Parramatta Road and Shaftesbury Road Intersection Upgrade

Submissions Report

April 2017

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Roads and Maritime Services

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Submissions Report

APRIL 2017

Prepared by NGH Environmental and Roads and Maritime Services
RMS 17.296
ISBN: 978-1-925659-32-0

Document controls

Approval and authorisation

Title	Parramatta Road and Shaftesbury Road Intersection Upgrade Submissions Report
Accepted on behalf of Roads and Maritime NSW by	ROBIN FERDOUS
Signed	
Dated	10/04/17

Executive summary

Roads and Maritime Services (Roads and Maritime), propose to duplicate the right turn lane from Parramatta Road (citybound) to Shaftesbury Road (southbound) and duplicate the southbound through lane on Shaftesbury Road to provide additional capacity. The proposed works are required to improve traffic flow and reduce the risk of rear end, side swipe and lane change crashes on Parramatta Road on the approach to the intersection with Shaftesbury Road.

The NSW Government is funding this proposal as part of its $246 million Pinch Point and Clearways Program which aims to reduce delays, manage congestion and improve peak travel times on Sydney's main roads, particularly during week peak periods.

Construction is anticipated to commence in first half of 2018 and is expected to require 9 months of construction work. The majority of works would be completed as night works to minimise traffic delays locally and to the wider road network.

Roads and Maritime prepared a review of environmental factors to assess the environmental impacts of the proposed works. The review of environmental factors was publically displayed for 14 days between 6 December 2016 and 19 at two locations. The review of environmental factors was placed on the Roads and Maritime project website and made available for download. The display locations and website link were advertised in the Inner West Courier.

In addition to the above public display, a community newsletter and invitation to comment on the review of environmental factors was sent directly to 1000 local residents, businesses and key stakeholders. The community and stakeholders were encouraged to provide their feedback, leave comments and make submissions via mail, email or phone contact with the project team.

A community information session was held on Wednesday 14 December 2016 to give the community an opportunity to speak with the project team and ask questions. Upon community request, an additional community meeting was held on 20 December 2016 with residents from Loftus and Burton Street's. The meeting was held to discuss specific issues raised by this community.

The meeting minutes indicate that 12 feedback items and/or questions were raised at the community information sessions. All feedback items and/or questions were from individuals in the community. All 12 feedback items and/or questions were requests for information regarding the proposal and do not support or oppose the project. The minutes from the meeting were recorded and form one submission.

The feedback items and/or questions received included the following categories:

- Justification/need for proposal
- Traffic impacts on Loftus Street
- Property acquisition
- Environmental impacts (biodiversity, air quality and public health)
- Construction methodology

One additional study was undertaken to assess impacts to parking from the proposal. The parking study assessed the impact to parking from removal of 40 metres of car parking space required for the additional lane width on Shaftesbury Road southbound.

Traffic modelling for the proposal was also updated in late 2016 to update the original 2012 modelling. The outcomes of this modelling re-confirmed the proposal benefits of improving overall intersection efficiency as well as improved efficiency along Parramatta Road.

No additional management and mitigation measures are required as a result of the received submissions or the parking study.

Contents

Appendices

1 Introduction and background

1.1 The proposal

Roads and Maritime Services (Roads and Maritime), propose to duplicate the right turn lane from Parramatta Road (citybound) to Shaftesbury Road (southbound) and duplicate the southbound through lane on Shaftesbury Road to provide additional capacity. The proposed works are required to improve traffic flow and reduce the risk of rear end, side swipe and lane change crashes on Parramatta Road on the approach to the intersection with Shaftesbury Road.

The NSW Government is funding this proposal as part of its $246 million Pinch Point and Clearways Program which aims to reduce delays, manage congestion and improve peak travel times on Sydney's main roads, particularly during week peak periods.

Key features of the proposal would include:

- Pavement widening on the northern side of Parramatta Road, adjacent to Concord Oval to allow for an additional right turn lane into Shaftesbury Road
- Pavement widening on the western side of Shaftesbury Road to allow two southbound through lanes
- Relocation of traffic signals to suit the new intersection layout
- Relocation of utilities affected by the proposed widening
- Signage and line marking adjustments
- Property acquisitions and adjustments on Parramatta Road and Shaftesbury Road
- Upgrade to stormwater drainage infrastructure
- Landscaping
- Construction compound site.

Construction is anticipated to commence in first half of 2018 and is expected to require 9 months of construction work. The majority of works would be completed as night works to minimise traffic delays locally and to the wider road network.

A more detailed description of the proposal is found in the review of environmental factors prepared by NGH Environmental on behalf of Roads and Maritime in November 2016.

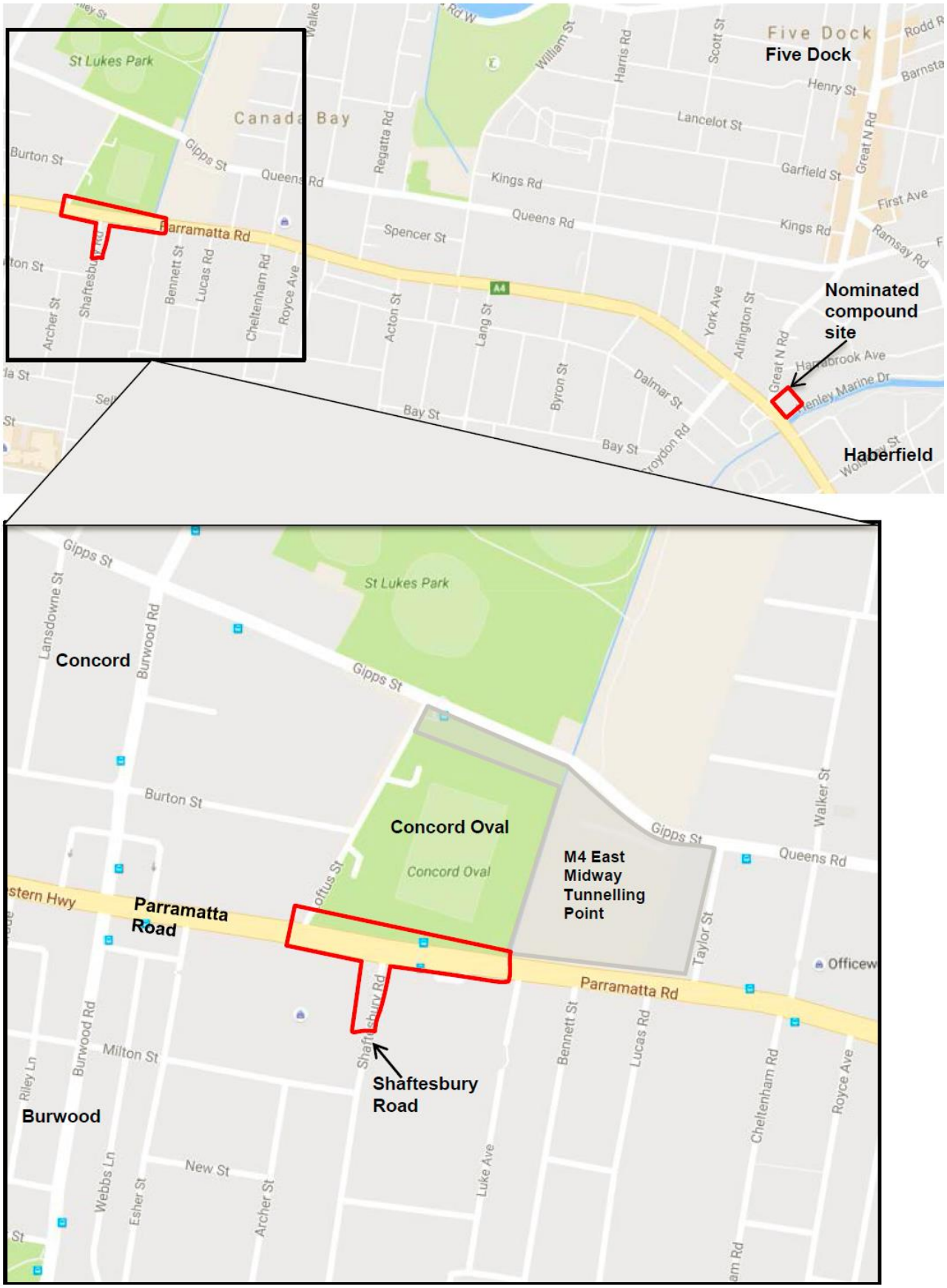

Figure 1-1 Locality map of the proposal

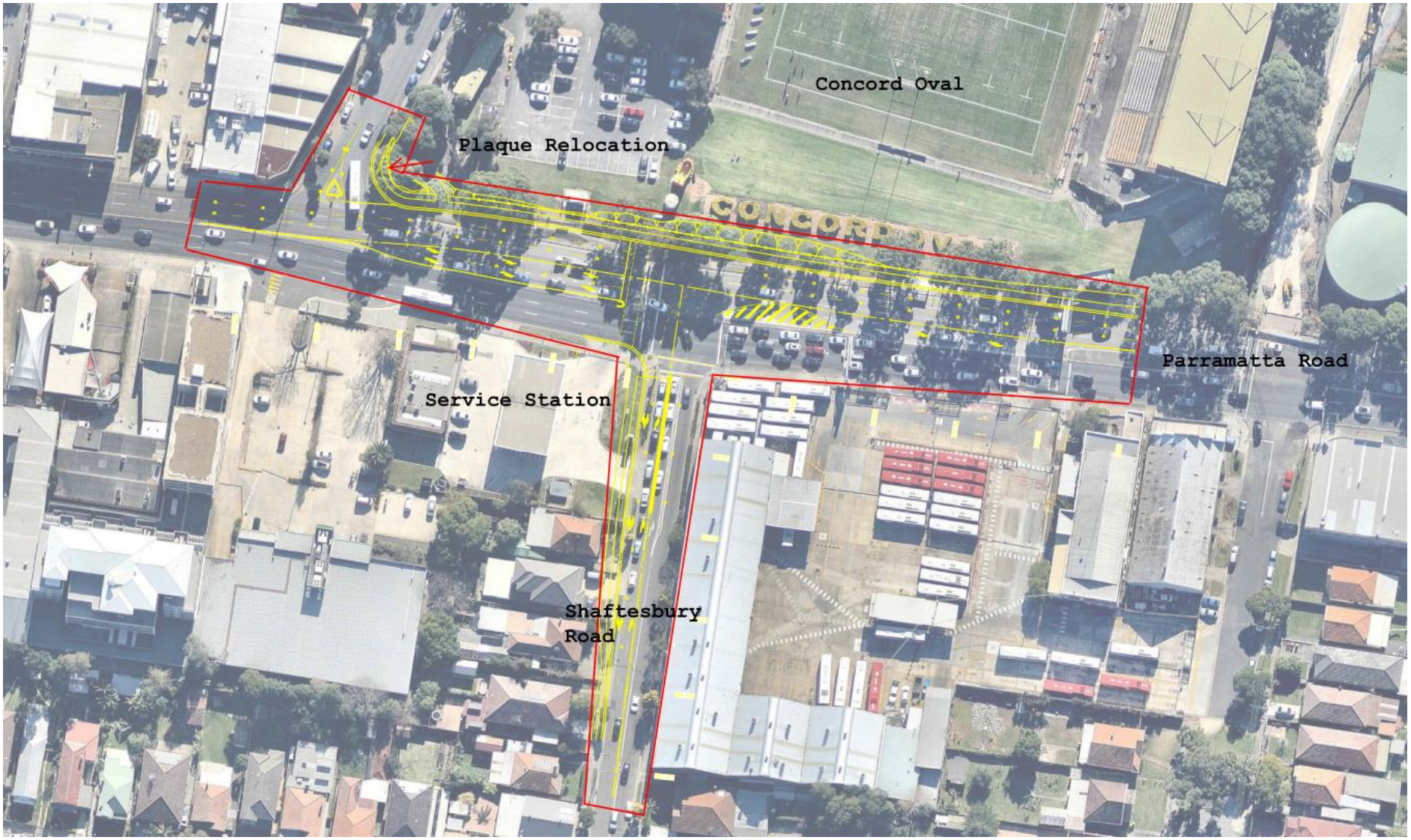

Figure 1-2 Design of the proposed Parramatta Road & Shaftesbury Road intersection upgrade. The proposal area boundary is shown in red.

