Camellia West Development

Traffic Impact and Parking Assessment Report

September 2012

Statewide Planning

181 James Ruse Drive
Camellia NSW 2142

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Content

1. Introduction

1.1 Background

Mott MacDonald has been commissioned by Statewide Planning to undertake a Traffic Impact and Parking Assessment for a proposed development at 181 James Ruse Drive, Camellia. The proposed mixed use development will comprise both residential and commercial/retail land uses. This report will form part of the supporting documentation for the Planning Proposal for the proposed development.

1.2 Aim

The purpose of this report is to:

- Describe the existing road network and traffic conditions;
- Describe the development proposal;
- Assess the required onsite parking demand;
- Estimate the traffic generated by the proposed development;
- Determine a suitable access arrangement;
- Assess the traffic impacts of the proposed development; and
- Make recommendations where appropriate.

1.3 Scope of Report

This report begins with a summary of the existing traffic and transport conditions. The scale of the proposed development, a discussion on proposed access arrangements, and expected traffic operating characteristics are then described. The section which follows discusses the assessment of parking provision and demand. The penultimate section includes an estimation of the traffic generated by the development, likely traffic impacts and ameliorative measures required to address these impacts. The report concludes with a summary of key conclusions and recommendations.

2. Existing Conditions

2.1 Subject Site

The subject site is located at 181 James Ruse Drive, Camellia. The site is currently a vacant lot containing concrete slab, at grade bitumen debris and vegetation. The site was previously used as a James Hardie factory producing building materials, before it was demolished when a new site was found. The site contains soil contaminants and as part of a two stage development will be remediated prior to the actual development of the site.

The subject site is bounded by James Ruse Drive to the west. James Ruse Drive is a large arterial road that carries in the order of 65,000 vehicles per day. The eastern boundary of the site is the Carlingford Railway Line. This 2 track railway line runs between Clyde and Carlingford train stations.To the south of the main area of the site lies Tasman Avenue, currently an unused, closed off road that has a site gate at the approach to James Ruse Drive.This road will provide access into the development site. Parramatta River forms the a foreshore area at the northern boundary of the site. Figure 2.1 indicates the Subject Site location.

Figure 2.1: Subject Site Location

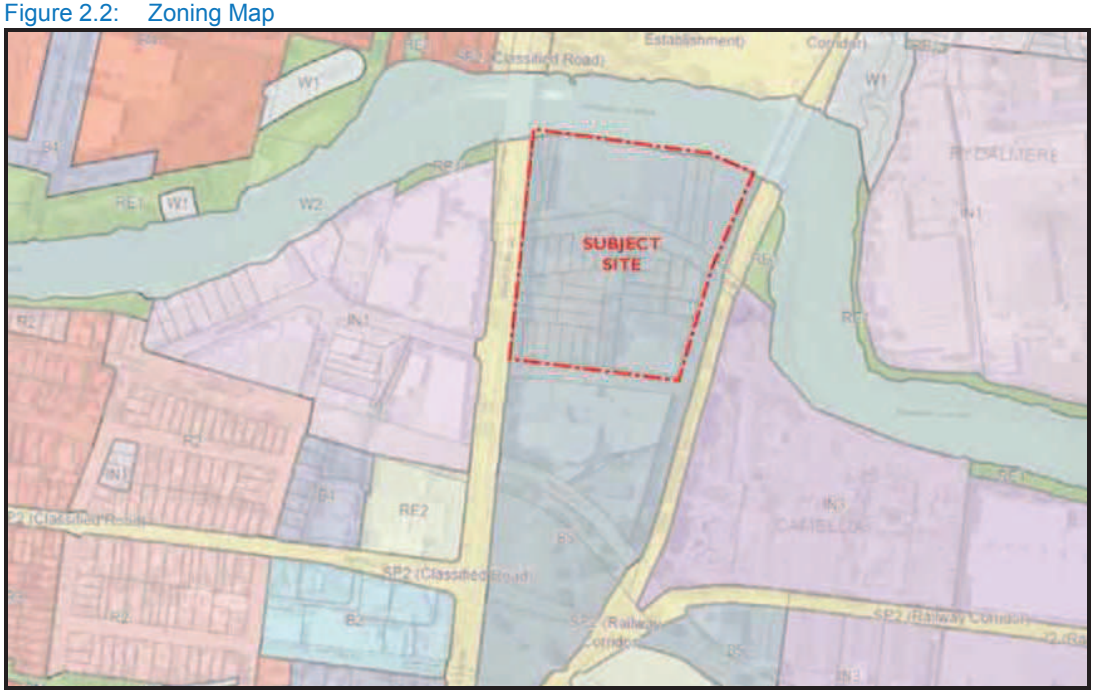
Source: Google Maps

There is also a service road that travels along the eastern boundary of the site between the Parramatta River and Grand Avenue North and this roadway may be utilised as an auxiliary access point, however would be subject to negotiation with utility companies including Sydney Water, as a series of services travel underneath this roadway parallel to the railway line.

As indicated in Figure 1.2, the site is zoned as commercial B5 Business Development under the Parrmatta Council 2011 Local Environmental Plan (LEP). Other land uses in close proximity of the site include:

- Heavy industrial areas located to the east and south east on the Camellia peninsula;
- Rosehill Racecourse to the south of the site;
- Business Park style like industrial units located west of the site;
- University of Western Sydney Parramatta Campus north of the site; and
- A mix of retail uses located on the corner of Hassall and James Ruse Drive south west of the site.

Figure 2.2: Zoning Map



Source: Parramatta Council Zoning Map

The purpose of the planning proposal is to have the development site rezoned to allow retail and residential developments. The site has remained vacant for a number of years and would play a large role in reactiviating the Camellia frontage of James Ruse Drive as part of wider planning strategies for Rosehill and the Camellia Peninsula.

2.2 Adjacent Road Network

The site currently has a frontage to James Ruse Drive. Directly opposite the site over James Ruse Drive lies River Road West. Both River Road West and Tasman Street intersect James Ruse in an offset configuration. There is a break in the median along James Ruse Drive and turning lanes to allow vehicles to turn into either Tasman Street or River Road West as well as through movements between the two side streets. This intersection operates under give way conditions.The River Road/West/James Ruse Drive intersection lies approximately 250 metres north of the major signalised intersection of Hassall Street/Grand Avenue/James Ruse Drive.The significant roads in the vicinity of the site and their indicative road classification in accordance with the Roads and Maritime Services (RMS) Road Classification are listed in Table 2.1 below:

Table 2.1: Adjacent Road Network

Road	Classification
James Ruse Drive	State Road
Hassall Street	Regional
Grand Avenue	Major Collector
River Road West	Local Collector
Grand Avenue North	Local
Tasman Street	Local

James Ruse Drive is a State Road under the management of the Roads and Maritime Service (RMS) and carries approximately 65,000 vehicles per day. In the vicinity of the site, it is configured with three travel lanes in both directions, with an additional turning lane at the River Road West intersection for southbound vehicles. It provides the main ring road route around the Parramatta CBD, as well as function as a key distributor road, with interchanges with other main roads including, the M4 Motorway, Parramatta Road, Victoria Road, Kissing Point Road, Pennant Hills Road, Windsor Road and Old Windsor Road.

Hassall Street is classified as a Regional Road and carries up to 15,000 vehicles per day. It provides a main east-west connection through Parramatta linking James Ruse Drive with the Great Western Highway and Church Street. The roadway is configured with two travel lanes in both directions, but incorporates an additional right and left turning lane for eastbound traffic at the intersection with James Ruse Drive.

Grand Avenue is classified as a Major Collector Road carrying between 3,000 and 7,000 vehicles per day. Grand Avenue forms the eastern leg of the signalised intersection of James Ruse Drive and Hassall Street and serves as one of only two access points into the Camellia Peninsula. The roadway in proximity to James Ruse Drive is configured with a single lane bridge over the Carlingford Railway line in both directions and carries a high percentage of heavy commercial vehicles due the heavy industrial land use within the Camellia Peninsula.

River Road West is classified as a local collector road carrying approximately 2,500 vehicles per day. It provides an attractive alternative route for access into and out of the Parramatta City Centre, with the provision of a turning lane on James Ruse Drive, and the platooning of vehicles from the Hassall Street intersection allowing for northbound left turning movements onto James Ruse Drive.

Grand Avenue North and Tasman Street are classified as local roads. Tasman Street is currently closed and will be the main access road into the proposed development site. Grand Avenue North currently provides access to the light industrial units south of the site as well as supplementary parking areas owned by the Sydney Turf Club.

2.3 Existing Traffic Volumes

Traffic volume surveys were undertaken at the following sites in order to gain an understanding of the existing traffic conditions in the vicinity of the site.

- James Ruse Drive/Hassall Street/Grand Avenue intersection(signalised);
- James Ruse Drive/Grand Avenue North intersection; and
- James Ruse Drive/River Road West.

