Figure 2.9: Public Transport Network

2.8 Pedestrian and Cycle Infrastructure

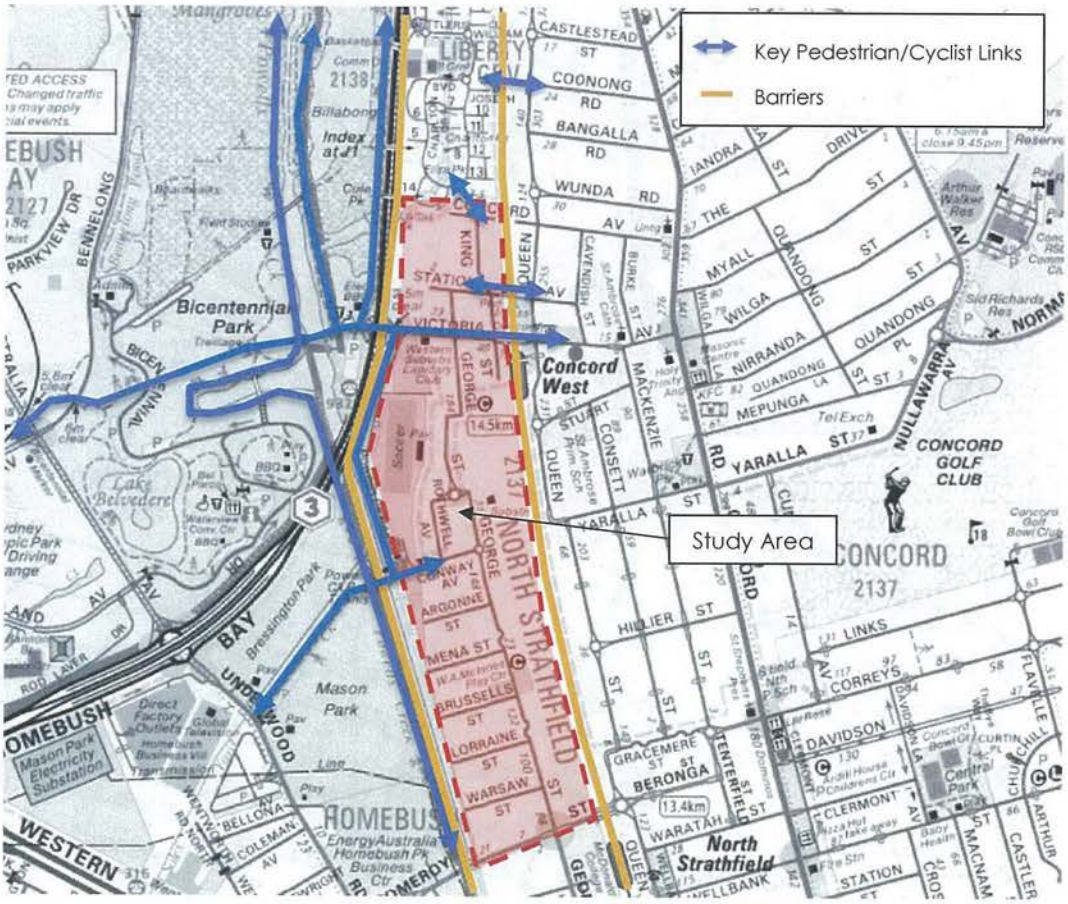
There are a number of barriers (Homebush Bay Drive, the railway line, Powell's Creek and Liberty Grove) that limit the full integration of the local pedestrian/cycle network into the broader network. However, unlike the traffic network there are a number of access points at these key barriers, as follows:

- Homebush Bay Drive at Victoria Avenue
- Powell's Creek crossings at Conway Avenue and Pomeroy Street
- Railway Line at Pomeroy Street, Victoria Avenue (at the station) and Station Avenue
- Liberty Grove at Concord Avenue

In addition to the above links, pedestrian footpaths are generally provided on both sides of each of the roads within the study area. A number of off-road paths are provided to the west of the study area in the vicinity of Bicentennial Park.

The fine grain pedestrian/cycle network is illustrated in Figure 2.10.

Figure 2.10: Pedestrian and Cycle Networks



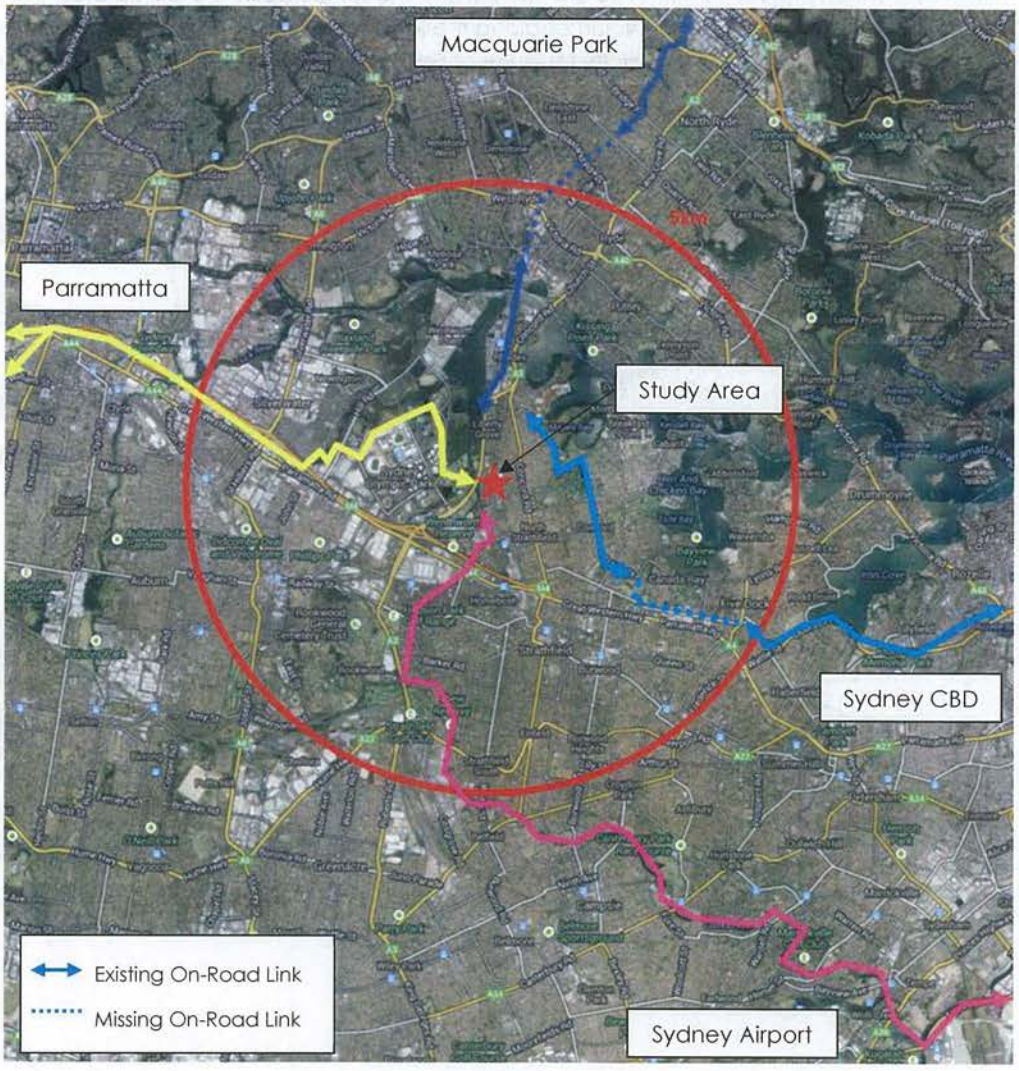
There is an extensive network of the regional cycling links in the vicinity of the study area, including connectivity to the following areas:

- Macquarie Park to the north
- Sydney CBD to the east
- Sydney Airport to the south
- Parramatta to the west

There are some gaps within the above links, particularly to the north and east that are progressively being developed.

Figure 2.11 provides an overview the regional bike network. A typical cyclist commutes up to 10km to work which suggests that accessing Macquarie Park and Parramatta CBD are realistic options for residents of the study area.

Figure 2.11: Regional Cycle Network



2.9 WestConnex

Once completed, the WestConnex project will provide a new continuous 33km link between the M4 and M5 Motorways. The project is to be delivered in 3 stages, commencing in 2015 with anticipated final completion date of 2023.

Key benefits of the WestConnex project have been sourced from the WestConnex Delivery Authority website, reproduced below:

- *"Provide quicker, more reliable trips between Western Sydney and the Port Botany/Sydney Airport precinct to support Sydney's urban freight task*
- *Help distribute traffic across the wider road network, removing bottlenecks and relieving congestion for local trips*
- *Provide better connections along the M4 and M5 corridors to cater for the forecast growth in employment and population along these routes*
- *Allow urban revitalisation and increase opportunities for active and public transport along and across Parramatta Road."*

The WestConnex project will increase capacity along the M4 corridor. It is anticipated that the project will reduce existing traffic volumes along the length of Parramatta Road and in turn potentially create additional capacity for lower order streets that intersect Parramatta Road.

An overview of the project is illustrated in Figure 2.12.

Figure 2.12: WestConnex Overview

Source: http://www.westconnex.com.au/

3. Future Land Use Scenario

3.1 Master Plan Overview

An overview of the indicative Master Plan is provided in Figure 3.1.

Figure 3.1: Concord West Master Plan Overview

Source: JBA

3.2 Residential Yield

As previously noted, the study area is divided into seven (7) sites. It is noted that this assessment does not include any future redevelopment of the Westpac Data Centre site (Site 4).

Table 3.1 provides a summary of the indicative development yields for each of the sites. It is noted that no retail or commercial land uses have been anticipated at this stage (i.e. residential land uses only).

Table 3.1: Indicative Development Schedule [1]

Site	Site Name	Site Area	Anticipated Max No. of Storeys	No. of Residential Apartments
1	7 Station Street	14,968sq.m	7	*785 dwellings*
2	204-210 George Street	5,028sq.m	2-6	
3	3 King Street	809sq.m	2-4	
5	George Street	7,806sq.m	2-6	
6	Rothwell Street	9,404sq.m	2-4	
7	25 George Street	7,402sq.m	4-6	

[1] Sourced from JBA Planning Draft Masterplan.

On the basis of the above, an indicative residential yield of 785 apartments has been adopted for the traffic assessment.

4. Car Parking Considerations

4.1 Existing DCP Car Parking Requirements

The car parking requirements for different development types are set out in Part 6 of the City of Canada Bay Council's DCP 'Residential: Controls for detached dual occupancies, multi dwelling housing & residential flat buildings'. In terms of parking and access the DCP states that:

"The provision of car parking should reasonably satisfy the needs of current and future residents. New development should accommodate parking for visitors and residents within the site and minimise excavation."

The minimum car parking requirements for residential uses are set out in Section 6.4.8 of the DCP and are summarised in Table 4.1 below.

Table 4.1: Off-Street Parking Minimum Requirements Residential Buildings

	Resident Parking	Visitor Parking	Disabled Parking
Detached Dual Occupancy	1 per dwelling	Nil	Nil
Multi Dwelling Housing & Residential Flat Buildings	Small – 1 per dwelling Medium – 1.5 per dwelling Large 2.0 per dwelling	≤ 5 dwellings – 1 spaces > 5 dwellings – 0.5 spaces per dwelling	Reference should be made to Adaptable Housing Requirements

The above DCP rates are generally applicable for the entire City of Canada Bay LGA Area, however, there are precincts within the LGA that are subject to specific parking controls that vary from the generic car parking rates presented above. Typically locations subject to site-specific parking controls are located within town centres, urban renewal areas and/or close to public transport nodes.

In this regard, it is considered appropriate that specific residential car parking rates be developed for the study area.

4.2 Reduced Car Parking Rates

As detailed above, the current car parking controls (City of Canada Bay DCP) for the study area recommend a minimum car parking provision be provided for residential land uses. Limiting on-site car parking provisions for future multi-dwelling residential uses in the study area is considered appropriate for the following reasons:

i Study areas accessibility to public transport
ii Reduce traffic generation from the study area
iii Minimise impact on the George Street / Pomeroy Street intersection
iv Existing pedestrian and cycle links in the vicinity of the study area.

In order to determine an appropriate future car parking rate reference has been made to the following sources:

- Other car parking controls in Canada Bay(Rhodes West)
- RMS recommended car parking rates
- ABS car ownership data for existing residents.

4.2.1 Rhodes West Development Control Plan

Rhodes West is located approximately 1.5km to the north of the study area within the City of Canada Bay LGA. It is located adjacent to Rhodes Railway Station, has been identified for significant urban renewal and is subject to specific planning controls. The car parking requirements for residential uses within Rhodes West are set out in Section 4.3.29 of the Rhodes West DCP. The Strategy for on-site car parking is reproduced below:

"The higher residential density and mixed-use envisaged for the Rhodes Peninsula will enhance public transport use and viability and reduce travel demand. This DCP promotes public transport use by minimising car parking requirements whilst providing for on-site service vehicle parking."

Table 4.2 provides a summary of the DCP car parking provisions for Rhodes West. It is noted that a maximum car parking rate is imposed on resident parking provisions.

Table 4.2: Rhodes West Car Parking Controls

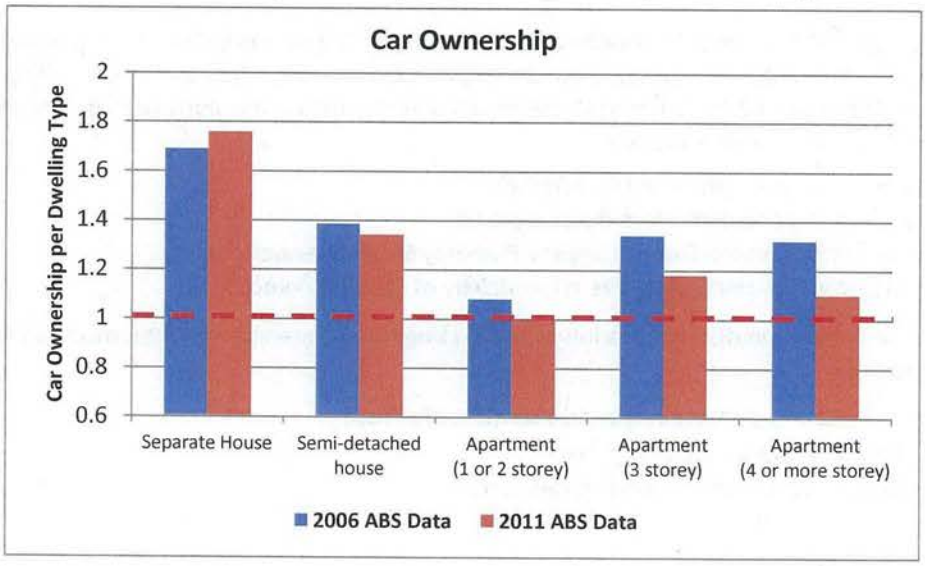
Use	Type	Rate
Residential	All dwelling types	Max 1 space per dwelling (average)
	Visitors	Max 1 space per 10 apartments, min 1 space per 20 apartments
	Service vehicles	Max 1 space per 50 apartments for first 200 apartments plus 1

4.2.2 ABS Car Ownership Data

In order to assess the likely car ownership of the future residents reference has been made to the 2006 and 2011 Census undertaken by the Australian Bureau of Statistics (ABS). The Census collected data on the car ownership levels associated with a variety of dwelling types and in this instance GTA have reviewed the car ownership levels of different housing stock (separate/ detached house, semi-detached house, apartment building etc.) for postcode: 2138 (Concord West, Liberty Grove, Rhodes).

