transport & accessibility impact study

for a Concept Plan and Stage 1 Project Plan relating to the construction of a residential development on the corner of epping road and herring road, macquarie park

prepared on behalf of Stamford Land Corporation by
TRAFFIX traffic & transport planners
ref: 10 151 report v4 April 2011

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1. introduction

TRAFFIX has been commissioned by Stamford Property Services to undertake a Transport & Accessibility Impact Study relating to a Concept Plan and Stage 1 Project Application on land located on the existing Stamford Hotel situated on the corner of Herring Road and Epping Road at Macquarie Park. The report is to accompany an Environmental Assessment undertaken by JBA Planning.

The Concept Plan seeks approval for the construction of seven residential buildings comprising a total of 626 residential units and ancillary (non-residential) floor space, with a total provision of 790 parking spaces and 40 motor bike/moped spaces within three basement levels of car parking and new on-street parking. This report documents the findings of our investigation and focuses on the requirements outlined in the Director General's Requirements including the use of the Macquarie Park Corridor Paramics Model to assess the external traffic impacts of the development. A separate section of the report relates to the Stage 1 Project Application, although the assessment of traffic impacts of this are included in the overall Concept Plan assessment.

The report has benefitted from consultation with Ryde City Council and the NSW RTA and all matters raised by these authorities have been taken into full account in the preparation of the Concept Plan and the documentation of this report. With regard to Council's requirements, it is emphasised that Council has made available a Paramics model which forms the basis of this assessment. This model incorporates within it all committed developments in the study area which are required to be taken into account. This model is therefore continually and progressively updated by Council. The RTA's requirements include the need to consider the implications of the proposed grade-separation of the intersection of Herring Road with Epping Road (embodied in Council's 2031 Paramics model). This has been discussed with the RTA and at the time of preparation of this report, this matter was still under consideration by the RTA.

The report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development

- Section 5: Assesses the parking requirements
- Section 6: Traffic modelling
- Section 7: Discusses access and internal design aspects
- Section 8: Construction Traffic management Principles
- Section 9: Presents the Summary Response to the DGR's
- Section 10: Presents the overall Concept Plan study conclusions
- Section 11: Project Application (Stage 1) Assessment

2. location and site

The site is situated within the Ryde City Council local government area, located approximately 12 kilometres north-west of the Sydney CBD. More specifically, the site is positioned within the boundary of the area identified as the Macquarie Park employments lands on the north-western corner of the intersection of Epping Road and Herring Road, approximately 600 metres south of the Macquarie University Railway Station and bus interchange.

The site is generally rectangular in configuration with a total area of 22,433m^2 and currently operates as the Stamford Grand Hotel comprising 256 rooms. It has a southern frontage to Epping Road of approximately 191 metres, an eastern frontage to Herring Road of 45 metres, a northern frontage to residential dwellings of 176 metres and a western frontage to a retirement village of 64 metres.

A Location Plan is presented in **figure 1**, with a Site Plan presented in **figure 2**. Reference should also be made to the Photographic Record presented in **appendix a**, which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

