TMAP study

concept plan application and staged PA for the nepean hospital precinct (barber avenue), corner of parker st and the great western highway, kingswood

prepared on behalf of aesthete no.3 pty. limited by TRAFFIX traffic & transport planners
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1. introduction

TRAFFIX has been commissioned by Turner Associates Architects on behalf of Aesthete No. 3 Pty. Limited to undertake a Transport Management Accessibility Plan (TMAP) study of a proposed Concept Plan Application for The Nepean Hospital Precinct located at the corner of The Great Western Highway and Parker Street, Kingswood. The report follows upon a previous report prepared in support of the Preliminary Environmental Assessment which was an application made under Part 3A of the Environmental Planning and Assessment Act, 1979, following authorisation of the Concept Plan by the Minister. This TMAP study should therefore be read in conjunction with the overall Environmental Assessment, of which it forms a part. The Environmental Assessment deals with all relevant matters as identified under the Director General's Requirements.

This report documents the findings of our further investigations in response to Council's and the RTA's responses to the Preliminary Environmental Assessment. It is also in response to the Director General's Requirements and subsequent discussions. The Concept Application relates to the use of the site for mixed use purposes.

Separate Project Application/s will subsequently be submitted which will include a traffic impact assessment report that will provide more accurate details of impacts associated with individual development application/s. That is, the level of investigations undertaken in this report are consistent with what would be expected based on a master plan approach for the overall site.

The development is located within the Penrith City Council LGA and has been assessed under that council's controls; with regard also given to the RTA's Guidelines and relevant standards.

2. location and site

The site is located within the Nepean Hospital Precinct on the south-eastern corner of the intersection of The Great Western Highway and Parker Street, at Kingswood. The site adjoins the Nepean Private Hospital and is currently occupied by an at-grade car park; and a Baptist Church and church residence with a combined area of approximately 9,571m^2. It is generally 'L' shaped in configuration and has frontages to The Great Western Highway, Parker Street and Barber Avenue.

The site is currently serviced by five separate accesses, four of which are situated on the Barber Avenue frontage with the remaining one situated on The Great Western Highway frontage. No access is available to Parker Street due the relatively short frontage and the close proximity to the major intersection of Parker Avenue with the Great Western Highway.

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

figure 2: site

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:

- The Great Western Highway: an RTA state road (SR 5) that runs in an east west direction forming a primary arterial link between Sydney's Western suburbs and the city. It carries approximately 32,000 vpd in the vicinity of the site;
- Parker Street (The Northern Road): an RTA main road (MR 154) that generally runs in a north south direction between Camden Valley Way at Narellan in the south and Richmond Road at Bligh Park in the north. It carries about 40,000 vpd in the vicinity of the site;
- Somerset Street: a local road that runs in a north south direction between The Great Western Highway at its northernmost extent and Jamison Road at its southernmost extent and carries about 5,000 vpd in the vicinity of the site;
- Derby Street a local road that runs in an east west direction to the south of site connecting Jamisontown in the west with Claremont Meadows in the east; and
- Barber Avenue a local road that runs in an east west direction extending east from Parker Street and terminating within the Nepean Hospital Precinct. This provides the primary access to the subject 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. The major constraint to site accessibility is the concentration of traffic activity via Barber Avenue, which is restricted to left-in/left-out movements at Parker Street. This underscores the importance of obtaining an exit onto the Great Western Highway (as currently available), especially in view of the high concentration of travel demand to/from the west.