The data was obtained on Monday 30th July 2012 between the following survey periods.

- 7:00am to 9:30am; and
- 4:00pm to7:00pm.

The peak traffic periods occurred at the following times:

- 7:45am to 8:45am; and
- 4:45pm to 5:45pm.

The traffic volume survey data reflected the various classifications of each road in the vicinity of the site and highlighted the heavy traffic volumes that are accommodated along James Ruse Drive during the peak periods. Peak Traffic Volumes are included in the Trip Generation and Distribution in Appendix A.

2.4 James Ruse Drive/Hassall Street Intersection

The key intersection associated with the proposed development is the intersection of Hassall Street, James Ruse Drive and Grand Avenue. The intersection is located approximately 250 metres south of the proposed signalised intersection access to the site and forms a critical intersection between three important roads. James Ruse Drive is a State Road that is under the management of RMS, Hassall Street provides a main east-west connection through the Parramatta CBD and Grand Avenue provides the major access to the Camellia Peninsula.

The intersection currently operates with a poor level of service during the AM and PM peak periods, with extensive queue lengths experienced along each leg. This is representative of an intersection that has a high degree of saturation where the phasing must balance the high levels of traffic demand for each road. The phasing is currently a modified diamond design and from on-site observations can approach cycle times of nearly 3 minutes.

From discussions with RMS, it is proposed that a series of works are to be undertaken in the next financial year as part of the Pinch Point Program, to alleviate congestion on major arterial corridors.

Figure 2.3 and Figure 2.4 indicate the extent of queueing along James Ruse Drive observed at a site visit during the AM and PM peak periods.

Figure 2.3: AM peak period queueing

Figure 2.4: PM peak period queueing north from River Road West intersection

2.5 Corridor Capacity

An important consideration indicated by RMS in relation to a preferred access arrangement is the maintenance of traffic capacity along the James Ruse Drive corridor. The existing traffic conditions along James Ruse Drive are such that long queue lengths are developed during the peak periods. This is counteracted to a large degree by a long green through movement phase that allows large sections of the queued traffic to pass through the intersection.

When the signals turn red vehicles stop and a queue develops at the Hassall Street intersection. Due to the high level of traffic along James Ruse Drive, the queue develops quickly and can extend past the proposed site access towards the Parramatta River during heavy traffic flows. As the signal turns green, vehicles at the front of the queue depart and accelerate through the intersection and the queue slowly begins to mobilise. At the rear of the queue vehicles simultaneuously slow as they approach the rear end of the queue. As the green signal

continues, the whole queue begins to slowly accelerate and stretch out along James Ruse Drive, clearing the majority of the queue that developed during the previous red signal phase.

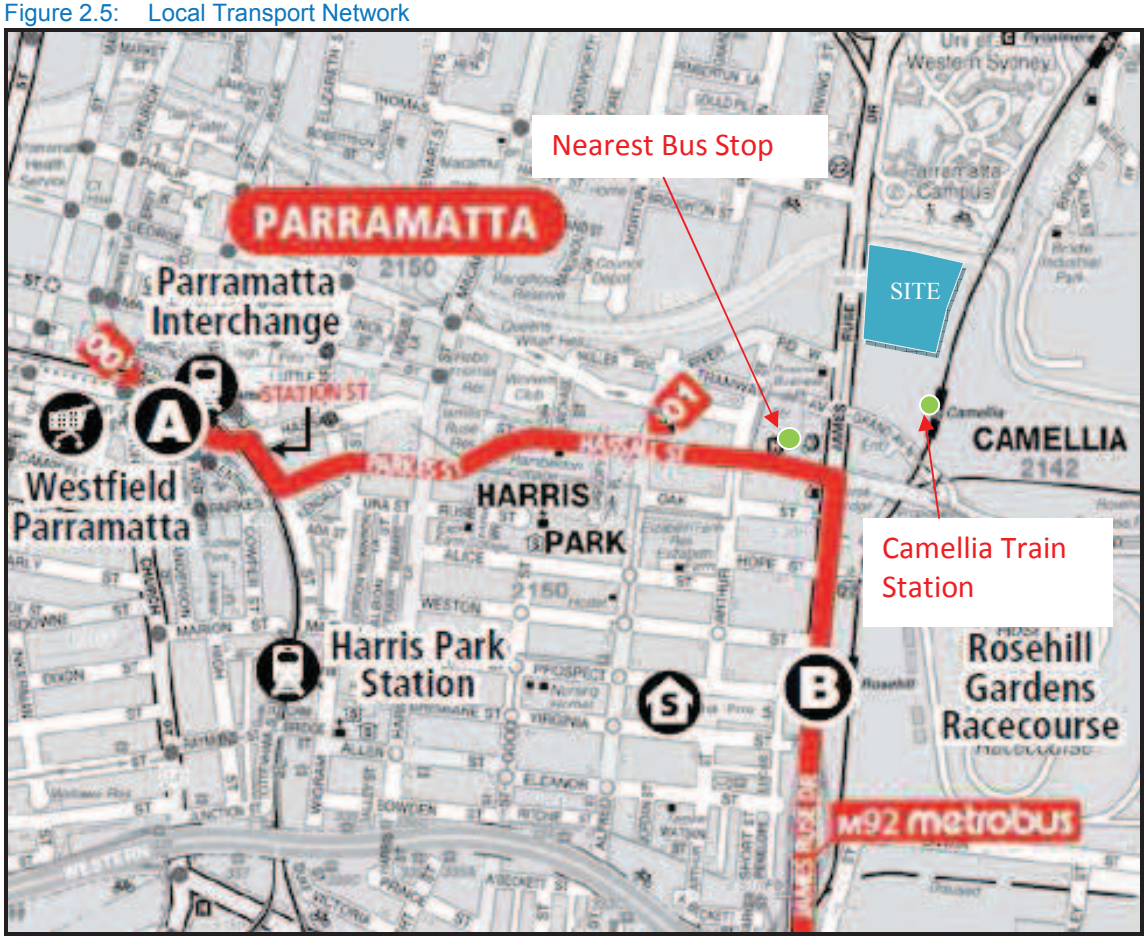
RMS has indicated that a proposed site access will need to have a minimal impact on this corridor capacity and the operation of the signals at the Hassall Street intersection. The RMS Pinch Point Program works are anticipated to assist with the capacity problems currently experienced at the intersection.

2.6 Public Transport

The site lies within 400m walk of Camellia train Station, which operates between Carlingford and Clyde train station, providing access to the wider Cityrail network. Furthermore, the nearest bus stop is located on Hassall Street outside the Mercure Hotel. This bus stop is serviced by the M92 express service between Parramatta and Sutherland and operates every ten minutes in peak periods in the both directions. This availability of public transport services is anticipated to encourage travelling to work by means other than a car. This is not simply limited to buses and trains too, with Parramatta Council's goal to increase sustainable transport to reduce the impact of developments on the environment and congestion on the road network.

Some examples that have been considered for the site include car share initiatives, quality pedestrian and cycling facilities including end of trip facilities to encourage a greater proportion of commuters to utilise sustainable transport options. Adoption of some of these measures would significantly reduce the number of parking spaces and traffic generated by the site. Figure 2.5 indicates the public transport network within the vicinity fo the development site.