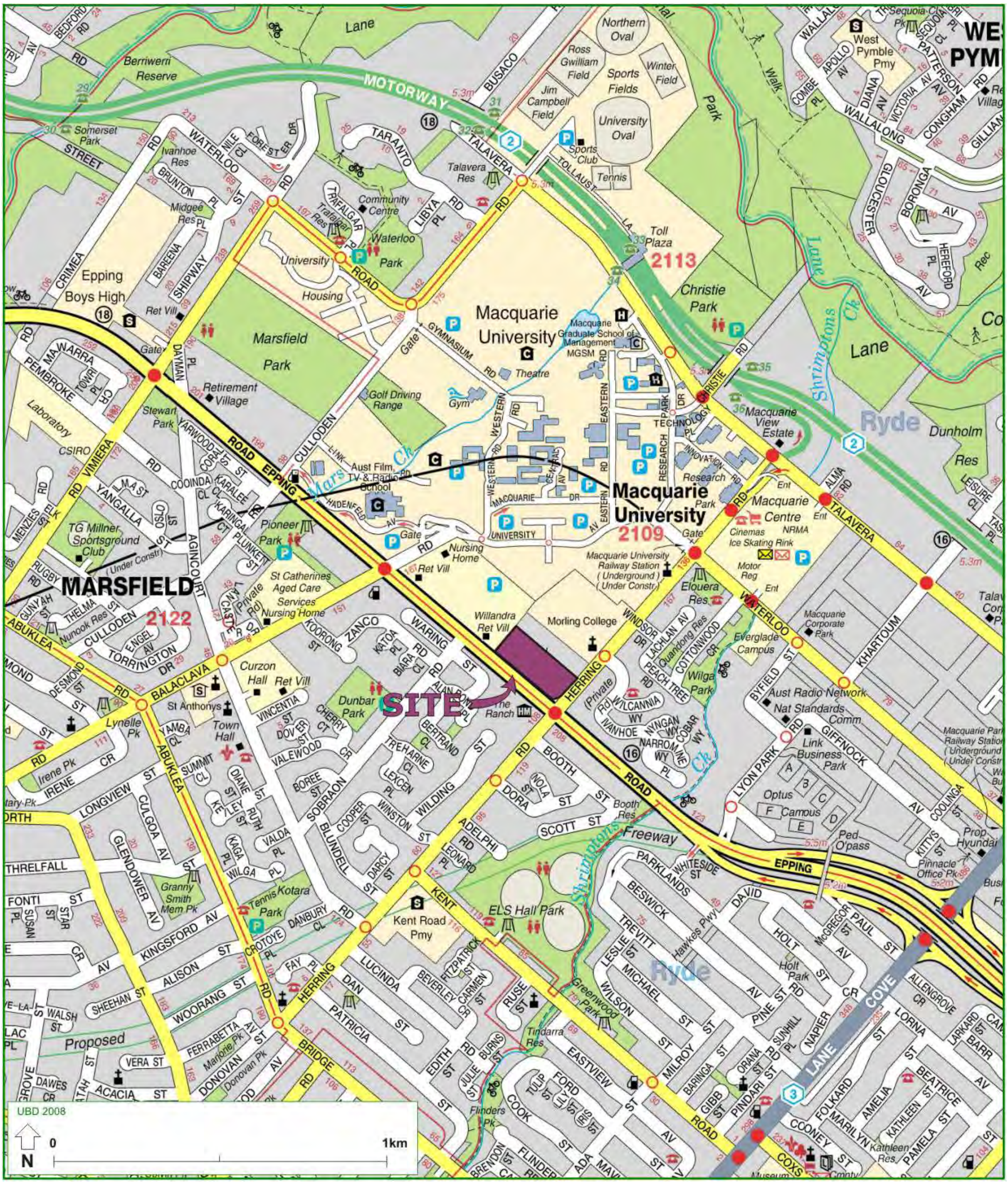

figure 1: location plan

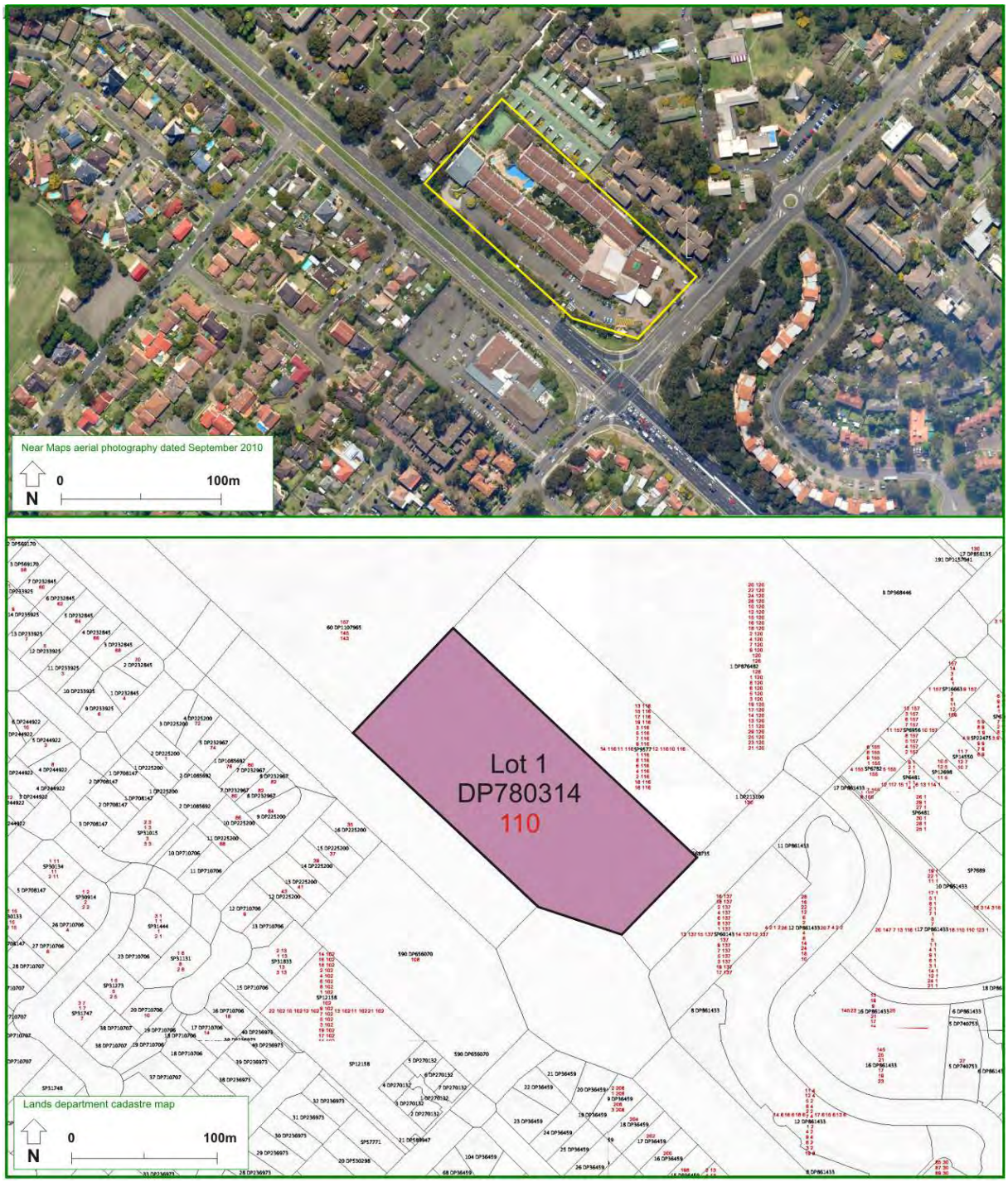

figure 2: site plan

3. existing traffic conditions

3.1 road hierarchy

The road hierarchy in the vicinity of the site is shown in **figure 3** with the following roads of particular interest:

- M2 Motorway: an RTA State Road (MR 6002) that generally runs in an east-west direction between Lane Cove in the east and Baulkham Hills in the west. The M2 Motorway is one of Sydney's major transport corridors to the north-western suburbs. It carries in the order of 95,000vpd;
- Epping Road: an RTA State Road (MR 373) that generally runs in an east-west direction between the M2 Motorway (at Lane Cove) in the east and Blaxland Road (Epping) in the west. Epping Road forms the southern site boundary and carries approximately 50,000vpd;
- Lane Cove Road: an RTA State Road (MR 162) that runs in north-south direction to the east of the site. It forms a continuation of Homebush Bay Drive in the south and continues into Mona Vale Road in the north. It carries approximately 75,000 vpd in the vicinity of the site.
- Herring Road a local collector road that runs in a north-south direction between Bridge Road in the south and connects with the M2 Motorway in the north. Herring Road forms the site's eastern boundary and provides both existing and future access to the development. It carries in the order of 27,000 vpd in the vicinity of the site.

It can be seen from **figure 3** that the site is conveniently located with respect to the arterial and local road systems serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

