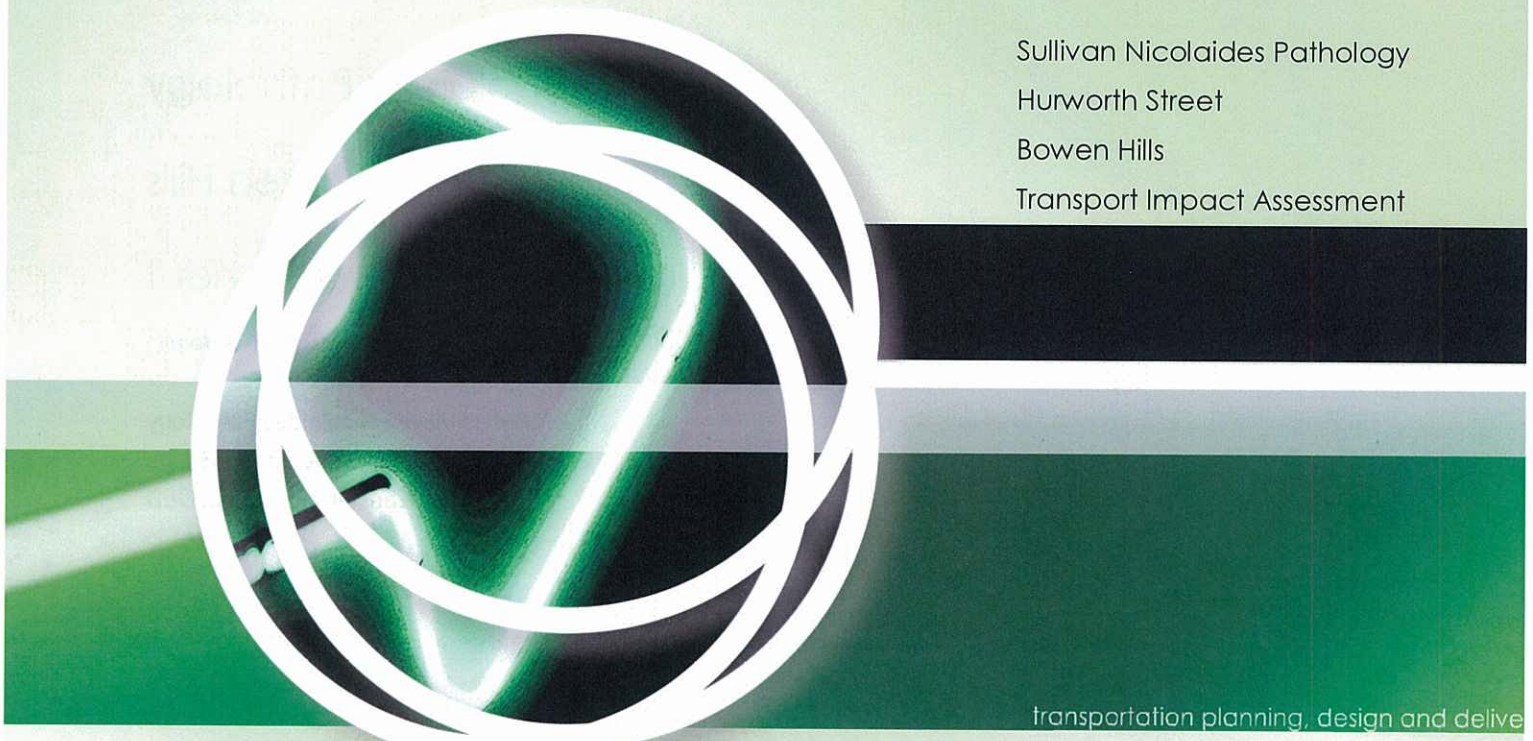
Sullivan Nicolaides Pathology
Hurworth Street
Bowen Hills
Transport Impact Assessment



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GTAconsultants

Sullivan Nicolaides Pathology

Hurworth Street, Bowen Hills

Transport Impact Assessment

Issue: A 12/02/13

Client: Sullivan Nicolaides Pathology
Reference: 13B1087000
GTA Consultants Office: QLD

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By
A-Dr	30/01/12	Draft	Alexander Rozario	John Hulbert	
A	12/02/13	Final	Alexander Rozario	John Hulbert	John Hulbert (RPEQ 8902)

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1. Introduction

1.1 Background

It is understood that Sullivan Nicolaides Pathology (SNP) is to lodge a development application with the Urban Land Development Authority (ULDA) for a proposed pathology laboratory on land located at Hurworth Street, Bowen Hills. It is further understood that the proposed development will be a relocation of the existing SNP operations at Taringa. The proposed development primarily comprises of medical laboratory facilities with ancillary administration, storage and loading areas. It is noted that the development will be constructed in two stages, however, the car parking for both stages will be constructed during Stage 1 for ease of constructing Stage 2.

GTA Consultants was commissioned by the Applicant in November 2012 to undertake a transport impact assessment for the proposed development.

1.2 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

i existing traffic and parking conditions surrounding the site
ii parking demand likely to be generated by the proposed development
iii suitability of the proposed parking in terms of supply (quantum) and layout
iv service vehicle requirements
v pedestrian and bicycle requirements
vi the traffic generating characteristics of the proposed development
vii suitability of the proposed access arrangements for the site
viii the transport impact of the development proposal on the surrounding road network.

1.3 References

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

- an inspection of the site and its surrounds undertaken on 28 November 2012
- Brisbane City Council's (BCC) CityPlan 2000 Planning Scheme
- Australian / New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS / NZS 2890.1:2004
- Australian / New Zealand Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS / NZS 2890.2:2002
- Australian / 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 by Austraffic as referenced in the context of this report
- plans for the proposed development prepared by Nettleton Tribe, Drawing Number 3232_DA010 to 3232_DA017, Revision B, dated 21 January 2013
- other documents and data as referenced in this report.