Figure 2.5: Local Transport Network

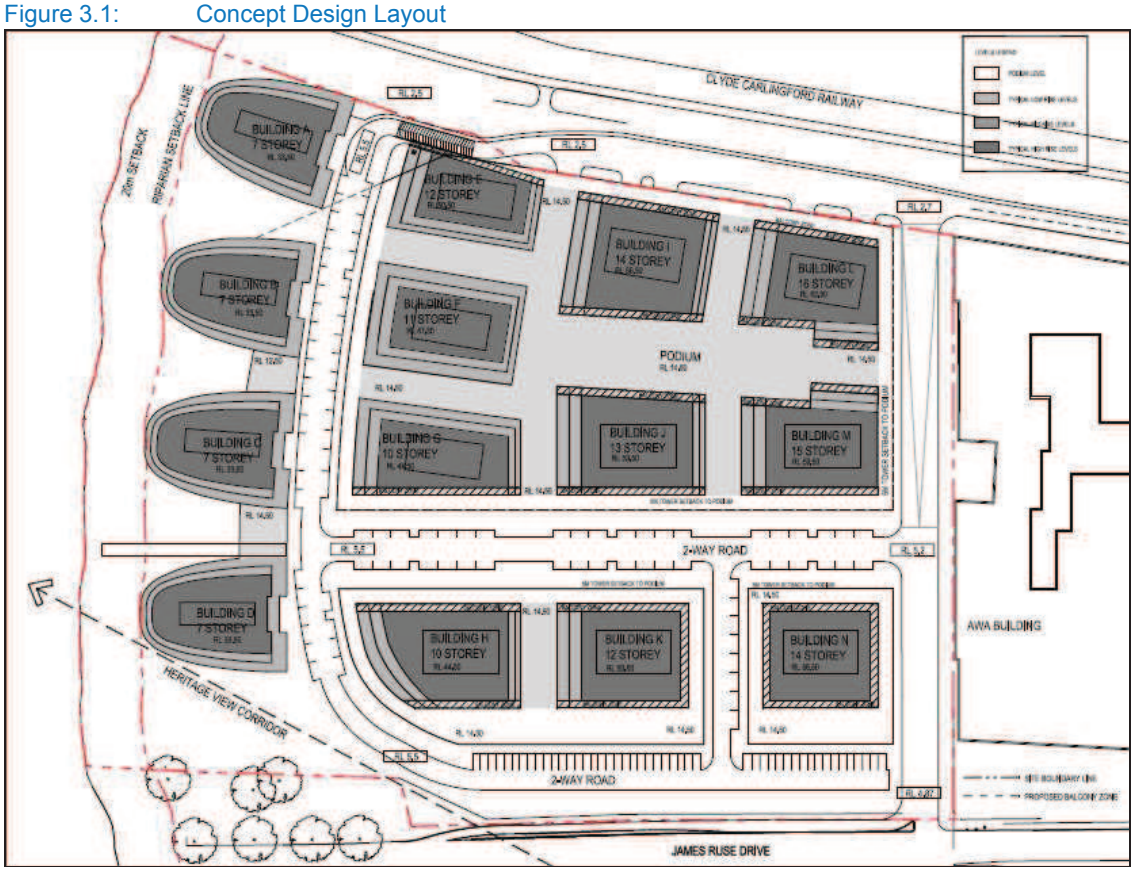


3. Proposed Development

3.1 Development Layout

The concept plans prepared by Tony Owen Partners show that it is proposed to construct a mixed use development consisting of 14 buildings comprising multi storey residential dwellings and podium and ground level mix of commercial and retail space below. The proposed development is to comprise a total of 1800 residential units and approximately 15,000m^2 GFA of commercial space and 15,000m2 of retail space. A concept layout of the development is shown in Figure 3.1.

Figure 3.1: Concept Design Layout



Source: Tony Owen Partners Concept Plan August 2012

3.2 Internal Roadway Layout

The internal roadway layout will provide circulation for access to the 14 buildings within the development and provide a connection to Tasman Street, the main access into the site from James Ruse Drive. The internal roadway layout includes a two lane two-way circulation road, a central north-south promenade and an additional small roadway connection between these two roads.

The loop road passes along the service road at the eastern boundary of the site (formerly Scarborough Street), behind the river front precinct towers and back south toward Tasman Street along the James Ruse Drive frontage of the site. The loop road contains a dead end adjacent to Building N. The central promenade provides a direct connection between Tasman Street and the loop road and riverfront tower buildings. Another road also connects the central promenade with the loop road. All roads contain on-street parking. This is anticipated to be short term parking, provided for retail customers and commercial visitors. All on site roads have been configured as two lane two-way roads.

3.3 Site Access

The presence of a natural river barrier to the north, a railway line to the east and an arterial road frontage to the west is such that the proposed development site access options are heavily constrained, with a single access point identified that would have sufficient capacity to provide access to the site. The intersection between James Ruse Drive, Tasman Street and River Road West provides the necessary opportunities for vehicles to access the site from both sides of James Ruse Drive and allow for a more even distribution of traffic along a corridor that can be heavily congested in the peak periods.

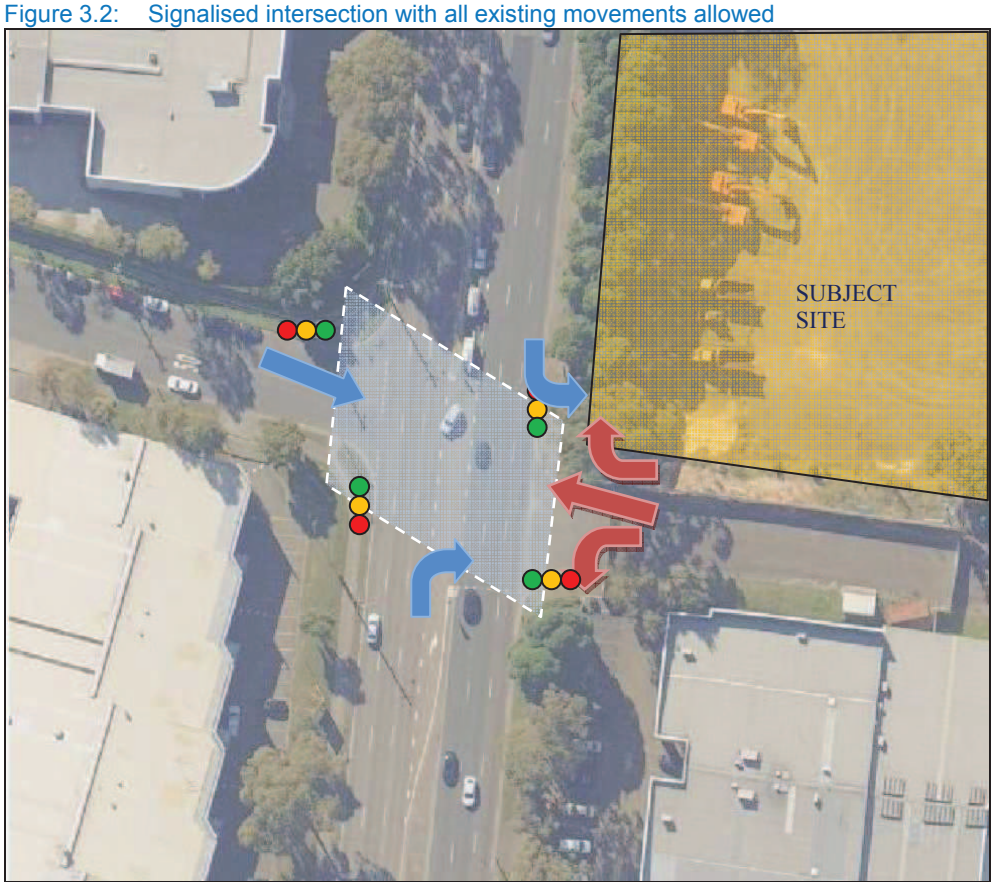
Both River Road West and Tasman Street intersect James Ruse in an offset configuration. There is a break in the median along James Ruse Drive and turning lanes to allow vehicles to turn into either Tasman Street or River Road West as well as through movements between the two side streets. This intersection currently operates under give way conditions.The River Road/West/James Ruse Drive intersection lies approximately 250 metres north of the major signalised intersection of Hassall Street/Grand Avenue/James Ruse Drive.

Mott MacDonald undertook an assessment of access arrangement options for the intersection, and determined that the best access arrangement would be a signalised intersection. The lane configuration for Tasman Street would have 3 outbound lanes with a single right/through lane and two left turn lanes.The inbound lane configuration would have a single lane to accommodate through movements and right turns, with a separate slip lane for left turn movements into the site from the north. The existing right turn lane from the southern approach

of James Ruse Drive would be extended to 85m in length to incorporate vehicles queueing to turn into the site. Figure 3.2 shows the proposed access arrangement.

3.3.1 Signalised Intersection with all existing movements allowed

Figure 3.2: Signalised intersection with all existing movements allowed



The following issues identified with this site access option include:

- Safety concerns expressed by RMS regarding adequate stopping distance for heavy vehicles travelling southbound along James Ruse Drive;
- Safety concerns regarding the intersection layout, including the turning movement paths out of both Tasman Street and River Road West caused by the staggered configuration of the intersection;
- Queue lengths in the southbound direction extending through the proposed intersection and on occasion as far as the bridge over Parramatta River during peak traffic periods; and
- Impact on the throughput of vehicles along James Ruse Drive, particularly in the peak traffic periods.

3.3.2 Preferred Access Arrangement

The criterion used to determine a preferred access option included a suitable level of access for the scale of development, minimisation of traffic impacts on the surrounding road network, maintenance of arterial corridor service, reduction of safety concerns and additional benefits.

The signalised intersection option would distribute traffic in a more even and efficient manner, leading to improved access to the site and reduced total traffic movements by allowing vehicles to access both directions of James Ruse Drive. Qualitatively, this is expected to minimise the impact of the traffic generated by the development on the surrounding road network compared to the other options considered, where the majority of traffic associated with the development would be concentrated in one or two movements.