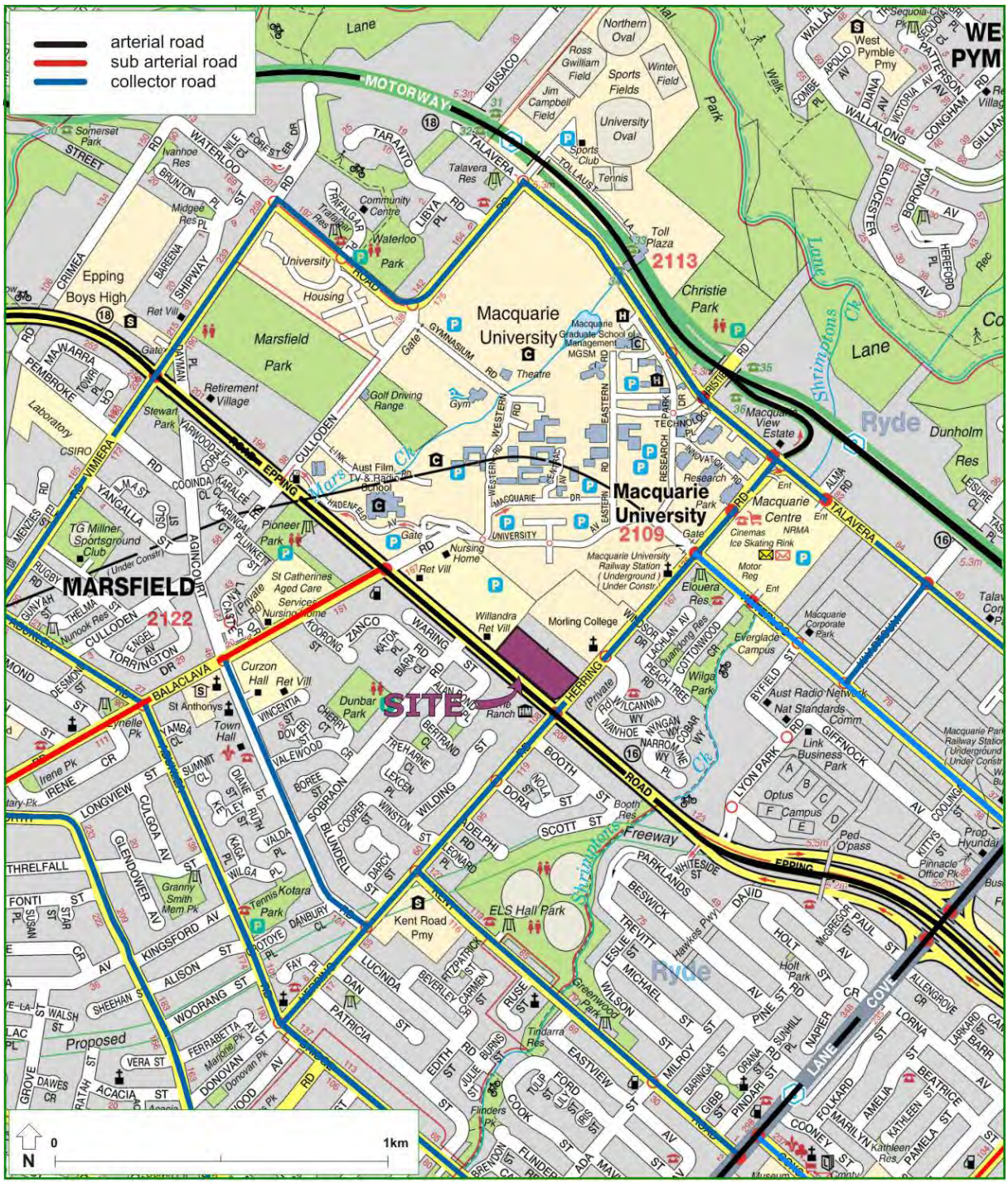

figure 3: road hierarchy

3.2 general description of road environment

Epping Road is constructed with a varying width divided carriageway and generally carries three lanes of traffic in either direction. In the vicinity of the site, it forms a four-way signalised intersection with Herring Road. The westbound approach of Epping Road to the intersection incorporates dual right turn lanes of length 390 metres. A T3 (Transit Lane) restriction is in operation within the kerbside lane, with an unsignalised left turn slip laneslip lane. The eastbound approach of Epping Road incorporates a 70 metre right turn bay, also with an unsignalised left turn slip lane of length 120 metres along the site frontage, with a short bus priority lane. The kerbside through lane is also subject to a T3 restriction however this restriction is for the AM peak only. Pedestrian footpaths are provided on both the northern and southern sides of Epping Road with bus stops located approximately 100 metres west of Herring Road on the northern side of Epping Road; and 60 metres west of the intersection on the southern side of Epping Road. No dedicated bicycle lanes are provided along Epping Road.

Herring Road is constructed with a varying width carriageway and is subject to a 50km/h speed limit on all approaches. On the northbound approach to the critical intersection with Epping Road, Herring Road is widens from 11.5 metre to 16 metres and includes an unsignalised left turn slip lane, a single right turn bay and two through lanes. To the north of Epping Road, Herring Road is generally constructed with a 23 metre divided carriageway and includes two through lanes in either direction in addition to a dedicated kerbside parking lane. However, adjacent to the site frontage the kerbside lane is a merge lane of length 110 metres. This also effectively provides a protected entry-exit lane to/from the subject site. On the southbound approach to its intersection with Epping Road, the kerbside lane of Herring Road forms a dedicated left turn slip lane approximately 100 metres in length. To the north of the site, Herring Road forms a roundabout controlled intersection with Ivanhoe Place. This intersection currently facilitates U-Turn movements by vehicles exiting the site wishing to travel east, south or west (other than via the M2 Motorway).

Waterloo Road is located to the north of the site and forms a four-way signalised junction with Herring Road. Waterloo is constructed with a 20 metre wide divided carriageway and connects Herring Road in the west with Lane Cove Road in the east.

3.3 public transport

The site benefits from excellent exposure to public transport and is serviced by both bus and rail. Existing bus services operating in the locality are shown in **figure 4** below. It is evident that the site benefits from excellent access to the bus network with buses traversing along Epping Road, Herring Road and Waterloo Road. The Macquarie University Railway Station is located approximately 600 metres to the north of the site further improving sites accessibility to public transport. This is within the 800 metre walking distance that is typically accepted as the reasonable limit for pedestrian access for journey to work (commuter) trips. Macquarie Park Station is located 1.4kms to the north-east of the site, at the intersection of Lane Cove Road with Waterloo Road.