2. Site Environs

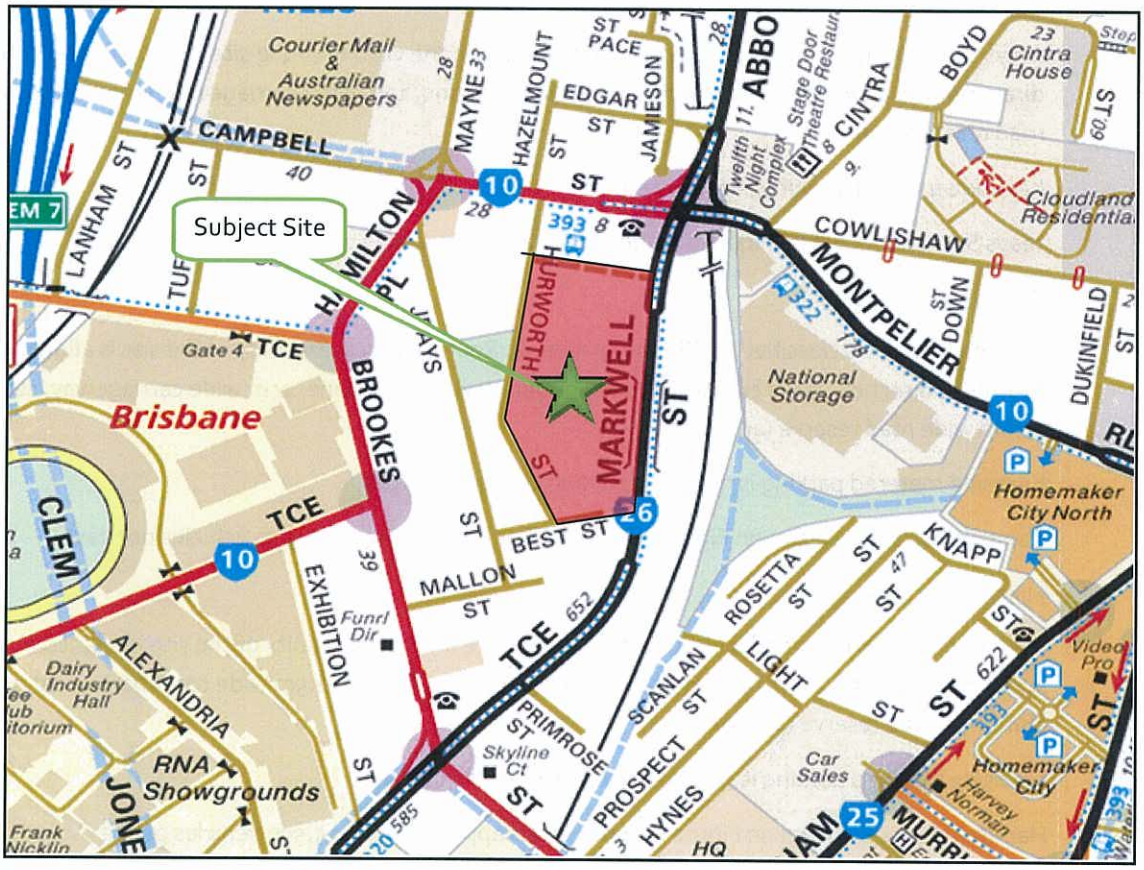
2.1 Subject Site

The subject site is located at Lot 5, Hurworth Street, Bowen Hills and is currently vacant land. It is located within Precinct 5 – Markwell Street West Precinct of the ULDA's Bowen Hills Urban Development Area. The site has a frontage of approximately 170m to Hurworth Street and 30m to Best Street.

The surrounding properties predominantly include commercial and residential uses.

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

Figure 2.1: Subject Site and Its Environs



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2.2 Road Network

Best Street

Best Street is classified by BCC as a local street and in the vicinity of the site is aligned in an east-west direction. It is a two-way road currently configured with a two-lane, 8.5m wide carriageway, set within a 10m wide road reserve (approx).

Kerbside parking is not permitted on Best Street.

The proposed development intends to gain access from the currently unmade Best Street road stub, which is currently utilised by vehicles informally parking along the roadway.

Best Street is shown on Figure 2.2 and Figure 2.3. The section of Best Street between Hurworth Street and Jeays Street carries approximately 640 vehicles per day[1].

Hurworth Street

Hurworth Street is classified by BCC as a local street and in the vicinity of the site is aligned in a north-south direction. It is a two-way road configured with a two-lane, 7m wide carriageway, set within a 10m wide road reserve (approx).

Kerbside metered parking is permitted on the eastern side of the roadway.

Hurworth Street is shown on Figure 2.4 and carries approximately 545 vehicles per day[2].

Jeays Street

Jeays Street is classified by BCC as a local street and in the vicinity of the site is aligned in a north-south direction. It is a two-way road configured with a two-lane, 12m wide carriageway, set within a 20m wide road reserve (approx).

Kerbside metered parking is permitted.

Jeays Street is shown on Figure 2.5 and carries approximately 420 vehicles per day[3].

Campbell Street

Campbell Street is classified by BCC as an Arterial Route and in the vicinity of the site is aligned in an east-west direction. It is a two-way road configured with a four-lane, 14m wide carriageway, set within a 20m wide road reserve (approx).

Kerbside metered parking is not permitted on Campbell Street.

Campbell Street is shown on Figure 2.6 and carries approximately 11,250 vehicles per day[4].

Hamilton Place

Hamilton Place is classified by BCC as a District Route and in the vicinity of the site is aligned in a north-south direction. It is a two-way road configured with a four-lane, 12.5m wide carriageway, set within an 18m wide road reserve (approx).

Kerbside metered parking is not permitted on Hamilton Place.

Hamilton Place is shown on Figure 2.7 and carries approximately 14,500 vehicles per day[5].

Brookes Street

Brookes Street is classified by BCC as a District Route and in the vicinity of the site is aligned in a north-south direction. It is a two-way road configured with a four-lane, 12.5m wide carriageway, set within a 23m wide road reserve (approx).

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1 Based on peak hour traffic counts undertaken by Austraffic in December 2012 and assuming a peak-to-daily ratio of 10%.
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Kerbside parking on Brookes Street is available subject to time restrictions.

Brookes Street is shown on Figure 2.8 and carries approximately 11,500 vehicles per day[6].

Mallon Street

Mallon Street is classified by BCC as a local street in the vicinity of the site is aligned in an east-west direction. It is a two-way road configured with a two-lane, 12.5m wide carriageway, set within a 20m wide road reserve (approx).

Kerbside metered parking is available on Mallon Street.

Mallon Street is shown on Figure 2.9 and carries approximately 800 vehicles per day[7].

Figure 2.2: Best Street (Facing west)

Figure 2.3: Best Street road stub (Facing east)

Figure 2.4: Hurworth Street (Facing north)

Figure 2.5: Jeays Street (Facing north)

[6] Based on peak hour traffic counts undertaken by Austraffic in December 2012 and assuming a peak-to-daily ratio of 10%.

[7] Based on peak hour traffic counts undertaken by Austraffic in December 2012 and assuming a peak-to-daily ratio of 10%.

Figure 2.6: Campbell Street (Facing east)

Figure 2.7: Hamilton Place (Facing south)

Figure 2.8: Brookes Street (Facing north)

Figure 2.9: Mallon Street (Facing east)

2.3 Traffic Volumes

GTA Consultants commissioned traffic movement counts on key roads and intersections in the vicinity of the subject site on 6 December 2012 during the following peak periods:

- 7:00am and 9:00am
- 4:00pm and 6:00pm.

The surveyed locations included:

- Campbell Street / Hurworth Street intersection (all movements)
- Jeays Street / Best Street intersection (turns only)
- Brookes Street / Mallon Street intersection (all movements)
- Hamilton Place / Jeays Street intersection (all movements).

The surveyed AM and PM peak hour traffic volumes are contained at Appendix A.

2.4 Integrated Transport Infrastructure

2.4.1 Public Transport

A review of the public transport currently available in the vicinity of the subject site is summarised in Table 2.1.

Table 2.1: Public Transport Provision

Service	Route #	Route Description	Location of Stop	Distance to Nearest Stop	Frequency On/Off peak
Bus	320	City to Chermside	Abbotsford Road	320m	15-20 minutes peak / 30 minutes off peak
Train	n/a	Nambour to Richlands Caboolture to Brisbane Brisbane to Richlands Caboolture to Ipswich Nambour to Brisbane Brisbane to Ipswich Caboolture to Richlands Nambour to Ipswich Gympie to Brisbane Brisbane to Rosewood	Bowen Hills Station	400m	3 minute peak / 15 minutes off peak

2.4.2 Pedestrian Infrastructure

Existing pedestrian paths are located as follows:

- Hurworth Street (both sides) – 1.0m and 1.3m wide paths, providing access to major road pedestrian network
- Best Street (both sides) – 1.4m wide paths.

Pedestrian crossing points in vicinity of the site include the following locations:

- all legs of the Brookes Street / Gregory Terrace intersection
- all legs of the Campbell Street / Hamilton Place intersection
- all legs of the Abbotsford Road / Campbell Street intersection.

2.4.3 Cycle Infrastructure

There is no dedicated cycle infrastructure in the vicinity of the site.

3. Development Proposal

3.1 Land Uses

The proposal includes a single laboratory use, as summarised in Table 3.1.

Table 3.1: Development Schedule [1]

Use	Size
Pathology Laboratory	22,656 sq.m GFA

[1] Source: Nettleton Tribe, Drawing Number 3232_DA041-049, Revision B, dated 11 February 2013.

A copy of the development plans appended to the Town Planning Report.