The average car ownership data for the different housing stock in 2006 and 2011 are illustrated in Figure 4.1.

Figure 4.1: Car Ownership Data Comparison 2006 and 2011 (Postcode 2138)



The 2011 ABS data indicates that apartments (all types) have average car ownership rates of between 1.0 and 1.2 cars per dwelling. Of particular note, Figure 4.1 indicates that with the exception of 'separate house' the car ownership for all dwelling types reduced between 2006 and 2011. In addition, the number of dwellings with zero car ownership increased from 290 to 532 between 2006 and 2011 (83% increase).

Based on the above it is concluded that car ownership rates for apartment residents in the vicinity of the site are on the decline.

4.2.3 RMS Guidance

Reference to the RMS *'Guide to Traffic Generating Developments'* (2002) indicates the following resident car parking rates for high density residential uses in Metropolitan Sub-Regional Centres:

- *0.6 spaces per 1 bedroom unit.*
- *0.9 spaces per 2 bedroom unit.*
- *1.4 spaces per 3 bedroom unit.*

4.3 Recommended Future Car Parking Rates

Having regard for the above, it is recommended that multi-dwelling residential developments within the study area are subject to maximum car parking rates, as follows:

- Maximum one resident car parking space per dwelling
- One visitor space per 5 to 10 dwellings (based on block size and parking layout).

In order to ensure the effective implementation of the above car parking rates it is recommended that the following measures are implemented:

- introduction of a resident car parking scheme (details to be confirmed)
- introduction of time restricted on-street car parking in the vicinity of the railway station to discourage commuter car parking as well as at strategic locations within the study area
- provision of appropriate end of trip bicycle facilities (see Section 6).

4.4 Resident Parking Scheme

As detailed above it is recommended that a resident parking scheme be implemented to manage future on-street car parking demands in the vicinity of the development sites. Eligibility for the resident parking scheme would be limited to existing residents of the precinct and would not be available to residents of the rezoned lands. Typically, resident parking schemes are only available to residents of single dwelling properties with access to one or less off-street car parking spaces. If this were to be implemented, existing dwellings with access to two or more off-street spaces would not be eligible for the scheme.

The details of any future resident parking scheme would need to be determined as part of a detailed parking study for the area. The study would identify the following:

- Eligibility criteria for resident parking permits
- Extent of the scheme
- Complementary car parking restrictions.

The resident parking scheme should be implemented prior to resident occupation of the rezoned lands.

It is noted that the study area is already subject to 2P Special Event parking restrictions when large events take place at the adjacent Sydney Olympic Park precinct.

The introduction of a resident parking scheme and time restricted parking would limit non-residential car parking demands within the study area generated by commuter parking associated with the Concord West railway station and employee parking associated with the Sydney Olympic Park precinct.

5. Sustainable Transport Infrastructure

5.1 Preamble

As detailed in the introduction of this report, when Council resolved to endorse the redevelopment of the industrial lands it noted:

"THAT the planning for the precinct occurs on the assumption that new development will prioritise pedestrians, bicycles and the use of public transport"

The rezoned lands have the following attributes and as such are proposed to be developed as transport oriented developments:

- Good accessibility to public transport facilities
- Walkable neighbourhood with access to recreational facilities
- End-of-trip bicycle facilities
- Limited resident car parking provisions (approximately 1 space per dwelling).

In this regard, the following sections identify measures that could be implemented to promote the use of sustainable transport modes (non-private motor vehicle) to access the site.

5.2 Bicycle End-of-Trip Facilities

Part 3.7 of the City of Canada Bay DCP recommends that bicycle parking be provided for residential uses, as follows:

- Resident: 1 space per apartment
- Visitor: 1 space per 12 apartments

It is recommended that the residential bicycle parking rates specified above be applied for future development of the rezoned lands and treated as a minimum provision.

5.3 Walking and Cycling Network

5.3.1 Network Upgrades

The existing fine grain and regional bicycle and pedestrian networks are presented in Section 2 of this report. A number of opportunities to improve the local pedestrian and cycle network have been identified, as follows:

- improved streetscape (including an upgrade of existing footpaths)
- new off-road link to the west of sites 1 and 2
- new off-road link between Liberty Grove and Homebush Bay Drive
- improved north-south link on George Street (e.g. cycleway, shared path, on-road lanes)
- continuation of above George Street facilities along King Street, should Site 4 (Westpac Data Centre) be redeveloped in the future
- improved east-west link on Victoria Avenue between Homebush Bay and the rail crossing (potential for integration with broader street improvements)
- improved links to Powell's Creek Reserve
- Powell's Creek crossing on the north side of Pomeroy Street
- provision of future formal Shared Zone treatments within rezoned lands to prioritise pedestrian and bicycle movements over vehicles.

Ideally new east-west links would be provided across the railway line; however, they would likely be cost prohibitive.

An overview of the potential upgrades is provided in Figure 5.1.

Figure 5.1: Potential Bicycle Network Upgrades

5.3.2 Bicycle Treatments

As detailed above, there may be an opportunity to improve the existing cyclist facilities along George Street, as follows:

- separated cycleway
- on-road bike lanes
- shared path.

In regards to the potential provision of a separated cycleway, Table 5.1 provides an overview of the dimensional requirements of any potential future facility, should one be pursued on George Street.

Table 5.1: Carriageway Requirements – Cycleway

Component	Cross-Section Requirement	
	Desirable	Minimum
Cycleway	3.0m	2.4m
Separator	1.0m	400mm
Parking Lanes	2.1m	2.1m
Traffic Lane	3.2m	2.8m

Based on the above, there would be an opportunity to provide a separated cycleway and maintain parking on both sides of the carriageway at the northern end of George Street where the existing carriageway exceeds 12.6m wide, without the need to widen the existing kerb alignment.

Where the George Street carriageway is less than 12.6m wide, on-street car parking would only be able to be provided on one side of the carriageway.

It is recommended that the desirable traffic lane widths be provided at the southern end of George Street where traffic volumes are greater. As a result it is likely that on-street car parking could only be provided on one side of the carriageway. This would be feasible on the basis that the existing residential flat buildings have appropriate off-street parking provisions.

5.3.3 Shared Zones

A number of shared zone treatments are earmarked for a number of the development sites within the study area. A shared zone is defined by the Transport for NSW (TfNSW) as:

"A Shared Zone is a road or network of roads where the road space is shared safely by vehicles and pedestrians. The maximum speed limit is always 10 km/h.

There may be no road lines, kerb or gutter in a Shared Zone to show that pedestrians and vehicles are equal. Drivers must give way to pedestrians at all times.

Vehicles can only stop in a Shared Zone if they obey the parking signs and park in marked bays, if they are provided.

Drivers travelling at a lower speed are better able to control their vehicles and safely avoid impact with other road users."

To be considered for a Shared Zone treatment, each location should comply with the TfNSW Policy and Guidelines for Shared Zones. In this regard the following key characteristics should be met:

- the traffic volume in a Shared Zone should be less than 100 vehicles per hour and less than 1000 vehicles per day
- the current speed limit on a road earmarked to be a Shared Zone should be less than 50km/h
- a Shared Zone should be less than 400 metres in length
- the current carriageway should be a minimum of 2.8 metres in width
- the road must not be located along a bus or heavy vehicle route, except for delivery or garbage uses.

A high level review suggests that any Shared Zones provided within the future development sites would meet the above criteria. However, a detailed review of any future Shared Zone treatments would be required at the design stage.

5.4 Public Transport

As detailed earlier the study area has good public transport accessibility with the Concord West Railway Station located within a short walking distance of the majority of the study area. The rail services are complemented by bus services that operate along Concord Road to the east of the site.

The Concord West railway station is being upgraded as part of the Northern Sydney Freight Corridor (North Strathfield Underpass) upgrade works, including upgrades to the existing platforms, a new concourse over the railway lines and four lifts between the platforms and new aerial concourse, and station exterior improvements. The new station facilities will be DDA compliant and offer improved accessibility for future users of the station.

Public transport accessibility would be further enhanced with any public domain upgrades (including the proposed new station square), in addition to the bicycle and pedestrian network improvements identified above.

6. Traffic Impact Assessment

6.1 Intersection Upgrades

The George Street/ Pomeroy Street intersection is to be upgraded (via a consent condition) as part of the primary school (Victoria Avenue) development within the study area. A new left turn slip lane and 30m short auxiliary left turn lane will be provided on George Street (north approach).

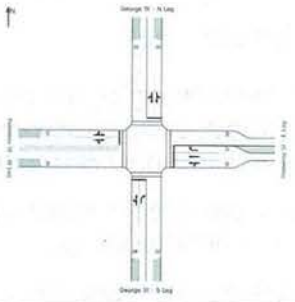
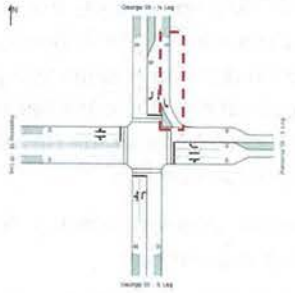
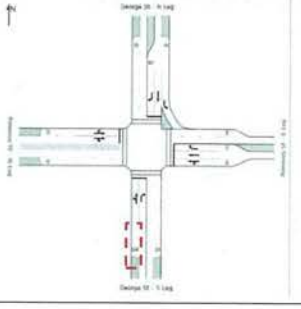
Additional intersection upgrades are recommended based on the likely traffic capacity required for the indicative site yields (i.e. total 785 dwellings).

It is proposed to lengthen the 'No Parking' restriction on the south approach from 40 m to 120m (i.e. to Malta Street) during the AM peak periods, consistent with the existing 'No Parking' restriction during the PM peak periods (3:00 to 7:00pm). The works will increase the capacity of the north (additional intersection approach lane) and south (additional queuing area and more capacity for the right turn) approaches to the intersection during the AM peak hour. The above works are considered satisfactory to cater for the development of 785 dwellings within the study area, as detailed in the following assessment.

Beyond this level of development, additional intersection works would be required to accommodate additional dwelling numbers.

The existing and proposed George Street/ Pomeroy Street intersection works are summarised in Table 6.1.

Table 6.1: George Street / Pomeroy Street Intersection Upgrades

Stage	Intersection Layout	Summary of Intersection Works
Existing Conditions		• No change
Post Primary School		• 30m left turn short lane and slip lane provided on the north approach
Post-Development (+785 dwellings)		• Extension of 'No Parking' restriction from 40m to 120m on the south approach during the AM peak hour

6.2 Traffic Generation

6.2.1 Subject Site

The rezoned lands are proposed to be developed as transit oriented developments. Reference has been made to the RMS *Guide to Traffic Generating Developments (2002)* which indicates a peak hour traffic generation rate of **0.29 movements per dwelling** for high density residential developments in metropolitan subregional centres.

It is noted that the more recent RMS Technical Direction (August 2013) indicates lower traffic generation rates than those quoted in the 2002 document. Figure 6.1 provides a summary of the traffic generation of each of the sites surveyed as part of the update, including a breakdown of the traffic generated by dwelling (unit) and car space.

Figure 6.1: Traffic Generation Summary – RMS Technical Direction

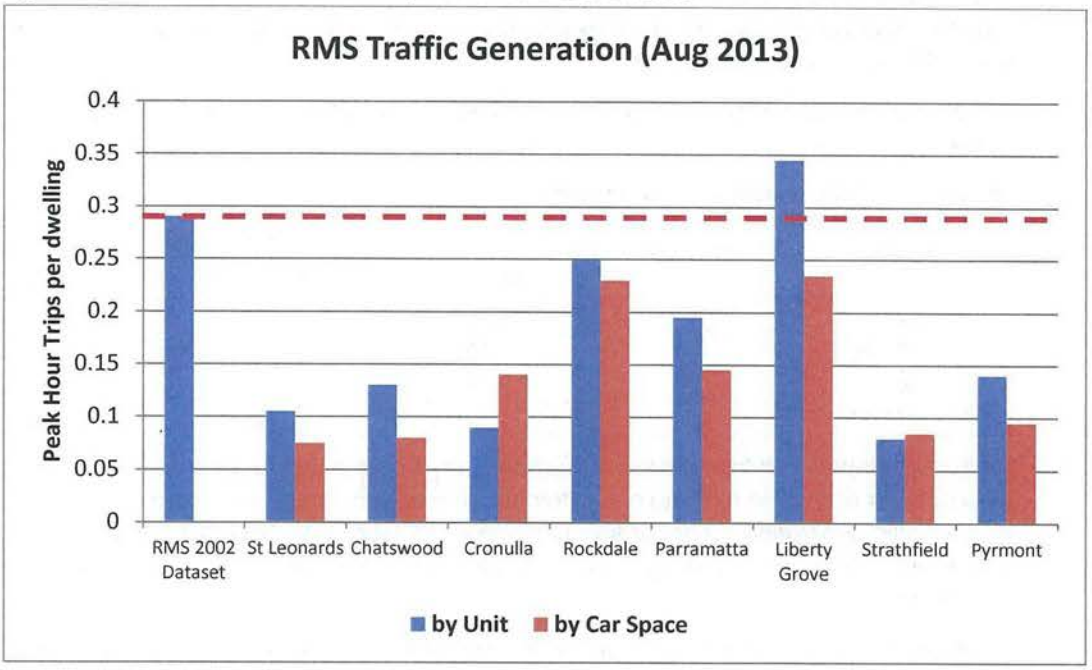


Figure 6.1 indicates that Liberty Grove located to the north of the site, generates traffic at a rate of 0.34 trips per dwelling per peak hour. The relatively high trip generation rate at Liberty Grove is reflective of the high on-site car parking provision at this location. In this regard, the Liberty Grove site generates traffic at a rate of 0.23 trips per car parking space.

Based on the above the traffic generation rate of 0.29 trips per peak hour is considered appropriate. This also confirms that limiting car parking provision (i.e. to 1 space per dwelling) should inturn reduce trip generation to and from the site.

The peak hour and daily traffic volumes for the post-development scenario are set out in Table 6.2.

Table 6.2: Traffic Generation Estimates

Stage	No. of Dwellings	Design Generation Rates		Traffic Generation Estimates	
		Peak Hour [1]	Daily	Peak Hour	Daily
Post Development	785	0.29 vehicle movements / dwelling	2.9 vehicle movements / dwelling	228	2,280

[1] Adopting a peak to daily ratio of 10%.

Table 6.2 indicates that the rezoned lands could be expected to generate some 230 and 2,300 peak hour and daily vehicle movements, respectively.