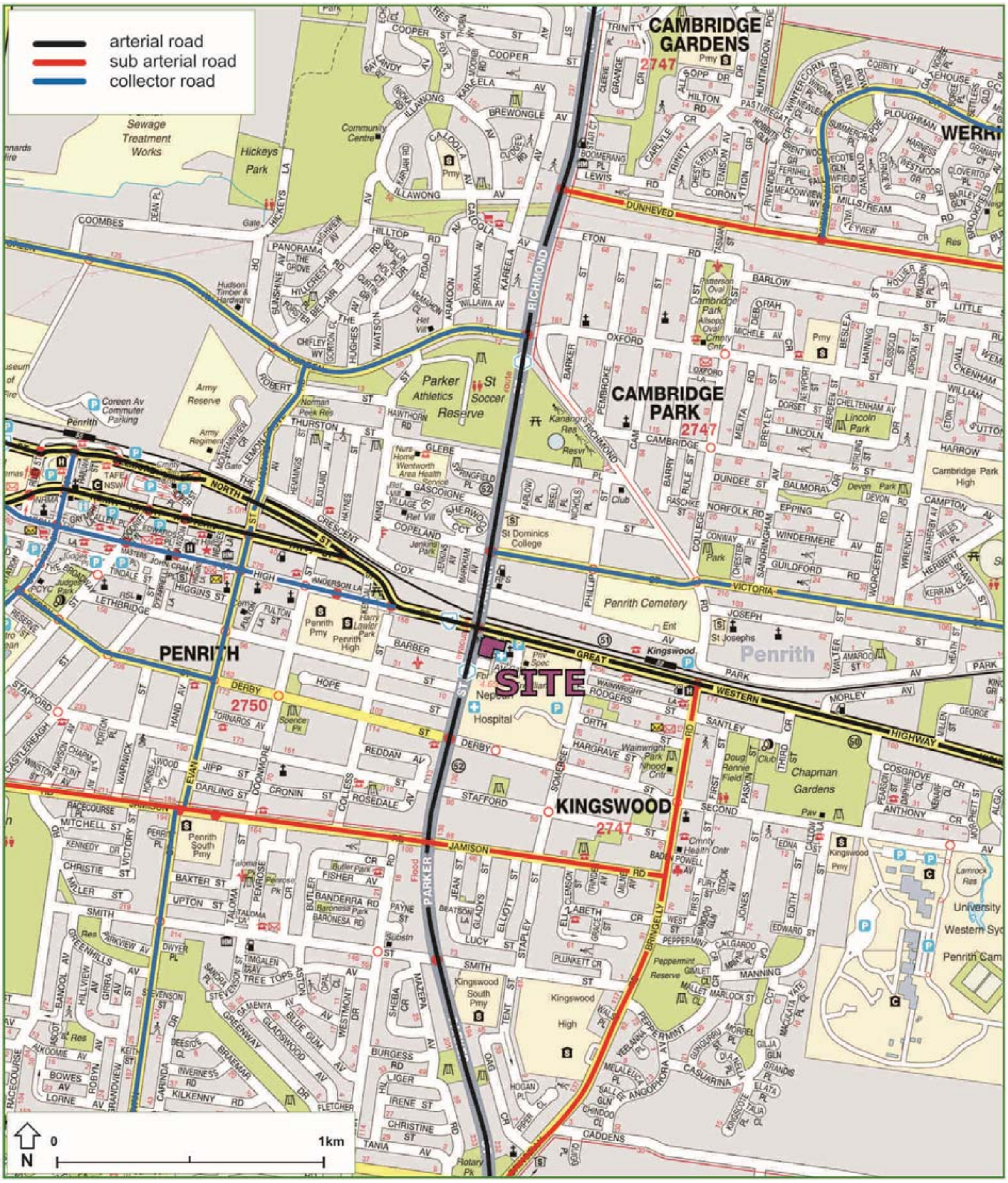


figure 3: road hierarchy

3.2 general description of road environment

The Great Western Highway is constructed with a 23 metre divided carriageway and generally carries three lanes of traffic in either direction. To the immediate north-west of site is the major signal-controlled intersection of Parker Street with the Great Western Highway. Approaching this intersection from the east the Highway comprises three lanes of through traffic, with a 120 metre right turn lane and a 20 metre left turn slip lane. Approaching from the west the road comprises two lanes of through traffic, an 80 metre right turn lane and a 70 metre left turn slip lane. The speed zoning on The Great Western Highway is 60 km/hr. 'No Stopping' controls apply on both sides of The Great Western Highway in the vicinity of the site.

Parker Street, also known as The Northern Road, is constructed with a 22 metre wide divided carriageway and generally carries two through lanes of traffic in either direction. Approaching its intersection with The Great Western Highway from the north, Parker Street consists of two lanes of through traffic, a 115 metre right turn lane and a 115 metre left turn slip lane. From the south Parker Street comprises a left turn slip lane and a right turn lane both of length 100 metres.

Parker Street also forms the northern and southern approaches to a 4-way signalised intersection with Derby Street to the south of the subject site. Both of these approaches consist of two lanes of through traffic, with short opposing right turn lanes of length 44 metres and 36 metres. The speed zoning on Parker Street is 70km/hr.

Somerset Street is constructed with a 12 metre wide carriageway and carries a single lane of traffic in either direction. It forms a priority controlled 'T-junction' with The Great Western Highway to the east of site, with a right turn bay in the Highway of length 58 metres. Right turn movements out of Somerset Street are prohibited by local channelization.

Barber Avenue is constructed with an 8.8 metre wide undivided carriageway and carries a single lane of traffic in either direction. Directly adjacent to the site Barber Avenue forms the stem of a priority controlled 'T-junction' with Parker Street, with only left-in and left-out movements permitted due to the continuous median within Parker Street. Approximately 70 metres east of this intersection the road width tapers to 7.3 metres, and about 100 metres beyond this point the road terminates at the Hospital.

3.3 public transport

The journey to work data available from Transport NSW for the subject locality (Travel Zone 1856) indicates that 64% of people drive into this zone to work (with a very small sample of only 375 persons travelling); while 79% of people drive to work outside the zone (with 2,235 persons travelling). This is a high level of car dependency and this presents a challenge for the subject site, with measures required to reduce this situation and promote alternate travel modes as discussed further below.

The existing bus services that operate in the locality are shown in **figure 4**. It is evident that the site benefits from good access to the public transport system with buses travelling along the Great Western Highway and Parker Street immediately adjacent to the site; as well as along Derby Street which lies only 350 metres to the south of the site. In addition, Kingswood Railway Station lies 700 metres to the east of the site which is within the usual 800 metres walking distance for employees.