The existing traffic situation along James Ruse Drive requires an access option that can maintain throughput along the corridor, while also provide gaps to allow access and egress from the development site. Based on these requirements, a signalised intersection is the preferred access arrangement. A coordinated signalised intersection would minimise any adverse impacts on queue lengths by providing regular intervals for vehicles to enter and exit the site that occur during queueing for the movement of vehicles along the southbound corridor of James Ruse Drive. During the peak period, queue lengths extend beyond this intersection. Based on this, the phasing could be coordinated to provide access when these queue lengths approach their peak such that a signalised intersection would provide access into the site when vehicles are already queued through the intersection. If implement effectively, such an intersection would allow for suitable access for the site, while maintaining the corridor throughput for James Ruse Drive required by RMS.

A signalised intersection would remove the difficulty and safety concerns associated with undertaking a right turn into the sight during peak periods when there are minimal safe gaps under give way conditions. This option would reduce safety hazards associated with unsignalised options.

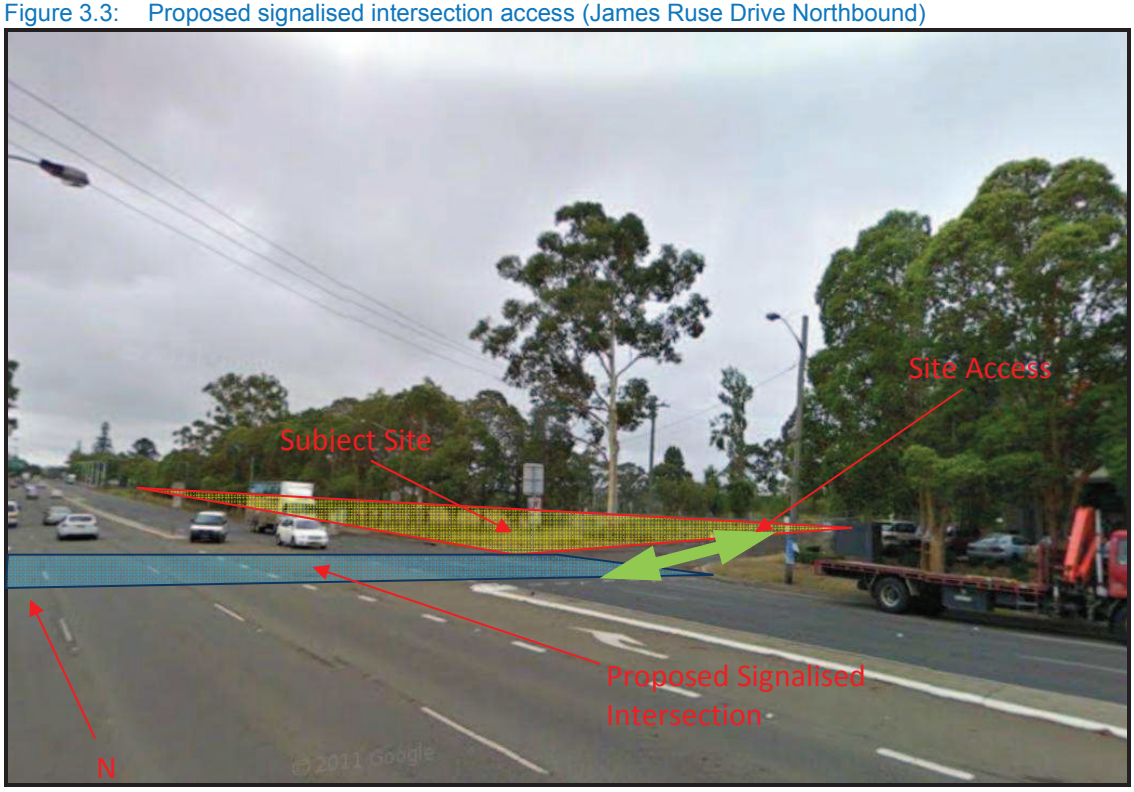
Given the existing vacant site and the scale of the proposed development, a significant amount of additional pedestrian activity will be generated. James Ruse Drive is a 6 lane wide arterial corridor, with the closest pedestrian crossing located at the Hassall Street intersection. An additional benefit of a signalised intersection would be the provision of a more convenient and suitable pedestrian crossing for residents and commercial users alike.

There were some concerns expressed in relation to adequate stopping distance for heavy vehicles at a signalised intersection for the development, however, there is a speed camera located adjacent to the development site, which forces drivers to regulate their speed already. A brief measurement of sight distance to the intersection and site observations were undertaken

and there is approximately 450 metres between the intersection and the crest of James Ruse Drive, adjacent to the UWS site north of the Parramatta River. Heavy vehicles currently are required to stop prior to the proposed site access during heavy queueing in the peak periods . As such there is sufficient sight distance that would be adequate for heavy vehicles to stop should a signalised intersection be installed.

A signalised intersection best addressed the assessment criterion and as such is considered the preferred access arrangement. Figure 3.3 shows the proposed location of the signalised intersection into the development site.

Figure 3.3: Proposed signalised intersection access (James Ruse Drive Northbound)



Source: Google Maps - Streetview

3.3.3 Slip Lane

The proposed southbound access into the site is via a slip lane. The traffic modelling informed the likely queue lengths that would be experienced for left turn vehicles and this was used to estimate a suitable slip lane length. The proposed slip lane would need to be approximately 100 metres in length to accommodate the peak period traffic volumes undertaking this movement. This lane would extend along James Ruse Drive to a similar location where the existing right turn bay for River Road West starts, approximately 45 metres south of the existing 70km/h speed camera.

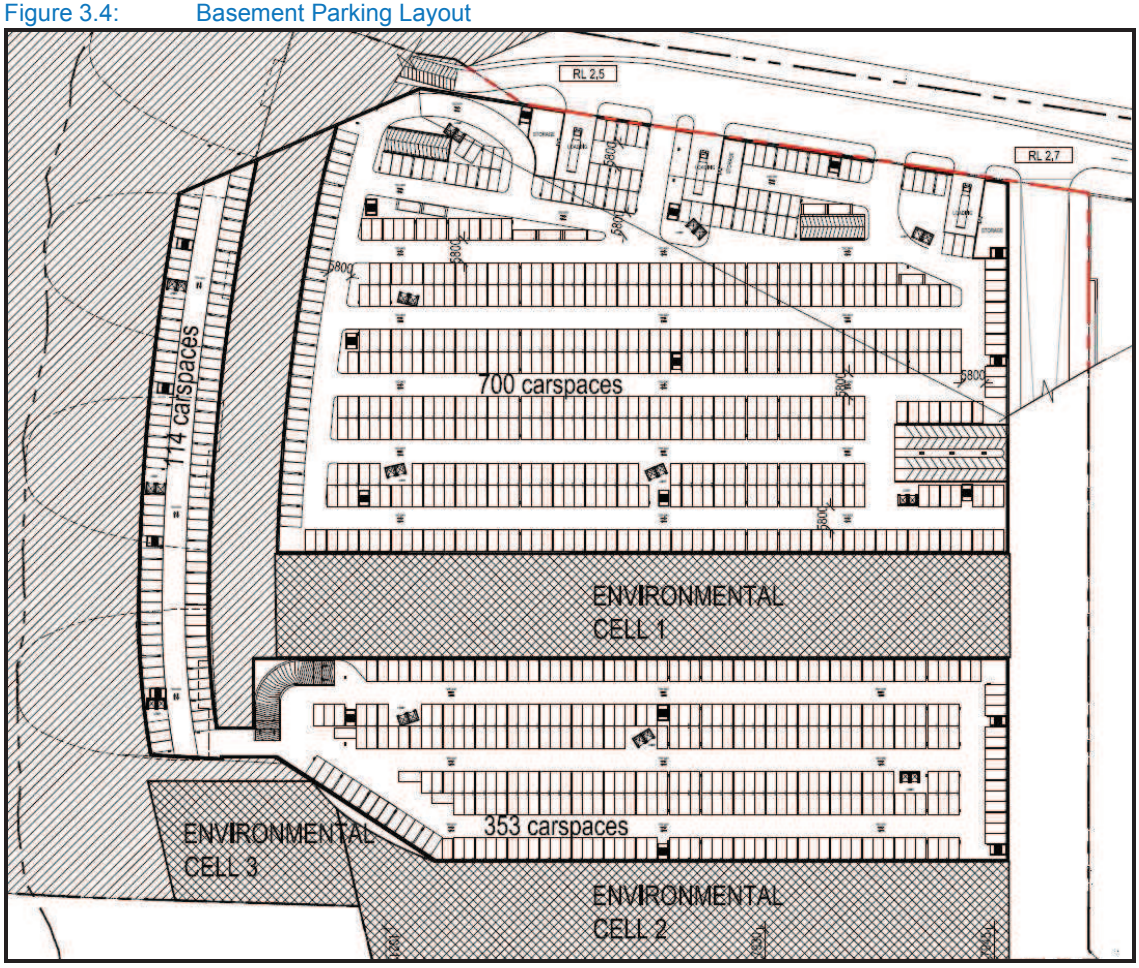
3.4 Car Parking Requirements

The parking supply for the development is to comprise of two levels of basement. The two basement levels of parking will supply all of the residential parking. The podium level car park will provide parking for the commercial and retail users. 137 short term on-street parking spaces will also be provided for retail customers as well. The parking provision requirements based on the Parramatta Development Control Plan and the proposed parking supply are detailed in Table 3.1. Figure 3.4 indicates the proposed parking layout for basement level 1 of the proposed development.