1.2 REF display

Roads and Maritime prepared a review of environmental factors to assess the environmental impacts of the proposed works. The review of environmental factors was publically displayed for 14 days between 6 December 2016 and 19 at two locations, as detailed in Table 1-1. The review of environmental factors was placed on the Roads and Maritime project website and made available for download. The display locations and website link were advertised in the Inner West Courier.

Table 1-1: Display locations

Location	Address
Concord Library	60 Flavelle St, Concord NSW 2137
Five Dock Library	Level 1, 4-12 Garfield St, Five Dock 2046

In addition to the above public display, a community newsletter and invitation to comment on the review of environmental factors was sent directly to 1000 local residents, businesses and key stakeholders as presented in Figure 1-3. The community and stakeholders were encouraged to provide their feedback, leave comments and make submissions via mail, email or phone contact with the project team.

Figure 1-3 Distribution of community newsletter

A community information session was held on Wednesday 14 December 2016 to give the community an opportunity to speak with the project team and ask questions.

Upon community request, an additional community meeting was held with residents from Loftus and Burton Street's. The meeting was held to discuss specific issues raised by this community. The meeting was held on 20th December at a public venue in Concord. The meeting was attended by representatives from the Roads and Maritime and Ventia Boral Amey (VBA) project team. At the meeting Roads and Maritime provided an overview of the Pinch Point Program and Environmental Assessment process. This was followed by a questions and answers session. Attendees were informed that the queries would be minuted and would form a submission.

1.3 Purpose of the report

This submissions report relates to the review of environmental factors (REF) prepared for the Parramatta Road and Shaftesbury Road Intersection Upgrade, and should be read in conjunction with that document.

The REF was placed on public display and submissions relating to the proposal and the REF were received by Roads and Maritime. This submissions report summarises the issues raised and provides responses to each issue (Chapter 2). It details investigations carried out since finalisation of the review of environmental factors (Chapter 3), and identifies new or revised environmental management measures (Chapter 4).

No project changes are proposed that would require the preparation of a preferred infrastructure report. No revisions have been made to the assessment or environmental management measures as described in the environmental impact statement.

2 Response to issues

2.1 Overview of issues raised

A total of 12 feedback items or questions were received in response to the display of the review of environmental factors during the community meetings. All feedback items or questions were from individuals in the community. The feedback items and/or questions were requests for information regarding the proposal and do not support or oppose the project. The minutes from the meeting were recorded and form one submission.

Each feedback item or question has been examined individually to understand the issues being raised. The issues raised in each feedback item or question have been extracted and collated, and corresponding responses to the issues have been provided. Where similar issues have been raised in different submissions, only one response has been provided. The issues raised and Roads and Maritime response to these issues forms the basis of this chapter.

The submissions received have been summarised into the following category:

- Justification/need for proposal
- Traffic impacts on Loftus Street
- Property acquisition
- Environmental impacts (biodiversity, air quality and public health)
- Construction methodology

2.2 Justification and need for the proposal

Issue Description

- Is the project needed? WestConnex will take traffic off Parramatta Road
- Why can't the southern side of Parramatta Road be widened?

Response

Modelling for this intersection from the 2012 Parramatta Road corridor study demonstrated that the proposal would improve eastbound traffic flows on Parramatta Road during the morning and afternoon peak. Additional intersection (SIDRA) and network modelling (EMME) completed in 2016 demonstrated that demand for right hand turn movement at Parramatta Road into Shaftesbury Road intersection was still high and continued to increase even once WestConnex is fully operational (model year of 2026). This reflected traffic movement to new developments and through to Burwood commercial area.

The REF assessed the option to widen the southern side of Parramatta Road (Section 2.4.3). The REF concluded that assessment of the service station infrastructure revealed that the proposal would potentially significantly impact the above and below ground service station infrastructure and consequently could potentially impact its ability to operate. The service station also recently underwent a major upgrade. Widening towards the bus depot was also found to potentially impact the operation of the bus facility and could require more land take (than if widened to the opposite Concord Oval side).

2.3 Traffic impacts on Loftus Street

Issue Description

- The proposal will encourage increased use and provide easier access to Loftus Street due to widening and construction activities.
- Loftus and Burton Streets are used as a rat run

Response

The proposal would include the removal of an existing concrete island and construction of new concrete island at Loftus Street to allow for widening of Parramatta Road and adjustments to the eastern kerb line of Loftus Street at the Parramatta Road intersection to allow for the widening. A stop line and stop sign would be constructed at the intersection of Loftus Street and Parramatta Road. The proposal would not widen Loftus Street or encourage increased traffic use of Loftus Street.

During construction heavy vehicles, operating as part of the proposal, would not use Loftus Street.

Traffic volumes to Burton Street would not be impacted by operation of the proposal and no construction activities are required on Burton Street.

2.4 Property acquisition

Issue Description

- How many houses are being acquired as part of this project?

Response

Property acquisition is included in Section 3.6 of the REF. Property acquisition would be required within properties along Shaftesbury Road and Parramatta Road as indicated in Table 2-1.Table 2-1 Proposed property acquisition The proposal requires only strip acquisition along the frontage of properties.

Figure 3 7 to Figure 3 12 of the REF display the location and area of proposed property acquisition.

Table 2-1 Proposed property acquisition

Lot and DP	Total area	Current owner	Land use zone (LEP)
Lot 1 DP 773472	140 m^2	7-Eleven	B6 (Enterprise Corridor)
Lot 5 DP 70456	45 m^2	Residential	R2 (Low Density Residential)
Lot 6 DP 70456	30 m^2	Residential	R2 (Low Density Residential)
Lot 3 DP 202439	15 m^2	Residential	R2 (Low Density Residential)
Lots 8, 9 & 10 DP 719520	120 m^2	Concord Oval	RE1 (Public Recreation)
Lot 1 DP 1210747	170 m^2	Concord Oval	RE1 (Public Recreation)

2.5 Environmental impacts

2.5.1 Biodiversity

Issue Description

- How many trees are being removed?

Response

As described in Section 6.3.3 of the REF and presented in Figure 2-1 the proposed works would require removal of native and exotic planted vegetation on the northern side of Parramatta Road along the Concord Oval boundary and the western side of Shaftesbury Road to allow for the road widening, including:

- Removal of 27 mature trees. The arborist report identified that two trees (#26 and #27) on the frontage of Concord Oval can be retained which reduces the tree removal along Concord Oval from 27 to 25. Two trees on the western side of Shaftesbury Road would also require removal.
- About seven Grevillea and other shrubs
- Hedges to the north east of intersection of Loftus Street and Parramatta Road where the historical plaque is located
- The landscaped hedge which spells out ‘Concord Oval’ would not be impacted as it is outside of the proposal area however it is immediately adjacent to the relocated boundary fence and would need to be protected from any indirect impacts.

Figure 2-1 Location of trees identified within the proposal area. Note – Trees #26 and #27 are to be retained

2.5.2 Air quality

Issue Description

- Concern about dust and pollution during construction.

Response

The proposed works have the potential for localised and temporary deterioration in air quality during construction due to:

- Emissions from machinery and vehicles. This could include exhaust fumes and/or from potential spills (hydrocarbon spills)
- Dust and particulates generated from disturbed surfaces, in particular during earthworks and vegetation clearing
- Uncovered loads being transported to and from the proposal area are also a potential source of dust
- Other odours from specific construction activities (e.g. painting of lanes and medians, excavation of contaminated soils if these occur).

The works would be located in close proximity to residents (10 metres away) and recreational users (10 metres away) and dust emissions and other odours have the potential to cause disturbances (e.g. coat windows, cars etc.) and affect human health. The safeguards and management measures included in Section 6.8.3 of the REF would minimise the likelihood and severity of these impacts.

The operation of the proposal would improve traffic flow, reducing queueing and the amount of vehicles stopping and starting, and may have a minor positive impact on air quality in the area.

2.5.3 Public health

Issue Description

- What are the health impacts of the increase diesel fuels?
- Why hasn't an Epidemiological study been carried out?

Response

The operation of the proposal would improve traffic flow and reduce fuel consumption including diesel consumption. During construction of the proposal there would be a negligible increase in the amount of diesel used from construction vehicles.

A study into public exposure to diesel fuel emissions by Cancer Research UK, and supported by the Cancer Council NSW, indicates that diesel exhaust does cause cancer, but the overall risk to the general population is low compared to other risk factors such as tobacco, excess bodyweight, and alcohol.

Epidemiology studies are completed for projects when there are significant changes to the likelihood and exposure to public health hazards. In considering the scale of the proposal and the standard management measures in place, Roads and Maritime have formed a view that this proposal would not significantly impact likelihood or exposure to public health hazards and consequently an epidemiology study has not been completed.

2.6 Construction

Issue Description

- When will the project start?
- How long will construction take?
- Where will the site compound be located?

Response

Construction is anticipated to commence in first half of 2018. The duration of the proposed works is expected to be 9 months, including utility relocation works.

The construction site compound will be a joint site compound with the Great North Road Pinch Point Project. This compound will be located on the corner of Parramatta Road and Great North Road, Five Dock as presented in **Error! Reference source not found.**

Figure 2-2 Site compound location

3 Additional assessment

3.1 Parking Studies at Parramatta Road/Shaftesbury Road Intersection

3.1.1 Summary

A parking assessment was undertaken by TDG on behalf of Roads and Maritime attached as Appendix A). The parking study assessed the impact to parking from removal of 40 metres of car parking space required for the additional lane width on Shaftesbury Road southbound.

The parking study provided detail on the following:

- Inventory of land use within study area
- Parking inventory of all spaces within the study area;
- Parking occupancy and length of stay surveys and analysis of all spaces within the study area between 6:00 am and 6:00pm on Thursday 8 December and on Saturday 10 December 2016. The surveys were carried outside the school holiday period and therefore provide a typical representation of the existing situation for weekdays and weekends.
- Assessment of proposed works on parking conditions and formulation of appropriate recommendations to remedy any impact.

The parking study identified 53 on-street parking spaces and 88 off-street parking spaces in the study area. An 88 space car park is also available adjacent to Concord Oval. An analysis of the parking occupancy survey indicates that:

- On-street one hour restricted spaces have low utilisation on Thursday and Saturday with less than 50 percent of spaces occupied during the day
- Unrestricted on-street spaces had high occupancies on Thursday (~85% to 90%)
- Overall on-street spaces were more utilised on Thursday than on Saturday
- The two 30 minute spaces in Loftus Street were occupied most of the time; however a closer analysis indicated that a small number of cars parked for very long period
- Spaces in the car park adjacent to Concord Oval had a peak occupancy of over 53% and 38% on Thursday and on Saturday respectively. It is reasonable to assume that when games are played at Concord Oval the car park may be fully occupied.

3.1.2 Review of the potential parking impacts of the proposal

Table 3-1 below presents a summary of the potential parking impacts from the proposal.