6.2.2 Other Development

Primary School

A new public primary school is currently under construction at 64-66 Victoria Avenue within the study area. The primary school will have up to 600 enrolments and is anticipated to open for the beginning of the 2015 school year. A transport impact assessment was prepared by McLaren Traffic Engineering (December 2012) on behalf of the Department of Education and Training.

The transport impact assessment includes an estimate of the peak hour traffic generation from the school and an assessment of the existing and post development operation of the George Street/ Pomeroy Street intersection.

The peak hour traffic generation estimates presented in the McLaren Report are reproduced below in Table 6.3.

Table 6.3: Primary School Traffic Generation

Period	Direction	Traffic Generation		
		Student Trips	Staff Trips	Total
AM (8:00 to 9:30am)	In	160	36	196
	Out	160	0	160
PM (2:30 to 4:00pm)	In	160	0	160
	Out	160	36	196

Table 6.3 indicates that the new primary school is anticipated to add some 356 vehicle trips to the road network during the morning and afternoon school peak hours. It is noted that the afternoon school traffic generation will occur prior to the evening road network peak hour, with the primary school not anticipated to generate any traffic during the evening road network peak hour (5:00 to 6:00pm).

As detailed above, an additional short left turn slip lane will be provided on the north approach of the George Street / Pomeroy Street intersection as part of the primary school project. These works will increase the capacity of the north approach to the intersection.

The traffic volumes used to assess the impact of the rezoned lands traffic generation includes both existing traffic as well as the estimated primary school traffic.

McDonald College

It is understood that McDonald College may seek to incorporate a new primary school within part of its existing grounds. However, Council are yet to receive any firm proposal for the site and as such, any change of use for the site has not been captured within the GTA traffic modelling.

Notwithstanding, a high level assessment of the potential traffic impact from the redevelopment of the McDonald College is presented in Appendix C.

In addition to any impacts on the George Street/ Pomeroy Street intersection, the primary school would impact on the midblock operation of George Street south of the intersection. The provision of increased turning movements into the school from George Street and increased pick-up/ drop-off activity on George Street would cause additional delays to through traffic on George Street. The increased congestion around the school could impact on the ability of non-school traffic to access the George Street/ Pomeroy Street intersection, particularly during the morning peak hour when the school peak corresponds with the road network peak.

It is noted that should additional development be provided at the site, it is envisaged that a transport impact assessment would be prepared to assess the impacts of any additional traffic generated by the site. In addition, similar to the primary school on Victoria Avenue and the study area itself, any significant development on the McDonald College site would require mitigation measures for associated traffic impacts on the local road network.

6.3 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 employment centres, retail centres and schools in relation to the site
v configuration of access points to the site.

Having consideration for the above, for the purposes of estimating vehicle movements, the existing peak hour directional distributions[4] at the George Street / Pomeroy Street intersection have been adopted.

In addition, the following directional splits of traffic (i.e. the ratio between the inbound and outbound traffic movements) have been adopted:

- AM Peak Hour: 30% in / 70% out
- PM Peak Hour: 70% in / 30% out

The base, additional and post development traffic volume scenarios are presented in Appendix D.

The assessment does not take into account any reduction in existing George Street traffic generated by industrial land uses as a result of the rezoning or a reduction in east-west traffic volumes through the intersection as a result of the WestConnex project. Nor does the assessment include traffic generated by future land uses to the south of the intersection such as the McDonald College expansion detailed above or any further works to the Bakehouse Quarter.

The development scenarios assessed are provided in Table 6.4.

Table 6.4: Development Scenarios Assessed

Assessment Includes	Base Case	Post-Development
Existing Traffic Volumes	✓	✓
Primary School Traffic Volumes (64-66 Victoria Avenue)	✓	✓
Development Traffic (+785 dwellings)	✗	✓
Existing Industrial Lands Traffic Volumes	✗	✗

The assessment does not take into account a reduction in network traffic volumes as a result of rezoning the industrial lands. Therefore the following assessment is considered conservative (higher traffic volumes assumes that may actually eventuate).

[4] The adopted distribution vary for each of the peak hours reflective of the current distributions to George Street.

6.4 Traffic Impact

6.4.1 George Street / Pomeroy Street Intersection

The post development traffic volumes for the base case and post-development scenario have been assessed for the George Street / Pomeroy Street intersection using SIDRA INTERSECTION. Table 6.5 presents a summary of the anticipated operation of the intersection, with full results presented in Appendix B of this report.

Table 6.5: George Street / Pomeroy Street Post Development Operating Conditions

Scenario	Peak	Leg	DOS	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Existing Conditions	AM	George Street (South)	0.69	39	43	D
		Pomeroy Street (East)	0.61	13	102	B
		George Street (North)	0.66	32	59	C
		Pomeroy Street (West)	0.89	34	184	C
	PM	George Street (South)	0.88	47	100	D
		Pomeroy Street (East)	0.60	18	91	B
		George Street (North)	0.83	43	103	D
		Pomeroy Street (West)	**0.90**	41	260	D
Post Primary School Development	AM	George Street (South)	0.61	37	54	D
		Pomeroy Street (East)	0.61	14	102	B
		George Street (North)	0.66	25	42	C
		Pomeroy Street (West)	**0.89**	33	184	C
	PM	George Street (South)	0.82	40	74	D
		Pomeroy Street (East)	0.48	13	67	B
		George Street (North)	0.76	30	43	C
		Pomeroy Street (West)	0.85	29	187	C
Post Development Scenario (+785 dwellings)	AM	George Street (South)	0.72	38	59	D
		Pomeroy Street (East)	0.68	14	102	B
		George Street (North)	0.87	28	56	C
		Pomeroy Street (West)	0.89	33	184	C
	PM	George Street (South)	0.74	39	96	D
		Pomeroy Street (East)	0.77	18	79	B
		George Street (North)	**0.90**	36	63	C
		Pomeroy Street (West)	0.89	36	231	D

Table 6.5 indicates that the George Street/ Pomeroy Street intersection is anticipated to operate with comparable Levels of Service to the existing operation of the intersection. Indeed the modelling indicates that the average queues and 95th percentile queues are anticipated to remain similar to those currently experienced at the intersection.

6.4.2 Pomeroy Street/ Queen Street/ Beronga Street

As detailed in Section 2, the Pomeroy Street / Queen Street / Beronga Street intersection is an irregular shaped roundabout that predominantly caters for east and westbound through movements. It is anticipated that any additional traffic generated by the development to the intersection will also be through movements.

Table 6.6 provides a summary of the existing and anticipated future traffic volumes at the Pomeroy Street/ Queen Street/ Beronga Street intersection.

Table 6.6: Pomeroy Street/ Queen Street/ Beronga Street Intersection Traffic Volumes

Development Scenario	Peak Hour Traffic Volumes	
	AM Peak Hour	PM Peak Hour
Existing	1,888	1,703
Base Case (with Primary School)	2,065	1,703
Post Development	2,164	1,787

Table 6.6 indicates that the additional traffic generated by the rezoned lands could generate some 100 and 80 traffic movements through the roundabout during the AM and PM peak hours, respectively.

It is anticipated that the roundabout would be able to accommodate this level of additional traffic. The additional traffic would add to the already dominant east-west through movements at the intersection. This may result in minor additional delays to traffic entering the roundabout from the side streets (Queen Street). If required these vehicles could use alternate routes to access the broader road network.

6.4.3 Parramatta Road/ George Street

Traffic distributed to the south is anticipated to either access the retail and entertainment land uses provided at the Bakehouse Quarter or continue south to the Parramatta Road/ George Street intersection. The existing intersection currently operates near its capacity.

It is understood that a new fourth leg is to be provided at the intersection as part of an approved mixed use development for lands immediately south of the site. Furthermore, traffic volumes along Parramatta Road are anticipated to change significantly as a result of the WestConnex project (likely a reduction of traffic volumes).

The future operation of this intersection cannot be assessed until the future traffic volumes are determined by the modelling currently being undertaken for the WestConnex project is complete and the long-term layout of the intersection is confirmed.

6.4.4 Pomeroy Street/ Underwood Road

The Pomeroy Street/ Underwood Road intersection located to the west of the study area (in the Strathfield Council LGA) currently limits the capacity of the east-west corridor. A large proportion of vehicles through this intersection undertake the north-west movement between Pomeroy Street and Underwood Road.

The intersection is currently experiences long delays during peak periods, with vehicles required to wait a number of traffic cycles before being able to clear the intersection. The addition of traffic through this intersection will further increase delays and queues.

In order to improve the existing operation of the intersection, increased capacity is required. This could be achieved via the provision of additional lanes; in particular an additional right turn lane on the Pomeroy Street (east) approach to the intersection.

However, in order to do accommodate additional lane(s) at the intersection, some property acquisition would likely be required.

Additional capacity through the intersection could be created by reducing the level of east-west through traffic along the Pomeroy Street-Underwood Road link (see following section).

6.4.5 Summary

Against existing traffic volumes in the vicinity of the site, the additional traffic generated by the proposed rezoned lands, in conjunction with the proposed intersection works, would not compromise the safety or function of the George Street/ Pomeroy Street and Pomeroy Street/ Beronga Street/ Queen Street intersections.

Additional capacity is required at the nearby Pomeroy Street/ Underwood Road intersection to adequately cater for the existing traffic demands as well as the future demands at this intersection. Alternatively, additional future capacity could be provided at the intersection by limiting the amount of through traffic along the Pomeroy Street-Underwood Road corridor. This could be achieved by introducing a number of local area traffic management treatments along the corridor that would slow vehicles and in turn discourage non-local vehicle trips.

Furthermore, the WestConnex project will increase the capacity of the east-west road network and should in turn reduce the number of non-local trips along this corridor.

7. Response to Community Consultation

7.1 Community Workshop #1

In November 2013, two community workshops were held to allow the existing Concord West community to provide their suggestions, concerns and ideas for the future Master Plan. It is noted that the workshops were held prior to a draft Master Plan being considered by the Consultant team.

The workshops provided the community an opportunity to comment on the following key areas:

i Built form
ii Public domain / Open space
iii Traffic and Transport

An overview and a response to each of the suggestions and ideas and concerns and issues from the Community Workshop #1 are provided in Table 7.1.

Table 7.1: Community Workshop #1

Item	Community Comment	Response	Refer to Section in GTA Report
1	*Suggestions and Ideas*		
1.1	Ramp (either entry or exit) to Homebush Bay Drive would help traffic issues in the area	An intersection with Homebush Bay Drive would promote through trips through the precinct and could further compromise the George Street / Pomeroy Street intersection. A link would come at a significant cost	-
1.2	Open an access lane or one/two way street to Liberty Grove to create another connection	Given the existing lot layout in Liberty Grove there is no opportunity to provide a future vehicle link	-
1.3	Remove parking on Pomeroy Street near George Street and the bridge	The proposed intersection works include the extension of existing 'No Parking' restrictions	6.1
1.4	A second underpass should be provided to increase access and safety. A good location is on Queen and Yaralla Streets	The works associated with the freight line will likely prohibit the provision of an additional pedestrian underpass A new underpass of the rail line would be very costly	
1.5	Support for parking permits for existing residents, this ratio must consider residents with more than 1 car	The details of the resident parking scheme would need to be confirmed by Council prior to implementation	4.4
1.6	Support for resident parking permits/schemes	The resident parking scheme would benefit eligible residents	4.4
1.7	Finding a balance between street parking and provision of bicycle paths	The detailed design of any future cycle facilities will need to be determined	5.3
1.8	Upgrades are needed for pedestrian and cycling amenity along George Street	New facilities are recommended	5.3

Item	Community Comment	Response	Refer to Section in GTA Report
2	*Concerns and Issues*		
2.1	Suggestions to open Liberty Grove or build new entry/exit ramps at Homebush Bay Drive will cause traffic to ran run through the area (use George Street)	Agreed	-
2.2	Need roundabouts at the dead end streets to help residents get out when George Street gets busy	Additional roundabouts could be provided on George Street to assist residents exiting side streets and to slow vehicle speeds on George Street	-
2.3	The school will generate additional traffic on top of the proposed residential uses. This will further impact on poor traffic conditions at the Pomeroy Road and George Street intersection	The additional traffic generated by the new primary school has been accounted for in the modelling assessment	6.2
2.4	Street car parking spaces are often occupied by people working at Olympic Park (this was seconded by several people)	The provision of a resident parking scheme and time restricted parking would restrict employee and commuter car parking in the study area	4.4
2.5	How will the existing residents be accommodated in regards to parking? King Street is already occupied with overflow car parking. Existing residents have already raised this issue in a survey	Overflow parking from industrial uses will disappear once these lands are rezoned	-
2.6	There is a need for increased pedestrian access to buses (on Concord Road), the underpass is dangerous and often flooded	Improved access will be provided via the new concourse across Concord West Railway Station which is understood top allow non-ticket holders to cross	5.4
2.7	Commuter parking in the streets will be addressed with 2P,4P parking schemes	New car parking restrictions would restrict employee and commuter car parking	4.4
2.8	Footpaths aren't maintained- 50 to 60 years old	There would be an opportunity to improve the streetscape through the development of the rezoned lands	5.3
2.9	Trains aren't regular enough	TfNSW would need to be lobbied to improve train frequencies	-
2.10	A need for increased pedestrian links along the river and connection with other local pedestrian and cycle networks	New off-road links have been identified	5.3
2.11	Traffic noise is getting worse during the day	The proposed development will have negligible impact on traffic generation on Homebush Bay Drive where the noise is being generated	6.2
2.12	An additional turning lane on George and Pomeroy Streets must consider residents turning into their driveways on George Street, in particular the houses close to the intersection	The proposed intersection changes will have minimal effect on residents entering driveways	
2.13	Traffic on George Street is forced to U-turn due to limited opportunities to turn left and right	The proposed intersection works will increase the capacity of the right turn movement on the south approach to the George Street / Pomeroy Street intersection	6.4
2.14	Some trips from the precinct to Parramatta Road can take in excess of 50 minutes	On-site observations indicate that typical average delays are less than 50 minutes	-

7.2 Community Workshop #2

The draft Masterplan was presented to the Community at a follow up workshop in March 2014. This subsequent workshop gave the community an opportunity to raise any suggestions and ideas or concerns and issues.

An overview and a response to each of the suggestions and ideas and concerns and issues from the Community Workshop #2 are provided in Table 7.2.