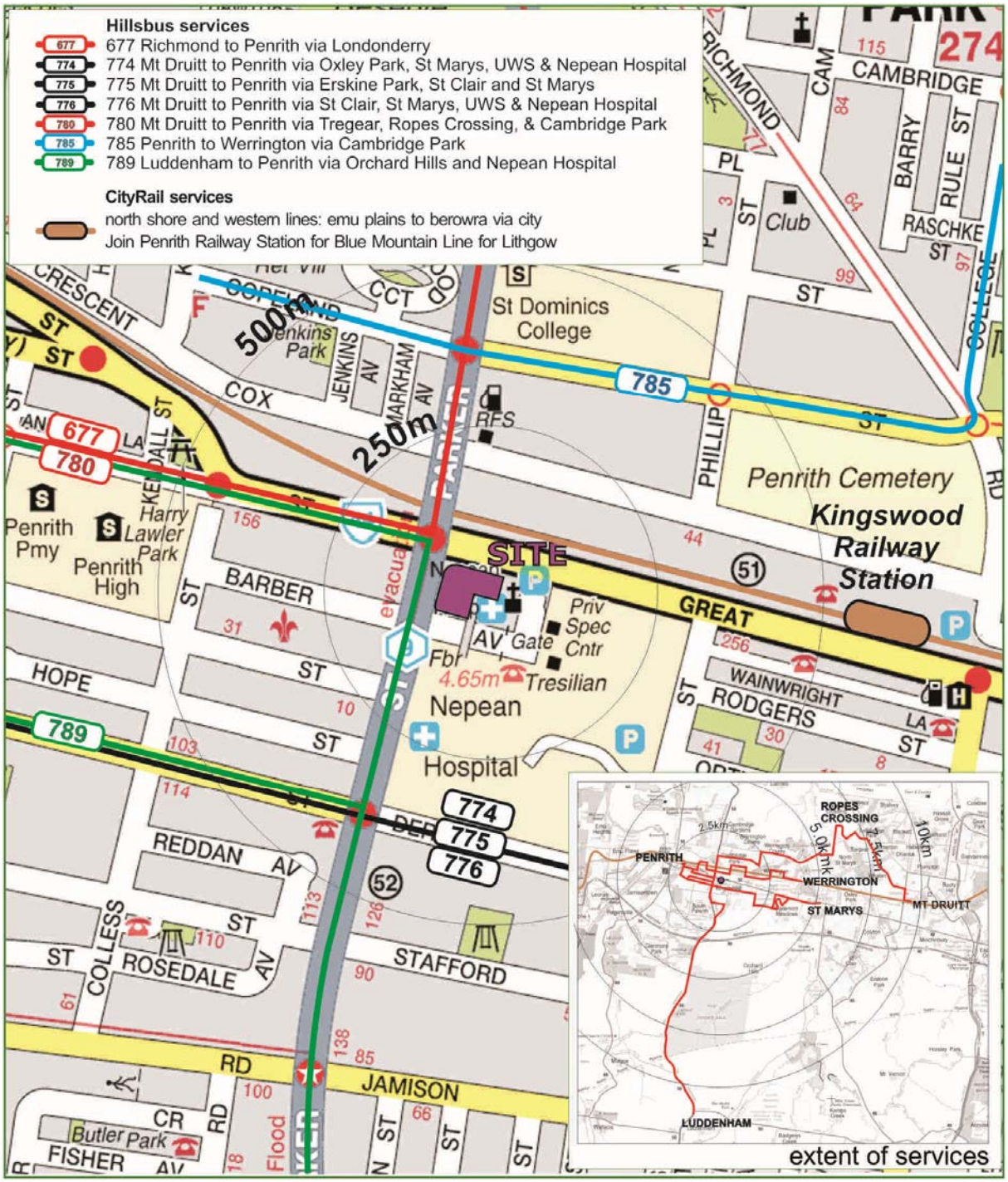


figure 4: existing public transport services

3.4 existing site generation

For the purpose of this assessment, no existing site generation has been assumed. That is, the development traffic is a net increase over existing conditions as reported upon below.

3.5 existing intersection performances

For the purposes of the assessment of traffic impacts of this development, surveys were undertaken of the most critical intersections in the vicinity. The key intersections in the locality that are of interest and were surveyed and assessed during the AM and PM peak periods are as follows:

- The intersection of Parker Street and The Great Western Highway;
- The intersection of Parker Street and Barber Avenue;
- The intersection of Parker Street and Derby Street; and
- The intersection of Somerset Road with The Great Western Highway;

The results of these surveys are shown in **figures 5 and 6** which relate to existing conditions at the time of maximum traffic volumes over the period surveyed (8-9am and 4-6pm). The results of these surveys were 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 at 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.

figure 5: existing am peak traffic volumes

figure 6: existing pm peak traffic volumes

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

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

Intersection Description	Period	Control Type	Degree of Saturation	Intersection Delay	Level of Service
Parker St. & The Great Western Highway	AM	signals	1.311	60.3	E
	PM		1.313	68.1	E
Parker St. & Barber Ave.	AM	priority	0.301	21.4	B
	PM		0.350	22.1	B
Parker St. & Derby St.	AM	signals	1.00	25.6	B
	PM		1.00	27.3	B
Somerset St. & The Great Western Highway	AM	priority	0.333	13.6	A
	PM		0.427	15.9	B

It can be seen from Table 1 that with the exception of the adjacent main intersection of Parker Street with the Great Western Highway these critical intersections operate satisfactorily under the existing 'base case' scenario, all with a levels of service A or B during both peak periods and with moderate delays. The intersection of the Parker Street and the Great Western Highway operates at level of service E during both peak periods and is therefore at capacity. The average delay is 60.3 seconds in the AM peak and 68.1 seconds in the PM peak, with evidence of right turn bays currently overflowing on the northern, eastern and southern approaches. The through movement on the eastern approach (westbound) on the highway during the PM peak is at level of service F, with an average delay for that movement of 127.5 seconds.

Nevertheless, it is stressed 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. This is discussed further in Section 5.

4. description of proposed development

A detailed description of the development proposed under the Concept Plan application is provided in the Environmental Assessment report prepared separately, of which this report forms a part. 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 development in two separate stages as follows:

Stage 1: Serviced Apartments, Commercial Office and Local Retail

- Development of 84 serviced apartment
  - 72 one bedroom; and
  - 12 two bedroom
- 20,191m^2 GFA of commercial floor area;
- 2,931m^2 NFA of retail area (same as lettable area); and
- Provision of 449 parking spaces.

Stage 2: Residential Units and Local Retail

- Development of 106 residential units comprising:
  - 32 one bedroom units; and
  - 74 two bedroom units
- 3,138.5m^2 NFA of retail area (same as lettable area); and
- Parking for 312 parking spaces

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 **aAppendix b** for ease of reference. It is emphasised that these plans are preliminary and will potentially be amended slightly to accommodate any changes that

may be required for the Preferred Project. However minor changes to the above land use mix/yield would not be expected to alter the outcome of the investigations presented in this report.

It is also noted that the above uses have a synergy so that parking and particularly traffic generation is reduced by virtue of linked trips (where patrons will divert from their existing trips) and multi-purpose trips (where one vehicle trip will involve visits to several uses). In addition, many people using the on-site retail facilities will be drawn from the on-site population and the surrounding neighbourhood, so that there will be a high proportion of walking trips, thereby containing external travel demand. Finally, the proposed use of car sharing will also reduce parking demands.

5. transport management and accessibility

5.1 introduction

The traffic impact assessment undertaken in this report, as discussed in this section below, is premised upon a reduction in traffic generation when compared with the RTA's "unconstrained" trip rates, which reflect relatively poor access to public transport for many of the land use components under consideration. To achieve this target, various initiatives are proposed. These are discussed below and include improved bus services, provision of pedestrian and bicycle linkages (including end-user facilities), taxi services, a constrained parking supply, car sharing arrangements and the formulation of a Transport Access Guide.