Table 3-1 Summary of parking inventory and impacts

Road name	Existing parking provision (within the study area)	Impact of the proposal on parking
Parramatta Road	• None, Clearway and No Stopping zone.	None
Shaftesbury Road southbound	• Seven unrestricted spaces • Five 1P spaces (with local permit holder exclusions)	• Loss of seven unrestricted car spaces due to proposed new 'No Stopping Zone' adjacent to the bus depot building (refer to Figure 3-3). • No change to the five 1P spaces.
Shaftesbury Road northbound	• Five spaces with timed 'no stopping' during weekday 6:30am to 9:30am and 3:30pm to 6:30pm and Saturday 6:30 to 12:30.	• Property acquisition may impact driveway parking for: ○ 1 Shaftesbury Road – up to one driveway park lost

Road name	Existing parking provision (within the study area)	Impact of the proposal on parking
		○ 3 Shaftesbury Road – up to one driveway park lost
Milton Street	• Seven unrestricted spaces on the southern side • Seven 1P spaces on the northern side	None
Loftus Street	• 11 unrestricted spaces on Loftus Street southbound • Nine unrestricted spaces on Loftus Street northbound • Two 1/2P spaces on Loftus Street northbound	None
Concord Oval carpark	• 86 spaces. Unrestricted with 24/7 access. Two of these are disabled parking spaces.	None

Review of available equivalent alternate parking in the surrounding side streets to offset the seven lost spaces on Shaftesbury Road southbound.

As presented in Figure 3-3 the proposal would result in the permanent removal of seven unrestricted on-street spaces on the eastern side of Shaftesbury Road. The parking assessment concluded that cars parking for up to 1 hour (weekday = 4 cars) can be catered for by the vacant 1 hour spaces in the sections of Shaftesbury Road and Milton Street within the study Area, where at least 8 spaces were vacant during the parking study. Vehicles parked for longer duration (greater than one hour) have equivalent available spaces on Milton St, Loftus Street and Concord Oval Carpark.

Milton Street and Loftus Street have capacity to offset the seven parking spaces during early morning and late afternoon, however between approximately 9am and 5pm they fall slightly below capacity (refer Figure 3-1,). During these times parking is likely to be available within Concord Oval carpark with at least 39 space vacant. The parking study data also demonstrated an average four and a half hour stay which suggest the parking could be employees of the surrounding area.

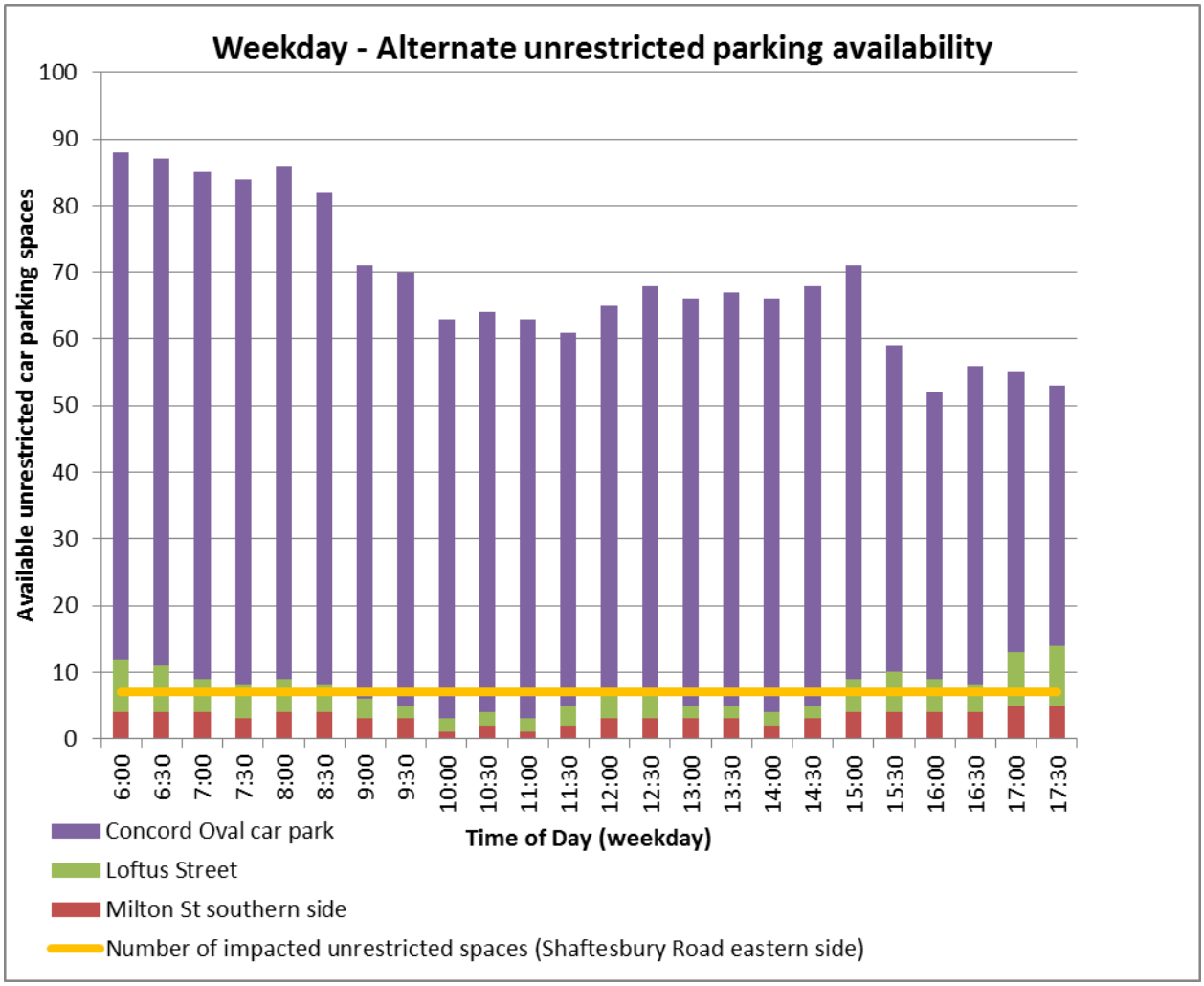

Figure 3-1 Weekday alternate unrestricted parking

As presented in Figure 3-2, on weekends the lost car parking is offset by equivalent local spaces available on Milton Street and Loftus Street to accommodate the difference. At least 54 additional spaces were also available within Concord Oval on the day of the survey.

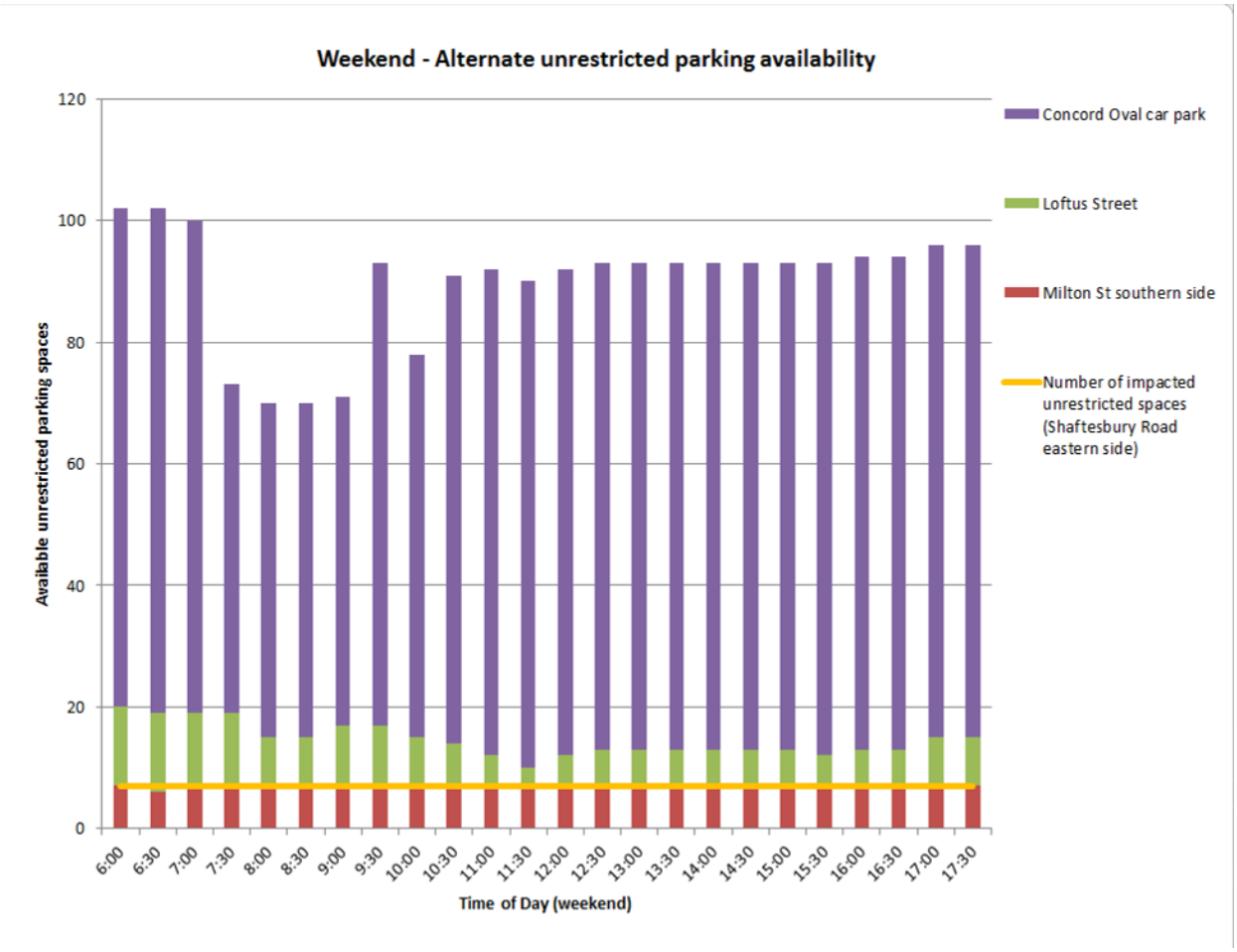

Figure 3-2 Weekend alternate unrestricted parking availability

Figure 3-3 Parking spaces available before and after construction

3.1.3 Additional management and mitigation measures

No additional management and mitigation measures are required for the proposal.

4 Environmental management

The REF for the Parramatta Road and Shaftesbury Road Intersection Upgrade identified the framework for environmental management, including safeguards and management measures that would be adopted to avoid or reduce environmental impacts (Section 7 of the REF).

After consideration of the issues raised in the public submissions, no additional safeguard and management measures are required

Should the proposal proceed, environmental management will be guided by the framework and measures outlined below.

4.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Construction Environmental Management Plan (CEMP) will be prepared to describe safeguards and management measures identified. The CEMP will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP will be prepared prior to construction of the proposal and must be reviewed and certified by environment staff, Sydney Region, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan), QA Specification G40 – Clearing and Grubbing and QA Specification G10 - Traffic Management.

4.2 Summary of safeguards and management measures

The review of environmental factors for the Parramatta Road and Shaftesbury Road Intersection Upgrade identified a range of environmental outcomes and management measures that would be required to avoid or reduce the environmental impacts.

After consideration of the issues raised in the public submissions, no additional environmental management measures for the project (refer to Chapter 7 of the REF) are required. Should the project proceed, the environmental management measures in Table 4-1 will guide the subsequent phases of the Parramatta Road and Shaftesbury Road Intersection Upgrade development.