Table 7.2: Community Workshop #2

Item	Community Comment	Response	Refer to Section in GTA Report
3	*Suggestions and Ideas*		
3.1	Please don't include speed humps – roundabouts are better. Please don't include speed humps – speed humps are harsh.	Local area traffic management treatments lower vehicle speeds, a preference for roundabouts or speed humps has not been determined as part of this study	-
3.2	Propose staggered hours of operation for new school in order to lessen traffic congestion	Delaying the start time of the new primary school to after the road network peak (say 9am) would spread the peak traffic load and reduce congestion on the network	
3.3	The Powell Creek Bridge should incorporate a pedestrian path as it is almost impossible, and very dangerous, for pedestrians to cross the bridge especially at peak hours	The provision of a pedestrian bridge on the north side of Pomeroy Street has been identified	5.3
3.4	Provide financial incentives for residents who don't own a car (possibly reduced rates or vouchers for local shops)	Apartments without an allocated car parking space would demand a lower market price. Other financial incentives could be investigated at the DA stage	-
3.5	If road upgrades are going to be delayed due to finances, developers should contribute to the funding	Planning controls relating to road network upgrades should be put in place	-
3.6	Permits for residents	Eligible residents would be granted car parking permits under the resident parking scheme	4.4
3.7	Suggestion for an underpass at Station Avenue	The cost associated with an additional rail crossing is prohibitive	-
3.8	Suggestion to make Pomeroy Street 2 lanes in each direction	Additional lanes would increase the midblock capacity of Pomeroy Street but would not increase capacity at the intersections where the delays are caused	-
3.9	The lack of parking provision will decrease the property value of the units, preventing high market prices. The demographics of the area are likely to change along with the unit prices	Comment only	-

Item	Community Comment	Response	Refer to Section in GTA Report
4	Concerns and Issues		
4.1	Traffic concerns – concerned that the school is going to generate more traffic than the proposed development. Concern about the speed limits along Victoria Avenue- cars travel down that street way too fast	The traffic generation from the school has been accounted for in the modelling. Local area traffic management treatments could be introduced if vehicle speeds are determined to be to high	-
4.2	Trains are already over capacity at peak hours	TfNSW would need to be lobbied to improve train capacity	-
4.3	The George/Pomeroy St intersection is already over capacity and the additional left turn slip way will not be significant enough to solve the issue	Modelling indicates that the proposed intersection layout will be able to accommodate the additional traffic forecasts	6.4
4.4	Residents want to be informed about the timing of the delivery of these road upgrades and who will be responsible for them (possibly contact with the local member would be helpful)	RMS would be able to provide details on any road upgrade in the area	-
4.5	Will there be additional roundabouts implemented to improve traffic flow (especially on Victoria Avenue and George Street)?	The anticipated traffic volumes at the George Street / Victoria Avenue intersection do not warrant the provision of a roundabout	-
4.6	How will the quality of roads be dealt with as a result of increased traffic volume?	Ongoing road maintenance will be undertaken by Council	-
4.7	Narrow streets can create potential traffic conflicts and hazards for emergency services vehicles	Designed appropriately narrow streets lower vehicle speeds and cater for design vehicles	5.3
4.8	The school will generate more traffic than apartments	The school is anticipated to generate 356 peak hour movements compared to the rezoned lands 228 movements	6.2
4.9	What about visitor parking?	Visitor parking will be provided on each of the sites and accommodated on-street	-
4.10	There is no provision for commuter car parking	Correct	4.4
4.11	George Street school zone/no parking has existing issues especially within 50 km/hr zone	This would appear to be an existing issues that should be dealt with by Council	-

8. Conclusion

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

i All traffic to and from the study area is required to pass through the George Street/ Pomeroy Street intersection.

ii The study area has good accessibility to nearby public transport services and the surrounding walking and cycling network.

iii There are opportunities to improve the existing pedestrian and cycle networks, for the benefit of future sustainable transport mode choice.

iv In order to minimise traffic generation, a maximum average car parking rate of 1 space per dwelling should be imposed on the rezoned lands.

v On-street parking restrictions should be implemented, with a resident parking scheme to cater for existing resident car parking demands.

vi The rezoned lands are expected to generate up to 228 and 2,280 vehicle movements in any peak hour and daily respectively.

vii A capacity assessment of the George Street/ Pomeroy Street intersection indicates that the study area could accommodate the traffic generation associated with the indicative dwelling yield of 785 dwellings.

viii A number of suggestions, ideas, concerns and issues have been raised by the community as detailed in Section 7. These have either been addressed by this report or can be explored further during the design process.

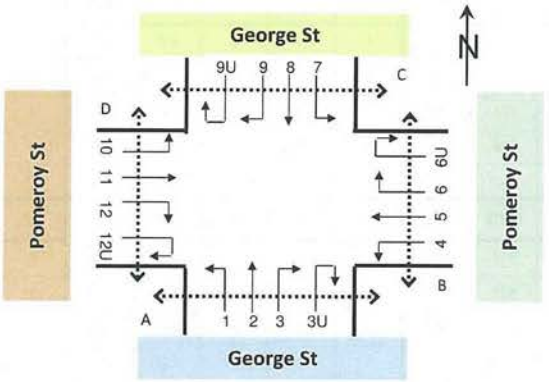
Appendix A

Appendix A

Existing Traffic Volume Survey Results

Job No. : N1236
Client : GTA
Suburb : Concord West
Location : 1. George St / Pomeroy St

Day/Date : Tue, 29th October 2013
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



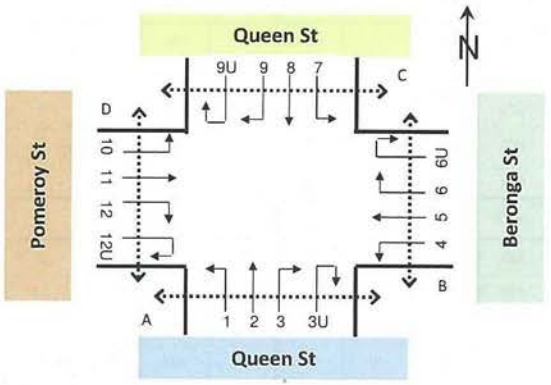
SKYHIGH - THE TRAFFIC SURVEY COMPANY

	Approach	George St					Pomeroy St					George St					Pomeroy St					Grand Total
	Time Period	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	
AM	7:45 to 8:45	279	14	1	1	**295**	1,122	23	2	11	**1,158**	337	13	0	5	**355**	661	24	4	7	**696**	2,504
PM	17:00 to 18:00	489	1	1	3	**494**	764	17	0	6	**787**	390	3	0	5	**398**	692	13	2	0	**707**	2,386

Approach	George St					Pomeroy St					George St					Pomeroy St					Grand Total
Time Period	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	
7:00 to 8:00	228	14	0	1	**243**	757	33	3	14	**807**	300	11	0	5	**316**	654	36	2	5	**697**	2,063
7:15 to 8:15	249	13	0	1	**263**	965	35	3	11	**1,014**	309	11	0	6	**326**	658	35	4	7	**704**	2,307
7:30 to 8:30	270	14	1	1	**286**	1,087	31	3	12	**1,133**	326	12	0	6	**344**	678	32	4	8	**722**	2,485
7:45 to 8:45	279	14	1	1	**295**	1,122	23	2	11	**1,158**	337	13	0	5	**355**	661	24	4	7	**696**	2,504
8:00 to 9:00	299	10	1	1	**311**	1,117	22	3	10	**1,152**	349	8	0	3	**360**	633	18	2	7	**660**	2,483
AM Totals	**527**	**24**	**1**	**2**	**554**	**1,874**	**55**	**6**	**24**	**1,959**	**649**	**19**	**0**	**8**	**676**	**1,287**	**54**	**4**	**12**	**1,357**	4,546
16:00 to 17:00	383	9	0	3	**395**	749	34	0	1	**784**	358	7	0	1	**366**	572	17	1	4	**594**	2,139
16:15 to 17:15	422	7	0	4	**433**	793	27	0	1	**821**	351	8	0	0	**359**	603	12	0	3	**618**	2,231
16:30 to 17:30	472	5	0	4	**481**	797	23	0	4	**824**	369	5	0	1	**375**	659	11	0	2	**672**	2,352
16:45 to 17:45	474	3	0	6	**483**	766	19	0	5	**790**	372	4	0	1	**377**	714	14	1	0	**729**	2,379
17:00 to 18:00	489	1	1	3	**494**	764	17	0	6	**787**	390	3	0	5	**398**	692	13	2	0	**707**	2,386
PM Totals	**872**	**10**	**1**	**6**	**889**	**1,513**	**51**	**0**	**7**	**1,571**	**748**	**10**	**0**	**6**	**764**	**1,264**	**30**	**3**	**4**	**1,301**	4,525

Job No. : N1236
Client : GTA
Suburb : Concord West
Location : 2. Queen St / Pomeroy St / Beronga St

Day/Date : Tue, 29th October 2013
Weather : Fine
Description : Classified Intersection Count
: Peak Hour Summary



SKYHIGH - THE TRAFFIC SURVEY COMPANY

	Approach	Queen St					Beronga St					Queen St					Pomeroy St					Grand Total
	Time Period	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	
AM	7:45 to 8:45	461	15	2	10	**488**	481	7	0	4	**492**	209	3	2	3	**217**	685	28	6	13	**732**	1,929
PM	17:00 to 18:00	384	14	0	2	**400**	312	3	0	2	**317**	100	1	0	2	**103**	899	12	2	3	**916**	1,736

Approach	Queen St					Beronga St					Queen St					Pomeroy St					Grand Total
Time Period	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	Cars	Trucks	Buses	Cyclists	Total	
7:00 to 8:00	329	23	2	12	**366**	374	12	1	5	**392**	97	6	2	4	**109**	629	35	3	8	**675**	1,542
7:15 to 8:15	386	24	2	9	**421**	458	10	1	4	**473**	158	7	2	3	**170**	639	33	5	11	**688**	1,752
7:30 to 8:30	436	20	2	10	**468**	494	8	1	3	**506**	192	7	2	4	**205**	667	30	6	12	**715**	1,894
7:45 to 8:45	461	15	2	10	**488**	481	7	0	4	**492**	209	3	2	3	**217**	685	28	6	13	**732**	1,929
8:00 to 9:00	444	14	3	10	**471**	477	6	0	2	**485**	223	4	0	2	**229**	706	22	3	12	**743**	1,928
AM Totals	**773**	**37**	**5**	**22**	**837**	**851**	**18**	**1**	**7**	**877**	**320**	**10**	**2**	**6**	**338**	**1,335**	**57**	**6**	**20**	**1,418**	3,470
16:00 to 17:00	392	16	0	0	**408**	304	13	0	1	**318**	98	9	0	0	**107**	758	11	2	8	**779**	1,612
16:15 to 17:15	416	8	0	0	**424**	315	12	0	1	**328**	102	8	0	0	**110**	809	12	0	8	**829**	1,691
16:30 to 17:30	437	11	0	0	**448**	310	6	0	2	**318**	90	7	0	0	**97**	758	7	0	7	**772**	1,635
16:45 to 17:45	400	11	0	1	**412**	312	5	0	2	**319**	93	2	0	2	**97**	800	6	1	4	**811**	1,639
17:00 to 18:00	384	14	0	2	**400**	312	3	0	2	**317**	100	1	0	2	**103**	899	12	2	3	**916**	1,736
PM Totals	**776**	**30**	**0**	**2**	**808**	**616**	**16**	**0**	**3**	**635**	**198**	**10**	**0**	**2**	**210**	**1,657**	**23**	**4**	**11**	**1,695**	3,348

Job No	N1236
Client	GTA
Road	George St - Adj No 37 (north of Child Care Centre)
Location	Concord West
Site No	1
Start Date	29-Oct-13
Description	- Volume Summary
Direction	Combined

Average Weekday	1,649
7 Day Average	1,590

Time	Day of Week							Ave W'day	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	4-Nov	29-Oct	30-Oct	31-Oct	1-Nov	2-Nov	3-Nov		
AM Peak	143	152	162	136	172	148	96		
PM Peak	155	134	160	130	140	134	120		
0:00	9	9	8	14	16	21	17	11	13
1:00	5	10	2	2	11	10	16	6	8
2:00	3	1	4	3	2	9	8	3	4
3:00	1	4	2	6	2	3	6	3	3
4:00	6	4	3	4	5	1	9	4	5
5:00	26	33	27	31	34	16	9	30	25
6:00	76	59	80	70	86	33	14	74	60
7:00	127	124	133	119	117	51	30	124	100
8:00	143	152	162	136	172	71	48	153	126
9:00	107	98	100	95	126	108	74	105	101
10:00	81	75	78	74	101	106	81	82	85
11:00	78	76	72	80	87	148	96	79	91
12:00	76	85	84	71	93	123	115	82	92
13:00	63	73	88	80	66	134	108	74	87
14:00	95	92	98	68	98	97	120	90	95
15:00	116	111	125	109	135	100	106	119	115
16:00	120	113	102	102	101	102	68	108	101
17:00	155	122	127	130	140	130	88	135	127
18:00	135	134	160	129	127	109	83	137	125
19:00	78	61	106	99	78	85	75	84	83
20:00	28	40	49	63	71	44	46	50	49
21:00	41	25	37	51	63	38	49	43	43
22:00	20	43	32	27	47	23	22	34	31
23:00	12	10	15	20	35	23	12	18	18
Total	1601	1554	1694	1583	1813	1585	1300	1649	1590
7-19	1296	1255	1329	1193	1363	1279	1017	1287	1247
6-22	1519	1440	1601	1476	1661	1479	1201	1539	1482
6-24	1551	1493	1648	1523	1743	1525	1235	1592	1531
0-24	1601	1554	1694	1583	1813	1585	1300	1649	1590

Job No	N1236
Client	GTA
Road	George St - 30m south of Warsaw St
Location	Concord West
Site No	2
Start Date	29-Oct-13
Description	- Volume Summary
Direction	Combined