Table 3.1: Parking Requirements

Land Use	Type	Number	GFA (m^2)	Parramatta DCP Parking Rate	Parking Requirement	Supply
Residential	1 bed	360		1 space/unit	360	
	2 bed	1080		1 space/unit	1080	
	3 bed	360		1.2 space/unit	432	
	Visitor			0.25 space/unit	450	
Retail	-	-	15000	1 space per 30sqm	500	
Commercial			15000	1 space per 50sqm	300	
Total		**1800**			**3,122**	**3,389**

Figure 3.4: Basement Parking Layout



Source: Tony Owen Partners – Planning Proposal Design Envelopes Vol. 3 28/8/2012

It is proposed that 3389 parking spaces be provided on the site. This level of parking provides a surplus of 267 parking spaces above the minimum required within the Parramatta DCP.It should also be noted that generally the peak parking demand for commercial, retail users and residents are not expected to occur simultaneously, reducing the total level of parking demand likely to be experience for the site.

This is derived from the variation in travel patterns for each land use. Parking demand is highest for residents in the evening when commuters arrive home from work and when retail stores are generally closed. Retail parking demand peaks throughout the day, with the exception of Thursday nights when parking demand can peak again. Commercial parking demand is highest

in the morning, as residents are leaving the site to commute to work and as retail parking demand is low.

3.5 Additional Parking Requirements

The details of parking for motorcycles, people with disabilities or bicycles has not been confirmed at this stage of planning, however it is envisaged that the proposed parking supply will incorporate these types of parking spaces in accordance with the requirements of the 2011 Parramatta Development Control Plan and Local Environmental Plan and the relevant Australian Standards.

3.6 Travel Plan and Parking Reduction Strategies

Given the scale of the development and the proximity of the site within 800m of a railway station, a Travel Plan is proposed to be developed at the Development Application stage. This is in accordance with the requirements outlined in Part 3.6.1 of the Parramatta Council Development Control Plan (DCP).

The Travel Plan would incorporate strategies to promote and encourage sustainable transport, with a view to reducing car dependence of residents and retail customers of the development. A number of examples are provided for indicative purposes.

3.6.1 Carshare initiatives

Carsharing initiatives would be incorporated in the later stages of the development design. The objective would be to support and encourage the use of sustainable transport and reduce the parking supply required for the site. The relevant design requirements in accordance Part 3.6.1 of the Parramatta Council DCP include the provision of one carshare space for every 50 residential units and 1 carshare space per retail development larger than 5000m^2. This would require a total of 33 car share spaces. The provision of such spaces also allows for a reduction of required parking spaces at a ratio of 1:3. This would reduce the parking requirements for the site by 66 parking spaces.

3.6.2 End of Trip Facilities and Pedestrian and Cycling infrastructure

The provision of end of trip facilities for the development would encourage staff and residents to utilise alternative means of transport and specific measures could be detailed within the Travel Plan. The utilisation of alternative transport could be encouraged through various measures such as incorporating a bicycle shop as a retailer and the provision of bicycle parking at numerous locations across the site.

3.6.3 Student Accomodation

The proximity of the site to UWS would be an attractive location for tertiary student accommodation. Negotiations with UWS could be made to provide student housing on site, which would reduce the level of traffic generated by the site, with students able to walk across Parramatta River to the UWS Parramatta Campus.

3.6.4 Integration with wider planning strategies

There are a number of higher level strategic planning investigations underway that may impact on the proposed development and as such input would be sought during the consultation periods of these planning investigations to support public transport services for the development. An example may include the proposed light rail network that would service Rydalmere Technology Park, UWS, Camellia and the Parramatta CBD. This service would travel along the existing Carlingford Railway corridor and along Grand Avenue North/Tramway Avenue and would provide a high volume, rapid transport connection to the Parramatta Transport Interchange.

Another initiative is the RMS Pinch Point Program that is proposed to improve the capacity issues experienced at the Hassall Street intersection in the peak period. The proposed works include the extension of an existing turning lane, as well as the construction of two new turning bays. is anticipated to improve the surrounding road network performance

4. Traffic Generation & Distribution

4.1 Anticipated Trip Generation

Traffic or trip generation patterns vary by land use. This is derived from travel patterns associated with various land uses. With reference to the proposed development, the trip generation profile for the commercial component of the development will vary greatly to the trip generation profile for the residential component.

Residential units would have a tidal trip generation pattern with the majority of vehicles leaving during the morning peak, and returning in the evening peak. The commercial component would largely operate in the reverse pattern to that of the residential units, with high in-bound trip generation in the morning as staff arrive for work, and high out-bounf trip generation in the evening when workers exit the site. The retail component would not be expected to have such concentrations of traffic. Most of the vehicles during the morning peak would be staff, while traffic generated by customers would be dispersed across the operating hours of the retail land use.

The total peak hour trip generation for the site was calculated based on the rates provided within the 2002 RTA Guide to Traffic Generating Developments (RTA Guide). Some assumptions about the proportion of trips generated during the peak periods were used to calculate an anticipated peak trip generation for the site. This was then used in the traffic modelling assessment that is discussed in Section 5 of this report. The anticipated peak trip generation of each proposed land use is discussed and summarised below.

4.2 Residential Trip Generation

The RTA Guide provides trip generation rates for various density residential land uses. Given the scale of the proposed development, a rate of 0.29 trips per unit was used, which corresponded to a high density residential building. The total peak residential trip generation was calculated to be 522 trips. It was conservatively assumed that the in / out spit would be 90% / 10% in during the morning peak period and 90% / 10% during the evening peak period. The breakdown of traffic in and out of each access during each peak period is shown below in Table 3.5.

4.3 Commercial Trip Generation

The RTA Guide provides a trip generation rate for commercial land uses. The respective rate for commercial offices is 2 trips per 100sqm GFA. The peak number of inbound trips would be generated in the AM peak period as commuters arrive for work and the peak number of outbound trips would be generated in the PM peak as commuters travel home from their workplace. The in/out splits for the AM and PM peak periods are 90% / 10% and 10% / 90%, respectively.

4.4 Retail Trip Generation

The peak period and trip generation rates for retail stores vary considerably based on operating hours, services provided and the size and type of the particular development. No information regarding specific retail tenancies have been confirmed, however it is anticipated that on a general weekday, the peak number of trips generatied by the retail development will not coincide with the peak period for the residential and commercial components. This is derived from the nature of the land uses.

Residents generally leave for work in the morning and arrive in the late afternoon home, while commercial users undertake the opposite travel pattern for each peak period. Retail customers access stores over a much longer period, generally the operating hours of the respective stores. This dilutes the level of peak trips generated for a larger shopping development on an average weekday. The anticipated peak period for the retail component would be a Thursday night, with people accessing stores after work. This period of peak traffic activity would overlap with the peak period for the residential component, and would be considered the worst case scenario for traffic impact on the surrounding road network. Given the style of the development as an integrated complex, it was determined that a rate of 4.6 trips per 100 sqm GFA would be used.

In the AM peak, it is anticipated that there would be minimal outbound vehicles, with inbound vehicles comprising only staff arriving for work. An in/out split of 20% / 10% was adopted. In the Thursday PM Peak it was conservatively assumed that the in/out split would be 50% / 50% of the total trips generated by the retail development.

4.5 Total Trip Generation

The estimated trip generation for the proposed development for both inbound and outbound vehicles in both peak hour periods is detailed in Table 4.1.

Table 4.1: Total Peak Trip Generation

Land Use	No. Units / GFA	Trip Gen Rate	Trip Gen (AM Peak) Inbound	Trip Gen (AM Peak) Outbound	Trip Gen (PM Peak) Inbound	Trip Gen (PM Peak) Outbound
Residential Units	1,800	0.29 trips / unit	53	470	470	53
Retail	15,000	4.6 trips / 100m2	138	69	345	345
Commercial	15,000	2 trips/100m2	270	30	30	270
Total			**461**	**569**	**845**	**668**

Table 4.1 indicates the PM peak hour to generate the most number of trips for both inbound and outbound movements. This is reflective of the overlapping of the peak hour residential trips and Thursday evening retail trips, which represents a worst case scenario for traffic network analysis. It can be reasonably assumed that the actual trip generation for the site would be reduced when accounting for linked trips of residents and potential reductions in trips through car share and public transport initiatives. The combination of high density residential dwellings with retail stores is also anticipated to create a reduction in the retail trip generation, as many residents would not utilise their car to visit these stores.