Table 4-1: Summary of environmental safeguards and management measures

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the Roads and Maritime Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following: • any requirements associated with statutory approvals • details of how the project will implement the identified safeguards outlined in the REF • issue-specific environmental management plans • roles and responsibilities • communication requirements • induction and training requirements • procedures for monitoring and evaluating environmental performance, and for corrective action • reporting requirements and record-keeping • procedures for emergency and incident management • procedures for audit and review. The endorsed CEMP will be implemented during the undertaking of the activity.	Contractor / Roads and Maritime project manager	Pre-construction / detailed design	Core standard safeguard GEN1
GEN2	General - notification	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity.	Contractor / Roads and Maritime project manager	Pre-construction	Core standard safeguard GEN2
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings.	Contractor / Roads and Maritime project	Pre-construction / detailed	Core standard safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include: • areas of non- Aboriginal heritage sensitivity • adjoining residential areas requiring particular noise management measures	manager	design	GEN3
NV1	Noise and Vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • all potential high noise and vibration generating activities associated with the activity • A map indicating the locations of sensitive receivers including residential properties. • A quantitative noise assessment in accordance with the EPA Interim Construction Noise Guidelines (DECCW, 2009) • feasible and reasonable mitigation measures to be implemented, taking into account *Beyond the Pavement: urban design policy, process and principles* (Roads and Maritime, 2014). • A process for assessing the performance of the implemented mitigation measures. • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive receivers	Contractor	Pre construction	Core standard safeguard NV1 Section 4.6 of *QA G36 Environment Protection*
NV2	Noise and Vibration	• A process for documenting and resolving issues and complaints • A process for updating the plan when activities affecting construction noise and vibration change.			

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		• Identify in toolbox talks where noise and vibration management is required			
NV3	Complaints	A management procedure will be put in place to deal with noise complaints that may arise from the construction works. Each complaint would need to be investigated and potential noise mitigation measures reviewed.	Contractor	Pre construction	Additional Safeguard
NV4	Construction Noise	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise levels such as rock breaking and concrete cutting should be scheduled not to be done after 12am.	Contractor	Construction	Additional Safeguard
NV5	Construction Noise	Use quieter and less noise emitting construction methods where feasible and reasonable.	Contractor	Construction	Additional Safeguard
NV6	Construction Noise	All plant and equipment to be appropriately maintained to ensure optimum running conditions, with periodic monitoring.	Contractor	Construction	Additional Safeguard
NV7	Construction Noise	The noise levels of plant and equipment items are to be considered and are not to be used on site unless compliant with the noise criteria	Contractor	Construction	Additional Safeguard
NV8	Construction Noise	The offset distance between stationary noisy plant and adjacent sensitive receivers is to be maximised where practicable. Plant used intermittently to be throttled down or shut down when not in use Noise-emitting plant to be directed away from sensitive receivers where possible.	Contractor	Construction	Additional Safeguard
NV9	Construction Noise	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.	Contractor	Construction	Additional Safeguard
NV10	Construction Noise	Non-tonal reversing beepers (or an equivalent mechanism) should be fitted and used on all construction vehicles and mobile plant regularly used on site	Contractor	Construction	Additional Safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		for periods of over two months			
NV11	Construction Noise	Investigate the use of structures to shield residential receivers from noise such as: • site shed placement; • temporary or mobile noise screens (where practicable) • enclosures to shield fixed noise sources such as pumps, compressors, fans etc (where practicable); and • consideration of site topography when situating stationary plant. Include the investigation and any potential use of screening within the NVMP.	Contractor	Construction	Additional Safeguard
TT1	Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the RMS Traffic Control at Work Sites Manual and the worksite manual RMS Specification G10. The TMP will include: • confirmation of haulage routes including investigation of alternate routes to minimise use of local roads • measures to maintain access to local roads and properties • site specific traffic control measures (including signage) to manage and regulate traffic movement • measures to maintain pedestrian and cyclist access • access to construction sites including entry and exit locations • consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic.	Contractor	Detailed design / Pre-construction	Core standard safeguard TT1 Section 4.8 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
TT2	Traffic and transport	• The traffic management plan would include measures to minimise construction vehicle usage on local roads. Where practicable, deliveries of plant and materials would be carried out outside of peak traffic periods.	Contractor	Detailed design / Pre-construction	Additional safeguard
TT3	Access	• Access to businesses and residences must be maintained where possible • Safe pedestrian access around the work site would be provided by the construction contractor and captured within the traffic management plan. • Signage outlining pedestrian and cyclist diversion routes would be displayed during construction (where required). • The parking of light construction vehicles (eg staff vehicles) would be restricted to designated areas	Contractor	Construction	Additional safeguard
TT4	Bus services	• Bus services are to be notified in advance of the proposed construction works, including timing.	Roads and Maritime	Pre-construction	Additional safeguard
B1	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contactor	Detailed design / pre-construction	Core standard safeguard B2
B2	Vegetation impacts	Avoid stockpiling materials and equipment and parking vehicles and machinery within the dripline of any tree.	Contractor	Construction	Additional safeguard
B3	Vegetation removal	Prior to the start of any clearing a physical clearing boundary is to be demarcated and implemented.	Contractor	Pre-construction	Additional safeguard
B4	Vegetation	• Where trees are to be retained, place an exclusion zone fencing outside	Contractor	Construction	Additional

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
	removal	the tree protection zone • Erect signs to inform personnel of the purpose of the fencing. Signs should be clearly visible and be general in nature, such as 'Exclusion zone' or 'Environmental Protection zone'.			safeguard
B5	Noxious weeds	• Declared noxious weeds (ie. *Asparagus aethiopicus*) will be managed according to the requirements stipulated by the Noxious Weeds Act 1993, and any weed removal activities will follow Guide 6 (Weed Management) in the Biodiversity Guidelines (RTA 2011).	Contractor	Pre-construction	Additional safeguard
B6	Vegetation removal	A Vegetation Management Plan would be prepared and would include: • Identification (marking) of the clearing boundary and trees to be cleared • A detailed clearing process in accordance with RMS Biodiversity Guidelines (2011) including requirements of Guide 1,2, 4 & 9 • measures to protect the hedge at Concord Oval and place an exclusion zone fencing. • Measures to protection of trees #26 and #27 as outlined in Arborist Report.	Contractor	Pre-construction	Standard safeguard
LV1	Rehabilitation	• A Landscape Plan would be prepared in accordance with the Roads and Maritime *Beyond the Pavement urban design policy, process and principles* (Roads and Maritime, 2014) and *Landscape Guideline* (RTA, 2008) and approved by the councils. The landscape plan must take into consideration the values identified in the Concord Oval Precinct plan of management (refer Appendix D).	Contractor	Pre-construction	Additional safeguard
LV2	Light spills	• Ensure all lights are directed away from residential properties.	Contractor	Construction	Additional safeguard
SW1	Erosion and sedimentation	A site specific Erosion and Sediment Control Plan (ESCP) will be prepared and implemented as part of the CEMP.	Contractor	Detailed design /	Core standard

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		. The ESCP would include the following: • Separation of on-site and off-site water • The direction of run-off and drainage points during each stage of construction • Direction of flow of on-site and off-site water • The locations of other erosion and sediment control measures • A process for reviewing and updating the plan on a fortnightly basis and/or when works alter. • Nominated concrete wash out areas		Pre-construction	safeguard SW2 Section 2.2 of QA G38 *Soil and Water Management*
SW2	Accidental spills	• The CEMP is to include a site specific emergency spill plan in accordance with RMS Incident Classification and Reporting Procedure.	Contractor	Detailed design / Pre-construction	Core standard safeguard C3 Section 4.3 of QA *G36 Environment Protection*
SW3	Contaminated land	• A Contaminated Land Management Plan will be prepared and implemented as part of the CEMP for any areas of existing contaminated land or to address land contamination likely to be caused by the activity.	Contractor	Detailed design / Pre-construction	Core standard safeguard C1 Section 4.2 of QA *G36 Environment Protection*
SW4	Contaminated	If contaminated areas are encountered during construction, appropriate	Contractor	Detailed	Core

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
	land	control measures will be implemented to manage the immediate risks of contamination. This may include but not be limited to: - diversion of surface runoff - capture of any contaminated runoff - temporary capping.		design / Pre-construction	standard safeguard C2 Section 4.2 of QA *G36 Environment Protection*
HH1	Impact on unknown heritage items	Should any remains of unexpected historic heritage be encountered all work must cease in that location and the procedures in the Roads and Maritime's *Standard Management Procedure: Unexpected Archaeological Finds* (Roads and Maritime, 2012) must be followed.	Contractor	Construction	Core standard safeguard H2 Section 4.10 of QA *G36 Environment Protection*
AQ1	Vehicle emissions	• Plant and machinery must be maintained in accordance with manufacturer's specification. • Smoky emissions must be kept within the standards and regulations under the *Protection of the Environment Operations Act 1997* that no vehicle shall have continuous smoky emissions for more than 10 seconds. • Vehicles must not be left running when idle.	Contractor	Construction	Additional safeguard
AQ2	Dust generation	• Any material transported in trucks must be appropriately covered to reduce dust generation.	Contractor	Construction	Additional safeguard
AQ3	Dust emissions	• Measures including watering or covering exposed areas must be used to	Contractor	Construction	Additional

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		minimise or prevent dust generation. • Visual surveillance for dust generation must occur at all times. Work must cease when high levels of airborne dust cannot be controlled.			safeguard
AQ4	Smoke emissions	• Vegetation or other materials are not to be burnt on site.	Contractor	Construction	Additional safeguard
CC1	Climate Change	• Consider the use of renewable energy to power the site compounds (e.g. solar panels) or the contribution to green energy programs. Any contribution must cover the full power usage during construction.	Contractor	Construction	Additional safeguard
CC2	Climate Change	• Where feasible and reasonable, procure recycled content road construction materials.	Contractor	Construction	Additional safeguard
CC3	Climate Change	• Maintain all plant and vehicles regularly to maintain fuel efficiency. • Procure locally produced goods and services where feasible, reasonable and cost effective to reduce transport fuel emissions. • Alternative fuel and power sources (such as biodiesels and ethanol blends) will be used wherever practicable.	Contractor	Construction	Additional safeguard
W1	Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets.	Contractor	Detailed design / pre-construction	Core standard safeguard W1 Section 4.2 of QA *G36 Environment Protection*
W2	Burning of waste	Waste must not be burnt on site.	Contractor	Construction	Additional

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
					safeguard
W3	Waste on site	Waste material must not be left on site once the works have been completed.	Contractor	Construction	Additional safeguard
W4	Waste on site	Working areas must be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	Additional safeguard
AH1	Impact on unknown heritage items	If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the regional environment officer and Roads and Maritime's Aboriginal cultural heritage advisor contacted immediately. Steps in the Roads and Maritime *Standard Management Procedure: Unexpected Archaeological Finds* (Roads and Maritime 2012) must be followed.	Contractor	Construction	Core standard safeguard AH2 Section 4.9 of QA *G36 Environment Protection*
C1	Cumulative Impacts	The traffic management plan including Road Occupancy Licenses would be prepared in consultation with the Transport Management Centre taking into consideration the traffic cumulative impact of projects on the Sydney road network.	Project Manager and Contractor	Construction & pre-construction	Additional safeguard
C2	Cumulative Impacts	Undertake regular meetings with WestConnex to discuss co-ordination of the construction works and provision of respite for night works.	Project Manager and Contractor	Construction & pre-construction	Additional safeguard
C3	Cumulative	The construction environmental management plan (CEMP) would be revised	Project Manager	Construction	Additional