Average Weekday	7,949
7 Day Average	7,480

	Day of Week								
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Ave	7 Day
Time	4-Nov	29-Oct	30-Oct	31-Oct	1-Nov	2-Nov	3-Nov	W'day	Ave
AM Peak	644	671	729	643	696	540	352		
PM Peak	646	726	686	676	662	510	424		
0:00	58	56	50	65	75	126	138	61	81
1:00	33	25	26	28	47	78	81	32	45
2:00	11	12	13	20	9	42	53	13	23
3:00	15	21	27	23	25	28	47	22	27
4:00	39	32	27	27	35	38	30	32	33
5:00	131	128	144	134	135	93	34	134	114
6:00	346	334	364	349	357	163	61	350	282
7:00	555	585	639	594	589	210	95	592	467
8:00	644	671	729	643	696	333	186	677	557
9:00	479	469	541	508	517	464	258	503	462
10:00	323	313	337	367	397	540	352	347	376
11:00	315	292	315	353	366	525	340	328	358
12:00	324	366	318	335	345	494	415	338	371
13:00	326	323	349	333	395	502	353	345	369
14:00	398	394	409	346	432	434	388	396	400
15:00	525	537	542	492	593	412	406	538	501
16:00	595	620	625	633	572	415	316	609	539
17:00	646	726	686	676	662	510	381	679	612
18:00	576	618	642	565	616	469	424	603	559
19:00	428	384	455	455	499	388	340	444	421
20:00	245	315	370	364	363	264	295	331	317
21:00	221	228	301	282	313	230	236	269	259
22:00	135	193	181	180	238	195	150	185	182
23:00	83	73	103	127	209	172	114	119	126
Total	7451	7715	8193	7899	8485	7125	5493	7949	7480
7-19	5706	5914	6132	5845	6180	5308	3914	5955	5571
6-22	6946	7175	7622	7295	7712	6353	4846	7350	6850
6-24	7164	7441	7906	7602	8159	6720	5110	7654	7157
0-24	7451	7715	8193	7899	8485	7125	5493	7949	7480

draft

Appendix B

SIDRA INTERSECTION Results

Appendix B

MOVEMENT SUMMARY

Pomeroy St / George St
EXISTING CONDITIONS
AM PEAK HOUR
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: George St - S Leg											
1	L	69	3.0	0.629	37.0	LOS D	5.5	39.5	0.88	0.84	30.6
2	T	93	3.0	0.629	28.7	LOS C	5.5	39.5	0.88	0.73	31.2
3	R	148	3.0	0.686	46.4	LOS D	6.0	43.1	1.00	0.86	26.4
Approach		311	3.0	0.686	39.0	LOS D	6.0	43.1	0.94	0.82	28.6
East: Pomeroy St - E Leg											
4	L	474	3.0	0.607	17.0	LOS B	9.6	69.2	0.56	0.79	40.9
5	T	634	3.0	0.541	9.6	LOS A	14.3	102.3	0.62	0.56	45.3
6	R	112	3.0	0.341	20.1	LOS C	2.0	14.1	0.77	0.77	38.7
Approach		1219	3.0	0.607	13.4	LOS B	14.3	102.3	0.61	0.67	42.9
North: George St - N Leg											
7	L	157	3.0	0.500	26.0	LOS C	4.1	29.5	0.71	0.77	35.0
8	T	132	3.0	0.662	33.1	LOS C	8.2	59.1	0.97	0.84	29.2
9	R	85	3.0	0.662	41.4	LOS D	8.2	59.1	0.97	0.86	29.0
Approach		374	3.0	0.662	32.0	LOS C	8.2	59.1	0.86	0.81	31.3
West: Pomeroy St - W Leg											
10	L	191	3.0	0.397	22.2	LOS C	4.5	32.0	0.64	0.77	37.3
11	T	463	3.0	0.886	36.7	LOS D	25.6	183.8	0.98	1.09	28.3
12	R	79	3.0	0.886	45.0	LOS D	25.6	183.8	0.98	1.11	28.1
Approach		733	3.0	0.886	33.8	LOS C	25.6	183.8	0.89	1.01	30.1
All Vehicles		2636	3.0	0.886	24.8	LOS C	25.6	183.8	0.76	0.80	34.9

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	10.5	LOS B	0.1	0.1	0.51	0.51
P3	Across E approach	53	34.2	LOS D	0.1	0.1	0.93	0.93
P5	Across N approach	53	17.6	LOS B	0.1	0.1	0.66	0.66
P7	Across W approach	53	31.5	LOS D	0.1	0.1	0.89	0.89
All Pedestrians		212	23.4	LOS C			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

Pomeroy St / George St
EXISTING CONDITIONS
PM PEAK HOUR
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: George St - S Leg											
1	L	131	3.0	0.470	37.7	LOS D	11.0	79.2	0.85	0.85	30.2
2	T	151	3.0	0.470	29.4	LOS C	11.0	79.2	0.85	0.72	30.9
3	R	239	3.0	0.881	64.1	LOS E	13.9	99.6	1.00	1.01	21.7
Approach		520	3.0	0.881	47.4	LOS D	13.9	99.6	0.92	0.89	25.8
East: Pomeroy St - E Leg											
4	L	222	3.0	0.352	20.0	LOS B	5.4	38.4	0.53	0.76	38.8
5	T	457	3.0	0.427	13.5	LOS B	12.7	91.4	0.62	0.55	41.9
6	R	149	3.0	0.600	28.3	LOS C	3.8	27.6	0.91	0.80	33.8
Approach		828	3.0	0.600	17.9	LOS B	12.7	91.4	0.65	0.65	39.3
North: George St - N Leg											
7	L	151	3.0	0.531	26.5	LOS C	4.4	31.9	0.65	0.76	34.7
8	T	129	3.0	0.831	48.3	LOS D	14.3	102.7	1.00	0.99	24.1
9	R	139	3.0	0.831	56.6	LOS E	14.3	102.7	1.00	0.99	24.0
Approach		419	3.0	0.831	43.2	LOS D	14.3	102.7	0.87	0.90	27.0
West: Pomeroy St - W Leg											
10	L	102	3.0	0.258	26.0	LOS C	2.9	21.0	0.63	0.75	35.0
11	T	575	3.0	0.898	42.8	LOS D	36.2	260.0	1.00	1.08	26.2
12	R	67	3.0	0.898	51.2	LOS D	36.2	260.0	1.00	1.08	26.1
Approach		744	3.0	0.898	41.3	LOS D	36.2	260.0	0.95	1.03	27.1
All Vehicles		2512	3.0	0.898	35.2	LOS D	36.2	260.0	0.83	0.85	29.8

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	14.6	LOS B	0.1	0.1	0.54	0.54
P3	Across E approach	53	32.8	LOS D	0.1	0.1	0.81	0.81
P5	Across N approach	53	21.8	LOS C	0.1	0.1	0.66	0.66
P7	Across W approach	53	30.4	LOS D	0.1	0.1	0.78	0.78
All Pedestrians		212	24.9	LOS C			0.70	0.70

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

Pomeroy St / George St
EXISTING + SCHOOL
(WITH INTERSECTION UPGRADES)
AM PEAK HOUR
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: George St - S Leg											
1	L	69	3.0	0.603	37.3	LOS D	7.5	53.9	0.91	0.83	30.7
2	T	148	3.0	0.603	29.0	LOS C	7.5	53.9	0.91	0.75	31.2
3	R	148	3.0	0.608	43.9	LOS D	5.7	41.2	0.98	0.82	27.2
Approach		366	3.0	0.608	36.6	LOS D	7.5	53.9	0.94	0.80	29.4
East: Pomeroy St - E Leg											
4	L	474	3.0	0.608	17.0	LOS B	9.6	69.2	0.56	0.79	40.9
5	T	634	3.0	0.541	9.6	LOS A	14.3	102.3	0.62	0.56	45.3
6	R	194	3.0	0.600	21.1	LOS C	3.6	26.0	0.84	0.80	38.1
Approach		1301	3.0	0.608	14.0	LOS B	14.3	102.3	0.63	0.68	42.4
North: George St - N Leg											
7	L	261	3.0	0.660	14.3	LOS B	4.2	30.2	0.53	0.74	43.3
8	T	174	3.0	0.382	28.1	LOS C	5.8	41.7	0.88	0.72	32.3
9	R	107	3.0	0.509	44.1	LOS D	4.1	29.4	0.97	0.79	27.1
Approach		542	3.0	0.660	24.6	LOS C	5.8	41.7	0.73	0.75	35.3
West: Pomeroy St - W Leg											
10	L	259	3.0	0.541	22.8	LOS C	6.3	45.5	0.67	0.78	36.9
11	T	463	3.0	0.886	36.7	LOS D	25.6	183.8	0.98	1.09	28.3
12	R	79	3.0	0.886	45.0	LOS D	25.6	183.8	0.98	1.11	28.1
Approach		801	3.0	0.886	33.0	LOS C	25.6	183.8	0.88	0.99	30.5
All Vehicles		3011	3.0	0.886	23.7	LOS C	25.6	183.8	0.75	0.79	35.5

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	10.5	LOS B	0.1	0.1	0.51	0.51
P3	Across E approach	53	34.2	LOS D	0.1	0.1	0.93	0.93
P5	Across N approach	53	17.6	LOS B	0.1	0.1	0.66	0.66
P7	Across W approach	53	31.5	LOS D	0.1	0.1	0.89	0.89
All Pedestrians		212	23.4	LOS C			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

Pomeroy St / George St
EXISTING
(WITH INTERSECTION UPGRADES)
PM PEAK HOUR
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: George St - S Leg											
1	L	131	3.0	0.602	37.5	LOS D	9.9	71.2	0.94	0.84	30.4
2	T	151	3.0	0.602	29.2	LOS C	9.9	71.2	0.94	0.79	30.8
3	R	239	3.0	0.816	48.3	LOS D	10.3	74.2	1.00	0.96	25.8
Approach		520	3.0	0.816	40.1	LOS D	10.3	74.2	0.97	0.88	28.2
East: Pomeroy St - E Leg											
4	L	222	3.0	0.290	16.1	LOS B	3.9	28.1	0.48	0.75	41.7
5	T	457	3.0	0.398	9.0	LOS A	9.3	66.8	0.56	0.50	46.1
6	R	149	3.0	0.480	22.1	LOS C	2.8	20.0	0.86	0.79	37.4
Approach		828	3.0	0.480	13.3	LOS B	9.3	66.8	0.60	0.62	43.1
North: George St - N Leg											
7	L	151	3.0	0.417	14.0	LOS B	2.3	16.5	0.55	0.72	43.5
8	T	129	3.0	0.271	26.4	LOS C	4.1	29.7	0.85	0.68	33.2
9	R	139	3.0	0.763	50.3	LOS D	5.9	42.6	1.00	0.91	25.2
Approach		419	3.0	0.763	29.9	LOS C	5.9	42.6	0.79	0.77	32.6
West: Pomeroy St - W Leg											
10	L	102	3.0	0.255	22.2	LOS C	2.8	19.8	0.62	0.77	37.5
11	T	575	3.0	0.852	29.0	LOS C	26.0	186.6	0.95	0.98	31.5
12	R	67	3.0	0.852	37.8	LOS D	26.0	186.6	0.96	1.04	31.0
Approach		744	3.0	0.852	28.9	LOS C	26.0	186.6	0.90	0.96	32.1
All Vehicles		2512	3.0	0.852	26.2	LOS C	26.0	186.6	0.80	0.80	34.1

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	11.0	LOS B	0.1	0.1	0.53	0.53
P3	Across E approach	53	33.3	LOS D	0.1	0.1	0.91	0.91
P5	Across N approach	53	18.2	LOS B	0.1	0.1	0.68	0.68
P7	Across W approach	53	30.6	LOS D	0.1	0.1	0.88	0.88
All Pedestrians		212	23.3	LOS C			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

Pomeroy St / George St
EXISTING + 785 DWELLINGS
(WITH INTERSECTION UPGRADES)
PM PEAK HOUR
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: George St - S Leg											
1	L	131	3.0	0.635	38.7	LOS D	13.4	95.9	0.93	0.86	30.0
2	T	214	3.0	0.635	30.4	LOS C	13.4	95.9	0.93	0.79	30.4
3	R	239	3.0	0.744	46.7	LOS D	10.7	76.5	0.98	0.90	26.3
Approach		583	3.0	0.744	38.9	LOS D	13.4	95.9	0.95	0.85	28.5
East: Pomeroy St - E Leg											
4	L	222	3.0	0.321	18.0	LOS B	4.6	33.3	0.51	0.76	40.2
5	T	457	3.0	0.413	11.2	LOS B	11.0	79.1	0.60	0.53	43.9
6	R	212	3.0	0.772	30.9	LOS C	5.6	40.5	0.95	0.89	32.5
Approach		891	3.0	0.772	17.6	LOS B	11.0	79.1	0.66	0.67	39.7
North: George St - N Leg											
7	L	177	3.0	0.549	15.2	LOS B	3.2	23.1	0.56	0.72	42.6
8	T	152	3.0	0.274	26.8	LOS C	5.2	37.2	0.81	0.66	33.0
9	R	163	3.0	0.902	65.6	LOS E	8.9	63.6	1.00	1.05	21.4
Approach		492	3.0	0.902	35.5	LOS D	8.9	63.6	0.78	0.81	30.1
West: Pomeroy St - W Leg											
10	L	144	3.0	0.336	24.4	LOS C	3.8	27.3	0.64	0.76	35.9
11	T	575	3.0	0.886	37.5	LOS D	32.2	230.9	0.99	1.06	28.0
12	R	67	3.0	0.886	45.8	LOS D	32.2	230.9	0.99	1.07	27.8
Approach		786	3.0	0.886	35.8	LOS D	32.2	230.9	0.92	1.01	29.2
All Vehicles		2752	3.0	0.902	30.5	LOS C	32.2	230.9	0.82	0.83	31.9

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	12.8	LOS B	0.1	0.1	0.53	0.53
P3	Across E approach	53	32.9	LOS D	0.1	0.1	0.86	0.86
P5	Across N approach	53	20.0	LOS B	0.1	0.1	0.67	0.67
P7	Across W approach	53	30.4	LOS D	0.1	0.1	0.82	0.82
All Pedestrians		212	24.0	LOS C			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.

MOVEMENT SUMMARY

Site: Existing AM + School + 785 dwellings

Pomeroy St / George St
EXISTING + SCHOOL + 785 DWELLINGS
(WITH INTERSECTION UPGRADES)
AM PEAK HOUR
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: George St - S Leg											
1	L	69	3.0	0.527	37.6	LOS D	8.2	59.0	0.92	0.84	30.6
2	T	166	3.0	0.527	29.3	LOS C	8.2	59.0	0.92	0.77	31.1
3	R	148	3.0	0.718	47.9	LOS D	6.1	44.0	1.00	0.88	25.9
Approach		384	3.0	0.718	38.0	LOS D	8.2	59.0	0.95	0.82	28.8
East: Pomeroy St - E Leg											
4	L	474	3.0	0.609	17.0	LOS B	9.6	69.2	0.56	0.79	40.9
5	T	634	3.0	0.541	9.6	LOS A	14.3	102.3	0.62	0.56	45.3
6	R	217	3.0	0.675	22.8	LOS C	4.4	31.5	0.87	0.83	36.9
Approach		1324	3.0	0.675	14.4	LOS B	14.3	102.3	0.64	0.69	42.1
North: George St - N Leg											
7	L	342	3.0	0.865	18.7	LOS B	6.8	49.0	0.57	0.79	39.9
8	T	227	3.0	0.501	29.1	LOS C	7.9	56.4	0.92	0.76	31.8
9	R	141	3.0	0.709	48.0	LOS D	5.8	41.8	1.00	0.87	25.9
Approach		711	3.0	0.865	27.8	LOS C	7.9	56.4	0.77	0.80	33.6
West: Pomeroy St - W Leg											
10	L	289	3.0	0.605	23.1	LOS C	7.2	51.9	0.68	0.79	36.7
11	T	463	3.0	0.886	36.7	LOS D	25.6	183.8	0.98	1.09	28.3
12	R	79	3.0	0.886	45.0	LOS D	25.6	183.8	0.98	1.11	28.1
Approach		832	3.0	0.886	32.7	LOS C	25.6	183.8	0.88	0.99	30.7
All Vehicles		3251	3.0	0.886	24.8	LOS C	25.6	183.8	0.77	0.80	34.9

Level of Service (LOS) Method: Delay (HCM 2000).
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 used.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	10.5	LOS B	0.1	0.1	0.51	0.51
P3	Across E approach	53	34.2	LOS D	0.1	0.1	0.93	0.93
P5	Across N approach	53	17.6	LOS B	0.1	0.1	0.66	0.66
P7	Across W approach	53	31.5	LOS D	0.1	0.1	0.89	0.89
All Pedestrians		212	23.4	LOS C			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.