3.2 Vehicle Access

Vehicular access for the proposed development is to be provided at three locations, namely:

- A single 7.0m wide two-way driveway on Hurworth Street for access to the visitor car parking area.
- A single 7.0m wide two-way driveway on Best Street for access to the development's staff parking areas.
- Provision of an access way within the Markwell Street road reserve providing access to the development's courier vehicle parking and loading areas, as well as providing infrequent access for Council vehicles required for maintaining the Markwell Street road reserve (eg. trimming/mowing of vegetation). The access way ranges in width from 7.1m to 9.0m.

The suitability of the proposed access arrangements is discussed in Section 4.5 of this report.

3.3 Car Parking

With the exclusion of the proposed development's loading area, the development will include parking for a total of 319 vehicles. The breakdown of vehicle parking spaces is as follows:

- 269 staff car parking bays (n.b. 10 of which are tandem)
- 34 courier car parking bays
- 5 van parking bays
- 11 visitor car parking bays.

The suitability of the car parking provision and layout is discussed in Section 4 of this report.

3.4 Pedestrian Facilities

Pedestrian access to the site is proposed via the Ground Floor on Hurworth Street.

Internal pedestrian facilities include three lifts and an open courtyard.

The suitability of the proposed pedestrian facilities is discussed in Section 5.2 of this report.

3.5 Bicycle Facilities

The development plans show 93 bicycle parking spaces and ancillary facilities for employees, these are located on Lower Ground 1. The proposed development plans show the provision of shower and change room facilities for employees that cycle, adjacent to the bicycle parking areas.

A total of 19 bicycle parking spaces for visitors are also provided at Lower Ground 1.

The suitability of the bicycle provisions is discussed in Section 5.3 of this report.

3.6 Loading Areas

There is one loading area currently proposed within the site, located on the Lower Ground 2 level for use of vehicles up to and including 12.5m heavy rigid vehicles (HRV). Access is gained via the proposed access way within the Markwell Street road reserve at the north-eastern end of Best Street.

The refuse storage area is to be located on the Lower Ground 2 level, adjacent to the loading dock.

The suitability of the proposed loading arrangements is discussed in Section 6 of this report.

4. Car Parking

4.1 Statutory Requirement

The ULDA's *Land Use Plan* for the Bowen Hills Urban Development Area does not have a specific car parking rate applicable to a use as that proposed (i.e. medical laboratory facility). As such, the *Land Use Plan* defers to the car parking requirements of BCC's planning scheme.

The car parking provision requirements for different development types are set out in BCC's Draft *'Transport, Access, Parking and Servicing Planning Scheme Policy'* (TAPS Policy) to be implemented in the near future. Given that the site is located within the City Frame, the car parking requirement is governed by a maximum statutory car parking rate as summarised in Table 4.1.

Table 4.1: BCC's Car Parking Requirements – City Frame

Description	Use	Size	Statutory Parking Rate	Maximum Statutory Parking Requirement
City Frame	Pathology Laboratory	22,656sq.m	Maximum 1 space / 100sq.m GFA	227 spaces

Based on the above, the proposed development would be required to provide a maximum of 227 car parking spaces.

4.2 Empirical Assessment of Car Parking Demand

4.2.1 City Frame Comparison

For the purposes of comparison, a theoretical assessment of the statutory car parking requirement has been undertaken assuming that the site was located just outside the City Frame boundary (approximately 1km from the site). The results of this assessment has been summarised in Table 4.2.

Table 4.2: BCC's Car Parking Requirements

Use	Size	Statutory Parking Rate	Statutory Parking Requirement
Centre Activity within 400m of a Railway Station	22,656sq.m	Maximum 5 spaces / 100sq.m GFA on all levels accessible at grade from a public street or an on-site car parking area plus 2 spaces per 100sq.m GFA on other areas	682 spaces (maximum)
Centre Activity – any other circumstance	22,656sq.m	3 spaces per 50sq.m GFA for levels accessible at grade plus 1 space per 20sq.m for all other levels	960 spaces (minimum)
Commercial Office	22,656sq.m	1 space per 30sq.m GFA	756 spaces (minimum)
Medical Centre	22,656sq.m	14 spaces plus 1 space per 20sq.m	1,147 spaces (minimum)

As can be seen above, BCC's non-City Frame car parking rates are significantly greater for developments located just outside the City Frame boundary. Should the development have been located one kilometre to the north, an allowance of up to 691 spaces would have been compliant with the statutory requirement. As such, the proposed number of car parking spaces is less than half of the allowable parking requirement for similar developments located outside of the city frame.

Whilst it is understood that the proposed development exceeds the maximum statutory car parking requirement for 227 spaces, the proposed number of car parking spaces is realistically less than half of the anticipated demand.

4.2.2 Shift Change Scenarios

The proposed development provides 24 hour operations and consequently caters for both day and night shifts. These shift patterns must overlap to ensure the facility is appropriately staffed at all times. For this reason the carpark must therefore be enlarged to cater for the peak carparking demand, which occurs when day shift staff are arriving and night shift staff are still working (and vice-versa). Whilst this only represents a temporary overlap occurring twice daily, it is nonetheless important when considering an appropriate level of carparking for the facility. Whilst the quantum of carparking being provided may be greater than that ordinarily required, the temporary peak in demand (and overlap) will mean that the expected average turnover of trip generation per individual parking spaces will be lower than normal, therefore the larger basement does not directly equate to a larger proportion of staff travelling to work via private car.

The night shift patterns also result in staff safety concerns with a large proportion of staff being female and a lack of access to secure parking would resulting in staff needing to walk to public transport facilities elsewhere in Bowen Hills during the evening.

4.3 Adequacy of Parking Supply

As previously discussed, the proposed development is to include parking on-site for a total of 319 vehicles. This total includes parking associated with 34 courier cars and 5 vans. It should be highlighted

that these vehicle types are explicitly associated with the tenant and use, and as such are more of a servicing need than a typical car parking requirement. Therefore, the parking associated with these 39 vehicles should be excluded from the assessment of car parking provision.

As such, the proposed development's 22,656sq.m GFA and the remaining 280 parking spaces would result in a car parking provision in the order of 1 space per 80sq.m GFA, which is approximately 23% greater than BCC's planning scheme requirement.

Based on the empirical assessment of parking demand, and the fact that the staff car parking areas are only expected to be close to fully occupied for only a short time of the day (i.e. spanning the staff shift changes), the 23% of spaces in excess of BCC's planning scheme requirement is not expected to create an adverse impact on the operations of the proposed development nor the surrounding developments within the Bowen Hills Urban Development Area.

4.4 Car Parking Layout Review

The car park layout has been reviewed against the requirements of the BCC's TAPS Policy and the Australian / New Zealand Standard for Off Street Car Parking (AS / NZS2890.1:2004 and AS / NZS2890.6:2009). This assessment included a review of the following:

- bay and aisle width
- adjacent structures
- turnaround facilities
- circulation roads and ramps
- ramp grades
- height clearances
- internal queuing
- parking for persons with disabilities
- motorcycle / motor scooter parking.

Details of this review are provided below. This review indicates that the proposed car parking layout is expected to operate satisfactorily, subject to the adoption of recommendations discussed below.

4.4.1 Bay and Aisle Width

The typical car parking bays are a minimum of 5.4m long by 2.4m wide and the access aisles are a minimum of 6.2m wide. This complies with the requirements of the TAPS Policy for class 1 employee uses. Visitor parking spaces located on the Ground Floor are a minimum of 5.4m long by 2.6m wide, which complies with the requirements for class 3 users.

There are four car bays in the staff car parking area on Lower Ground 1 and Lower Ground 3 which are a minimum of 5.0m long by 2.3m wide and therefore comply with the requirements of the TAPS policy. It is recommended that these bays are designated for small cars only.

4.4.2 Adjacent Structures

The proposed development conforms with the requirements of the Australian Standard with regard to structures adjacent to car bays (including walls and columns).

