49.1
Approach		1398	3.3	0.398	13.6	LOS A	14.8	106.4	0.54	0.51	48.7
All Vehicles		3335	3.4	0.554	15.7	LOS B	14.8	106.4	0.52	0.48	46.8

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.

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P1	South Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96	
P2	East Full Crossing	53	13.9	LOS B	0.1	0.1	0.46	0.46	
All Pedestrians		105	36.6	LOS D			0.71	0.71	

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

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

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

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