4.6 Trip distribution

The trip distribution for the proposed development was established using the following assumptions:

- Signalised Intersection allows for access from both directions along James Ruse Drive, as well as from River Road West;
- All inbound trips return in the same direction outbound;
- 50% of residents commute regionally via the M4 motorway; and
- 20% of trips are generated within Parramatta and divided between the Hassall Street and River Road West.

It is anticipated that with the provision of a signalised intersection for access to the site, that motorists would balance their travel routes based on the anticipated travel time. This means that the trip distribution would vary as motorists assess the most efficient route for egress and access to the site. An important consideration is the travel patterns of city commuters, with the proximity of both the M4 and M2 motorways. The estimated trip distribution is therefore only indicative of the possible distribution of traffic generated by the site.

A detailed breakdown of the estimated trip generation and distribution for the development in vehicles per hour are contained in Appendix A.

5. Traffic Impact

5.1 Traffic Network Modelling

A preliminary assessment of the traffic impact of the development was undertaken by using SCATES network modelling. The analysis used traffic survey data, the anticipated trip generation and trip distribution for the proposed development and the existing signalling information for the Hassall Street intersection. An existing scenario and a future scenario incorporating the traffic generated by the development were produced. The focus of the modelling was to determine an access that would suitably accommodate the anticipated traffic generated by the site and that would minimise the impact on the surrounding road network. Detailed model outputs for both scenarios are included in Appendix B.

5.1.1 2012 Existing Scenario

Under existing conditions, the Hassall Street intersection is already oversaturated in both peak periods. The existing model outputs for the proposed site access and Hassall Street intersection are outlined in Table 5.1.

Table 5.1: 2012 Existing Scenario

Intersection	Peak Period	Average Delay(s)	Level of Service	Degree of Saturation
Hassall Street	AM Peak	94	F	1.02
	PM Peak	130	F	1.06

Source: Transport and Urban Planning

The delays currently experienced at the Hassall Street intersection are unsatisfactory, with a level of service F in both peak periods. This unsatisfactory performance is a matter that RMS propose to address with proposed intersection works as part of the Pinch Point Program. The Pinch Point works are scheduled for construction in the next financial year (FY2103-2014) and are anticipated to be undertaken prior to the construction of the proposed development. These measures are expected to improve the performance of the Hassall Street intersection, however for a dramatic improvement of the surrounding road network, a wider and higher level strategic planning approach is required to address the existing traffic conditions for the James Ruse Drive corridor.

This has been adopted with the submission of the Parramatta Ring Road proposal to Transport for NSW. The result of the Parramatta Ring Road review by Transport for NSW is scheduled for September. The results of a number of planning investigations and requests are also anticipated to inform and impact on the detailed final access arrangements at later development approval stages and improve the traffic conditions within the vicinity of the site. As such, the focus of this traffic impact assessment has sought to establish a suitable access arrangement in light of these changes that are anticipated to improve the surrounding road network performance.

5.1.2 2012 Future Scenario with Full Development

The future model conservatively used the traffic generation of the full development and the existing 2012 traffic survey volumes. The Hassall Street Intersection was also updated to include the proposed RMS Pinch Point works. The Pinch Point works aim to improve the throughput of vehicles the intersection, through new lane treatments and lane configurations. The proposed measures include the following:

- Extension of central median south of Hassall Street intersection to make Hope Street access left in/left out only.
- Extension of right turn lane into Grand Avenue from James Ruse Drive northbound to 290 metres long.
- Installation of 50 metre long left turn only lane into Hassall Street for James Ruse Drive northbound (requires the property acquisition of part of Hooters car park).
- Installation of 60 metre long left turn lane into Grand Avenue for James Ruse Drive southbound.
- Reconfiguration of lane marking in Hassall Street approach to comprise:
  - existing left turn slip lane
  - single through/right lane
  - two dedicated right turn lanes

In practice, the full development of the site is likely to occur over a number of years, as well as a number of large scale planned developments that are anticipated to significantly change the traffic conditions surrounding the site. The future model outputs for the proposed site access and Hassall Street intersection are outlined in Table 5.2. The proposed signalised access was detailed as follows:

- Left, through and right turns permitted into and out of the development site;
- Reconfiguration of Tasman Street to meet River Road West in a four way intersection to remove the cycle time impacts of split phasing for both side roads;
- 85 metre right turn bay on James Ruse Drive northbound to allow access into Tasman Street; and
- 3 outbound lanes at Tasman Street with one through-right lane and two left turn lanes.

Table 5.2: 2012 Future Scenario with Full Development and RMS Pinch Point Works

Intersection	Peak Period	Average Delay(s)	Level of Service	Degree of Saturation
Site Access	AM Peak	13	A	0.82
	PM Peak	29	C	0.96
Hassall Street	AM Peak	88	F	1.05
	PM Peak	45	D	0.92

Source: Transport and Urban Planning

The results of the future model indicate that the proposed site access would operate successfully in the AM peak with a LOS A and LOS C in the PM peak period.

The results for the future scenario when compared with the existing situation also indicate improved performance at the Hassall Street intersection. In the AM peak period the level of service remains a LOS F, however there is a reduction in average delay of 6 seconds. In the PM peak period; there is a major reduction in average delay of 85 seconds and an improvement from LOS F to LOS D.

The comparison between the existing and future scenario indicate that the impact of traffic generated by the proposed development will be mitigated with the proposed improvements at the Hassall Street intersection. In fact, with the incorporation of the traffic from the development, the future performance of the adjacent road network is anticipated to improve.

6. Conclusions & Recommendations

The likely traffic impact of the proposed development has been assessed. The main points to note from this assessment are as follows:

- It is proposed to construct 14 buildings consisting of 1800 residential units, 15,000 sqm GFA of commercial space and 15,000 sqm GFA of retail space as well as on road, podium and basement parking facilities;
- The proposed parking supply is 3,389 parking spaces, which represents a surplus of 267 parking spaces above the minimum required in accordance with the Parramatta DCP and is anticipated to adequately accommodate the parking demand for the development;
- It is anticipated that the proposed development will generate a total of 1513 trips with 1030 trips during the morning peak hour and 1513 trips in the evening peak hour;
- The car parking areas would be designed in accordance with Australian Standards AS/NZS2890.1, AS/NZS2890.2 and AS/NZS2890.6 at the Development Application stage;
- All vehicles are anticipated to enter and exit the site in a forward direction including waste collection vehicles;
- The proposed site access arrangement is via Tasman Street at a signalised four way intersection of James Ruse Drive, Tasman Street and River Road West;
- The signalised intersection would be coordinated with the Hassall Street intersection to maintain the levels of vehicle throughput along James Ruse Drive in the peak periods;
- The signalised intersection is anticipated to sufficiently accommodate the traffic generated by the proposed development, with a LOS A in the AM peak and a LOS C in the PM peak period; and
- The results of traffic modelling indicate that the nearby Hassall Street intersection is currently at capacity but will operate at a marginally better LOS F in the AM peak and a dramatically improved LOS D in the PM peak with the inclusion of traffic generated by the proposed development and the RMS Pinch Point works;

In light of the above, no ameliorative work above the signalised access arrangement detailed within this assessment would be required to mitigate against any adverse traffic impacts resulting from the development. It is therefore recommended that the proposed development be supported on traffic and parking grounds.

Mott MacDonald

CHRIS AVIS

ASSOCIATE DIRECTOR (CIVIL)

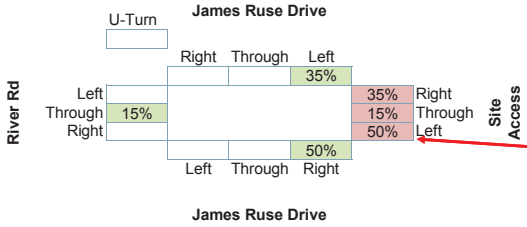
Appendices

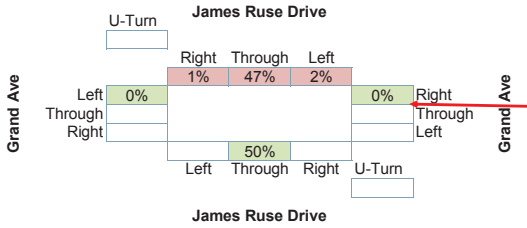
Appendix A. Trip Distribution and Generation

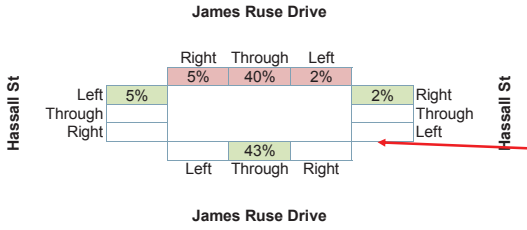
Anticipated Trip Distribution (AM & PM Peak)