There is one bay on Lower Ground 3 where an adjacent wall encroaches on the parking envelope. It is recommended that this bay be designated for small cars only such that it complies with the requirements of the Australian Standard.

4.4.3 Turnaround Facilities

A number of terminating aisles are located within the proposed car parking areas, these provide a 2.0m aisle extension or 8.0m directly behind the last bay in accordance with the TAPS Policy.

4.4.4 Circulation Roads and Ramps

The circulation roads and ramps are a minimum of 6.5m wide between walls, which does not strictly meet the minimum requirement of 6.5m width plus 0.15m clearances from any nominal kerb faces as per the TAPS Policy.

Notwithstanding, the Australian Standards require a width of 5.5m for a two-way circulation roads and ramps with additional 300mm clearances from obstructions (such as walls), resulting in a required total width of 6.1m.

In this regard, the proposed circulation road width exceeds the Australian Standard and is therefore expected to operate satisfactorily.

4.4.5 Ramp Grades

The gradients of the circulation ramps do not exceed 1:6 (16.6%) from the inside of the kerb, which complies with the TAPS Policy.

The TAPS Policy requires a maximum grade of 1:20 (5%) on an exit driveway for the first 6m into the site, measured from the property boundary. It is noted that whilst this requirement has not been met on the visitor car park entrance which provides a 1:8 (12.5%) grade, it complies with the requirements of the Australian Standard which states:

"The grade of the first 6m into the car park may be increased to 1 in 8 (12.5%) provided all three of the following conditions are met:

- *(i) The grade is a downgrade for traffic leaving the property and entering the frontage road.*
- *(ii) The user class is Class 1, 1A or 2 only.*
- *(iii) The maximum car park size is for entry to a local road – 100 car spaces."*

In this regard the proposed gradient at the visitor car parking entrance complies with the requirements of the Australian Standard.

4.4.6 Height Clearance

A typical minimum clearance of 2.3m is to be provided between levels on the ground and lower ground floors. It is further noted that a 2.5m height clearance is to be provided above PWD bays in accordance with the Australian Standard.

4.4.7 Internal Queuing

Approximately 49m internal queuing distance is provided between the property boundary and the first conflict point on Lower Ground 1 from Best Street. BCC requires the provision of a queuing distance of 8 vehicles[8] between property boundary and the first internal conflict point. Assuming a vehicle queue length of 6m, a total queuing distance of 48m is required. The proposed development provides the required distance between the property boundary and the conflict point.

In addition, approximately 40m internal queuing distance is provided for the Lower Ground 2 (courier) parking area which exceeds the requirement for 12m queuing distance between the property boundary and the first conflict point.

Furthermore, approximately 16m internal queuing distance is provided for the visitor parking area which exceeds the requirement for 6m queuing distance between the property boundary and the first conflict point.

4.4.8 Parking for Persons with Disabilities

Building Codes Australia (BCA) requires that for office uses, 1% of the static capacity of the car park be set aside as parking for persons with a disability. This equates to a requirement for three (3) car spaces to be allocated for parking for persons with a disability. This has been accommodated within the proposed development. The development plans show three (3) PWD bays located in the visitor parking area which have been designed in accordance with the Australian Standards of a minimum of 5.4m long by 2.4m wide with an adjacent shared zone of the same dimensions.

4.4.9 Motorcycle/Motor Scooter Parking

BCC TAPS Code allows for 2% of the required number of car parking spaces to be provided for motorcycles.

The development plans do not incorporate the provision of dedicated motorcycle bays. It is expected that motorcyclists will be able to use the car parking bays.

4.5 Suitability of Site Access

The proposed development provides numerous access points for the various uses within the site. The dimensional requirements of the access points have been discussed in the following sections.

4.5.1 Visitor Car Parking Area

A single 7m wide two-way driveway is proposed on Hurworth Street for access to the visitor car parking area. BCC requires driveways gaining access to a car parking area up to 25 spaces from a minor road, to provide a Type A driveway. The development plans indicate that a Type B1 driveway has been provided, which exceeds the minimum Type A crossover. Furthermore, the location of the driveway does not encroach within 10m of the Hurworth Street / Best Street intersection in compliance with the TAPS Policy.

8 For a car park greater than 250 car parking spaces.

4.5.2 Staff Car Parking Area

A single 7m wide two-way driveway is proposed on Best Street for access to the staff car parking area. BCC requires driveways gaining access to a car parking areas between 250 to 500 spaces from a minor road, to provide a Type C1 Driveway. This driveway type contains a 1.5m median with a 4.5m entry width and 3.5m exit width. The development plans indicate that a Type B2 has been provided. Whilst this does not strictly meet the statutory requirement, the proposed crossover is considered suitable given that the car parking area is only expected to service more than 250 vehicles at a time during the shift overlap period. The driveway location does not encroach within 10m of the Hurworth Street / Best Street intersection in compliance with the TAPS Policy.

4.5.3 Markwell Street Access Way

The proposed development proposes an access way adjacent the Markwell Street overpass to the rear of the site providing access for courier and service vehicles only. The access way ranges from 7.1m to 9.0m wide to accommodate the swept path of a large rigid vehicle (LRV) around the existing sewer stack.

It is noted that an LRV is required to utilise the opposite side of the Best Street carriageway to undertake the turning manoeuvre into the Markwell Street access way. Given that the eastern end of Best Street is accessed by service and courier vehicles only, it is expected that the turning manoeuvre will negligibly impact vehicular operations. This swept path has been shown in Appendix B.

4.5.4 Courier Car Parking Area

A single 7.1m wide two-way driveway is proposed on the Markwell Street access way for access to the courier car parking area. Given that the driveway gains access via the Markwell Street, the driveway type requirements are not applicable, hence, the proposed 7m wide driveway is considered acceptable to allow vehicles up to and including service vans.

4.5.5 Loading Dock Entrances

The proposed development provides loading dock access for service vehicles via the Markwell Street access way. There are two access points in total, the northern access catering for vehicles up to and including 12.5m LRVs and the southern access catering for vehicles up to and including 8.3m MRVs. The adequacy of the loading facilities has been discussed in greater detail in Section 6.

4.6 Sight Distance

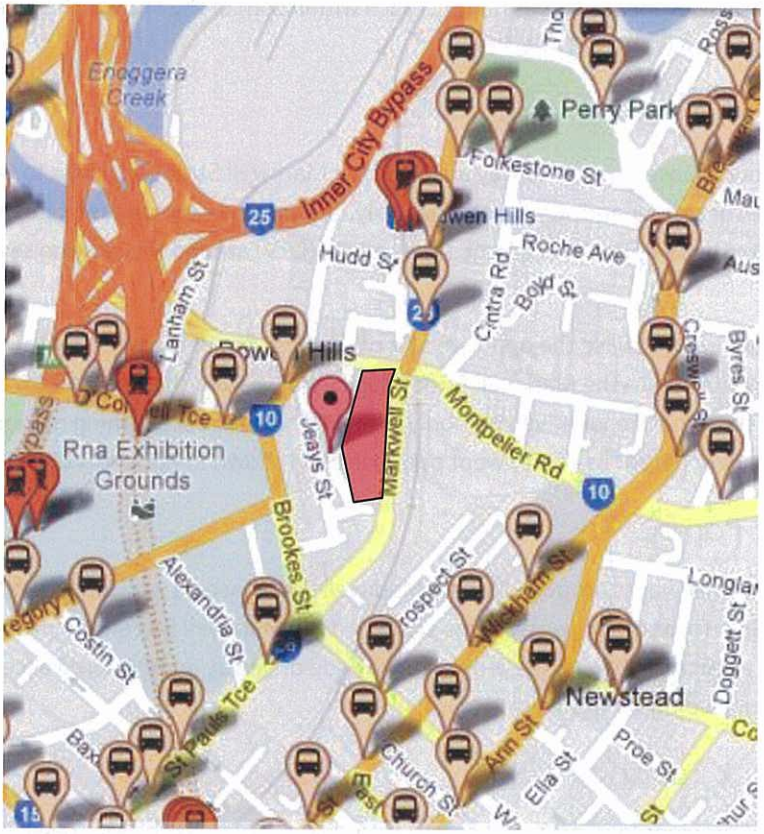
BCC requires that in 50km/h speed environments, driveways are to be located with a desirable minimum sight distance of 90m and an absolute minimum sight distance of 70m for car parking areas up to 500 car parking spaces. Given that the two main driveways to the site gain access to the site via the Best Street road stub, sight distance is not anticipated to be an issue given that visibility extends to the Hurworth Street / Best Street intersection.