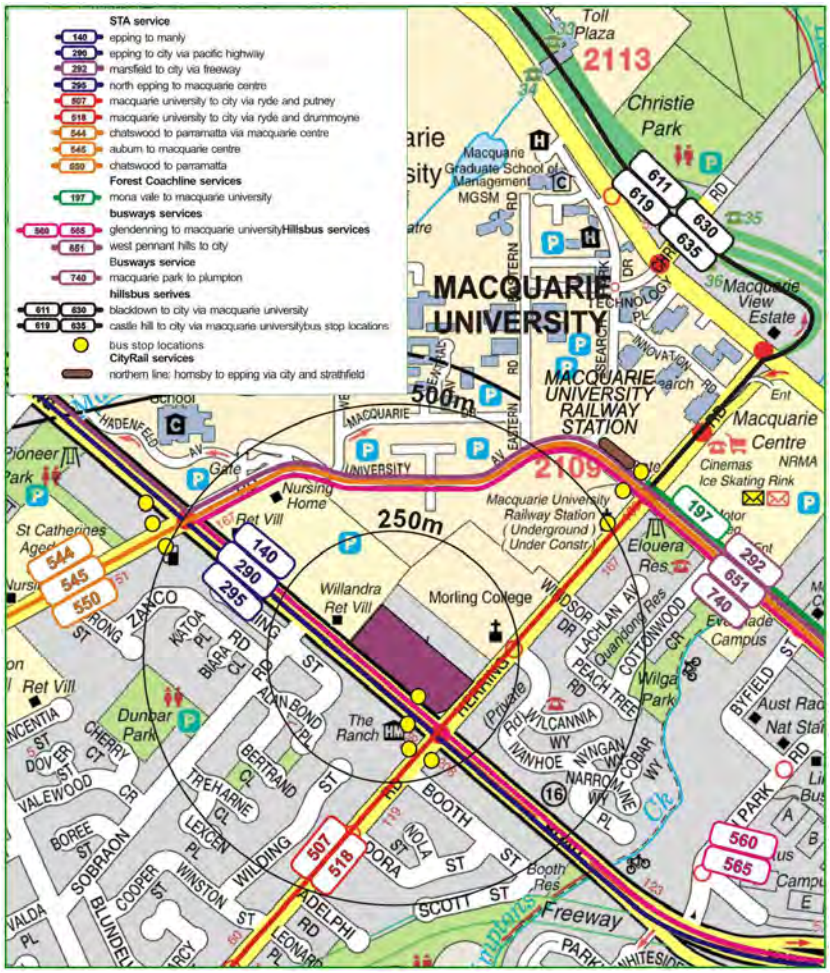

figure 4: public transport

3.4 existing site generation

Generation of the existing Stamford Hotel has been assessed through survey of the development during both the AM and PM peaks. The surveys demonstrated that the site generated 128 vehicles per hour during the AM peak period (80 in and 48 out) and 104 vehicles per hour during the PM peak (48 in and 56 out). These trips will be removed from the network under the development proposed under the Concept Plan.

3.5 existing intersection performances

To assess the operation of key intersections in the vicinity of the site, turning movements were extracted from the 2010 AM and PM Macquarie Park Corridor Paramics Models as provided by Council for the established AM and PM peak periods (being 7.45AM-8.45AM and 4:45PM-5.45PM respectively). The key intersections identified by the RTA for Sidra analysis include:

- Herring Road and Epping Road;
- Herring Road and Waterloo Road, and
- Epping Road and Lane Cove Road
- Herring Road with Talavera Road, and
- Epping Road with Balaclava Road.

It should be noted that the intersections of Herring Road with Talavera Road and Epping Road with Balaclava Road have been modelled in the Paramics model. Subsequent Sidra analysis were not required however (as discussed further in Section 6) due to the fact that based on Council's required protocols adopted by Council for its Paramics model, the additional volumes generated by the development at these intersections are below the required threshold levels.

The turning movements were then analysed using the SIDRA computer program to determine their performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per

vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit of 1.1 can be assumed. For intersections controlled by roundabout or give way/stop control, satisfactory intersection operation is generally indicated by a DOS of 0.8 or less.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

A summary of the modelled results are provided below. Reference should also be made to the SIDRA outputs provided in **appendix c** which provide detailed results for individual lanes and approaches.

table 1: existing intersection performance: am and pm peak periods

Intersection Description	Period	Control Type	Degree of Saturation	Intersection Delay	Level of Service
Land Cove & Epping Rds	AM	Signal	1.10	80.6	F
	PM		1.00	62.6	E
Epping Rd & Herring Rd	AM	Signal	1.00	44.1	D
	PM		1.45	59.7	E
Herring Rd & Waterloo Rd	AM	Signal	0.78	36.8	C
	PM		0.86	35.7	C

The SIDRA analysis was validated to the Ryde Paramics Micro Simulation model provided by Ryde City Council. The results of the analysis indicated that the intersections of Epping Road with Herring Road and Epping Road with Lane Cove Road operate at unsatisfactorily levels during both the AM and PM peak periods with the intersection of Herring Road and Waterloo Road operating with some spare capacity. These results are nevertheless expected and are in line with the findings of the Macquarie Park Traffic Study.