These should be seen in the context where the site is expected to accommodate over 1,000 employees and residents.

5.2 bus services

Existing bus services are discussed in Section 3 and are extensive within a 350 metre walking distance, which includes services along the Great Western Highway and Derby Street. At this time, no additional bus services are considered necessary. Nevertheless, discussions will be held with bus operators as part of the later Stage 2 Project Application stage to identify the potential for improved services when the site is fully developed, as well as improved facilities including bus shelters. At this stage, all weather shelters are considered essential along both sides of Parker Street and the Great Western Highway, although these would benefit the hospital precinct generally.

These bus services operate regularly and will provide an alternative travel mode choice for residents, employees and visitors associated with the proposed development. The use of these services should be encouraged by residential strata managers and employers where possible. This may include the provision of current service timetable and route information within reception, foyer and/or other communal areas within the site.

5.3 rail services

Rail services provide access to the wider transport network serving the greater metropolitan area. The site is only 700 metres from Kingswood Station which is clearly very attractive for all trip purposes. The station will be accessed via the existing footpath and crossing facilities that exist along the Great Western Highway.

5.4 pedestrian and bicycle linkages

Pedestrian and bicycle linkages will be provided within the site. This includes an internal footpath network that includes the through-site plaza and widened footpath along the Highway. Connectivity to all footpath systems in the locality on all public roads will also be provided, with the ability to access bus and rail services. Safe crossing opportunities are available on all major desire-lines, including integrated crossings within the intersections of Parker Street with the Great Western Highway; and Parker Street with Derby Street. In addition, the hospital precincts to the immediate east and south of the south are provided with extensive pedestrian linkages, including links through to Somerset Street and Derby Street.

It is expected that cyclists will rely on the external roads which provide shared on-road facilities, while Council's bicycle network is generally available more remote from the site.

In addition, shower facilities will be available within buildings and bicycle storage provision is to be made in accordance with Council's requirements. Reference should be made to individual Project Application reports for details regarding the specific provision in each development stage.

5.5 pedestrian safety

The internal design and particularly vehicle access locations has taken due account of pedestrian safety. The overall pedestrian linkages will be developed at Project Application stage. All driveways will be designed as standard laybacks so that pedestrians have priority. All driveways will also be in accordance with AS 2890.1 and AS 2890.2, which includes the provision of appropriate sight lines.

5.6 taxi services

Taxi services will be able to access the site directly via the internal road system which is via Barber Avenue. It is recommended that consideration be given to the provision of a taxi rank in Barber Avenue and this is a matter that will also be finalised in consultation with Council's traffic committee. Taxis can also use the drop-off area adjacent to the retail plaza.

5.7 car share and car pool arrangements

It is considered that car share arrangements will form an integral part of future Project Applications and this can be conditioned. This will be prepared having regard for relevant guidelines when available. In general, a parking system such as "GoGet" is contemplated which has potential application to all non-resident land uses and this will be effective in reducing retail and commercial tenant parking demands. In this regard, as a general proposition, one "GoGet" car is able to meet the needs of many users, substantially reducing the need for a 'designated' car and thereby reducing parking demands. Based on the experience of "GoGet", one shared space is equivalent to 5 'normal' spaces. It is therefore recommended that consideration be given to the dedication of one or two car share spaces within the site.

The implementation of a car share policy is a matter that can be conditioned having regard for relevant guidelines in association with individual applications.

5.8 servicing

The access and internal movement system has been developed to ensure safe and convenient access to all parts of the site, based on the required Design Vehicle. The largest commercial vehicle is the standard Service vehicle as defined under AS 2890.1 which is an 8,8m MRV. However, the need to accommodate garbage vehicles is expected to require access by a maximum 10.5m rigid truck. This is a matter for assessment during later Project Application/s and compliance with relevant standards is proposed. Service vehicles will enter and exit via the main access onto Barber Avenue in a forward direction and are provided with a separate, dedicated loading facility.

Servicing of the residential component of the development (in Stage 2) can be undertaken on-street in Barber Avenue using Councils garbage services; as well as from within the internal roadway. This will be assessed for all relevant Project Applications.

5.9 parking requirements

5.9.1 parking rates and provision

The site is subject to the controls of the Penrith DCP 2006 (Section 2.11 Car Parking), although regard needs also to be given to the requirements of the RTA's Guideline as well as other survey-based assessments where these are of assistance. Specifically, the Director General's requirements seek to reduce parking as far as possible while promoting other (non-car) travel modes. This however needs to be balanced against the practical reality that some car-dependent uses (for example supermarkets) are to a degree car-dependent (even to serve the local catchment) and need to provide sufficient parking to ensure that on-street demands do not occur, which would potentially create amenity impacts.

The resulting outcome for the overall development is the provision of 761 spaces, compared with 960 spaces under Council's DCP and up to 983 spaces under the RTA's Guideline. This is a reduction of 21% compared with Council's requirements and 22.5% based on the RTA's requirements which is a very significant reduction and reflects the special nature of the proposed uses, most of which have a close affinity with the private hospital. The required parking levels for each land use component are considered separately below.

- Specialty Retail and Other Shops

Council's DCP requires 1 space/26m^2 of net lettable floor area. The development proposes 6,069.5m^2 of NLA comprising 2,931m^2 NLA in Stage 1 and 3,138.5m^2 NLA in Stage 2, resulting, nominally, in a need for 234 spaces. This is lower than the RTA's rate of 1 space/22m^2 for secondary retail areas; or 1 space/24m^2 for supermarkets, which would result in a need for about 270 spaces. However, these rates can both be regarded as the 'unrestricted' demand for parking which is to say they follow a car-dependent 'model'. Having regard for this and in view of the DGR's, a significantly reduced level of retail parking is proposed (193 spaces) which acknowledges the fact that the retail area will predominantly serve the residents and employees in the locality to a significant extent, with many of these people walking to the shops. That is, the retail use is expected to provide a service to the wider

hospital community including staff and visitors. It is expected to include services such as florist, newsagent, chemist, cafe and such support/ancilliary tenancies. This ancilliary nature of the retail uses also includes the supermarket which is expected to also attract a predominantly local catchment, being located within the Lower Ground Floor (beneath the street level of the Highway) and with a trading area of only 960.75m^2. That is, it is more in the nature of a convenience, walk-in supermarket.