5. Access and Mobility Management

5.1 Public Transport

The site is accessible by public transport with bus stops and a train station located within 400m. These have been shown graphically on Figure 5.1.

Figure 5.1: Public Transport Stop Locations



Source: Google Maps via Translink website

5.2 Pedestrian Provisions

The proposed development provides walk-up access from Hurworth Street. This access provides pedestrian connectivity to public transport stops in the vicinity of the site.

5.3 Bicycle End-of-Trip Facilities

BCC requires that office developments greater than 2,500sq.m to provide adequate bicycle parking, shower cubicles and lockers.

Table 5.1 outlines the bicycle parking requirements for the proposed development as per BCC's TAPS Code.

Table 5.1: Required Bicycle Parking Spaces

Type of User	Provision Rate	GFA for Calculation Purposes	Requirement
Employee	1 space / 500sq.m GFA	22, 656sq.m	46 spaces
Office Visitor	1 space / 750sq.m GFA	22,656sq.m	31 spaces
Total			**77 spaces**

Table 5.1 indicates that a total of 46 spaces are required for staff and 31 spaces are required for visitors.

In addition to the provision of bicycle spaces, one locker is required per two employee bicycle parking spaces and one shower cubicle (with ancillary change rooms) is required per 10 employee bicycle spaces. Provision for both females and males are required.

Based on the above, the development is required to provide 23 lockers and five showers with ancillary change rooms.

The BCC TAPS Code requires that the bicycle parking and storage areas are designed in accordance with the superseded AUSTROADS Traffic Engineering Practice, Part 14 – Bicycles.

The development plans show parking for 93 staff bicycles and 19 visitor bicycles located on Lower Ground 1.

Given that the proposed development is not a typical office use where visitors are expected on a regular basis, the visitor bicycle parking rate is considered excessive for the use of the site. In this regard, dedicated visitor parking has been provided in the form of 19 visitor bicycle parking spaces adjacent to the staff bicycle parking facilities. The provision of 19 visitor spaces is deemed to be adequate to more than cater for the anticipated demand.

6. Loading Facilities

6.1 Accessibility

The proposed development is expected to provide for regular access by an LRV.

A swept path analysis has been conducted using the computer program *AutoTurn*, the results of which are contained at Appendix B. The results of this analysis indicate that an LRV design vehicle can manoeuvre as required above and the swept path (plus the required clearances) can be accommodated within the access easement to the rear of the site.

6.2 Loading Bay Requirements

The proposed development will provide the following loading bay provisions based on the anticipated servicing demand at the laboratory facility:

- one 11m by 4.5m LRV bay
- one 9m by 4.5m MRV bay
- five 5.4m by 3.0m van bays.

A loading area is proposed to be located to the rear of the site gaining access within the Markwell Street reserve and via the Best Street road stub. Van loading bays are located on Lower Ground 2 within the courier parking area. The dimensions of the loading bays exceed the statutory requirements listed above.

The swept path assessment indicates that the required design vehicles can manoeuvre in and out of the loading bays as required.

6.3 Refuse Collection

The refuse area is located adjacent to the loading dock on Lower Ground 2. The accessibility of this area has been tested for a 12.5m LRV.

The results of the swept path analysis indicate that a refuse collection vehicle can manoeuvre in and out of the loading / refuse collection area.

6.4 Gradients

The gradients of the access ramps / circulation roads have been reviewed against the requirements of the TAPS Policy. The proposed grades will meet the transition and grade requirements for LRV design vehicles which is 1:10 for ramps and 1:25 for manoeuvring areas.

7. Traffic Impact Assessment

7.1 Assessment Scenarios

To assess the impact of this development it is appropriate to have consideration to a relevant "Base Case" against which to test the development impact. A "Base Case" examines the performance of the road network *without* the proposed development at the key points in time. The standard key points in time are typically opening year and 10 years post development, however staging may be relevant.

It has been advised that Stage 1 of the development is likely to be operational by 2014.

The following assessment scenarios have been undertaken:

- year 2014 base case
- year 2014 with development
- year 2024 base case
- year 2024 with development.

To forecast the without development traffic flows, a 1% per annum growth rate (compound) has been applied to the traffic counts collected in December 2012, due to limited capacity and current saturation levels of the inner-city external road network during peak periods.

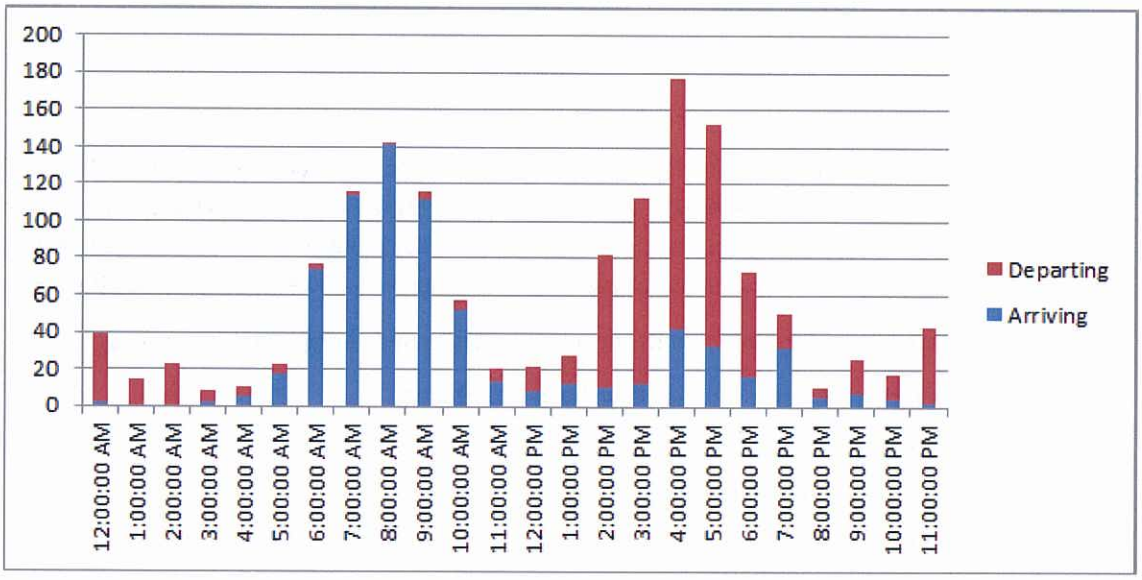
7.2 Traffic Generation

7.2.1 Design Rates

Given the unique characteristics of the pathology laboratory, there are no standard generation rates which can be reasonably applied to the proposed use. In this regard, the design traffic generation estimates adopted for the proposed development have been sourced from employee and vehicle movement surveys conducted at the existing SNP Facility located at Taringa.

The distribution of staff trips throughout the day has been shown graphically in Figure 7.1.

Figure 7.1: Daily Staff Distribution



As can be seen, the site has defined peak periods from 8:00am to 9:00am in the morning and 4:00pm to 5:00pm in the afternoon.

The surveys have also specified the following peak hours periods:

- AM Peak Hour – 7:30am – 8:30am
- PM Peak Hour – 4:45pm – 5:45pm.

An estimate of peak hour and daily traffic volumes resulting from the proposal are set out in Table 7.1.