Notwithstanding, it is emphasised that the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of the proposed development as discussed further below.

4. description of proposed development

A detailed description of the Concept Plan Application is provided in the Environmental Assessment report prepared by JBA. In summary, the Concept Plan development for which approval is now sought relates to the establishment of uses and building envelopes, road layout and landscaping across the subject site. The proposal comprises a total floor area of 56,892m2 GFA and incorporates the following components:

- Demolition of all existing structures;
- Construction of seven residential buildings accommodating a total of 626 residential units including:
  - 342 one bedroom dwellings (55%);
  - 241 two bedroom dwellings (38%); and
  - 43 three bedroom dwellings (7%);
- The above includes 73 apartments (10%) which are adaptable;
- The provision of 1,110m^2 GFA of non-residential (ancilliary) floor space;
- Allowance for access by vehicles up to and including an 8.8 metre MRV within the new internal roads created by the development; and a 10 metre garbage truck for the Type 3 roads under Council's DCP;
- The construction of a three level basement car park levels comprising 715 spaces in addition to 75 new on-street parking spaces that are available within the proposed road network (790 spaces in total), and
- Construction of two new Type 3 roads generally in accordance with the principles established under Councils Street Network Structure Plan, accessing both Epping Road and Herring Road, but with the removal of the north-south road that traverses the site and a slight relocation of the north-south road to align it with the site boundary, so that this road can be (partially) delivered in Stage 1.

The parking and traffic impacts arising from the Concept Plan are discussed in the following sections. Reference should be made to the plans submitted separately to the Department of Planning, some of which are presented at reduced scale in **appendix b** for ease of reference.

5. parking requirements

5.1 council controls

Parking for the proposed development has been assessed in accordance with the requirements of the City of Ryde Development Control Plan 2010 and in particular Part 3.4 - "Residential Flat Buildings and Multi Dwelling Housing" and Part 9.3 - "Car Parking" and the Ryde LEP 2010 Restrictions Map for the non residential land uses. Table 2 below outlines the required and proposed parking allocation based on the land use and apartment mix proposed. It should be noted that the location of the site within 400 metres of Epping Road, allows the application of reduced parking rates as outlined in section 2.1 of the Car Parking DCP. The RTA parking rates for high density developments in metropolitan sub-regional centres has also been assessed for comparison purposes. Whilst detailed apartment numbers are not sought at Concept Plan level for Stage 2 of the development, an assumed overall apartment mix for Stage 2 has been adopted in order to identify the maximum number of spaces that will be needed for the site.

table 2: council parking rates and provision

Type	Number	Council Parking Rate	DCP Rate	RTA Parking Rate	RTA Requirement	Spaces Proposed
Residential						
One Bedroom	342	1.0 spaces per unit	342	0.6 spaces per unit	205	342
Two Bedroom	241	1.2 spaces per unit	289	0.9 spaces per unit	217	241
Three Bedroom	43	1.6 spaces per unit	69	1.2 spaces per unit	52	86
Visitor	626	1 space per 4 units	157	1 space per 5 units	125	105
Total Residential			857		599	774
Non Residential						
Various Uses[1]	1,110m^2 GFA	See discussion	12	See discussion	12	16
Totals			869		611	790

Note 1: Includes community, possible child care and retail uses (see discussion)

It will be noted that the development makes full provision for resident parking, with 669 spaces required and 669 spaces proposed. There is however a slight reduction in parking for the two bedroom units and a commensurate increase in the parking for the three bedroom units, which reflects the expectation of the market in this locality. In addition, the visitor parking is reduced to a rate of 1 space/6 units, which is more consistent with the RTA's requirements and represents the average rate for visitor parking within a regional and sub-regional centre. This approach is supported by Council officers, particularly in circumstances where there is extensive public parking in the locality that will generally be underutilised during the evenings and on weekends. It is also consistent with other development approvals in the vicinity.

The non-residential area of 1,110m^2 GFA comprises a mix of retail, community areas such as meeting rooms and a resident gymnasium; and a possible childcare centre. The community areas (about 320m^2) require no parking as this will be used by residents who will walk.