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
	Impacts	to consider potential cumulative impacts from surrounding development activities as they become known.	and Contractor	& pre-construction	safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
GEN1	General - minimise environmental impacts during construction	A CEMP will be prepared and submitted for review and endorsement of the Roads and Maritime Environment Manager prior to commencement of the activity. As a minimum, the CEMP will address the following: • any requirements associated with statutory approvals • details of how the project will implement the identified safeguards outlined in the REF • issue-specific environmental management plans • roles and responsibilities • communication requirements • induction and training requirements • procedures for monitoring and evaluating environmental performance, and for corrective action • reporting requirements and record-keeping • procedures for emergency and incident management • procedures for audit and review. The endorsed CEMP will be implemented during the undertaking of the activity.	Contractor / Roads and Maritime project manager	Pre-construction / detailed design	Core standard safeguard GEN1
GEN2	General - notification	All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five days prior to	Contractor / Roads and	Pre-construction	Core standard

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		commencement of the activity.	Maritime project manager		safeguard GEN2
GEN3	General – environmental awareness	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings. Site-specific training will be provided to personnel engaged in activities or areas of higher risk. These include: • areas of non- Aboriginal heritage sensitivity • adjoining residential areas requiring particular noise management measures	Contractor / Roads and Maritime project manager	Pre-construction / detailed design	Core standard safeguard GEN3
NV1	Noise and Vibration	A Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) and identify: • all potential high noise and vibration generating activities associated with the activity • A map indicating the locations of sensitive receivers including residential properties. • A quantitative noise assessment in accordance with the EPA Interim Construction Noise Guidelines (DECCW, 2009) • feasible and reasonable mitigation measures to be implemented, taking into account *Beyond the Pavement: urban design policy, process and principles* (Roads and Maritime, 2014). • A process for assessing the performance of the implemented mitigation measures. • A monitoring program to assess performance against relevant noise and vibration criteria • Arrangements for consultation with affected neighbours and sensitive	Contractor	Pre construction	Core standard safeguard NV1 Section 4.6 of *QA G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		receivers • A process for documenting and resolving issues and complaints • A process for updating the plan when activities affecting construction noise and vibration change. • Identify in toolbox talks where noise and vibration management is required			
NV3	Complaints	A management procedure will be put in place to deal with noise complaints that may arise from the construction works. Each complaint would need to be investigated and potential noise mitigation measures reviewed.	Contractor	Pre construction	Additional Safeguard
NV4	Construction Noise	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise levels such as rock breaking and concrete cutting should be scheduled not to be done after 12am.	Contractor	Constructio n	Additional Safeguard
NV5	Construction Noise	Use quieter and less noise emitting construction methods where feasible and reasonable.	Contractor	Constructio n	Additional Safeguard
NV6	Construction Noise	All plant and equipment to be appropriately maintained to ensure optimum running conditions, with periodic monitoring.	Contractor	Constructio n	Additional Safeguard
NV7	Construction Noise	The noise levels of plant and equipment items are to be considered and are not to be used on site unless compliant with the noise criteria	Contractor	Constructio n	Additional Safeguard
NV8	Construction Noise	The offset distance between stationary noisy plant and adjacent sensitive receivers is to be maximised where practicable. Plant used intermittently to be throttled down or shut down when not in use Noise-emitting plant to be directed away from sensitive receivers where possible.	Contractor	Constructio n	Additional Safeguard
NV9	Construction	Plan traffic flow, parking and loading/unloading areas to minimise reversing	Contractor	Constructio	Additional

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
	Noise	movements within the site.		n	Safeguard
NV10	Construction Noise	Non-tonal reversing beepers (or an equivalent mechanism) should be fitted and used on all construction vehicles and mobile plant regularly used on site for periods of over two months	Contractor	Constructio n	Additional Safeguard
NV11	Construction Noise	Investigate the use of structures to shield residential receivers from noise such as: • site shed placement • temporary or mobile noise screens (where practicable) • enclosures to shield fixed noise sources such as pumps, compressors, fans etc (where practicable) • consideration of site topography when situating stationary plant. Include the investigation and any potential use of screening within the NVMP.	Contractor	Constructio n	Additional Safeguard
TT1	Traffic and transport	A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will be prepared in accordance with the RMS Traffic Control at Work Sites Manual and the worksite manual RMS Specification G10. The TMP will include: • confirmation of haulage routes including investigation of alternate routes to minimise use of local roads • measures to maintain access to local roads and properties • site specific traffic control measures (including signage) to manage and regulate traffic movement • measures to maintain pedestrian and cyclist access	Contractor	Detailed design / Pre-construction	Core standard safeguard TT1 Section 4.8 of QA *G36 Environment Protection*

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
		• access to construction sites including entry and exit locations • consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic.			
TT2	Traffic and transport	• The traffic management plan would include measures to minimise construction vehicle usage on local roads. Where practicable, deliveries of plant and materials would be carried out outside of peak traffic periods.	Contractor	Detailed design / Pre-construction	Additional safeguard
TT3	Access	• Access to businesses and residences must be maintained where possible • Safe pedestrian access around the work site would be provided by the construction contractor and captured within the traffic management plan. • Signage outlining pedestrian and cyclist diversion routes would be displayed during construction (where required). • The parking of light construction vehicles (eg staff vehicles) would be restricted to designated areas	Contractor	Constructio n	Additional safeguard
TT4	Bus services	• Bus services are to be notified in advance of the proposed construction works, including timing.	Roads and Maritime	Pre-construction	Additional safeguard
B1	Biodiversity	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.	Contactor	Detailed design / pre-construction	Core standard safeguard B2
B2	Vegetation	Avoid stockpiling materials and equipment and parking vehicles and	Contractor	Constructio	Additional

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
	impacts	machinery within the dripline of any tree.		n	safeguard
B3	Vegetation removal	Prior to the start of any clearing a physical clearing boundary is to be demarcated and implemented.	Contractor	Pre-construction	Additional safeguard
B4	Vegetation removal	• Where trees are to be retained, place an exclusion zone fencing outside the tree protection zone • Erect signs to inform personnel of the purpose of the fencing. Signs should be clearly visible and be general in nature, such as 'Exclusion zone' or 'Environmental Protection zone'.	Contractor	Constructio n	Additional safeguard
B5	Noxious weeds	• Declared noxious weeds (ie. *Asparagus aethiopicus*) will be managed according to the requirements stipulated by the Noxious Weeds Act 1993, and any weed removal activities will follow Guide 6 (Weed Management) in the Biodiversity Guidelines (RTA 2011).	Contractor	Pre-construction	Additional safeguard
B6	Vegetation removal	A Vegetation Management Plan would be prepared and would include: • Identification (marking) of the clearing boundary and trees to be cleared • A detailed clearing process in accordance with RMS Biodiversity Guidelines (2011) including requirements of Guide 1,2, 4 & 9 • measures to protect the hedge at Concord Oval and place an exclusion zone fencing. • Measures to protection of trees #26 and #27 as outlined in Arborist Report.	Contractor	Pre-construction	Standard safeguard
LV1	Rehabilitation	• A Landscape Plan would be prepared in accordance with the Roads and Maritime *Beyond the Pavement urban design policy, process and principles* (Roads and Maritime, 2014) and *Landscape Guideline* (RTA, 2008) and approved by the councils. The landscape plan must take into consideration the values identified in the Concord Oval Precinct plan of management (refer Appendix D).	Contractor	Pre-construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
LV2	Light spills	• Ensure all lights are directed away from residential properties.	Contractor	Construction	Additional safeguard
SW1	Erosion and sedimentation	A site specific Erosion and Sediment Control Plan (ESCP) will be prepared and implemented as part of the CEMP. . The ESCP would include the following: • Separation of on-site and off-site water • The direction of run-off and drainage points during each stage of construction • Direction of flow of on-site and off-site water • The locations of other erosion and sediment control measures • A process for reviewing and updating the plan on a fortnightly basis and/or when works alter. • Nominated concrete wash out areas	Contractor	Detailed design / Pre-construction	Core standard safeguard SW2 Section 2.2 of QA G38 *Soil and Water Management*
SW2	Accidental spills	• The CEMP is to include a site specific emergency spill plan in accordance with RMS Incident Classification and Reporting Procedure.	Contractor	Detailed design / Pre-construction	Core standard safeguard C3 Section 4.3 of QA *G36 Environment Protection*
SW3	Contaminated land	• A Contaminated Land Management Plan will be prepared and implemented as part of the CEMP for any areas of existing contaminated land or to address land contamination likely to be caused by the activity.	Contractor	Detailed design / Pre-construction	Core standard safeguard C1 Section 4.2

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
					of QA *G36 Environment Protection*
SW4	Contaminated land	If contaminated areas are encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. This may include but not be limited to: • diversion of surface runoff • capture of any contaminated runoff • - temporary capping.	Contractor	Detailed design / Pre-construction	Core standard safeguard C2 Section 4.2 of QA *G36 Environment Protection*
HH1	Impact on unknown heritage items	Should any remains of unexpected historic heritage be encountered all work must cease in that location and the procedures in the Roads and Maritime's *Standard Management Procedure: Unexpected Archaeological Finds* (Roads and Maritime, 2012) must be followed.	Contractor	Construction	Core standard safeguard H2 Section 4.10 of QA *G36 Environment Protection*
AQ1	Vehicle emissions	• Plant and machinery must be maintained in accordance with manufacturer's specification. • Smoky emissions must be kept within the standards and regulations under the *Protection of the Environment Operations Act 1997* that no vehicle shall have continuous smoky emissions for more than 10 seconds. • Vehicles must not be left running when idle.	Contractor	Construction	Additional safeguard

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
AQ2	Dust generation	• Any material transported in trucks must be appropriately covered to reduce dust generation.	Contractor	Construction	Additional safeguard
AQ3	Dust emissions	• Measures including watering or covering exposed areas must be used to minimise or prevent dust generation. • Visual surveillance for dust generation must occur at all times. Work must cease when high levels of airborne dust cannot be controlled.	Contractor	Construction	Additional safeguard
AQ4	Smoke emissions	• Vegetation or other materials are not to be burnt on site.	Contractor	Construction	Additional safeguard
CC1	Climate Change	• Consider the use of renewable energy to power the site compounds (e.g. solar panels) or the contribution to green energy programs. Any contribution must cover the full power usage during construction.	Contractor	Construction	Additional safeguard
CC2	Climate Change	• Where feasible and reasonable, procure recycled content road construction materials.	Contractor	Construction	Additional safeguard
CC3	Climate Change	• Maintain all plant and vehicles regularly to maintain fuel efficiency. • Procure locally produced goods and services where feasible, reasonable and cost effective to reduce transport fuel emissions. • Alternative fuel and power sources (such as biodiesels and ethanol blends) will be used wherever practicable.	Contractor	Construction	Additional safeguard
W1	Waste	A Waste Management Plan (WMP) will be prepared and implemented as part of the CEMP. The WMP will be prepared taking into account the *Environmental Procedure - Management of Wastes on Roads and Maritime Services Land* (Roads and Maritime, 2014) and relevant Roads and Maritime Waste Fact Sheets.	Contractor	Detailed design / pre-construction	Core standard safeguard W1 Section 4.2 of QA *G36*

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
					Environment Protection
W2	Burning of waste	Waste must not be burnt on site.	Contractor	Construction	Additional safeguard
W3	Waste on site	Waste material must not be left on site once the works have been completed.	Contractor	Construction	Additional safeguard
W4	Waste on site	Working areas must be maintained, kept free of rubbish and cleaned up at the end of each working day.	Contractor	Construction	Additional safeguard
AH1	Impact on unknown heritage items	If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the regional environment officer and Roads and Maritime's Aboriginal cultural heritage advisor contacted immediately. Steps in the Roads and Maritime *Standard Management Procedure: Unexpected Archaeological Finds* (Roads and Maritime 2012) must be followed.	Contractor	Construction	Core standard safeguard AH2 Section 4.9 of QA *G36 Environment Protection*
C1	Cumulative Impacts	The traffic management plan including Road Occupancy Licenses would be prepared in consultation with the Transport Management Centre taking into consideration the traffic cumulative impact of projects on the Sydney road network.	Project Manager and Contractor	Construction & pre-construction	Additional safeguard
C2	Cumulative	Undertake regular meetings with WestConnex to discuss co-ordination of the	Project Manager	Constructio	Additional

No.	Impact	Environmental safeguards	Responsibility	Timing	Standard / additional safeguard
	Impacts	construction works and provision of respite for night works.	and Contractor	n & pre-construction	safeguard
C3	Cumulative Impacts	The construction environmental management plan (CEMP) would be revised to consider potential cumulative impacts from surrounding development activities as they become known.	Project Manager and Contractor	Constructio n & pre-construction	Additional safeguard

4.3 Licensing and approvals

As the proposal is being assessed under Part 5 of the EP&A Act, Roads and Maritime is both the proponent and determining authority. Additional licensing and approvals required for the proposal is summarised in Table 4-2.