In these circumstances, and to promote non-car modes in accordance with the DGR's, provision of only 193 retail spaces is appropriate and is equivalent to a rate of 1 space/31.4m^2 which is an 18% reduction compared with Council's DCP; and a 29% reduction compared with the RTA's Guideline.

As mentioned, this approach is in accordance with the objectives of the DCP as well as the Director General's requirements and will reflect the high proportion of walking trips that are expected in this location, most notably the staff and visitors associated with the hospital.

- Residential Units

Council's DCP requires one space per unit with additional visitor parking required at a rate of 1/5 units. The overall site that is the subject of this Concept Plan accommodates 106 one and two bedroom units. This results in a need for 128 spaces (106 resident spaces and 22 visitor spaces).

The concept plan proposes to increase the resident parking for the 74 two bedroom units from 74 spaces to 137 spaces, resulting in an overall provision of 191 resident spaces. This equates to a rate of 1.85 spaces per unit. This is slightly higher than the expected demand and it is considered that a maximum rate of 1.6 spaces per two bedroom unit would be more appropriate and is more in line with 2006 census data relating to car ownership. It is emphasised in this regard that this is unlikely to detract unduly from public transport use for the journey to work. Rather, these cars will be necessary for the many off-peak trips that are not well served by public transport, including shopping, recreational, educational and other social trips, most of which occur during the evenings and on weekends when public transport provision is substantially downgraded and is likely to remain so.

- Serviced Apartments

It is proposed to provide 1 space/2 serviced apartment units which is considered to be more than adequate, having regard for the fact that the serviced apartments are intended to be ancilliary to the hospital campus. These will be used by visiting hospital staff and other professional (including visits for training purposes) as well as families of patients and it is unreasonable to assume that they will

generate one space per apartment. Many visiting staff and other professionals, as well as families of patients, would use taxis and other modes of travel; as well as using shared vehicles, such as business associates attending training courses. This is in contrast, for example, to a motel in relative isolation which might reasonably be expected to provide one space per apartment.

- Commercial Area

The 20,191m^2 of commercial area in Stage 1 attracts a rate of a space/40m^2 under Council's DCP, which it is noted is the same as the RTA's requirement and is generally regarded as the unrestrained demand parking rate. It would result in a need for 505 parking spaces. In response, only 335 spaces are proposed and this is equivalent to a 34% reduction; or a rate of 1 space/60m^2. This will substantially increase reliance on alternate travel modes for the journey to work associated with the commercial floor space.

- Summary of Parking Requirements

The above assessment results in the need for parking as follows. The "unrestrained" demand for parking associated with the non-residential uses is also shown (in brackets) for comparison, so that the extent of parking 'suppression' can be gauged to encourage non-car travel modes. This information is also summarised in **appendix c**.

Retail	193	(266 if unrestrained under RTA Guideline – 234 DCP)
Commercial	335	(505 if unrestrained under DCP and RTA Guideline))
Residential	191	(128 under Council's DCP)
Serviced Apartments	42	(84 spaces under DCP and RTA Guideline for a motel)

It can be seen that the development would require up to 983 spaces based on the unrestrained demand for parking; whereas only 761 spaces are proposed. This is an overall 22.5% reduction in parking which will suppress travel by non-car modes and readily achieve what may be expected to be a typical target reduction of 10-15% in this location. That is, in this case parking is being used as a policy tool to suppress car use and this is consistent with State Government policy and is sound transport planning.

5.9.2 disabled parking

This is a matter for assessment during later Project Application/s and compliance with relevant Australian Standards is proposed.

5.10 transport access guide

The NSW Government State Plan (November 2006) includes the following transport targets:

- Increase the mode share of public transport trips to the Sydney CBD to 75%;
- Increase journeys to work within the Sydney metropolitan region by public transport to 25% by 2016;
- Consistently meet public transport reliability targets for all forms of public transport;
- Road fatalities continue to fall relative to distance travelled;
- Increase the number of people who live within 30 minutes of a city or major centre by public transport in metropolitan Sydney;
- Maintain current travel speeds along Sydney's major road corridors despite increase in travel volumes;

Generally the primary objective of Government behind establishing a Transport Access Guide for a major development is to reduce the reliance on private vehicle usage associated with the proposed development. Increasing the number of journey to work trips by public transport is considered the most relevant State target, identified above, with regard to the subject development. A reduced target of say 10-15% is arguably more realistic and appropriate when considering that the overall metropolitan target will be significantly influenced by mode shares associated with major centres including the Sydney CBD. In the subject case and having regard for the proposed uses, a target of 10% is considered readily achievable in relation to the journey to work trips, as discussed above. This is likely to be achieved through the reduced parking rates alone (a 22.5% reduction overall); with other initiatives further promoting the use of other travel modes including public transport, cycling and walking. These are also discussed above. It is expected that the preparation of a Transport Access Guide will be included as a condition of consent.

5.11 traffic impacts

5.11.1 trip generation

It is usual practice to adopt trip rates published by the Roads and Traffic Authority for individual land use components, as set out in the document entitled "Guide to Traffic Generating Developments". While this is appropriate for some land uses, it is not appropriate for the proposed uses as parking demand in particular will be actively suppressed, to take advantage of the excellent public transport and more particularly, the fact that the retail area is intended to serve the hospital campus to a very substantial extent, so that travel is 'contained' within the immediate area, with a high proportion of walking trips. The trip rates associated with individual land use components are discussed below.