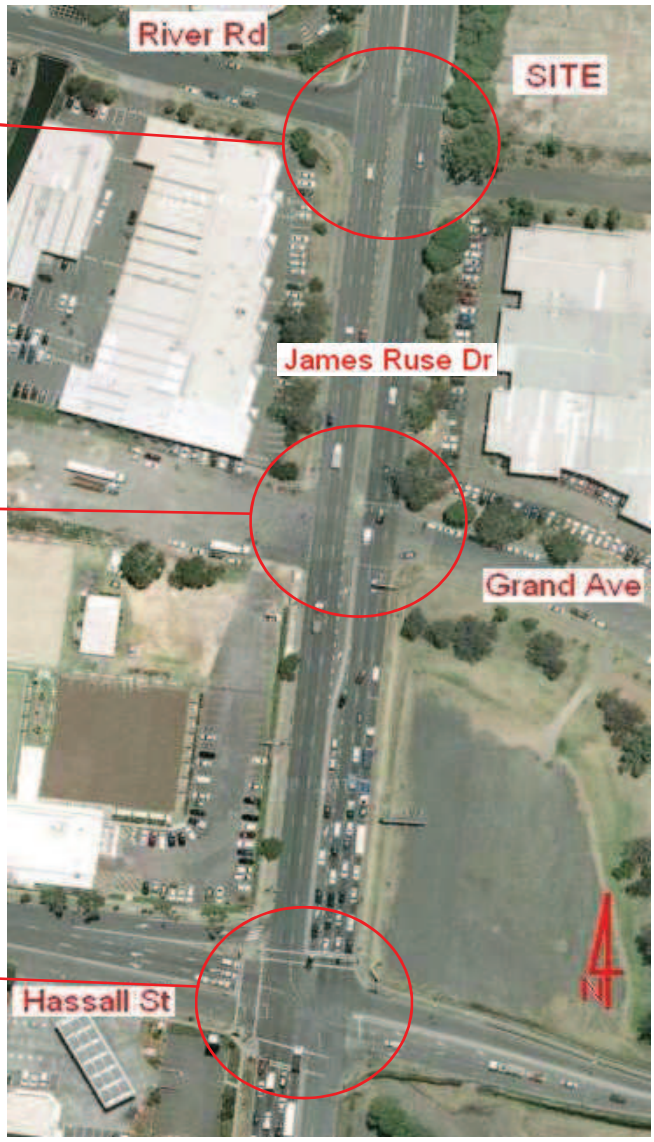
100% Inbound Trips

100% Outbound Trips





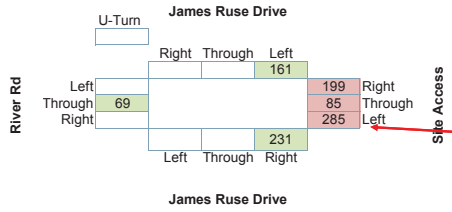




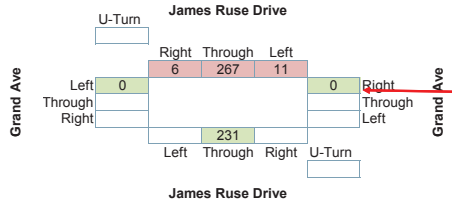
Anticipated Trip Generation (AM Peak)

461 Inbound Trips (vph)

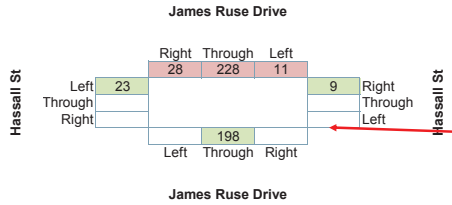
569 Outbound Trips (vph)



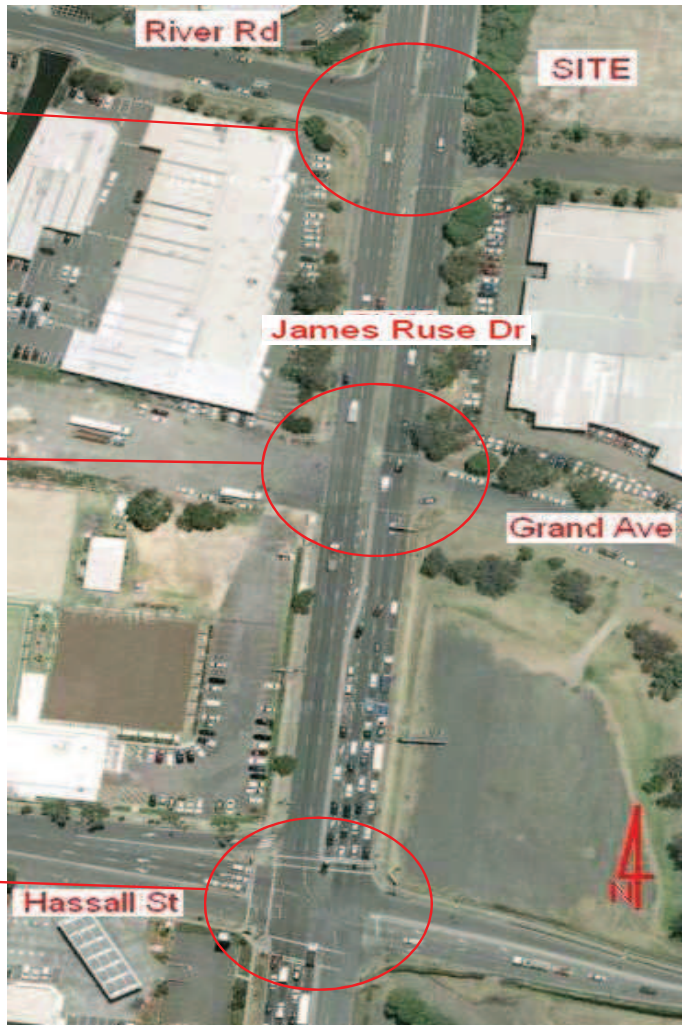
Road & Section	Travel Direction on Approach North	South	East	West	Total
James Ruse Drive					
North of River Rd	199	161			361
South of River Rd	231	285			515
River Rd					
East of James Ruse Drive			461	569	1030
West of James Ruse Drive			69	85	155



Road & Section	Travel Direction on Approach North	South	East	West	Total
James Ruse Drive					
North of Grand Ave	231	285			515
South of Grand Ave	231	267			498
Grand Ave					
East of James Ruse Drive			11	0	11
West of James Ruse Drive			0	6	6



Road & Section		Travel Direction on Approach North	South	East	West	Total
James Ruse Drive						
North of Hassall St		231	267			498
South of Hassall St	######	198	228			426
Hassall St						
East of James Ruse Drive				11	9	21
West of James Ruse Drive				23	28	52

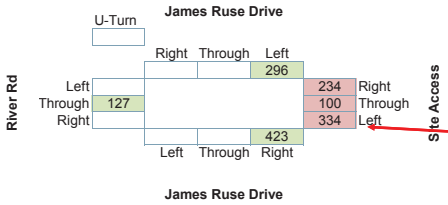


Land Use	No. Units / GFA	Trip Gen Rate	Trip Gen (AM Peak) Inbound	Outbound	Trip Gen (PM Peak) Inbound	Outbound	
Residential	1,800	0.29 trips / unit	53	470	470	53	
Retail	15,000	4.6 trips / 100m^2	138	69	345	345	
Commercial	15,000	2 trips/100m2	270	30	30	270	
Total			**461**	**569**	**845**	**668**	**trips**

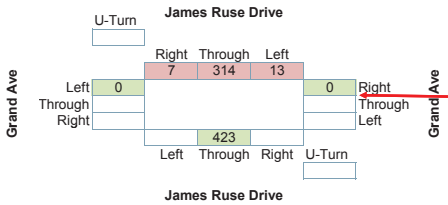
Anticipated Trip Generation (PM Peak)

845 Inbound Trips (vph)

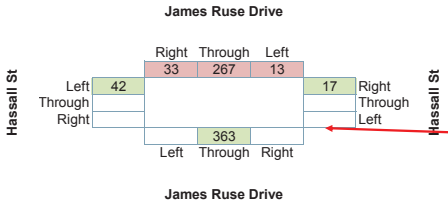
668 Outbound Trips (vph)