Table 4-2: Summary of licensing and approval required

Instrument	Requirement	Timing
Roads Act 1993	Approval under Section 138 from the appropriate road authority prior to works on roads	Prior to works on roads
Land Acquisition (Just Terms Compensation) Act 1991	Compensation for land acquired for the proposal would be negotiated in accordance with the Act	Prior to land acquisition

5 References

Roads and Maritime Services 2016, Review of Environmental Factors Parramatta Road and Shaftesbury Road Intersection Upgrade, Sydney.

Appendix A

Parking Assessment

in association with:
Gennaoui Consulting

1976 – 2016
40 YEARS OF CREATING
REMARKABLE JOURNEYS

Memorandum

To: Vishal Gandhy

From: Fred Gennaoui

Date: 23 January 2017

Job N°: 14412

Subject: Parking Studies at Parramatta Road/Shaftesbury Road Intersection

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Background

The Road & Maritime Services (RMS) is proposing major works along Parramatta Road to improve the capacity and safety of the intersection with Great North Road in accordance with the REF produced in November 2016 for this location and titled *Parramatta Road and Great North Road Intersection Upgrade - Review of Environmental Factors*.

The proposal aims to upgrade the intersection of Parramatta Road with Shaftesbury Road, Burwood/Concord to increase the capacity of the right turning movement into Shaftesbury Road, improve traffic efficiency for road users on Parramatta Road, and improve intersection safety. The proposed intersection upgrade is represented in **Figure 1**.

Figure 1-2 Design of the proposed Parramatta Road & Shaftesbury Road intersection upgrade. The proposal area boundary is shown in red.

Figure 1: Proposed RMS Works at Intersection of Parramatta Road with Shaftesbury Road

The additional lane width on Shaftesbury Road southbound requires removal of 40 metres of car parking space to convert it into a through traffic/ merge lane, which is approximately seven unrestricted car spaces. This 40 metre section is shown in **Figure 2**.

TDG in association with Gennaoui Consulting has been commissioned to assess the impact of these works on parking in the vicinity of this intersection.

Scope of Work & Methodology

The scope of works and adopted methodology was based on the RMS requirements for a parking study report reproduced below:

A review and mapping of the current parking restriction should be undertaken to inform the parking study. The parking study should specifically identify and assess:

- *The current parking restrictions that apply, by time of day and day of week at the location, including any loading zones, bus zones etc;*
- *The number of parking spaces in each section and type (retail, commuter, staff or residential);*
- *The adjacent land use where the parking is permitted (including side streets);*
- *The length of parking that will be removed and the number of parking spaces that will be impacted in accordance with AS2890.5-1993 (width of parallel parking spaces for cars and light commercial vehicles under normal conditions = 2.3m, length of car spaces = 6.0 – 6.7m, refer AS2890.5-1993 for specifications);*
- *If the proposed clearway or removal of parking is through a residential area, identify if residences have off-street parking available;*
- *Identification of nearby public parking facilities, capacity, availability and their existing utilisation. The locations of these parking spaces will need to be presented in an aerial plan;*
- *The total number of parking spaces available and their existing utilisation along the route and the capacity of the adjacent side streets and parking areas;*
- *The duration of the stay and parking turnover of cars and of vehicles utilising loading zones by type;*
- *The need for parking directional signage for directing residents and other road users to side street parking and the potential location for these signs.*

The assessment of the proposed RMS works on nearby parking involved the following tasks:

- Inventory of land use within study area
- Parking inventory of all spaces within the study area;
- Parking occupancy and length of stay surveys and analysis of all spaces within the Study area between 6:00 am and 6:00pm on Thursday 8 December and on Saturday 10 December 2016. The surveys were carried outside the school holiday period and therefore provides a typical representation of the existing situation for weekdays and weekend.
- Assessment of proposed works on parking conditions and formulation of appropriate recommendations to remedy any impact.

Study Area

The parking study was carried out for the area illustrated **Figure 2**. It comprises the following land uses:

- Residential along Milton Street, in Shaftesbury Road, and on the western side of Loftus Street;
- Commercial along Parramatta Road, and part of the western side of Loftus Street;
- Bus depot along Parramatta Road;
- The Concord Oval north of Parramatta Road and east of Loftus street.

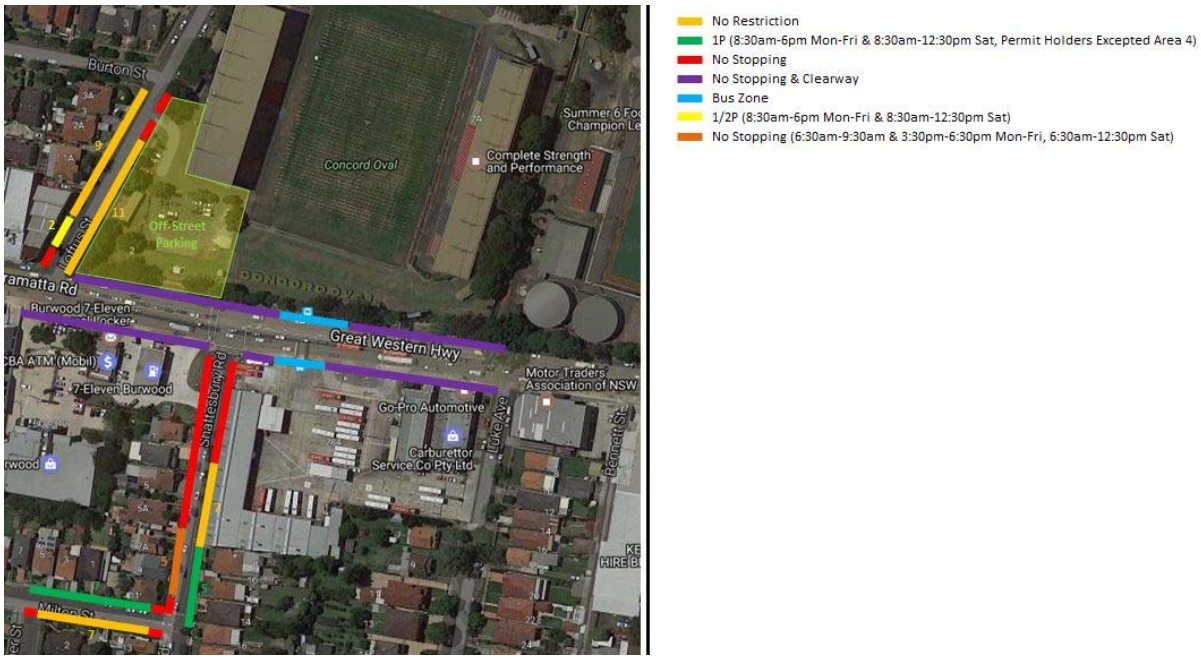


Figure 2: Study Area and Parking Inventory

Parking Inventory

There are about 140 parking spaces within the Study Area. The current number, location, type and time restrictions of spaces available for parking is detailed in **Appendix A,** summarised in **Table 1** and illustrated in **Figure 2**.

	Time of Restriction	**No of Spaces**
On-Street Spaces		
30mns	8:30am-6pm Mon-Fri and 8:30am-12:30pm Sat,	2
1 hour	8:30am-6pm Mon-Fri & 8:30am-12:30pm Sat, Permit Holders Excepted	12
No restriction		34
No restriction	9.30am to 3.30pm	5
Sub-Total		**53**
Off Street (East of Loftus St Adjacent Concord Oval)		
For Disabled		2
No Restriction		86
Sub-Total		**88**
Total		**141**

Table 1: Parking Inventory

Some 53 on-street spaces are available within the Study Area, for parking in Shaftesbury Road, Milton Street and Loftus Street. Twelve of these spaces are restricted to 1 hour parking along Shaftesbury Road (5 spaces) and Milton Street (7 spaces). Furthermore, two 30 minutes spaces are also available on the western side of Loftus Street. Of the remaining 39 unrestricted spaces, five spaces on the western side of Shaftesbury Road have "No Stopping" restrictions during the morning (6.30 to 9.30am) and afternoon (3.30 to 6.30pm) peak periods.

Adjacent to Concord Oval, there is a car park which can accommodate 88 cars. This car park appears to be available to all parkers without any restriction identified at the gate.

There are no loading zones within the surveyed area. It is also noted that all residences and commercial businesses within the study area have on-site parking.

Parking Occupancy

The total number of vehicles parked in each type of on-street and the off-street parking space within the Study area was recorded at half hourly intervals between 6:00 am and 6:00pm on Thursday 8th December and on Saturday 10th December 2016. The results of the survey are detailed in **Appendix B**. The average parking occupancy (%) of each type of available parking space on the Thursday and Saturday are summarised in **Table 2** and detailed in **Appendix B**.

Also included in **Table 2** and **Appendix B** are the maximum number of occupied spaces during the survey period and those occupied during the overall peak period.

The overall peak parking demand occurred on Thursday between 4:00pm and 4.30pm when spaces were occupied (~50% occupancy). A lower overall peak parking demand occurred on Saturday when 52 spaces were occupied (~37% occupancy) between 8.00am and 9.00am.

An analysis of the parking occupancy survey indicates that:

- On-street 1 hour restricted spaces have low utilisation on Thursday and Saturday with less than 50 percent of spaces occupied during the day;
- Unrestricted on-street spaces had high occupancies on Thursday (~85% to 90%);
- Overall on-street spaces were more utilised on Thursday than on Saturday;
- The two 30 minute spaces in Loftus Street were occupied most of the time; however a closer analysis indicated that a small number of cars parked for very long period as indicated in the next section;
- Spaces in the car park experienced peak occupancy over 53% and 38% on Thursday and on Saturday respectively. It is reasonable to assume that when games are played at the Oval the car park may be fully occupied.

PARKING RESTRICTIONS	THURSDAY				SATURDAY		
	Spaces	Average	Max	Overall Peak	Average	Max	Overall Peak
Shaftesbury Road							
1Hr (8:30am-6pm Mon-Fri and 8:30am-12:30pm Sat) Permit holders expected	5	21%	40%	20%	18%	40%	20%
No restriction	7	54%	86%	43%	1%	14%	0%
No Stopping 6:30am-9:30am and 3:30pm-6:30pm Mon-Fri, 6:30am-12:30pm Sat	5	0%	0%	0%	2%	20%	0%
Milton Street							
1Hr (8:00am-6pm Mon-Fri and 8:00am-1:00pm Sat). Permit holders expected	7	4%	29%	0%	20%	43%	29%
No Restriction	7	77%	86%	71%	51%	86%	43%
Loftus Street							
30mns 8:30am-6pm Mon-Fri and 8:30am-12:30pm Sat	2	58%	100%	50%	38%	100%	100%
No Restriction	20	79%	90%	75%	62%	85%	60%
Parramatta Road	0						
Sub-Total	**53**	**52%**	**62%**	**47%**	**36%**	**51%**	**38%**
Concord Oval (East of Loftus St)							
Disabled	2	8%	50%	50%	10%	50%	50%
No Restriction	86	29%	53%	49%	13%	37%	36%
Sub-Total	**88**	**28%**	**53%**	**49%**	**13%**	**38%**	**36%**
Total	**141**	**37%**	**48%**	**48%**	**21%**	**37%**	**37%**

Table 2: Parking Occupancy by Type of Parking

Parking Turnover and Length of Stay

The number plates of all vehicles parked in all on street short term and unrestricted parking spaces were recorded together with their approximate time of arrival and departure; a similar survey was carried out in the car park. The data collected was processed to obtain length of stay and parking turnover for each parking type of on-street spaces and of the off-street spaces. These surveys were carried out at 15 mns intervals on Thursday 8 December and on Saturday 10 December between 6:00am and 6:00pm.