- The general retail area (excluding the supermarket) has an area of 4,692.5m^2 (NFA) which represents 77% of the overall retail area of 6,069.5m^2 (NFA). The nature of this retailing needs to be understood. Specifically, the Economic Impact Assessment prepared by Hill PDA identifies that this retail area will include a range of specialty stores (such as cafe, take-away food, newsagency, florist, restaurant, specialty food, personal services and postal services). These will, to a very substantial degree, serve the 800 workers and 120 residents generated by the development itself. They will also serve the workers, patients and visitors who attend the existing hospital campus on a daily basis. Having regard for this, adoption of the a trip rate of 70% of the RTA's 'normal' trip rate of 4.6 trips/100m^2 of secondary retail floor area is considered reasonable and accounts for these special circumstances. Of the remaining 'external' trips, at least 25% will be linked trips, being traffic drawn from passing traffic that is already on the road network. Indeed, more recent research undertaken by the Queensland Department of Main Roads indicates that it is likely to be much higher in such a location at the juncture of two busy arterial roads. The resulting adjusted trip rate of 2.4 trips/100m^2 as applied to the 4,692.5m^2 of floor area therefore results in a generation of about 112 veh/hr during the PM peak period (56 in, 56 out).

- The supermarket has an area of 1,377m^2 (NFA) which represents 22% of the retail area. This is a small supermarket and the particular characteristics of the supermarket also need to be understood. In this regard, the Economic Impact Assessment undertaken by Hill PDA identifies that the supermarket will turn over $27.6m in its first full year of trade, which could increase to a minimum $30.4m. Of this turnover, $9m is expected to be generated by workers in the locality the vast majority of who (about 80%) are associated with the subject development and the hospital precinct. A further $0.6m of turnover relates to residents within the subject development. That is, a total of about $7.8m of overall turnover (26%) is expected to involve people who walk to the

supermarket and who therefore generate no external traffic impacts. The 'base' traffic generation of supermarkets of this size is typically 10-12 trips/100m^2 based on more recent surveys than those that underpin the RTA's Guidelines which were undertaken almost 20 years ago. This reflects the greater spread of shopper activity due to more flexible working hours and higher part-time worker participation levels. This rate would reduce to 7.4-8.9 trips/100m^2 when the high proportion of walking trips is taken into account. When applied to the 1,377m^2 of supermarket NFA, this results in 102-122 veh/hr. For assessment purposes, 122 veh/hr has been assumed for the supermarket generation. As a check, with 50 supermarket parking spaces assumed, this equates to 2.44 trips/space/hr which is an average dwell time of 49 minutes which is considered reasonable for those drivers who will be driving.

- The commercial component, with only 335 spaces (66% of the RTA's requirement) would normally be expected to generate 200 veh/hr during peak periods, based on a trip rate of 0.6 trips/space/hr which is a common rate for comparable developments. However, in the subject case the majority of occupiers will be medical businesses such as pharmaceutical firms, pharmacy/chemist, orthodontics, ophthalmic, cosmetic, plastics, equipment, radiology and specialist rooms. Furthermore, the Private Hospital has expressed interest in up to 5,000m^2 of commercial space for its specific needs. On this basis, the strong synergy between the commercial use and the existing medical/hospital uses within the hospital campus generally is expected to generate a high proportion of walking trips. Accordingly, a 20% reduction has been applied to account for this special relationship, resulting in a total of 160 veh/hr during peak periods. Due to the nature of the commercial uses (with a relatively high proportion of visitors), it has been assumed that 70% of these trips will be in the peak direction; with 30% in the opposite direction.

- The 106 residential units would typically generate 0.40 trips/unit/hr during peak periods which is higher than the RTA rate for a sub-regional centre. In this regard, the subject site is unique in that is has excellent access to both bus and rail services, with minimal parking, so that trip rates would probably be reduced below the 0.4 trips/unit/hr as indicated, even in the absence of other factors. In addition to this however, it is expected that many of the units (at least 25%) would be occupied by hospital workers or workers associated with the commercial floor area that is to be provided. Indeed, this is a market that has already been identified and will be targeted. This may be compared with a 'home office' scenario, where people will effectively walk to their workplace. Having regard for this special relationship, a trip rate of 0.3 trips/unit/hr has been assumed;

- The serviced apartments are expected to generate a maximum trip rate of 0.29 trips/unit/hr, having regard for the fact that the apartments will also have a strong affinity with the general hospital community, with these people walking to their workplace.

The resulting traffic generation from the overall site will is presented in **appendix c** and is summarised in Table 2.

table 2: adopted trip rates and traffic generation for concept plan

Use	GFA (m^2) or Units	Weekday AM Peak		Weekday PM Peak	
		IN	OUT	IN	OUT
General Retail	4,692 (NFA)	22		56	56
Supermarket	1,377 (NFA)	24		61	61
Commercial	20,190	112	48	48	112
Residential	106 units	6	26	26	6
Serviced Apartments	84 units	4	20	20	4
TOTAL		168	94	211	239
		262		450	

It can be seen from Table 2 that the development will result in moderate traffic volumes during the AM peak period (262 veh/hr), with peak demands occurring on a Thursday evening, when 450 veh/hr will be generated as shown. It is emphasised that these trips are essentially net increases and have therefore been added to the existing volumes as surveyed and reported upon in Section 3.