SIDRA INTERSECTION

draft

Appendix C

Assessment of McDonald College Redevelopment

Appendix C

McDonald College Traffic Impact Assessment

McDonald College is located on the southeast corner of the Pomeroy Street / George Street intersection south of the study area. Whilst a formal Development Application has not been lodged with the City of Canada Bay, it is understood that a new primary school facility is proposed. It is unknown as to whether or not the new primary school will replace existing uses within the College or operate in addition to the current uses. It is understood that once complete, the primary school will cater for up to 600 students, the same as the approved primary school within the study area.

A preliminary assessment of the anticipated traffic impact of a potential primary school (600 students) at this location on the George Street/ Pomeroy Street intersection is presented below.

For assessment purposes the following assumptions have been made:

- The new school will generate 356 peak hour movements (consistent with the approved primary school in the study area – McLaren Traffic Engineering Report).
- The school will not generate any significant traffic during the PM road network peak hour (the PM school peak hour would need to be assessed as part of any future DA application for the site).
- The existing McDonald College will continue to generate its current levels of traffic.
- Traffic Distribution:
    - 67% north to the George Street/ Pomeroy Street intersection comprising:
        - 55% east
        - 5% north
        - 40% west
    - 33% south to the Parramatta Road / George Street intersection
- The McDonald College traffic has been added to the base case scenario (existing + approved primary school traffic).
- The George Street/ Pomeroy Street intersection upgrades associated with the approved primary school have taken place prior to opening.

The additional traffic generated by the potential school and the post development traffic volumes are presented in Figures C1 and C2. The post-development traffic volumes do not include any development within the study area.

Figure C1: McDonald College AM Peak Hour Traffic Volume Generation

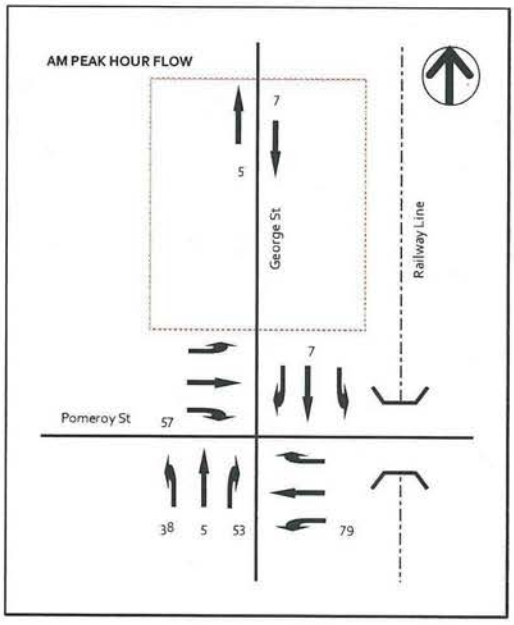
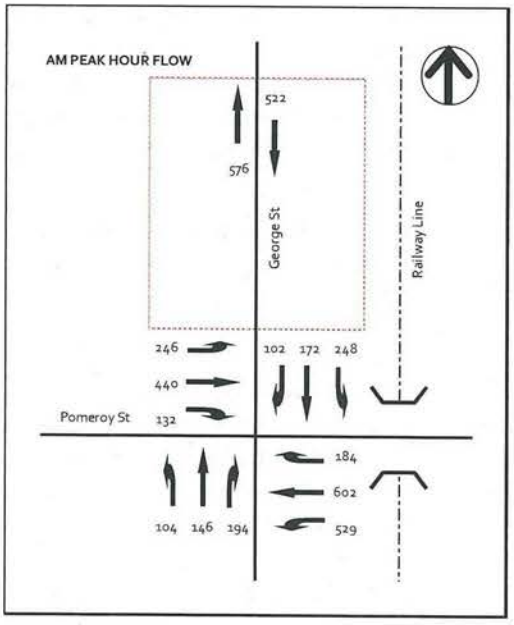


Figure C2: AM Peak Hour Post Development Traffic Volumes



The post development operation of the intersection during the AM Peak hour has been assessed using SIDRA INTERSECTION, with the results presented in Table C1.

Table C1: Intersection Operation (incl. McDonald College Development)

Scenario	Peak	Leg	Degree of Saturation (DOS)	Average Delay (sec)	95th Percentile Queue (m)	Level of Service (LOS)
Existing Traffic Volumes + Approved School Development + McDonald College	AM	George Street (south)	1.1	91	131	F
		Pomeroy Street (east)	0.74	15	108	B
		George Street (north)	0.81	35	56	D
		Pomeroy Street (west)	1.1	104	448	F

Table C1 indicates that following the potential development of the McDonald College the George Street/ Pomeroy Street intersection would be operating above its capacity. In particular the south and west approaches to the intersection are anticipated to fail (DOS's greater than 1.0).

Given the above, it is anticipated that any DA application for the McDonald College of a similar intensity to the one assessed above would need to include mitigation works at the George Street/ Pomeroy Street intersection to increase its capacity.

draft

Appendix D

Post Development Traffic Volumes

Appendix D

Figure D.1: AM Peak Hour – Existing Traffic Volumes

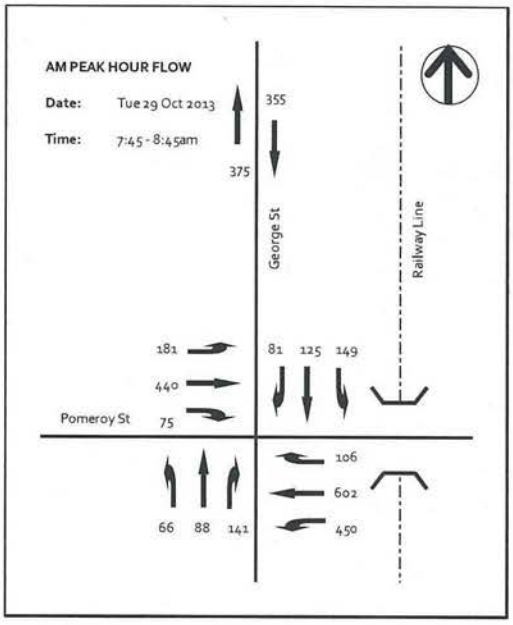


Figure D.2: PM Peak Hour – Existing Traffic Volumes

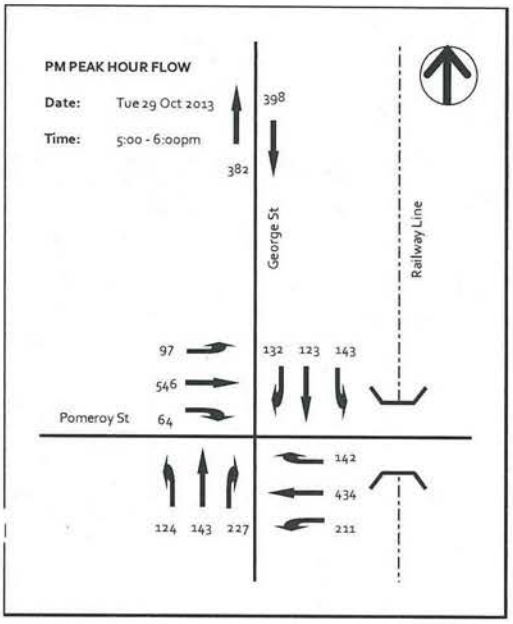


Figure D.3: AM Peak Hour – Additional Traffic Volumes (Approved Primary School)

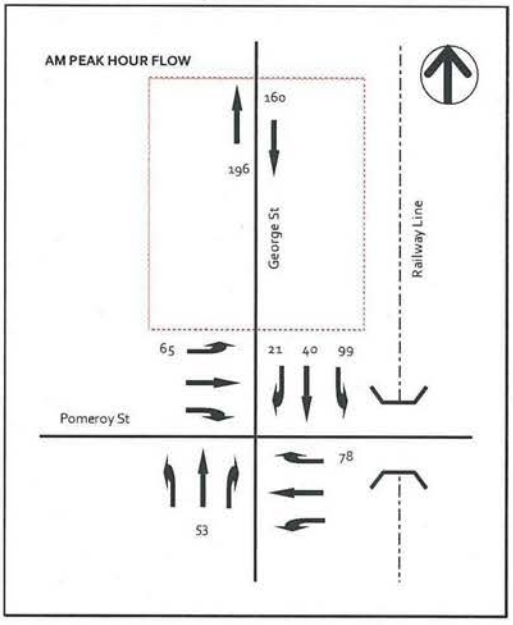


Figure D.4: AM Peak Hour – Base Traffic Volumes

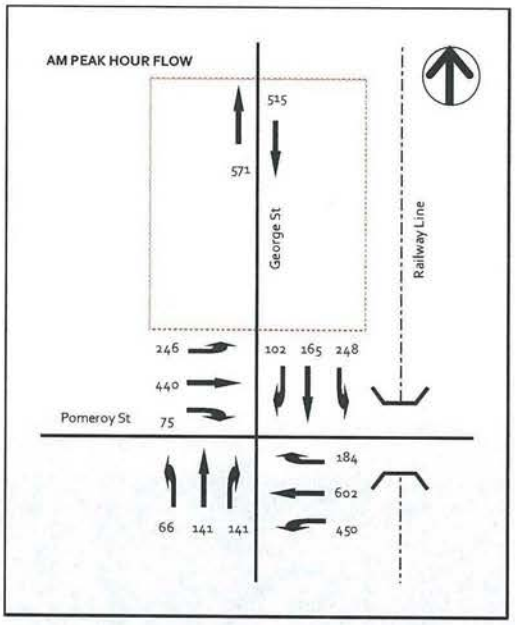


Figure D.5: PM Peak Hour – Base Traffic Volumes

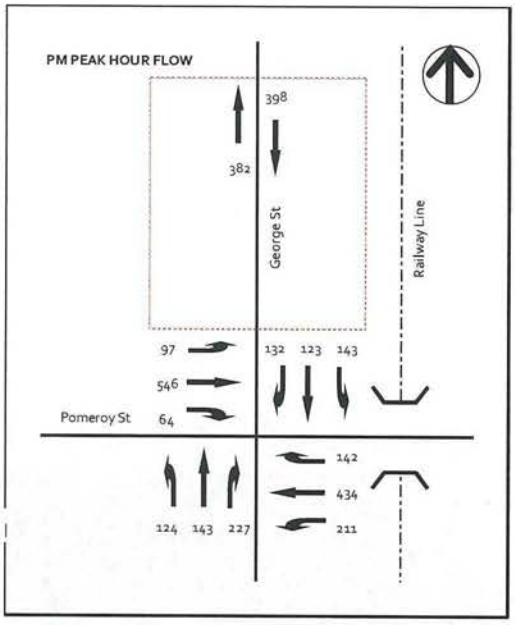


Figure D.6: AM Peak Hour – Post Development Traffic Volumes

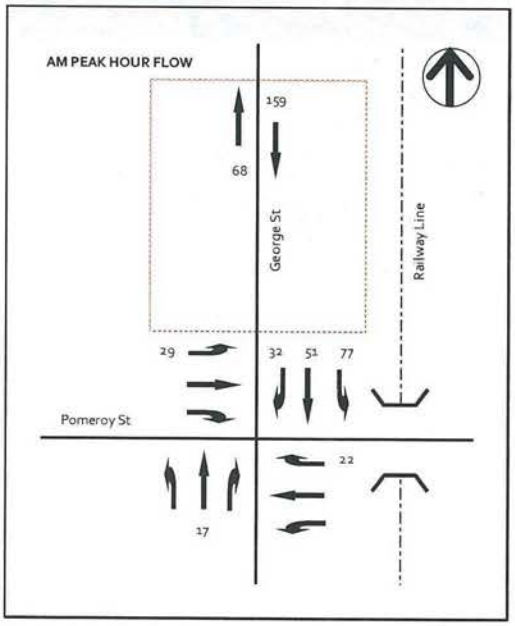
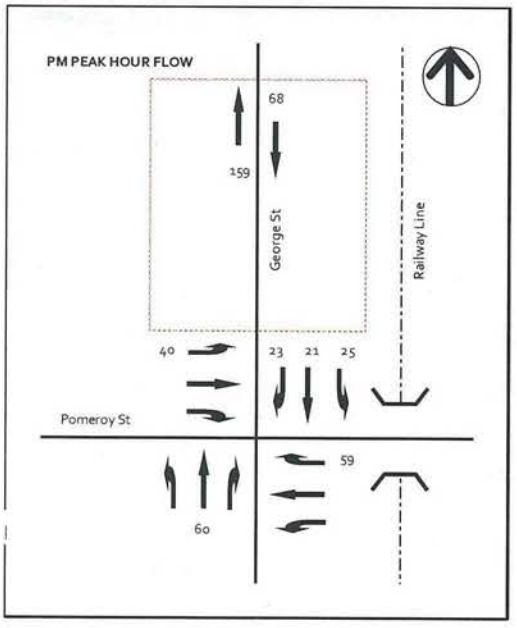
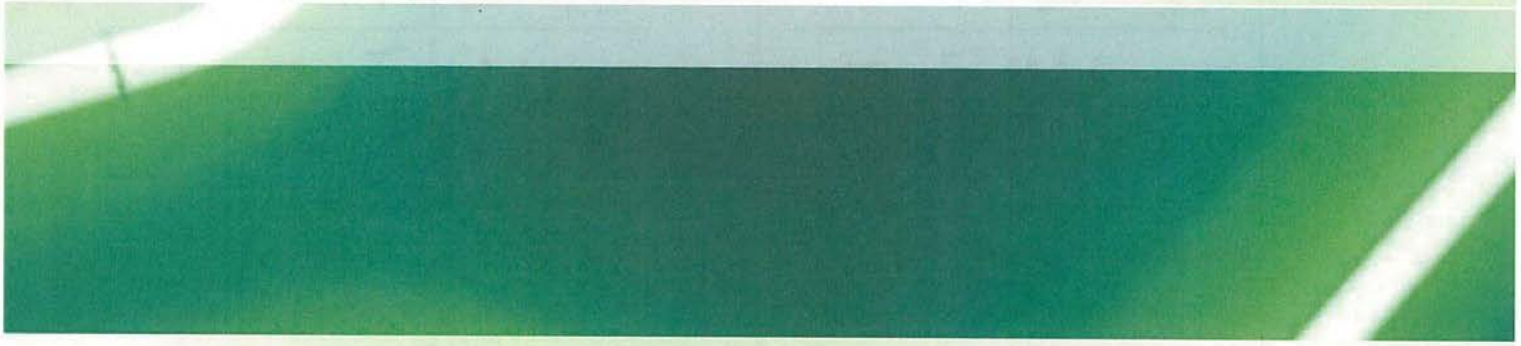