The balance of 790m^2 of retail/childcare/commercial areas are relatively small and are considered to be essentially ancilliary to the main residential use. In these circumstances, it is considered appropriate to adopt a rate that is half that of the applicable DCP rates for these components as this would account for people who live on the site and use these facilities. The childcare centre is a high parking generator and this has been adopted as a worst case scenario. If it is assumed that a child care accommodates 80 children within a 400 m^2 facility, then this would normally require 20 spaces at 1 space/4 children. This would reduce to 10 spaces with the 50% discount discussed above and this equates to 1 space/40m^2. The retail rate of 1 space/46m^2 would reduce to 1 space/92m^2 with the same discount. As the exact areas for the retail and childcare centre are not known at this time (and will in any case be considered as part of a Stage 2 Project Application) an average rate of 1 space/66m^2 has been assumed to apply to the balance of 790m^2 of non-residential area, resulting in a need for 12 parking spaces and in response, 16 spaces are provided. This can be reviewed in the Stage 2 Project Application when further information may be available.

It is evident from Table 2 that the overall development provides 790 spaces which represents a 'nominal' deficiency of 79 spaces. The reduced parking demand is however supported by the Department of Planning as a matter of State Government Policy in areas well serviced by public transport and the proposed parking is therefore supportable. In addition, the Ryde Councils LEP 2010 (Section 45E refers) encourages the use of alternative transport modes within the Macquarie Park Corridor and the adoption of a restricted parking regime as proposed will also achieve this objective.

The slightly reduced parking provision is therefore in line with the objectives of Ryde Council's LEP as well as those of the State Government.

The extent of parking reduction, while significant (10%) is not expected to create any adverse on-street parking effects in the wider locality, which could potentially raise amenity impacts for existing residents in particular. This is highlighted by reference to the RTA's Guide to Traffic Generating Developments for high density residential flat buildings in sub-regional centres which would require only 640 spaces for the development, compared to the 790 spaces proposed. While the subject site does not presently have the same level of accessibility to public transport and other services as these sub-regional centres, the concession sought from Council's requirement is both reasonable and appropriate in the circumstances.

It is noted that the 790 spaces as proposed includes 75 spaces that are provided on-street within the development area. The inclusion of these spaces is considered reasonable as it will achieve the activation of the street frontages, particularly for the residential and retail visitors who in most cases would find this parking more convenient than the basement parking. That is, even if additional basement parking were to be contemplated, it would most likely be unused in favour of the on-street parking. In addition, the peak resident and retail visitor demands are not expected to overlap.

In addition to the 715 spaces proposed to be provided within the basement car park, an additional 40 motorcycle spaces are also provided which will further ensure that all parking demands are accommodated on-site.

In summary while the parking provision is less than that nominally required by Council's DCP 2010, the level of provision is sufficient to accommodate expected demands, while still encouraging the use of alternative transport modes which is consistent with the objectives for the Macquarie Park Corridor and State Government policy more generally. The level of parking therefore also takes due account of the excellent level of accessibility to public transport services. Thus, the parking strategy as adopted achieves the Director General's Requirements.

5.2 disabled parking

Disabled car parking for the overall Concept Plan is provided for each of the 73 adaptable apartments for use by residents. These are provided within the basement parking levels and are designed in accordance with AS2890.6. In addition, two disabled visitor spaces are provided on-street. This represents 2% of the overall visitor provision of 105 spaces and is considered appropriate. In addition, it is likely that not all of the adaptable units will require parking so that there would be flexibility to provide additional disabled visitor spaces should these be required.

5.3 bicycle parking

Council's DCP requires a minimum of 1 bicycle space/3 units for residents (209 spaces) and 1 bicycle space/12 units for visitors (53 spaces). The Concept Plan in fact proposes a bicycle space for each dwelling unit which is an exceptional level of provision. These are able to be provided within the storage areas provided at basement level. An additional 3 spaces are required for employees and visitors to the non-residential uses (at an average rate of 1 space/475m^2 GFA) and these can be provided at ground level (for visitors) and within the separate storage area for employees associated with the non-residential uses.

5.4 servicing

The Type 3 roads that are delivered in Stage 1 of the Concept Application (as shown on the plans provided in **appendix b**) have been designed to accommodate a 12.5m HRV, taking due account of the partial construction of the western (north-south) road. The other internal roads are able to accommodate a 10m garbage truck and movement will via forward through-site manoeuvres, with no reversing necessary. Garbage rooms are provided at regular intervals within Basement 1 level and bins will be transported by caretaker to ground level for collection by Council's contractors.

5.5 response to strategic planning policies

Both the Metropolitan Transport Plan and Integrating Land Use and Transport – A Planning Policy Package, seek to reduce car usage and promote public transport and alternate transportation modes through integrated transport plans; and promoting development within close proximity to public transport.

Notwithstanding, the implementation of transport plans is more difficult to achieve in residential developments. In contrast to a workplace environment or other destination based land uses, where opportunities to influence travel demand (such as car pooling) are easier, it is relatively difficult within a residential development to encourage non car usage other than for the journey to work.