Length of Stay

The frequency distribution of length of stay, and the average and $85^{\%tle}$ length of stay of parkers in on-street spaces and in the off-street parking area are detailed in **Appendix C** and summarised in **Table 3**.

Time Restriction	Surveyed Spaces	Thursday		Saturday	
		Ave LOS (mins)	85%ile LOS (mins)	Ave LOS (mins)	85%ile LOS (mins)
Shaftesbury Road					
1Hr (8:30am-6pm Mon-Fri and 8:30am-12:30pm Sat) Permit holders expected	5	80	140	**210**	305
No restriction	7	267	510	**15**	15
No Stopping (6:30am-9:30am and 3:30pm-6:30pm Mon-Fri, 6:30am-12:30pm Sat	5				
Milton Street					
1hr (8:00am-6pm Mon-Fri and 8:00am-1:00pm Sat) Permit holders expected	7	45	67	**180**	259
No Restriction	7	355	603	**364**	585
Loftus Street					
30mns (8:30am-6pm Mon-Fri and 8:30am-12:30pm Sat)	2	275	325	**180**	250
No Restriction	20	381	675	**232**	427
Parramatta Road					
All on-street	**53**	294	**555**	**238**	456
Concord Oval car park					
Disabled spaces	2	75	99	**68**	83
No restriction	86	211	499	**111**	120
Total Off Street	**88**	208	**495**	**110**	**120**
Total Spaces	**141**	245	**530**	**159**	**375**

Table 3: Length of Stay of Vehicles

The average and 85%tle length of stay for vehicles parking in all on-street spaces up to 1 hour limit exceeded the posted time limit during the Thursday survey period. On Saturday, the 1-hour restriction is lifted after 12.30pm; thus the much higher Length of Stay.

Turnover of Parking Facilities

Parking turnover rates indicate the number of cars per hour, during a specified survey period, using a particular space. The shorter the designated length of stay for the space, the greater should be the turnover rate or utilisation of the space. In theory, where parking is in great demand and is strictly controlled, “15 minutes” spaces would show turnover rates of about 4.0 cars per hour, “half-hour” of 2.0, “one hour” spaces of 1.0 or more, and “two hour” spaces of 0.5 or more.

The average turnover rate over the period of the survey in vehicles/ space/hour have been calculated from the information collected and are also included in **Appendix C** and noted by parking type in **Table 4.**

Time Restriction	Surveyed Spaces	Thursday		Saturday	
		Total Cars	Turnover (veh/space/hr	Total Cars	Turnover (veh/space/hr
Shaftesbury Road					
1Hr (8:30am-6pm Mon-Fri and 8:30am-12:30pm Sat) Permit holders expected	5	**9**	0.15	3	0.05
No restriction	7	**10**	0.12	1	0.01
No Stopping (6:30am-9:30am and 3:30pm-6:30pm Mon-Fri, 6:30am-12:30pm Sat	5	0			
Milton Street					
1hr (8:00am-6pm Mon-Fri and 8:00am-1:00pm Sat) Permit holders expected	7	**4**	0.05	5	0.06
No Restriction	7	**11**	0.13	**7**	**0.08**
Loftus Street					
30mns (8:30am-6pm Mon-Fri and 8:30am-12:30pm Sat)	2	**3**	0.13	**3**	**0.13**
No Restriction	20	**30**	0.13	25	0.10
Parramatta Road					
All on-street	**53**	**67**	**0.12**	44	0.08
Concord Oval car park					
Disabled spaces	2	**2**	0.08	2	0.08
No restriction	86	**85**	0.08	**68**	**0.07**
Total Off Street	**88**	**87**	**0.08**	70	0.07
Total Spaces	**141**	**154**	**0.09**	**114**	**0.07**

Table 4: Vehicles Turnover
*During 12 hours survey period

On-street parking in time restricted spaces up to 1 hour recorded much lower turnover rates than expected. This is a largely due by the small number of parked cars which considerably exceeded the posted time limit.

Impact of Proposed Works on Parking

The proposed RMS works, illustrated in **Figure 1**, would result in the permanent removal of seven (7) unrestricted on-street spaces on the eastern side of Shaftesbury Road (~40m)**;** these spaces would become subject to a "No Stopping" restriction as illustrated in **Figure 3.**

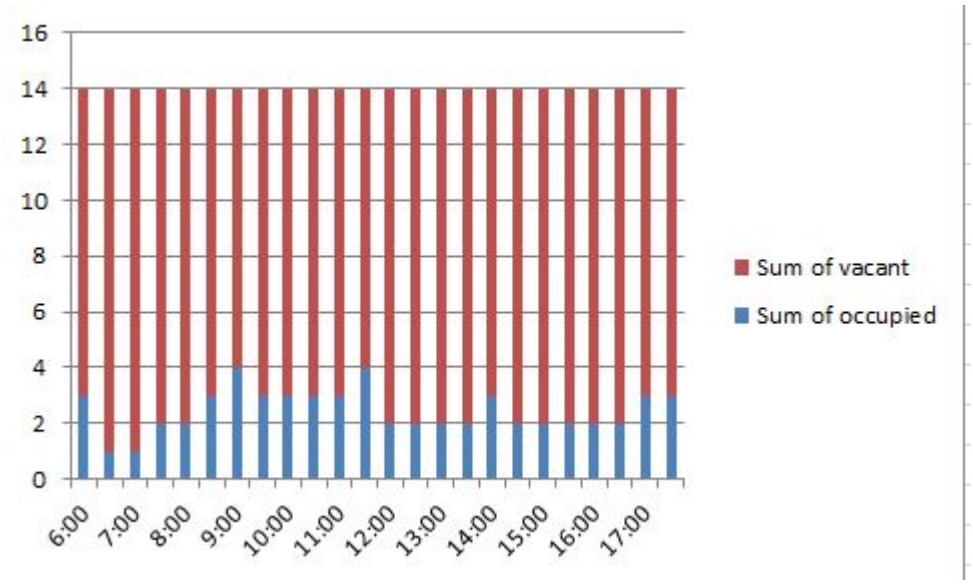
The seven unrestricted spaces on the eastern side of Shaftesbury Road experienced on Thursday a peak occupancy of six (6) spaces for no more than one hour during the 12 hours of survey. On the Saturday, only one car parked in these spaces for about 15 mns.

On Thursday, a total of 10 cars only used those spaces. Four of these cars parked for less than one hour and appeared to be mostly associated with nearby residences. The other six cars parked for between 2 and 11 hours by employees of the nearby bus depot or other businesses along Parramatta Road.

Figure 3: Parking Inventory at Completion of Works

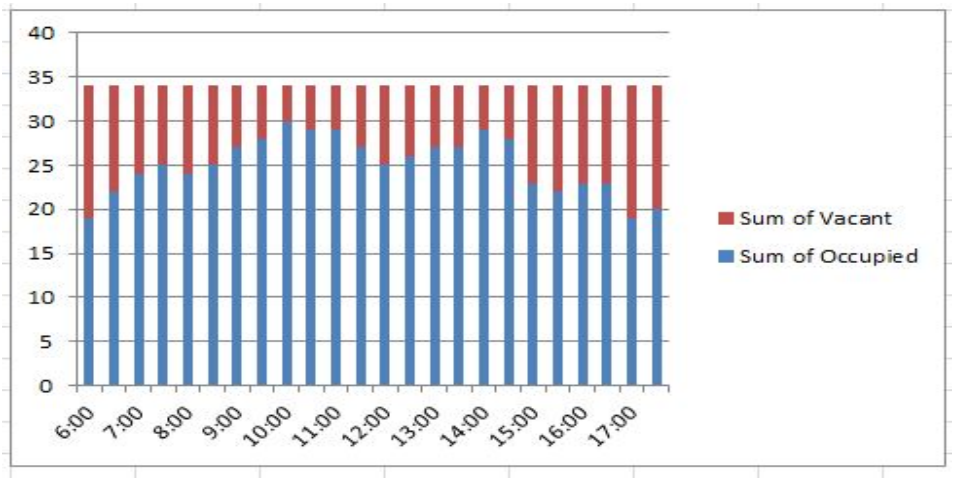
In order to establish where these cars could be accommodated, a closer analysis of on-street spaces was carried out. In this regard, the number of currently occupied and vacant on-street short stay (up to 1 hour limit) and unrestricted spaces on Thursday are displayed in Graphs 1 and 2 respectively.

The demand for short stay spaces could easily be catered for by the vacant 1 hour spaces in Shaftesbury Road and Milton Street where at least 8 spaces were vacant at all times as shown in **Graph 1**.



Graph 1: Thursday On-Street 1 Hour Occupied & vacant Spaces

The long stay spaces could be catered for by the currently vacant spaces in Milton Street and Loftus Street as shown in **Graph 2** as well as the large number of vacant spaces in the car park off Loftus Street (at least 45 spaces). However, if parking in the off street car park is prohibited in the future, then cars could park along the section of Loftus Street to the north of Burton Street where a number of vacant spaces were observed.



Graph 2: Thursday On-Street Unrestricted Spaces

The loss of spaces is not likely to affect residents at night time as there would be at least 25 vacant on-street spaces after 6.00pm on Thursday and Saturday.

Parking in Milton Street and Loftus Street is not likely to be affected. On-street parking along Parramatta Road is currently prohibited.

Conclusions

The proposed RMS works will result in the permanent loss of seven (7) unrestricted spaces along the eastern side of Shaftesbury Road. Cars parking for up to 1 hour would easily be catered for by the vacant 1 hour spaces in the sections of Shaftesbury Road and Milton Street within the Study Area, where at least 8 spaces were vacant at all times. The small number of long term parkers would most likely utilise the vacant spaces in Milton Street and Loftus Street, including the section to north of Burton Street.

There will be no need for directional signage for directing residents and other road users to side street parking.