5.11.2 traffic distributions

The impact of the above traffic generation and distribution onto the surrounding intersections is indicated by the future performance of the surrounding critical intersections. These intersections have been previously assessed under existing traffic conditions in Section 3. The above trips have been assigned to the road network on the basis of the distributions that have taken into account the nature of the trip and available access opportunities. For example, the retail catchment in relation to retail trips results in a different distribution to journey to work trips. The route choices are also different for

each peak period. Overall, trips have been assessed for the non-retail uses (216 veh/hr in the PM peak) on the basis of the journey to work data provided in **appendix d** for travel zone 1856 and the distributions may be summarised as follows:

North	2%
South	2%
East	26%
West	70%

The Economic Impact Assessment has identified that the retail catchment (for non-linked trips) is expected to be different, with a higher proportion of retail trips occurring to the north and south. Hence, the retail trips (234 veh/hr in the PM peak) have been distributed separately, as follows:

North	15%
South	15%
East	25%
West	45%

The resultant (weighted) trip distributions for all trip types adopted for the assessment is as follows:

North	8%
South	8%
East	26%
West	58%

These trips have been assigned to the road network having regard for the access arrangements which include:

- All entries via a left turn into Barber Avenue; and
- Exits shared between Barber Avenue (left turn only) and a left turn exit onto the Great Western Highway. It is emphasised that this exit is critical for the development in order to achieve an efficient distribution of trips, particularly with 58% of overall trips arriving and departing from/to the west along the Highway.

5.11.3 weekday peak period traffic impacts

A general context for the application is to review the impacts that the existing development operating at full capacity would have on the road network. To the extent that traffic activity currently occurs on the site, this has not been taken into account so that future intersection performances as assessed are considered conservative. The resulting volumes at each intersection as assessed in Section 3 are shown in the Sidra outputs presented in **appendix e**. The resulting performance of key intersections is also shown in appendix e and is also provided in Table 3 below.

table 3: future (Part 3A) intersection performance during the am and pm peak periods

Intersection Description	Period	Control Type	Degree of Saturation	Intersection Delay	Level of Service
Parker St. & The Great Western Highway	AM	signals	1.311 (1.311)	61.6 (60.3)	E (E)
	PM		1.314 (1.313)	94.5 (68.1)	F (E)
		Improved geometry	1.095	86.6	F
Parker St. & Barber Ave.	AM	priority	0.339 (0.301)	25.5 (21.4)	B (B)
	PM		0.762 (0.350)	37.0 (22.1)	C (B)
Parker St. & Derby St.	AM	signals	1.00 (1.00)	25.6 (25.6)	B (B)
	PM		1.00 (1.00)	28.1 (27.3)	B (B)
Somerset St. & The Great Western Highway	AM	priority	0.343 (0.333)	14.6 (13.6)	B (A)
	PM		0.559 (0.427)	16.7 (15.9)	B (B)

Note: Existing performance parameters (from Section 3) are shown in brackets

It can be seen that most intersections remain at existing levels of service and where a change occurs, the level of service remains at 'C' (or better) and this is a satisfactory result. The level of service 'C' relates to the left turn movement out of Barber Avenue into Parker Street in the PM peak this movement is associated with an average delay of 37.0 seconds and a 95th percentile queue of 4.6 vehicles.

The notable exception occurs at the major intersection of Parker Street with the Great Western Highway, where average delays increase in the PM peak from 68.1 seconds to 94.5 seconds. This result is not assisted by the provision of longer right turn storage lanes (which presently overflow) and the issue relates principally to the lack of through lane capacity along the Highway. This is a strategic issue for the RTA and in order to accommodate even general growth in background traffic levels, it is

anticipated that the RTA will need to investigate such options, irrespective of the subject development. In the interim, the resultant delay, though significant, is not uncommon throughout the metropolitan area. The potential for improving the geometry was also raised by the RTA in discussions and this concerned the provision of an additional southbound through lane in Parker Street across the intersection, by reducing the size of the islands. This option has been assessed during the more critical PM peak and the results are summarised in Table 3 above and are also provided, together with the proposed layout, in **appendix e**. The opportunity has also been taken to adjust the phase times to provide optimal performance. This results in a slight improvement, with the degree of saturation reducing from an existing 1.314 to 1.097 (better than existing); and with the average delays reducing from 94.5 seconds to 86.6 seconds. The two affected islands will be reduced in area but will have an area of at least $20m^2$ which is more than the minimum of $8m^2$ under the RTA's Road design Guide and in addition, there is a possibility of increasing this subject to detailed design.

It is noteworthy that the development is expected to generate only 19 veh/hr exiting the site onto the Great Western Highway and then turning right into Parker Street. This is a moderate increase over the 333 veh/hr that presently undertake this right turn manoeuvre. The modelling indicates that the 95^{th} percentile back of queue for this right turn is presently 160 metres and this is unchanged in the future. In this regard, the proposed exit driveway onto the Highway is 130 metres from this intersection, so that on occasions, vehicles will not be able to join this queue. This is not considered a significant issue in that the volumes are low (less than one movement every three minutes) and in addition, alternative routes are available should the right turn movement be blocked.

5.11.4 demolition traffic impacts

It is anticipated that a detailed demolition and construction traffic management plan will be prepared as part of individual Project Applications in response to a suitable condition of consent, taking due account of proposed development stages. In principle, it is assumed that all construction vehicle access will be via Barber Avenue.

5.11.5 site access arrangements

The development will make reliance on the proposed combined entry-exit driveway onto Barber Avenue. This has sufficient capacity to accommodate all entry volumes. The entry driveway is indicated on the plans with a short deceleration lane although in practice, this is not considered necessary onto a local road and in addition, raises potential conflicts with pedestrians. Hence, it is

recommended that a standard driveway be provided, with appropriate splays to accommodate the design truck (a 10.5m garbage truck).

The site is also proposed with an exit-only driveway onto the Highway. This is located about 130 metres from its intersection with Parker Street and is afforded excellent sight distances. It is emphasised that there will be negligible traffic exiting the site that will need to turn right at Parker Street, with only 25 of journey to work trips to/from the north. It is also emphasised that this exit is very beneficial in light of the fact that 58% of overall departures are to the west (principally along the Highway) so that this exit overcomes the need for traffic recirculation that would otherwise occur.

All accesses will need to comply with relevant standards and will operate safely and efficiently.