Figure D.7: PM Peak Hour – Post Development Traffic Volumes





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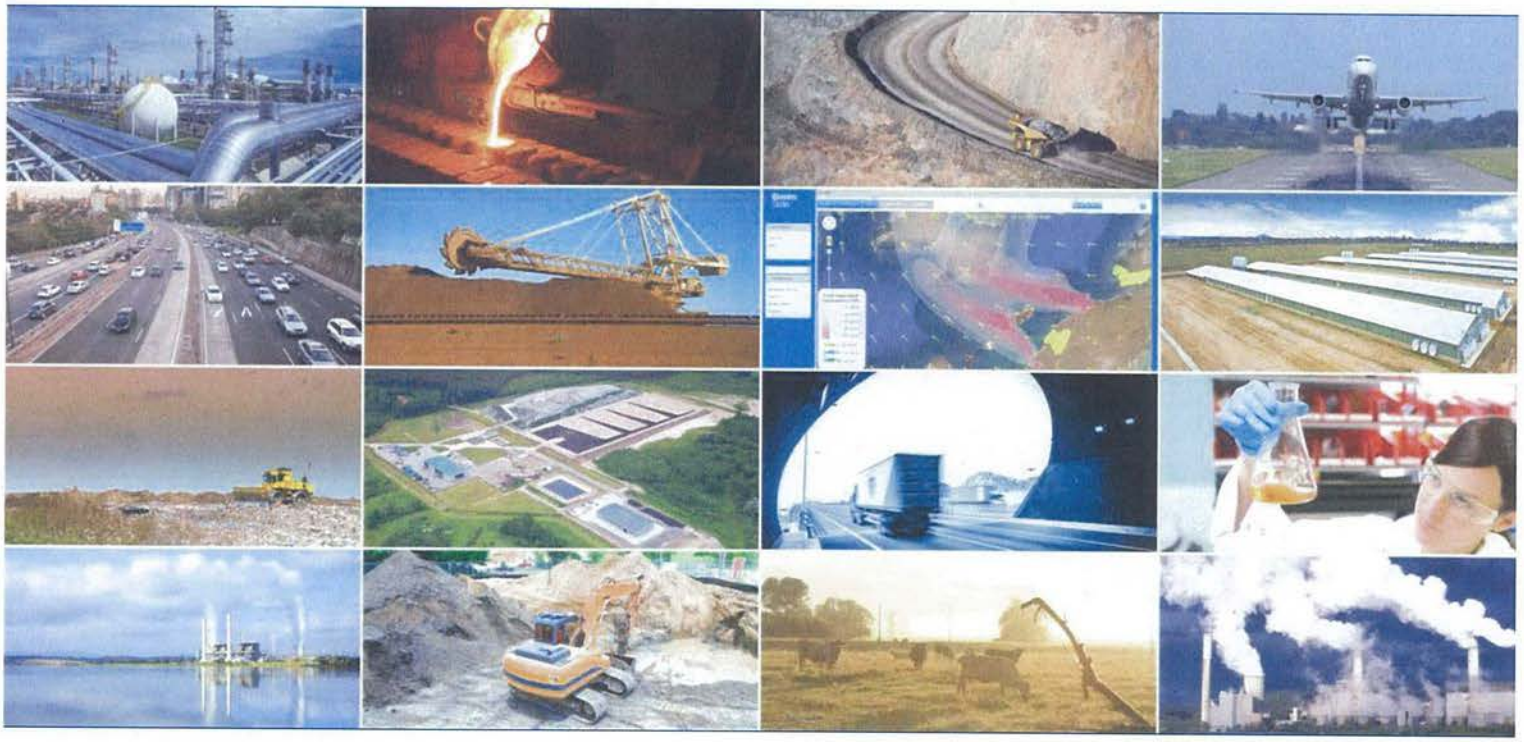
Appendix E Preliminary Site Investigation

DLA Environmental Services
A Pacific Environment company



Preliminary Site Investigation

25 George Street
North Strathfield NSW 2137

Piety THP Pty Ltd

DL3686_S003443

October 2015

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PROJECT ID	DL3686
DOCUMENT CONTROL NUMBER	S003443
PREPARED FOR	Piety THP Pty Ltd
APPROVED FOR RELEASE BY	Richard Bolton
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Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to DLA is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

ABBREVIATIONS

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AST	Above-ground Storage Tank
ASS	Acid Sulfate Soil
B(a)P	Benzo(a)Pyrene
BGL	Below Ground Level
BH	Borehole
BTEX	Benzene, Toluene, Ethyl Benzene, Xylene
COC	Chain of Custody documentation
CLM	Contaminated Land Management
DA	Development Application
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DLA	DLA Environmental Services
DP	Deposited Plan
DQO	Data Quality Objective
EC	Electrical Conductivity
EIL	Ecological Investigation Level
EMP	Environmental Management Plan
EPA	Environment Protection Authority (NSW)
ESL	Ecological Screening Level
HIL	Health-Based Investigation Level
LOR	Limit of Reporting
MW	Monitoring Well
NATA	National Association of Testing Authorities, Australia
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
OCP	Organochlorine Pesticides
OEH	Office of Environmental and Heritage
OPP	Organophosphorus Pesticides
OH&S	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photo-Ionisation Detector
PQL	Practical Quantification Limit
QA/QC	Quality Assurance and Quality Control
RAP	Remedial Action Plan
RPD	Relative Percentage Difference
SAC	Site Acceptance Criteria
SAQP	Sampling Analysis and Quality Plan
SEPP	State Environmental Planning Policy
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WHS	Work Health Safety

EXECUTIVE SUMMARY

DLA Environmental Services (DLA) was commissioned by Piety THP Pty Ltd to conduct a Preliminary Site Investigation (PSI) of the following area:

25 George Street, North Strathfield NSW 2137

The PSI was designed to be suitable for due diligence purposes. The document is intended to be incorporated into a Planning Proposal Submission as part of a rezoning application for the Regional Planning Authority. It is also intended for DA submission for the construction of high-density residential development pending rezoning approval, and is thus suitable for review by the NSW EPA, Department of Primary Industries (DPI) and the City of Canada Bay Council.

Investigation and analysis of available desktop materials report that the land use on this Site has consistently been for commercial/industrial purposes from 1912 to 2015. This is in line with the historic land uses of adjacent properties which have since converted to high-density residential developments. No items of cultural or environmental heritage were identified on Site, and no Dangerous Goods licences have been held for the Site.

Review of the Section 149 Certificate and the City of Canada Bay Council's Acid Sulphate Soils Map identified that a Planning Instrument may potentially be required for works on Site (subclause 4 of clause 6.1 of the Canada Bay LEP 2013).

Visual Site inspection did not identify surface staining, odours, waste drums or fill material. However, there may be limited fill under the slabs which may have been required to level the Site. Given the historical land use of the Site for commercial/industrial purposes and current land usage which includes a mechanical workshop and cleaning product storage facility, there is a potential that fuels, oils and cleaning products may have impacted materials under the slab through cracks or joins.

Desktop assessment and inspection of the Site are considered to be adequate for assessment purposes to assist with the rezoning application with the Regional Planning Authority and is also intended for DA submission for the construction of high-density residential development pending rezoning approval.

To determine the future land use suitability of the Subject Site in accordance with City of Canada Bay Council, relevant Development Consent Conditions and the general requirements of State Environmental Planning Policy No.55 (SEPP 55), DLA recommends a Stage II Detailed Site Investigation.

It is therefore the opinion of DLA that the Site assessment objectives of this report have been achieved. The PSI concludes that the Site has the potential for the intended land use consistent with NEPM (NEPC, 2013) *Residential B – Residential with minimal opportunities for soil access* pending a Stage II Detailed Site Investigation.

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APPENDICES

1.0 INTRODUCTION

1.1 General

DLA Environmental Services (DLA) was commissioned by Piety THP to conduct a Preliminary Site Investigation (PSI) of the following area:

25 George Street, North Strathfield, NSW 2137

The PSI was designed to be suitable for due diligence purposes. The document is intended to be incorporated into a Planning Proposal Submission as part of a rezoning application for the Regional Planning Authority. It is also intended for DA submission for the construction of high-density residential development pending rezoning approval, and is suitable for review by the NSW EPA, Department of Primary Industries (DPI) and the City of Canada Bay Council.

1.2 Objectives

The project objectives of this PSI are to satisfy the relevant Planning Proposal Submission and DA Conditions as well as the general requirements of State Environmental Planning Policy No.55 (SEPP 55) in accordance with *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA, 2011). Specifically, this PSI will consider the potential for suspected historical activities to have caused contamination at the Site and determine the suitability of the land for future land use consistent with *Residential B* as defined in the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) ('NEPM', NEPC, 2013). Should any potential adverse impacts to the environment or human health be identified, recommendations will be provided for additional assessment to determine if remedial action is required.

1.3 Scope of Works

To achieve this objective, DLA carried out the following works:

- Search and review of records and Site plans available locally and from State Regulatory Authorities, including WorkCover, Department of Lands and NSW EPA;
- Review of historical aerial photographs available from the Land Information Centre;
- Reviewing all environmental conditions of the Site including the geology and hydrogeology;
- Providing a comprehensive overview of the Site's past and current land uses and potential contamination issues;
- Provide a preliminary assessment of Site contamination (if any);

- Discuss the Site condition and suitability based on the proposed development;
- Assess the need (if any) for remediation and/or further investigations; and,
- Preparation of this PSI report in accordance with relevant EPA made or endorsed guidelines.

2.0 SITE DESCRIPTION

2.1 Site Identification

The Site identification details are summarised in **Table 2a** below:

Table 2a – Site Identification Summary

ITEMS	DETAILS
Address	25 George Street, North Strathfield, NSW, 2137
Local Government Authority	City of Canada Bay Council
Lot and Deposited Plan	Lots 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 SP22302
Development Controls	City of Canada Bay Local Environment Plan 2013
Site Zoning	IN1 General Industrial
Current Use (NEPM 2013 Table 1A(1)	Commercial / Industrial
Proposed Use (NEPM 2013 Table 1A(1)	Residential B – Residential with minimal opportunities for soil access
Site Area (approx.)	8140m^2 (0.814 ha)
Site Location	Refer to **Figure 1** – Site Location
Site Layout	Refer to **Figure 2** – Site Layout
Site Survey	Refer to **Figure 3** – Site Survey

2.2 Boundaries and Surrounding Land Use

The boundary and surrounding landscape features of the Site are summarised in **Table 2b** below:

Table 2b – Boundaries and Surrounding Land Use

DIRECTION	DETAILS
North	High-density residential development.
East	T1 railway line from Strathfield to Epping, followed by low-density residential dwellings.
South	High-density residential development.
West	Low-density residential dwellings.

2.3 Site Geology and Soils

Review of the Geological Survey map of NSW Sydney 1:100,000 Geological Series Sheet 9130 (Edition 1) indicates that the Site is located on Quaternary age sediments characterised by silty to peaty quartz sand, silt and clay with ferruginous and humic cementation in places.

Review of the NSW soil and land information provided on eSPADE indicates that the Site is underlain by the Blacktown Landscape Group. This is characterised by gently undulating rises on Wianamatta Group shales with shallow to moderately deep red and brown podzolic soils. Limitations typical of the Blacktown Landscape Group include moderately reactive highly plastic subsoil, low soil fertility and poor soil drainage.

2.4 Site Topography

The Site is located on relatively flat low-lying ground, sloping slightly toward the west. The highest point on Site is located on the eastern boundary (16m AHD), with the lowest point adjacent to the western boundary (14m AHD).

2.5 Acid Sulphate Soils

The City of Canada Bay Council's Acid Sulphate Soils Map (Sheet ASS_002) reports that the Site is located in an area of Class 5 ASS. This requires a Planning Instrument for works within 500m of adjacent Class 1, 2, 3 or 4 land which are likely to lower the water table below 1m metre in Class 1, 2, 3 or 4 land. The Site is located within 500m of Class 2 ASS.

2.6 Salinity and Aggressivity of Soils

Reference to the salinity map in the NSW Planning Viewer (maps.planningportal.nsw.gov.au/Map) showed no evidence of salinity hazards or dryland salinity indicators within the Site boundaries or land surrounding the Site.

2.7 Hydrology and Hydrogeology

The Site is largely situated on sealed surfaces, as such rainfall is expected to flow into the underground stormwater collection systems of which there are four in the asphalt car park. Additionally, garden beds at the front, rear and central nature strip can absorb water.

A search of the Department of Natural Resources groundwater database was also performed to identify wells in the vicinity of the Site. The search results identified six registered groundwater monitoring wells located within a 1.5 km radius of the Site, the information of which is presented in **Table 2c** below:

Table 2c – Regional Groundwater Summary Data

WELL ID	DISTANCE FROM SITE (m)	PURPOSE	DEPTH (m)	STANDING WATER LEVEL (m)	SALINITY (µS/cm)
GW102557	NE - 600	Monitoring	4	No data	No data
GW102559	W - 700	Monitoring	4	1.83	No data
GW111672	SE - 600	Monitoring	5.4	1.35	No data
GW100194	NE - 1200	Recreation	90	3	No data
GW102558	NE – 700	Monitoring	4	1.83	No data
GW111674	SE – 750	Monitoring	5.4	1.35	No data

Refer to **Appendix A** – Groundwater Works Database Search.

2.8 Site Meteorology

The Bureau of Meteorology NSW gives the annual rainfall for the North Strathfield area at 884mm, with an annual maximum temperature range of 17.7° - 28.4°C and a minimum temperature range of 7.8° - 19.4°C

3.0 DEVELOPMENT CONTROLS

3.1 Section 149 Certificate

A Planning Certificate from the City of Canada Bay Council under Section 149 of the *Environmental Planning and Assessment Act 1979* (NSW) was obtained for Lot 10 SP 22302, stating:

- The zoning and land use provisions of Zone IN1 General Industrial under the Canada Bay Environmental Plan 2013 apply to this land;
- The land does not include or comprise critical habitat and is not located in a conservation area;
- The Site does not contain Aboriginal archaeological sites or items of environmental heritage;
- The State Environmental Planning Policy (Sydney Region Growth Centres) 2006 does not apply to this land;
- The land is not affected by the operation Sections 38 or 39 of the *Coastal Protection Act 1979* (NSW);
- The land has not been proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act, 1961;
- The Site is not affected by Local Road Widening under Division 2 of Part 3 of the *Roads Act 1993* or any other planning instrument or council resolution;
- The land is affected by a policy adopted by the City of Canada Bay Council that restricts the development of the land because of the likelihood of acid sulphate soils (subclause 4 of clause 6.1 of the Canada Bay LEP 2013);
- The land is affected by a policy adopted by the Council that restricts the development of land because of the likelihood of contaminated land. This policy was adopted by resolution and applies to all land within the City of Canada Bay Council, however is not a statement about whether the property is affected by contamination or potential contamination;
- The land is not identified on bushfire prone land by the City of Canada Bay Council;
- No development on the land or part of the land is subject to flood related development controls;
- No part of the land is subject to prescribed by section 59 (2) of the *Contaminated Land Management Act* 1997.

Refer to **Appendix B** – City of Canada Bay Council Section 149 Certificate.

3.2 WorkCover Dangerous Goods Search

A WorkCover NSW search of their Stored Chemical Information Database indicated that no Dangerous Goods Licenses have been held for the premises.

Refer to **Appendix C** – Dangerous Goods Search.

3.3 Contaminated Land Record Search

A search was conducted of all records pertaining to section 58 of the *Contaminated Land Management Act 1997* (NSW) and revealed that the Site is not encumbered by any notices from the NSW EPA with regard to contaminated land. No sites in the vicinity of the Site were encumbered by any notices.