Table 7.1: Estimated Development Traffic Generation

Use	AM Peak Hour		PM Peak Hour		Source
	Inbound	Outbound	Inbound	Outbound	
Staff	141 vehicles	27 vehicles [1]	42 vehicles	135 vehicles	SNP staff survey [2]
SNP Couriers	5 vehicles	5 vehicles	5 vehicles	5 vehicles	Conservative assumption based on SNP survey data
External Couriers	7 vehicles	7 vehicles	4 vehicles	4 vehicles	SNP survey data
Service Vehicles	2 vehicles	1 vehicle	0 vehicles	0 vehicles	SNP survey data
Total	**155 vehicles**	**40 vehicles**	**51 vehicles**	**144 vehicles**	
	195 vehicles		**195 vehicles**		

[1] Outbound AM peak trips anticipated to be approximately one vehicle, however the value has been increased to provide a conservative and balanced assessment similar to the volumes during the PM peak hour.
[2] Vehicle volumes have been determined by disregarding staff public transport trips from travel survey data.

Table 7.1 indicates the proposed development could be expected to generate approximately 195 vehicles during the both the AM and PM peak hour periods on a typical weekday.

7.2.2 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:

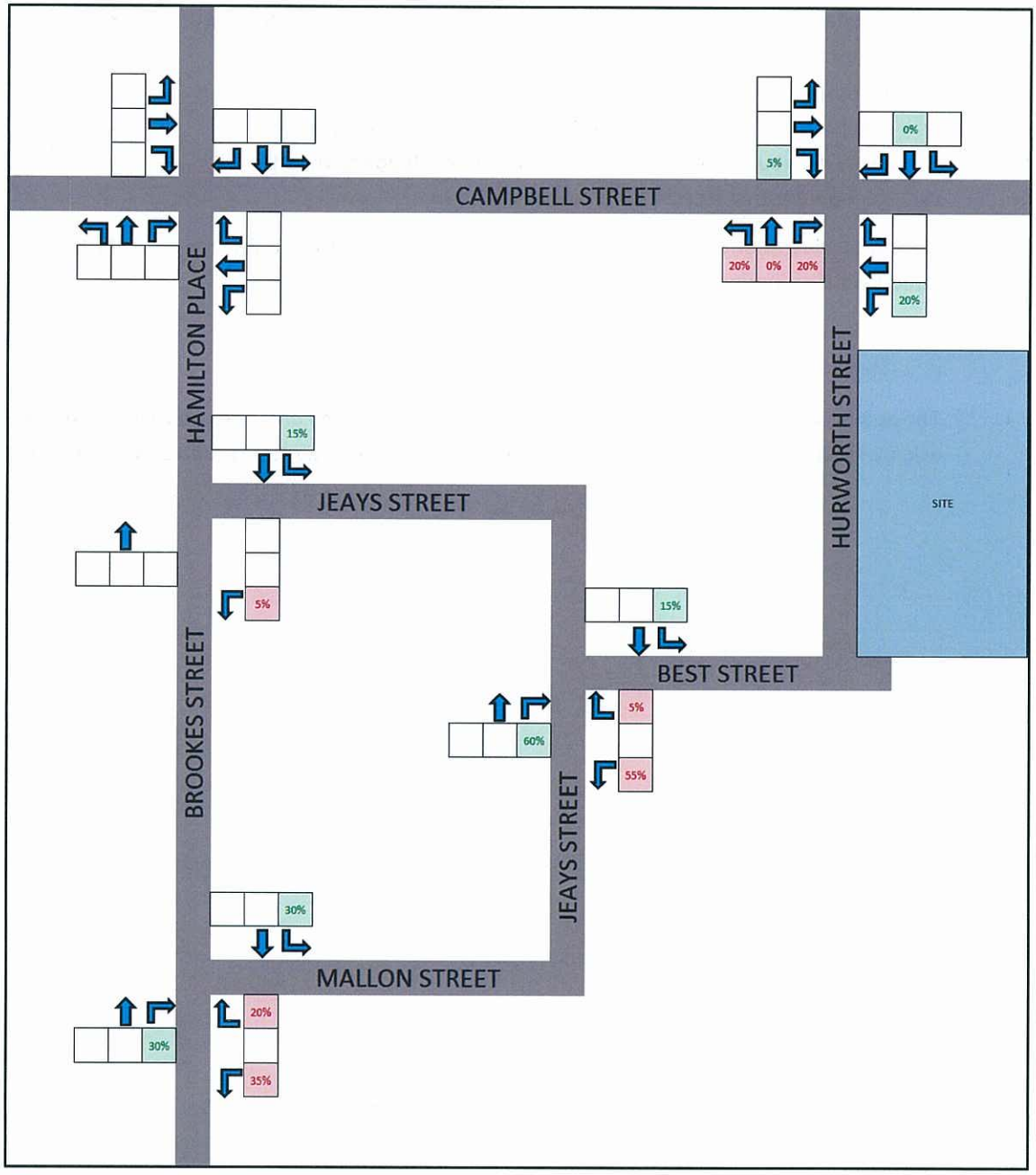
i configuration of the arterial road network in the immediate vicinity of the site
ii existing operation of intersections providing access between the local and arterial road network
iii distribution of households in the vicinity of the site
iv surrounding medical centres and hospitals in relation to the site
v likely distribution of employee's residences in relation to the site
vi 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:

- 40% north
- 60% south.

The abovementioned assumptions have been further distributed onto the external road network acknowledging the surrounding intersection layouts and major transport routes as shown in Figure 7.2.

Figure 7.2: Assumed Traffic Distribution



In addition, the directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) has been taken directly from the SNP survey data to gain an accurate depiction of the likely traffic movements during each peak hour period.

Based on the above, Figure 7.3 and Figure 7.4 have been prepared to show the estimated marginal increase in turning movements in the vicinity of the subject property following full site development.