Fred Gennaoui
Principal Consultant, TDG
Director, Gennaoui Consulting

Appendix A

Parking Inventory

Appendix A **Parking Inventory Shaftesbury Road Study Area**

Street	Between	Side	Parking Restriction	Time Restriction	Capacity
Zone 2 Area					
Shaftesbury Road	Milton St and Parramatta Rd	West	No Stopping		
Shaftesbury Road	Milton St and Parramatta Rd	West	No Stopping	6:30am-9:30am & 3:30pm-6:30pm Mon-Fri, 6:30am-12:30pm Sat	5
Shaftesbury Road	Parramatta Rd and Milton St	East	No Stopping		
Shaftesbury Road	Parramatta Rd and Milton St	East	No Restriction		7
Shaftesbury Road	Parramatta Rd and Milton St	East	1P	8:30am-6pm Mon-Fri & 8:30am-12:30pm Sat, Permit Holders Excepted Area 4	5
Milton Street	5 Milton St and Shaftesbury Rd	North	1P	8am-6pm Mon-Fri & 8am-1pm Sat, Permit Holders Excepted Area 3	7
Milton Street	5 Milton St and Shaftesbury Rd	North	No Stopping		
Milton Street	Shaftesbury Rd and Archer St	South	No Restriction		7
Milton Street	Shaftesbury Rd and Archer St	South	No Stopping		
Parramatta Road	Luke Ave and Loftus St	North	No Stopping	Clearway 6am-7pm Mon-Fri & 8am-8pm Sat-Sun	
Parramatta Road	Luke Ave and Loftus St	North	Bus Zone		
Parramatta Road	Luke Ave and Shaftesbury Rd	South	No Stopping	Clearway 6am-7pm Mon-Fri & 8am-8pm Sat-Sun	
Parramatta Road	Luke Ave and Shaftesbury Rd	South	Bus Zone		
Parramatta Road	Shaftesbury Rd and Loftus St	South	No Stopping	Clearway 6am-7pm Mon-Fri & 8am-8pm Sat-Sun	
Loftus Street	Parramatta Rd and Burton St	West	No Stopping		
Loftus Street	Parramatta Rd and Burton St	West	1/2P	8:30am-6pm Mon-Fri & 8:30am-12:30pm Sat	2
Loftus Street	Parramatta Rd and Burton St	West	No Restriction		9
Loftus Street	Parramatta Rd and Burton St	East	No Restriction		11
Loftus Street	Parramatta Rd and Burton St	East	No Stopping		
Sub-Total					**53**
Off Street Parking	Concord Oval (East of Loftus St)	-	No Restriction		86
Off Street Parking	Concord Oval (East of Loftus St)	-	Disabled		2
Sub-Total					**88**
Total					**141**

Appendix B

Parking Occupancy

APPENDIX B																														
Table B1																														
Shaftsburry Road Parking occupancy		**THURSDAY 8 December 2016**																												
Street	**Between**	**Supply**	**6:00**	**6:30**	**7:00**	**7:30**	**8:00**	**8:30**	**9:00**	**9:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**	**12:30**	**13:00**	**13:30**	**14:00**	**14:30**	**15:00**	**15:30**	**16:00**	**16:30**	**17:00**	**17:30**	**Avg**	**Max**	**Overall**
Shaftesbury Road																													**Peak**
Milton St and Parramatta Rd	1P 8:30am-6pm Mon-Fri & 8:30am-12:30pm Sat,	5	1	1	0	1	0	0	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	2	2	21%	40%	20%
Milton St and Parramatta Rd	No restriction	7	3	3	3	4	3	3	4	4	6	5	6	5	4	4	4	4	5	4	3	3	3	3	2	2	54%	86%	43%
Milton St and Parramatta Rd	No restriction 9:30am to 3:30pm-Mon-Fri, After 12:30pm Sat	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%
Milton Street																														
Shaftesbury Rd and Archer St	1P 8:00am-6pm Mon-Fri & 8:00am-1:00pm Sat, Permit Holders Excepted Area 4	7	2	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4%	29%	0%
Shaftesbury Rd and Archer St	No Restriction	7	4	6	6	6	6	6	6	6	6	6	5	5	5	6	5	5	6	6	5	5	5	4	5	4	77%	86%	71%
Parramatta Road																														
Luke Ave and Loftus St	No Sopping/ Bus Zone																													
Loftus Street																														
Parramatta Rd and Burton St	30mns 8:30am-6pm Mon-Fri & 8:30am-12:30pm Sat,	2	0	0	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	58%	100%	50%
Parramatta Rd and Burton St	No Restriction	20	12	13	15	15	15	16	17	18	18	18	18	17	16	16	18	18	18	18	15	14	15	16	12	11	79%	90%	75%
Sub-Total		**53**	**22**	**23**	**25**	**27**	**26**	**28**	**31**	**31**	**33**	**32**	**32**	**31**	**27**	**28**	**29**	**29**	**32**	**30**	**25**	**24**	**25**	**25**	**22**	**20**	**52%**	**62%**	**47%**
Concord Oval (East of Loftus S	For Disabled	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	8%	50%	50%
Concord Oval (East of Loftus S	No Restrictions	86	10	10	10	10	9	12	21	21	26	26	26	30	28	25	25	24	24	23	24	37	42	37	43	46	29%	53%	49%
Sub-Total		**88**	**10**	**10**	**10**	**10**	**9**	**12**	**21**	**21**	**26**	**26**	**26**	**30**	**28**	**25**	**25**	**24**	**24**	**23**	**24**	**37**	**43**	**38**	**44**	**47**	**28%**	**53%**	**49%**
Total		**141**	**32**	**33**	**35**	**37**	**35**	**40**	**52**	**52**	**59**	**58**	**58**	**61**	**55**	**53**	**54**	**53**	**56**	**53**	**49**	**61**	**68**	**63**	**66**	**67**	**37%**	**48%**	**48%**
Table B2																														
Shaftsburry Road Parking occupancy		**SATURDAY 10 December 2016**																												
Street	**Between**	**Supply**	**6:00**	**6:30**	**7:00**	**7:30**	**8:00**	**8:30**	**9:00**	**9:30**	**10:00**	**10:30**	**11:00**	**11:30**	**12:00**	**12:30**	**13:00**	**13:30**	**14:00**	**14:30**	**15:00**	**15:30**	**16:00**	**16:30**	**17:00**	**17:30**	**Avg**	**Max**	**Overall**
Shaftesbury Road																														
Milton St and Parramatta Rd	1P 8:30am-6pm Mon-Fri & 8:30am-12:30pm Sat,	5	1	1	1	1	1	1	1	1	1	1	1	2	0	0	0	0	1	1	1	1	1	1	1	1	18%	40%	20%
Milton St and Parramatta Rd	No restriction	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1%	14%	0%
Milton St and Parramatta Rd	No restriction 9:30am to 3:30pm-Mon-Fri, After 12:30pm Sat	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2%	20%	0%
Milton Street																														
Shaftesbury Rd and Archer St	1P 8:00am-6pm Mon-Fri & 8:00am-1:00pm Sat, Permit Holders Excepted Area 4	7	2	2	2	1	2	2	3	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	20%	43%	14%
Shaftesbury Rd and Archer St	No Restriction	7	2	2	2	3	3	3	3	3	3	4	6	6	6	6	4	4	4	4	4	3	3	3	3	1	51%	86%	43%
Parramatta Road																														
Luke Ave and Loftus St																														
Loftus Street																														
Parramatta Rd and Burton St	af,	2	0	0	0	0	2	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	38%	100%	50%
Parramatta Rd and Burton St	No Restriction	**20**	**7**	**7**	**8**	**8**	**12**	**12**	**10**	**10**	**12**	**13**	**15**	**17**	**15**	**14**	**14**	**14**	**14**	**14**	**14**	**15**	**14**	**14**	**12**	**12**	62%	85%	70%
Sub-Total		**53**	**12**	**13**	**13**	**13**	**20**	**20**	**18**	**17**	**18**	**20**	**24**	**27**	**24**	**22**	**20**	**20**	**21**	**21**	**20**	**20**	**20**	**20**	**18**	**16**	**36%**	**51%**	**38%**
Concord Oval (East of Loftus S	For Disabled	2	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10%	50%	0%
Concord Oval (East of Loftus S	No Restrictions	86	4	3	5	32	31	31	32	10	23	9	6	6	6	6	6	6	6	6	6	5	5	5	5	5	13%	37%	6%
Sub-Total		**88**	**4**	**3**	**5**	**33**	**32**	**32**	**33**	**10**	**24**	**9**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**5**	**5**	**5**	**5**	**5**	**13%**	**38%**	**6%**
Total		**141**	**16**	**16**	**18**	**46**	**52**	**52**	**51**	**27**	**42**	**29**	**30**	**33**	**30**	**28**	**26**	**26**	**27**	**27**	**26**	**25**	**25**	**25**	**23**	**21**	**21%**	**37%**	**18%**

Appendix C

Length of Stay and Turnover

APPENDIX C

LENGTH OF STAY SURVEY **THURSDAY 8 December 2016**

Length of Stay

	Spaces	Restriction	15mns	30mns	45mns	60mns	75mns	90mns	105mns	120mns	135mns	150mns	165mns	180mns	4hrs	5hrs	6hrs	7hrs	8hrs	9hrs	10hrs	11hrs	12hrs	Total	Avg	85% mns	Turnover
																											Cars/space/hr
Shaftesbury Rd	5	1P	3	1	1	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	**9**	80	140	0.15
Shaftesbury Rd	7	No restriction	1	2	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	3	0	1	0	**10**	267	510	0.12
Milton St	7	1P	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**	45	67	0.05
Milton St	7	No restriction	0	0	1	0	0	0	0	0	0	0	2	0	1	2	1	1	0	1	0	0	2	**11**	355	603	0.13
Loftus Street	2	30mns	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	**3**	275	325	0.13
Loftus Street	20	No Restriction	3	2	0	1	0	0	0	0	1	1	0	0	1	0	6	1	4	1	2	2	5	**30**	381	675	0.13
Sub-Total	**48**		8	6	3	2	2	0	0	1	1	3	2	1	2	5	8	2	4	5	2	3	7	**67**	294	555	0.12
Off Street Parking	2	Disabled	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**2**	75	99	0.08
Off Street Parking	86	No restriction	2	7	3	11	11	3	2	4	2	2	7	2	5	4	1	0	5	6	5	0	3	**85**	211	499	0.08
Sub-Total	**88**		**3**	**7**	**3**	**11**	**11**	**3**	**2**	**4**	**3**	**2**	**7**	**2**	**5**	**4**	**1**	**0**	**5**	**6**	**5**	**0**	**3**	**87**	208	495	0.08
All Spaces	**136**		**11**	**13**	**6**	**13**	**13**	**3**	**2**	**5**	**4**	**5**	**9**	**3**	**7**	**9**	**9**	**2**	**9**	**11**	**7**	**3**	**10**	**154**	245	530	0.09

APPENDIX C

LENGTH OF STAY SURVEY **SATURDAY 10 December 2016**

Length of Stay

	Spaces	Restriction	15mns	30mns	45mns	60mns	75mns	90mns	105mns	120mns	135mns	150mns	165mns	180mns	4hrs	5hrs	6hrs	7hrs	8hrs	9hrs	10hrs	11hrs	12hrs	Total	Avg	85% mns	Turnover
																											Cars/space/hr
Shaftesbury Rd	5	1P	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	**3**	210	305	0.05
Shaftesbury Rd	7	No restriction	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	15	15	0.01
Milton St	7	1P	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**5**	186	259	0.06
Milton St	7	No restriction	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	1	0	2	**7**	364	585	0.08
Loftus Street	2	30mns	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	**3**	180	250	0.13
Loftus Street	20	No Restriction	1	3	1	1	0	0	2	0	3	0	0	2	1	2	1	3	4	1	0	0	0	**25**	232	427	0.10
Sub-Total	**48**		4	4	2	2	1	0	3	1	4	1	0	2	1	4	3	3	4	1	1	0	3	**44**	238	456	0.08
Off Street Parking	2	Disabled	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	68	83	0.08
Off Street Parking	86	No restriction	13	12	7	1	1	3	12	9	0	1	3	0	0	0	0	1	1	2	0	0	2	**68**	111	120	0.07
Sub-Total	**88**		**13**	**13**	**7**	**1**	**1**	**3**	**13**	**9**	**0**	**1**	**3**	**0**	**0**	**0**	**0**	**1**	**1**	**2**	**0**	**0**	**2**	**70**	110	120	0.07
All Spaces	**136**		**17**	**17**	**9**	**3**	**2**	**3**	**16**	**10**	**4**	**2**	**3**	**2**	**1**	**4**	**3**	**4**	**5**	**3**	**1**	**0**	**5**	**114**	159	375	0.07

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