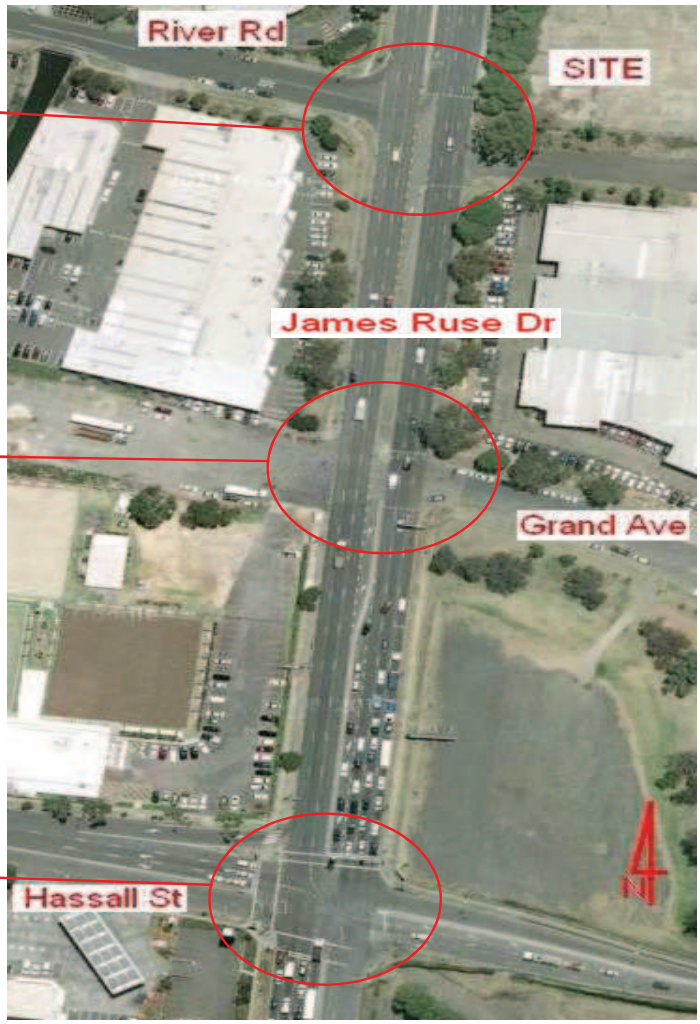
Road & Section	Travel Direction on Approach North	South	East	West	Total
James Ruse Drive					
North of River Rd	234	296			530
South of River Rd	423	334			757
River Rd					
East of James Ruse Drive			845	668	1513
West of James Ruse Drive			127	100	227



Road & Section	Travel Direction on Approach North	South	East	West	Total
James Ruse Drive					
North of Grand Ave	423	334			757
South of Grand Ave	423	314			736
Grand Ave					
East of James Ruse Drive			13	0	13
West of James Ruse Drive			0	7	7



Road & Section	Travel Direction on Approach North	South	East	West	Total
James Ruse Drive					
North of Hassall St		423	314		736
South of Hassall St	138	363	267		631
Hassall St					
East of James Ruse Drive			13	17	30
West of James Ruse Drive			42	33	76



Land Use	No. Units / GFA	Trip Gen Rate	Trip Gen (AM Peak) Inbound	Outbound	Trip Gen (PM Peak) Inbound	Outbound	
Residential	1,800	0.29 trips / unit	53	470	470	53	
Retail	15,000	4.6 trips / 100m^2	138	69	345	345	
Commercial	15,000	2 trips/100m2	270	30	30	270	
Total			**461**	**569**	**845**	**668**	**trips**

Appendix B. SCATES Model Outputs

SCATES Program Version: 2011 Date: 29-AUG-12 Time:
Registered User Name. - Freeware
Registered User No. - 0
Data File: C:\NETANAL\TEST\DATA\JR-E
JAMES RUSE DRIVE
EXISTING

The coordinated delays shown here are the calculated delays to be expected
under SCATS control. The coordinated delays in the Splits Screen will normally be higher as they are calculated there for isolated operation and do not reflect the benefits of coordination.

The isolated delay rate shown here for the main road is calculated to reflect the interaction of adjacent intersections.
The isolated main road and total delay rates will therefore differ to those
shown in the Splits and Movement DS Screens which are calculated with no interaction. The Level of Service (L/S) is for co-ordinated operation for all movements.

INTERSECTION DELAY PERFORMANCE for BUSINESS PEAK for FILE JR-E

	Main Road					Side Road					Total				
TCS No. & L/S	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu per Hour	Cord DS	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu per Hour	Cord DS	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu per Hour	Cord DS
1565B	11	0	1	479	0.81	14	14	33	1543	0.81	25	14	25	2022	0.81
5000A	4	0	1	322	0.46	2	2	6	1224	0.40	6	2	5	1546	0.46
TOT	15	0	1			16	16	21			31	16	16		
L/S = B															
HIGHEST DS					0.81					0.81					0.81

INTERSECTION DELAY PERFORMANCE for PM PEAK for FILE JR-E

	Main Road					Side Road					Total				
TCS	Isol	Cord	Cord	Pcu	Cord	Isol	Cord	Cord	Pcu	Cord	Isol	Cord	Cord	Pcu	Cord

No. & L/S	dlay Rate Pc/h	dlay Rate Pc/h	Sec per Pcu	Hour	DS	dlay Rate Pc/h	dlay Rate Pc/h	Sec per Pcu	Hour	DS	dlay Rate Pc/h	dlay Rate Pc/h	Sec per Pcu	Hour	DS
1565F	208	162	130	4469	1.06	61	61	129	1720	1.06	270	223	130	6189	1.06
5000A	18	0	0	4930	0.65	2	4	42	340	0.56	20	4	3	5270	0.65
TOT L/S = F	226	162	62			63	65	114			289	227	71		
HIGHEST DS					1.06					1.06					1.06

INTERSECTION DELAY PERFORMANCE for AM PEAK for FILE JR-E

TCS No. & L/S	Main Road Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Cord Hour	Cord DS	Side Road Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Cord Hour	Cord DS	Total Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Cord Hour	Cord DS
1565F	162	141	94	5403	1.02	39	39	95	1465	1.02	200	180	94	6868	1.02
5000A	20	0	0	5423	0.68	2	4	46	272	0.48	22	4	2	5695	0.68
TOT L/S = D	182	141	47			40	42	87			222	183	53		
HIGHEST DS					1.02					1.02					1.02

END OF FILE

SCATES Program Version: 2011 Date: 04-SEP-12 Time:
Registered User Name. - Freeware
Registered User No. - 0
Data File: C:\NETANAL\TEST\DATA\JR-P4
JAMES RUSE DRIVE
PINCHPOINT IMPS AT 1565 & PROPOSAL 4 TRAFFIC

The coordinated delays shown here are the calculated delays to be expected
under SCATS control. The coordinated delays in the Splits Screen will normally be higher as they are calculated there for isolated operation and do not reflect the benefits of coordination.

The isolated delay rate shown here for the main road is calculated to reflect the interaction of adjacent intersections.
The isolated main road and total delay rates will therefore differ to those
shown in the Splits and Movement DS Screens which are calculated with no interaction. The Level of Service (L/S) is for co-ordinated operation for all movements.

INTERSECTION DELAY PERFORMANCE for BUSINESS PEAK for FILE JR-P4

	Main Road					Side Road					Total				
TCS No. & L/S	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu per Hour	Cord DS	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu per Hour	Cord DS	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu per Hour	Cord DS
1565C	16	0	1	479	0.88	20	20	46	1543	0.88	36	20	35	2022	0.88
5000A	3	0	1	322	0.41	2	2	7	1224	0.36	6	2	6	1546	0.41
TOT	20	0	1			22	22	29			42	22	23		
L/S = B															
HIGHEST DS					0.88					0.88					0.88

INTERSECTION DELAY PERFORMANCE for PM PEAK for FILE JR-P4

	Main Road					Side Road					Total				
TCS	Isol	Cord	Cord	Pcu	Cord	Isol	Cord	Cord	Pcu	Cord	Isol	Cord	Cord	Pcu	Cord

No. & L/S	dlay Rate Pc/h	dlay Rate Pc/h	Sec per Pcu	Hour	DS	dlay Rate Pc/h	dlay Rate Pc/h	Sec per Pcu	Hour	DS	dlay Rate Pc/h	dlay Rate Pc/h	Sec per Pcu	Hour	DS
1565D	78	59	41	5175	0.92	28	28	57	1781	0.92	106	87	45	6956	0.92
5000C	94	44	28	5668	0.96	11	11	36	1125	0.96	105	55	29	6793	0.96
TOT L/S = C	172	103	34			39	39	49			212	142	37		
HIGHEST DS					0.96					0.96					0.96

INTERSECTION DELAY PERFORMANCE for AM PEAK for FILE JR-P4

	Main Road					Side Road					Total				
TCS No. & L/S	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu Hour	Cord DS	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu Hour	Cord DS	Isol dlay Rate Pc/h	Cord dlay Rate Pc/h	Cord Sec per Pcu	Pcu Hour	Cord DS
1565F	157	151	93	5864	1.05	30	30	71	1504	1.05	187	180	88	7368	1.05
5000A	54	14	9	5829	0.82	7	10	42	900	0.80	61	25	13	6729	0.82
TOT L/S = D	212	165	51			37	40	60			248	205	52		
HIGHEST DS					1.05					1.05					1.05

END OF FILE