A search of the NSW EPA online *Protection of the Environment Operations Act 1997* (NSW) public register did not locate any records of licences, applications, notices, audits, or pollution studies/ reduction programs for the Site.

4.0 SITE HISTORY

4.1 Aerial Photograph Review

Aerial photographs from 1930 to 2015, available from the NSW Lands Department and Nearmap (http://maps.au.nearmap.com/) were reviewed by DLA with relevant observations being summarised in **Table 4a** below:

Table 4a – Aerial Photograph Review

YEAR	DETAILS
1930 Sydney Map 3424 Run 4	A large structure the length of the lot is situated along the northern Site boundary. A structure half the length of the lot occupies the centre, along with a two smaller structures; one rectangular the other L-shaped. The south of the Site appears vacant and unsealed. The vicinity of the Site consists of residential dwellings to the east and west, numerous structures resembling warehousing or factory facilities to the north and south.
1943 http://maps.six.nsw.gov.au	Removal of the L-shaped structure seen in 1930.
1951 Sydney Run 12	No significant changes visible.
1961 Cumberland series Run 33e	It appears that the south of the Site, previously vacant, now has multiple narrow rectangular structures resembling bundles of timber. No significant changes to the centre or northern portions of the Site.
1972 Port Jackson Moorings Run 8	No significant changes to the Site, except the removal of the numerous narrow structures seen in 1961 aerial photograph.
1986 Sydney Run 21	Two new large structures resembling warehousing facilities occupy the northern and southern Site boundaries. The central strip of Site is a sealed carpark. Beyond the southern boundary of the Site is a large bare lot where structures seen in prior aerial photos have been removed.
1997 Strathfield LGA Run 9	No significant changes to the Site are visible.
2005 Sydney Run 10	No significant changes to Site. The lot adjacent to the Site in the south has multiple structures and landscaped gardens. The block to the north of the Site is now bare.
2010 Nearmaps 22.01.2010	No significant changes to Site. The block to the north of the Site is now a multi-structured development with internal grounds.

YEAR	DETAILS
2015 Nearmaps 01.09.2015	No significant changes visible.

Refer to **Appendix D** – Aerial Photographs.

4.2 Historical Title Search

Title Search results from 1912 to 2015 for Lots 1 and 10 and Common Property Strata Plan 22302 were reviewed by DLA with relevant observations being summarised **Table 4b, 4c, 4d and 4e** below:

Table 4b – Historical Title Search as regards the Whole

YEAR	SITE OWNER	LAND USE / OCCUPATION
1912	James Martin and Company Ltd	No data
1924	The Farmers' Co-Operative Implement Company Ltd	No data
1938	John Shearer & Sons Pty Ltd	No data
1971	Westinghouse Brake and Signal Company	No data
1981	Jonray (Sydney) Pty Ltd	No data
1981	Grosvenor Estates Pty Ltd	No data
1985	Registration of Strata Plan	No data

Table 4c – Historical Title Search - Lot 1 Strata Plan 22302

YEAR	SITE OWNER	LAND USE / OCCUPATION
1981	Grosvenor Estates Pty Ltd	No data
1986	Hurllo Pty Ltd	No data
1987	Thomas R. & Francis J. Forrest	Dentist and Wife
2002	Peter & Ann T. Skala	No data

Table 4d – Historical Title Search - Lot 10 Strata Plan 22302

YEAR	SITE OWNER	LAND USE / OCCUPATION
1981	Grosvenor Estates Pty Ltd	No data
1986	Hurllo Pty Ltd	No data
1987	Barry G. Walker	Electrician
1993	Anthony Colantonio	No data
2013	Anthony & Rosemary Colantonio	No data

Table 4e – Historical Title Search – as regards Common Property

YEAR	SITE OWNER	LAND USE / OCCUPATION
1985	The Proprietors – Strata Plan 22302	No data

Refer to **Appendix E** – Historical Title Search.

4.3 Heritage / Archaeological Items

A review of the Aboriginal Heritage Information Management System database did not identify any items of aboriginal or archaeological items on Site.

Refer **Appendix F** – AHIMS Results.

4.4 Site History Summary

Review of the historical titles indicate this Site has been occupied since 1913 and aerial photographs reveal structures resembling warehousing or factory facilities since 1930. This was consistent with the surrounding land uses to the north and south of the Site, which have since changed to high-density residential developments.

The historical titles and aerial photographs indicate that both brick warehouses observed at the time of inspection have occupied the Site since the early to mid 1980's. On inspection these warehouses were observed to be clean with concrete flooring and a central asphalt car park that was in good condition.

The results of a WorkCover NSW search reported that no Dangerous Goods Licenses have been held for the premises.

Potential contaminants of concern at the Site include hydrocarbons and VOCs (including halogenated compounds) associated with the mechanical workshop and cleaning product storage facility.

5.0 SITE INSPECTION

The Site inspection was undertaken on the 28th September 2015. The property consists of two warehousing facilities that run parallel to the northern and southern boundaries of the Site, separated by an asphalt car park with a narrow nature strip. The Site is bordered by high-density residential units to the north and south, low-density residential dwellings to the west and the T1 railway line from Strathfield to Epping to the east.

The two warehouses are identical, consisting of two-storey brick walls with concrete slab floors and metal roofing. Review of the historical titles and aerial photographs suggest that these were constructed in the early to mid 1980's. Various tenants currently occupy the warehouses in businesses such as cleaning product storage and distribution, mechanics, packing, furniture and upholstery. Inspection of the cleaning product warehouse identified that the majority of the products consisted of detergents, sanitisers, disinfectants and other cleaning products commonly used in the commercial and industrial cleaning, food servicing and healthcare industries. Solvents in the form of floor-strippers are also a minor part of their inventory.

On inspection, all warehouses appeared clean with no obvious surface staining, odours or drums of waste or fill material. There are no Dangerous Goods licences held for these premises, no indication of UST's or AST's on the premises and anecdotally no history of their presence on Site in the past.

The condition of the warehousing facilities, asphalt car park and concrete flooring were intact and showed no signs of wear, cracking or age. Vegetation on the nature strips and at the front and rear of the Site appeared healthy. Four grates in the asphalt car park lead to subsurface stormwater systems. Some piles of timber were noted at the front of the Site. At the rear, two shipping containers with unknown contents were identified adjacent to piles of woodchips. Abandoned train lines are visible in the garden at rear of warehouses, adjacent to the T1 railway line from Strathfield to Epping.

Refer **Appendix G** – Photographic Gallery

6.0 DISCUSSION

Investigation and analysis of available desktop materials report that the land use on this Site has consistently been for commercial/industrial purposes from 1912 to 2015. This is in line with the historic land uses of adjacent properties which have since converted to high-density residential developments. No items of cultural or environmental heritage were identified on Site, and no Dangerous Goods licences have been held for the Site.

Review of the Section 149 Certificate and the City of Canada Bay Council's Acid Sulphate Soils Map identified that a Planning Instrument may potentially be required for works on Site (subclause 4 of clause 6.1 of the Canada Bay LEP 2013).

Visual Site inspection did not identify surface staining, odours, waste drums or fill material. However, there may be limited fill under the slabs which may have been required to level the Site. Given the historical land use of the Site for commercial/industrial purposes and current land usage which includes a mechanical workshop and cleaning product storage facility, there is a potential that fuels, oils and cleaning products may have impacted materials under the slab through cracks or joins.

7.0 CONCLUSIONS

Desktop assessment and inspection of the Site are considered to be adequate for assessment purposes to assist with the rezoning application with the Regional Planning Authority and is also intended for DA submission for the construction of high-density residential development pending rezoning approval.

All reporting has been undertaken in accordance with the *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA, 2011) and the *Guidelines for the NSW Site Auditor Scheme* (NSW EPA, 2nd ed., 2006).

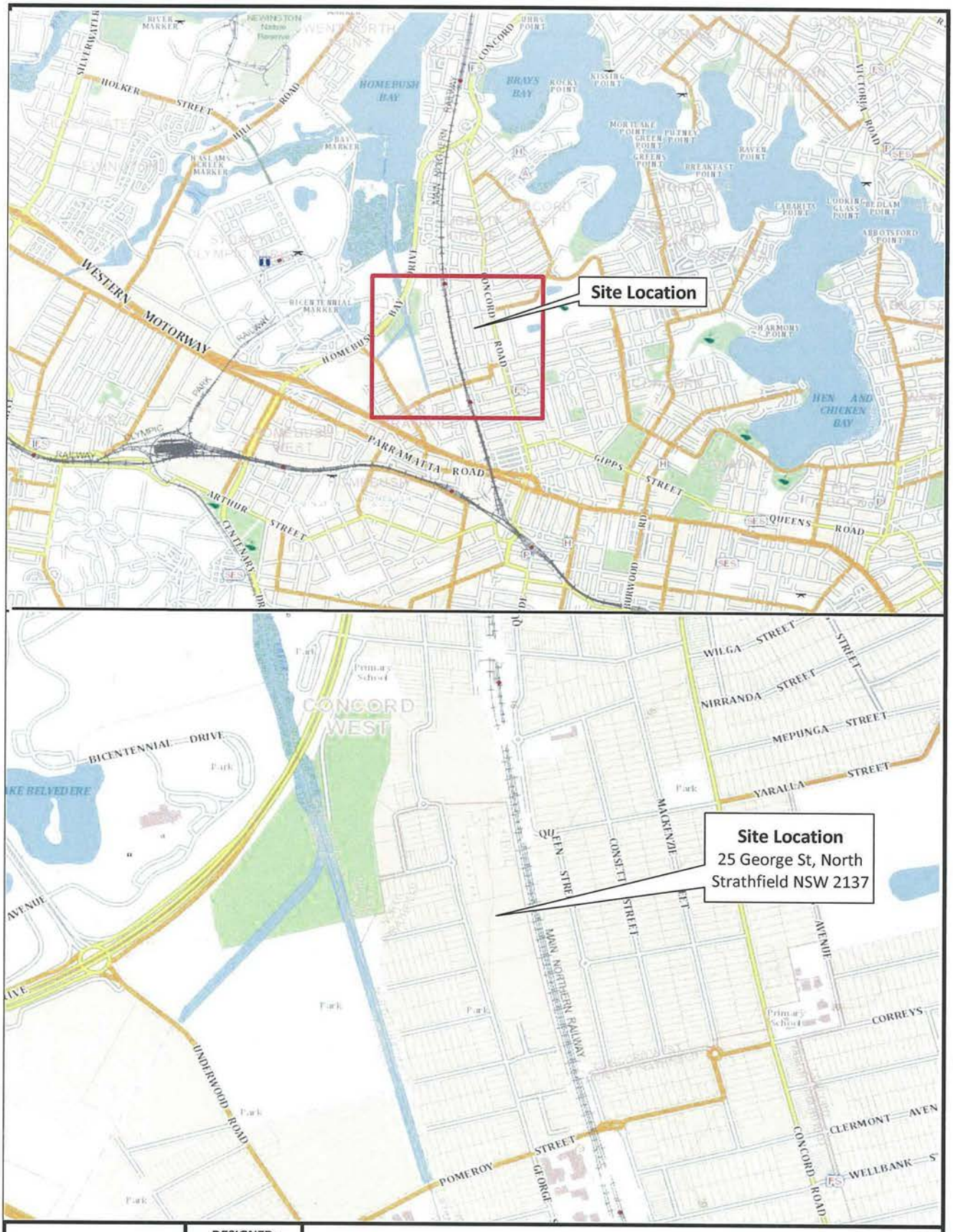
To determine the future land use suitability of the Subject Site in accordance with City of Canada Bay Council, relevant Development Consent Conditions and the general requirements of State Environmental Planning Policy No.55 (SEPP 55), DLA recommends a Stage II Detailed Site Investigation.

It is therefore the opinion of DLA that the Site assessment objectives of this report have been achieved. The PSI concludes that the Site has the potential for the intended land use consistent with NEPM (NEPC, 2013) *Residential B – Residential with minimal opportunities for soil access* pending a Stage II Detailed Site Investigation.

8.0 REFERENCES

- *Australian and New Zealand Guidelines for the Management of Contaminated Sites* (ANZECC/NHMRC 1992);
- *Australia and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000);
- *Australian Drinking Water Guidelines, National Water Quality Management Strategy* 2011;
- Chapman, G A, Murphy, C L, Tille, P J, Atkinson, G and Morse, R J, *Sydney Soil Landscapes Map*, Series 9130 (1989);
- *Code of Practice for the Safe Removal of Asbestos* (NOHSC, 2nd eds, 2005);
- *Contaminated Land Management Act 1997* (NSW);
- *Contaminated Sites: Assessing Service Station Sites, 1994* (NSW EPA, 1994);
- *Contaminated Site: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA, 2011);
- *Contaminates Sites: Guidelines on Duty to Report Contamination under the Contamination Land Management Act 1997* (NSW DECC, 2009);
- *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination* (NSW DEC, 2007);
- *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (NSW EPA, 2nd ed., 2006);
- *Contaminated Sites: Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report* (NSW EPA 1999);
- *Contaminated Sites: Sampling Design Guidelines* (NSW EPA 1995);
- *Environmental Guidelines: Solid Waste Landfills* (NSW EPA, 1996);
- *Guidelines for the Assessment of On-Site Containment of Contaminated Soil* (ANZECC, 1999).
- *Health - Based Soil Investigation Levels, Imray, P & Langley, A, National Environmental Health Forum Monographs, Soil Series No. 2 (2nd Ed), South Australian Health Commission* (NEHF 1998b);
- *How to Safely Remove Asbestos: Code of Practice* (WorkCover, 2011);
- *National Environment Protection (Assessment of Site Contamination) Measure (No.1)* (NEPC, 2013);
- *Managing Land Contamination: Planning Guidelines, SEPP 55 - Remediation of Land* (DUAP, 1998);
- *Storage and Handling of Dangerous Goods Code of Practice 2005*;
- Pacific Southwest, Region 9 Regional Screening Levels (US EPA, 2014);
- *Waste Avoidance and Resource Recovery Act 2001* (NSW);
- *Waste Classification Guidelines* (NSW EPA, 2014); and,
- *Work Health and Safety Act 2011* (NSW) and associated regulations.

FIGURE 1 – SITE LOCATION



DLA environmental Unit 3 38 Leighton Place Hornsby, NSW 2077	**DESIGNED:** DLA	SITE LOCATION		
	COMPILED: LV	**CLIENT:**	Piety THP	**DRAWING:** 29/09/2015
	PROJ. No. DL3686	**LOCATION:**	25 George St, North Strathfield New South Wales 2137	**FIGURE:** 1

FIGURE 2 – SITE LAYOUT

Legend ☐ Approx Site Boundary

N

Approximate Scale

0m 20m 40m 60m

DLA Environmental Services

Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557

Maitland Office
Phone (02) 4933 0001

Title			
Site Layout			
Client	Figure No		Date
Piety THP	2		6/10/2015
Project No.	Scale	Compiled	Revision
DL 3686	As Shown	LV	R00

FIGURE 3 – SITE SURVEY