Figure 7.3: AM Peak Hour Site Generated Traffic Volumes

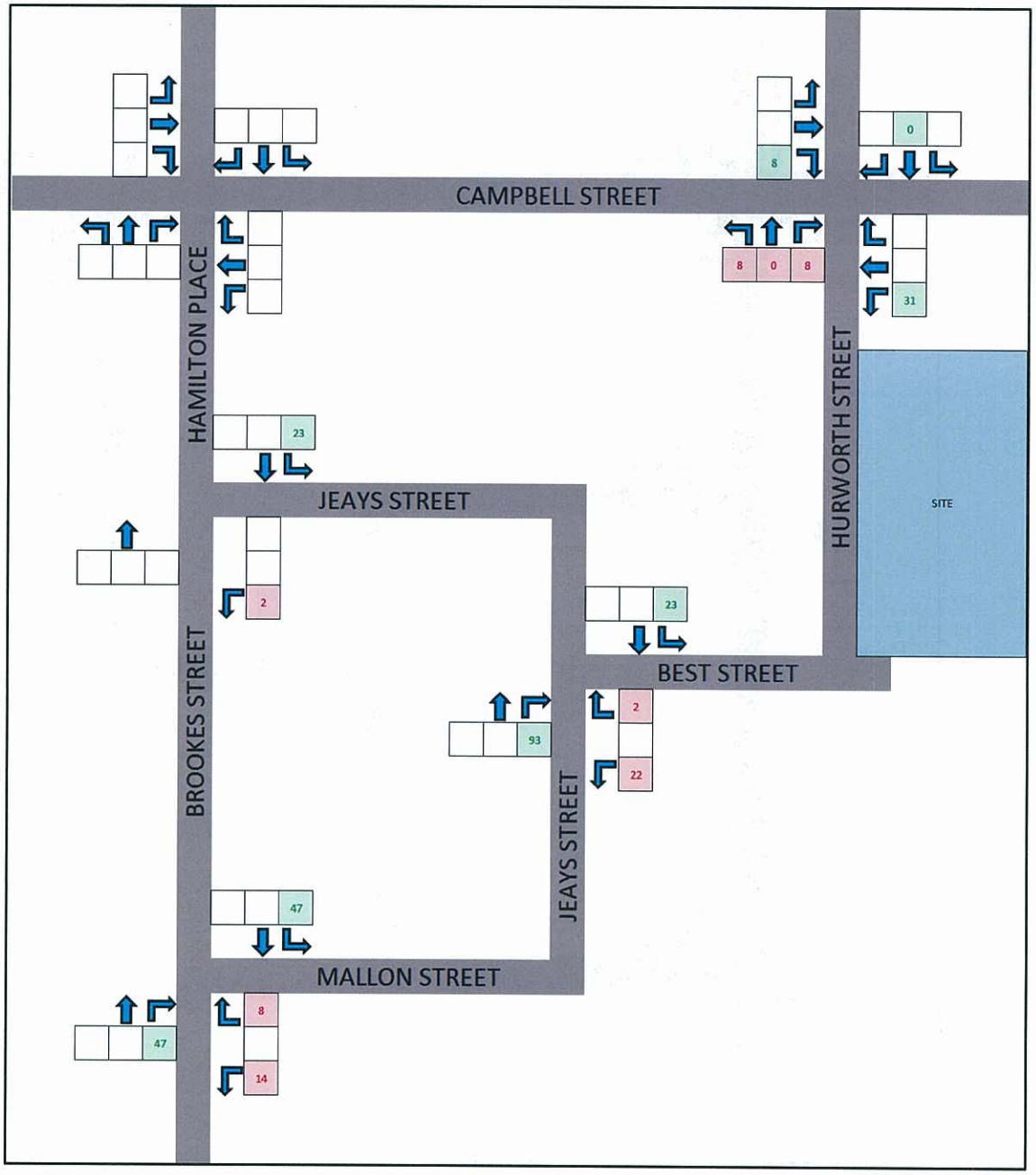
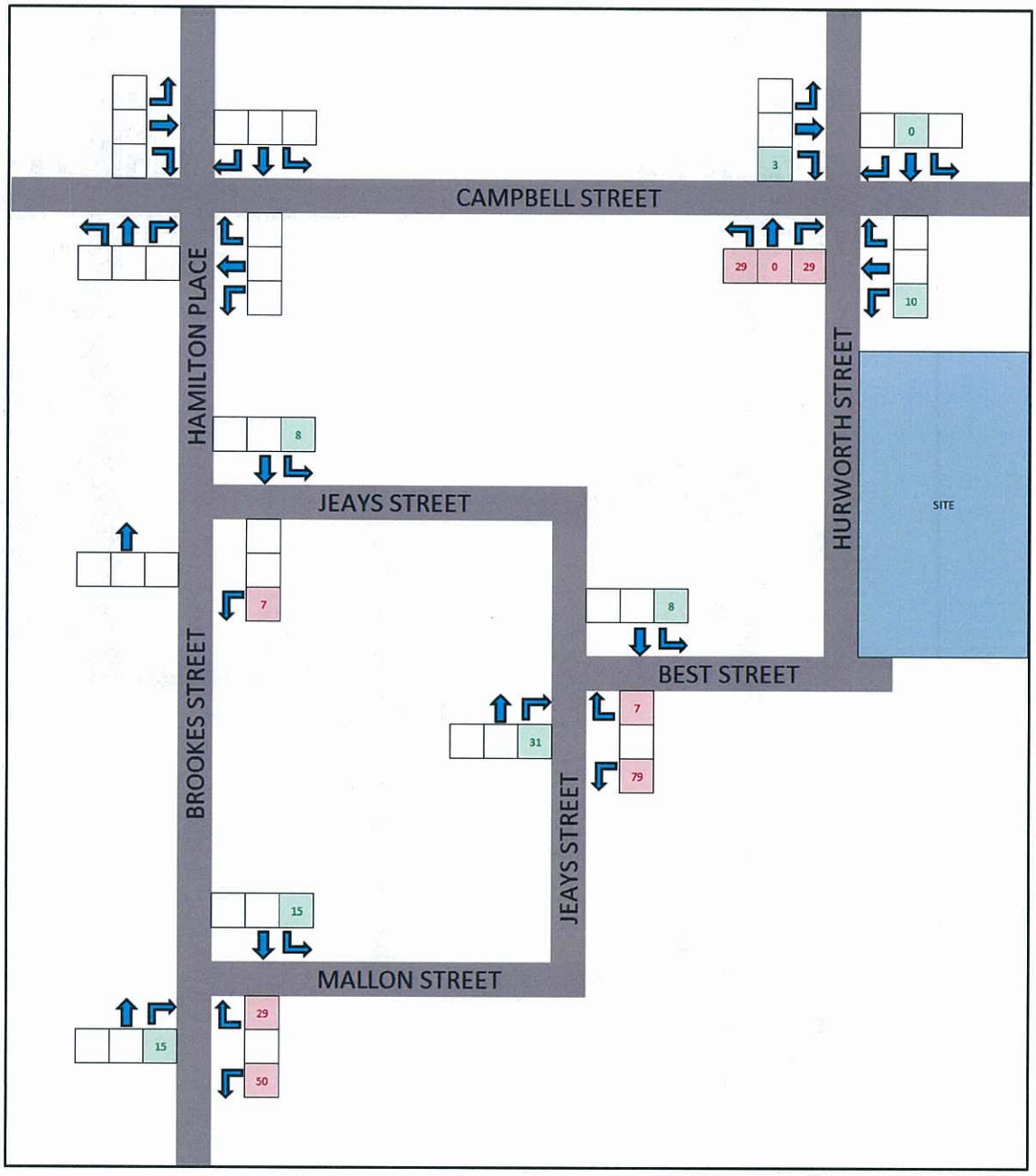


Figure 7.4: PM Peak Hour Site Generated Traffic Volumes



7.3 Intersection Operation

7.3.1 SIDRA Intersection

The operation of subject intersections has been assessed using SIDRA Intersection[9] (SIDRA), a computer based modelling package which calculates intersection performance.

[9] Program used under license from Akcelik & Associates Pty Ltd.

The commonly used measure of intersection performance is referred to as the *Degree of Saturation (X)*. The X-value represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. For signalised intersections, an X-value of around 0.90 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately[10]. For unsignalised intersections an X-value of 0.80 is typically the 'ideal' limit.

The following sections set out findings of SIDRA assessments of the key intersection in the vicinity of the site.

7.3.2 Campbell Street / Hurworth Street Intersection

The operation of the Campbell Street / Hurworth Street intersection has been assessed using SIDRA INTERSECTION *(SIDRA)*. Table 7.2 presents a summary of the anticipated future operation of the Campbell Street / Hurworth Street intersection following the full development of the site. Detailed results of this analysis are provided in Appendix C of this report.