In the case of residential developments, sustainable travel can however be maximised for all trip types through the promotion of public transport and the use of car share vehicles. This is also essential where parking is restricted, as is proposed. This ensures that residents are aware of the availability, relative convenience and frequency of such services. For this reason a Travel Plan is to be prepared for Stage 1 (and subsequently Stage 2) which will be located in common areas and will identify such aspects as:

- Local bus stop locations,
- Bus and rail time tables
- Location of taxi ranks in the locality
- Location of local services within walking distance such as convenience stores, supermarkets and other retail related areas,
- Location of car share vehicles within reasonable walking distance (if any); and
- Local cycle routes including the City of Ryde Cycle Map.

Knowledge of these services and the specific locations of the services will ensure that the development provides maximum opportunity for residents to use non car travel modes. The development also includes extensive bicycle facilities to promote non car travel for local trips in

particular; and commuter trips in general. It is therefore expected that Stages 1 and 2 will be conditioned to require a Travel Plan to be prepared and this is invited.

In addition to the above, consultation with car share operators such as Go Get to provide car share vehicles within the proposed future road network, for use by local residents will also need to be investigated. This will be dependent upon the requirements of car share operators however the development is considered to be a suitable candidate site for the provision of on-street facilities for car share vehicles. This would also form part of a Travel Plan.

Notwithstanding the above, it will be appreciated that the site is located within close proximity to major bus routes and the Macquarie University Railway Station (located 600 metres to the north of the site) and this will maximise trips using public transport generally, including journey to work trips but also other trip types; even in the absence of a Travel Plan.

6. traffic modelling

6.1 trip generation

6.1.1 residential

The generation of the proposed development has been based on the RTA's Guide to Traffic Generating Developments which for a high density residential flat building in a metropolitan sub-regional centre attracts a rate of 0.29 trips per unit. Application of this rate to the proposed 626 units results in a generation of 182 trips per hour with a likely 80:20 split in the direction of peak flow, which results in the following trips:

- 37 in and 145 out during the morning peak period (7-8am and 8-9am); and
- 145 in and 37 out during the afternoon peak period (4-5pm and 5-6pm).

6.1.2 Non residential

The only non-residential uses that will generate traffic under the Concept Plan relate to the 790m^2 of ancilliary retail/commercial/child care area as the balance of area is exclusively for residents. That is, it excludes the meeting rooms, community rooms and resident gymnasium. The generation from these uses has been based on the worst case assumption of uniform retail trip rates. The RTA's rate of 4.6 trips per 100m^2 of lettable floor area equates to about 4.0 trips/100m^2 of gross floor area. This may be regarded as a worst-case scenario as it takes no account of the use of these areas by people who reside within the site. Application of this rate results in a generation of 32 vehicles per hour during the critical AM and PM peak period and again assumes an 80:20 split in the direction of peak flow. The generation of the retail area is in practice likely to be reduced during the AM peak and will generally be associated with staff arrivals only, however as the exact nature of the retail tenancies is yet to be confirmed, the generation has also been included during the AM peak.

6.1.3 combined generation

The combined generation of the site for the assessment purposes is therefore 216 vehicles per hour, as follows:

- 64 in and 152 out during the morning peak period (7-8am and 8-9am); and
- 152 in and 64 out during the afternoon peak period (4-5pm and 5-6pm).

This is however not a net increase in generation as account for the existing generation of the site must also be taken into account. Accordingly, the overall increase as a result of the proposed development when taking into account the existing hotel (as outlined in Section 3) would results in the following net increase in generation;

- 0 in and 104 out during the morning peak period (7-8am and 8-9am); and
- 104 in and 7 out during the afternoon peak period (4-5pm and 5-6pm).

The impacts associated with the proposed increase in generation have been assessed using the Macquarie Park Corridor Paramics Model and the results of this are discussed in the following sections. It should however be noted that the site will result in a maximum increase of only 109 vehicles per hour which is considered moderate for developments within Macquarie Park. It should also be noted that the above does not allow for any discounts for increased use of public transport which is anticipated to increase over time. Discounts to the generation have also not taken into account multi-purpose trips, for example where residents may be associated with either the university or offices within the Macquarie Park corridor and who would walk. That is, the location of the development adjacent to the university and within the Macquarie Park Business Park will likely have a significant impact on trips from the site. As such the analysis below is considered a worst case assessment; but suitable for assessment purposes.

6.2 paramics micro simulation assessment

6.2.1 Introduction

As stipulated in the Director General's Requirements, a Paramics micro simulation model has been used to assess the impacts of the development on the surrounding road network. The assessment has been undertaken as part of the Macquarie Park Traffic Study and the Macquarie Park LEP to assess the overall impact of developments in the study area on the existing and future road networks. The assessment has been undertaken in accordance with Macquarie Park User Manuel (Reference Documents 1 and 2) provided by Council and is discussed below.