[10] SIDRA INTERSECTION adopts the following criteria for Level of Service assessment:

Level of Service		Intersection Degree of Saturation (X)	
		Unsignalised Intersection	Signalised Intersection
A	Excellent	<=0.50	<=0.60
B	Very Good	0.50-0.70	0.60-0.75
C	Good	0.70-0.80	0.75-0.90
D	Acceptable	0.80-0.90	0.90-0.95
E	Poor	0.90-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0

Table 7.2: Campbell Street / Hurworth Street Intersection

Assessment Scenario	Approach	Base Case			With Development		
		DOS (X)	Average Delay (sec)	95th Percentile Queue (m)	DOS (X)	Average Delay (sec)	95th Percentile Queue (m)
2014 AM Peak	Hurworth Street	0.13	18 sec	3m	0.19#	19 sec	5m
	Campbell Street (east)	0.13	2 sec	9m	0.14	2 sec	10m
	Hazelmount Street	0.04	17 sec	1m	0.04	18 sec	1m
	Campbell Street (West)	0.14#	2 sec	9m	0.14	2 sec	9m
2014 PM Peak	Hurworth Street	0.16	28 sec	4m	0.51#	39 sec	15m
	Campbell Street (east)	0.20#	2 sec	14m	0.20	2 sec	15m
	Hazelmount Street	0.11	21 sec	2m	0.12	22 sec	3m
	Campbell Street (West)	0.15	3 sec	13m	0.15	3 sec	13m
2024 AM Peak	Hurworth Street	0.17#	20 sec	4m	0.20#	21 sec	5m
	Campbell Street (east)	0.15	2 sec	10m	0.16	3 sec	11m
	Hazelmount Street	0.05	19 sec	1m	0.05	19 sec	1m
	Campbell Street (West)	0.15	2 sec	11m	0.16	2 sec	11m
2024 PM Peak	Hurworth Street	0.24#	37 sec	5m	0.68#	61 sec	21m
	Campbell Street (east)	0.22	2 sec	17m	0.22	2 sec	18m
	Hazelmount Street	0.16	26 sec	3m	0.17	27 sec	4m
	Campbell Street (West)	0.16	3 sec	16m	0.17	3 sec	16m

DOS – Degree of Saturation, # - Intersection DOS

On the basis of the above the Campbell Street / Hurworth Street intersection operates within capacity with full development to the year 2024.

7.3.3 Hamilton Place / Jeays Street Intersection

The operation of the Hamilton Place / Jeays Street intersection has been assessed using SIDRA INTERSECTION *(SIDRA)*. Table 7.2 presents a summary of the anticipated future operation of the Hamilton Place / Jeays Street intersection following the full development of the site. Detailed results of this analysis are provided in Appendix C of this report.

Table 7.3: Hamilton Place / Jeays Street Intersection

Assessment Scenario	Approach	Base Case			With Development		
		DOS (X)	Average Delay (sec)	95th Percentile Queue (m)	DOS (X)	Average Delay (sec)	95th Percentile Queue (m)
2014 AM Peak	Hamilton Place (south)	0.19	0 sec	0m	0.19	0 sec	0m
	Jeays Street	0.06	16 sec	2m	0.07	16 sec	2m
	Hamilton place (north)	0.24#	0 sec	0m	0.25#	1 sec	0m
2014 PM Peak	Hamilton Place (south)	0.23#	0 sec	0m	0.23#	0 sec	0m
	Jeays Street	0.02	12 sec	1m	0.04	13 sec	1m
	Hamilton place (north)	0.16	0 sec	0m	0.16	0 sec	0m
2024 AM Peak	Hamilton Place (south)	0.20	0 sec	0m	0.20	0 sec	0m
	Jeays Street	0.08	17 sec	2m	0.08	18 sec	2m
	Hamilton place (north)	0.26#	0 sec	0m	0.27#	1 sec	0m
2024 PM Peak	Hamilton Place (south)	0.25#	0 sec	0m	0.25#	0 sec	0m
	Jeays Street	0.03	13 sec	1m	0.04	13 sec	1m
	Hamilton place (north)	0.17	0 sec	0m	0.17	0 sec	0m

DOS – Degree of Saturation, # - Intersection DOS

On the basis of the above the Hamilton place / Jeays Street intersection operates within capacity with full development to the year 2024.

7.3.4 Best Street / Jeays Street Intersection

The operation of the Best Street / Jeays Street intersection has been assessed using SIDRA INTERSECTION *(SIDRA)*. Table 7.2 presents a summary of the anticipated future operation of the Best Street / Jeays Street intersection following the full development of the site. Detailed results of this analysis are provided in Appendix C of this report.

Table 7.4: Best Street / Jeays Street Intersection

Assessment Scenario	Approach	Base Case			With Development		
		DOS (X)	Average Delay (sec)	95th Percentile Queue (m)	DOS (X)	Average Delay (sec)	95th Percentile Queue (m)
2014 AM Peak	Jeays Street (south)	0.03#	2 sec	1m	0.09#	6 sec	3m
	Best Street	0.03#	9 sec	1m	0.04	9 sec	1m
	Jeays Street (north)	0.02	3 sec	0m	0.04	5 sec	0m
2014 PM Peak	Jeays Street (south)	0.02	3 sec	1m	0.04	6 sec	1m
	Best Street	0.02	9 sec	1m	0.08#	9 sec	2m
	Jeays Street (north)	0.03#	1 sec	0m	0.03	2 sec	0m
2024 AM Peak	Jeays Street (south)	0.03#	2 sec	1m	0.09#	6 sec	3m
	Best Street	0.03#	9 sec	1m	0.05	9 sec	1m
	Jeays Street (north)	0.03#	3 sec	0m	0.04	5 sec	0m
2024 PM Peak	Jeays Street (south)	0.02	3 sec	1m	0.04	6 sec	1m
	Best Street	0.03#	9 sec	1m	0.09#	9 sec	2m
	Jeays Street (north)	0.03#	1 sec	0m	0.04	2 sec	0m

DOS – Degree of Saturation, # - Intersection DOS

On the basis of the above the Jeays Street / Best Street intersection operates within capacity with full development to the year 2024.

7.3.5 Brookes Street / Mallon Street Intersection

The operation of the Brookes Street / Mallon Street intersection has been assessed using SIDRA INTERSECTION *(SIDRA)*. Table 7.2 presents a summary of the anticipated future operation of the Brookes Street / Mallon Street intersection following the full development of the site. Detailed results of this analysis are provided in Appendix C of this report.

Table 7.5: Brookes Street / Mallon Street Intersection

Assessment Scenario	Approach	Base Case			With Development		
		DOS (X)	Average Delay (sec)	95th Percentile Queue (m)	DOS (X)	Average Delay (sec)	95th Percentile Queue (m)
2014 AM Peak	Brookes Street (south)	0.14	3 sec	9m	0.19	3 sec	7m
	Mallon Street	0.11	16 sec	3m	0.20	19 sec	5m
	Brookes Street (north)	0.22#	1 sec	0m	0.23#	1 sec	0m
2014 PM Peak	Brookes Street (south)	0.19	2 sec	12m	0.20	2 sec	13m
	Mallon Street	0.23#	24 sec	6m	0.53#	26 sec	19m
	Brookes Street (north)	0.14	0 sec	0m	0.14	1 sec	0m
2024 AM Peak	Brookes Street (south)	0.16	4 sec	10m	0.22	3 sec	8m
	Mallon Street	0.14	19 sec	3m	0.19	21 sec	5m
	Brookes Street (north)	0.24#	1 sec	0m	0.25#	1 sec	0m
2024 PM Peak	Brookes Street (south)	0.21	2 sec	15m	0.22	2 sec	15m
	Mallon Street	0.37#	26 sec	10m	0.69#	38 sec	29m
	Brookes Street (north)	0.15	0 sec	0m	0.16	1 sec	0m

DOS – Degree of Saturation, # - Intersection DOS

On the basis of the above the Brookes Street / Mallon Street intersection operates within capacity with full development to the year 2024.

8. Conclusion

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

i The proposed development generates a maximum statutory parking requirement of 227 spaces as per BCC's Draft TAPS Policy.

ii The proposed supply of 319 spaces exceeds the maximum statutory rate, however, is appropriate given the anticipated demand and operations of the development proposal.

iii The proposed parking layout is consistent with the dimensional requirements as set out in the TAPS Policy and/or Australian / New Zealand Standard for Off Street Car Parking (AS / NZS2890.1:2004 and AS / NZS2890.6:2009).

iv The provision for bicycle facilities has been accommodated for by the proposed development.

v The provision of loading has been determined to meet the anticipated demand and is consistent with the dimensional requirements of the TAPS Policy.

vi The site is expected to generate up to 195 vehicle movements in the AM and PM peak hour periods.

vii There is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development.