6. response to dgr's and rta

This Traffic Management and Accessibility (TMAP) Study includes an assessment of all relevant matters raised in the Director General's Requirements and by the NSW Roads and Traffic Authority as summarised below:

- Development traffic generation is discussed in detail in Section 5 and has been updated based on discussions with the RTA;

- The cumulative traffic generation of other committed development in Penrith raises broad strategic implications for the locality in terms of the performance of the road network; and is arguably the responsibility of Council and the RTA in performing their respective strategic planning functions. The main developments that will have an impact (as discussed with the RTA) relate to development associated with the ADI site at St. Mary's; with development under the St. Mary's Town Centre Strategy as well as, more generally, development under the Urban Study and Urban Strategy that are presently underway within the Penrith City area. This Part 3A Application is therefore expected to provide input to the strategic studies that are presently underway, which is an appropriate response given that the applicant is not in a position to deal with these broader strategic planning issues.

  Notwithstanding, these developments will generate additional traffic through the most critical intersection in the locality, which is the intersection of Parker Street with the Great Western Highway. As discussed in Section 5, this intersection presently experiences significant delays during peak periods and these delays will increase as a consequence of the development, with this impact being ameliorated to a degree by the road improvements discussed in Section 5. The ADI development and other development will create additional impacts and will need to be considered in the context of the separate assessments undertaken by the RTA and Council based on the 2004 TMAP study (which is now outdated), which has resulted in a developer agreement which can be expected to provide additional capacity improvements over time. Any upgrades under the RTA's ongoing State Road network programme will also need to be considered.

- The report has identified that the only road/intersection upgrade that is feasible and has been considered in this report (based on discussions with the RTA) relate to the provision of an additional southbound through lane in Parker Street across its intersection with the Great Western Highway.

- The proposed vehicular access arrangements include reliance on Barber Street (via left turn entries and exits onto Parker Street); as well as a direct car exit driveway onto the Great Western Highway at the eastern site boundary. This latter driveway is essential to the development to achieve a reasonable distribution of traffic and avoid the need for significant traffic diversions, especially for access to Penrith which represents the main trip attractor/generator;

- The development incorporates a consolidated loading facility which is expected to accommodate all demands. The largest design truck is an 8.8m MRV, which is the 'standard' design truck based on AS 2890.1. This size of truck will need to be the subject of a suitable condition of consent;

- The site is very accessible to public transport as discussed in Section 3. The development will incorporate a Transport Access Guide (to be formulated under a suitable condition of consent), which will encourage use of bus and rail services, together with the reduced parking discussed separately below;

- Impacts of construction stages on pedestrian and bicycle linkages will be dealt with as part of a Construction Management Plan, which is expected to be required under a suitable condition of consent for individual Project Applications. This cannot be formulated at this time, although reliance will be made on Barber Avenue for construction access as far as practicable;

- The TMAP incorporates an assessment of AM and PM peak traffic movements and potential improvements have been identified. The capacity of the intersection of Parker Street with the Great Western Highway can be improved as discussed and will accommodate the development impacts. The cumulative impacts of further development in the locality will require further capacity improvements. These have not been addressed as they raise strategic planning issues which are considered to be the responsibility of Council and the RTA in the context of REP 30 (St. Mary's); as well as the Urban Study and Urban Strategy for Penrith that are presently underway;

- Public transport will also be encouraged by the significant reductions in parking that are sought under the application. This is a policy position that has been taken to suppress car usage, while promoting alternate travel modes, thereby achieving the 'minimalist' approach to parking. Pedestrian facilities are provided to serve buses and Kingswood Railway Station. Bicycle end-user facilities are proposed for all Project Applications;

- Bicycle storage facilities are to be provided in all Project Applications and in the case of Stage 1 PA, these are indicated on the submitted plans.

- Specific matters raised by the RTA have also been addressed in this report, following submission of a Draft TMAP report for consideration by the Authority. This has resulted in amended trip rates and trip distributions, based in particular on the additional information provided within the Economic Impact Assessment Report. This has resulted in increased traffic generation, which is nevertheless contained as a consequence of the minimalist approach taken to parking supply.

7. conclusions on concept plan

In summary:

- The site is currently underutilised and is available for redevelopment as an integral part of the Nepean Hospital precinct;
- The redevelopment seeks to minimise parking to encourage alternate travel modes in accordance with the DGR's. This is assisted by the strong affinity that the site has with existing uses within the precinct, which will result in a high proportion of walking trips;
- The site is uniquely placed to take advantage of excellent public transport services. The adopted vehicle trip rates reflect reliance on these services which is consistent with State Government Policy. The preparation of a Transport Access Guide is also expected to be required as a standard condition in support of subsequent Project Applications;
- The road network has been assessed with the Part 3A development and operates generally satisfactorily, including the site accesses and all local intersections. The notable exception is the major intersection of Parker Street with the Great Western Highway, where average delays are already unacceptable and will increase in the PM peak from 68.1 seconds to 86.6 seconds. This intersection requires increased through lane capacity along the Highway and this is a strategic issue for the RTA in order to accommodate even general growth in background traffic levels. It is anticipated that the RTA will need to investigate improvement options above those considered at the RTA's request, irrespective of the subject development. In the interim, the resultant delay, though significant, is not uncommon throughout the metropolitan area; and
- The access and internal design aspects of the development are acceptable and individual Project Applications will need to comply with AS 2890.1 and AS 2890.1. The site proposes an exit-only driveway onto the Highway. This is located about 130 metres from its intersection with Parker Street and is afforded excellent sight distances. It will operate satisfactorily and is very beneficial in light of the fact that 58% of departures are to the west (principally along the Highway) so that this exit overcomes the need for traffic recirculation through residential precincts that would otherwise occur due to the need for all traffic to otherwise turn left into Parker Street from Barber Avenue.

It is therefore concluded that the proposed development concept envisaged under the Concept Plan is supportable on traffic planning grounds and the proposed development will operate satisfactorily.

cp appendix a

photographic record

View looking north along Parker Street on approach to Barber Avenue and the GWH beyond. Note the left-in/left-out restriction.

View looking west along GWH on approach to the site at Somerset Street

View looking south along Parker Street on approach to the GWH with the site in the middle distance.

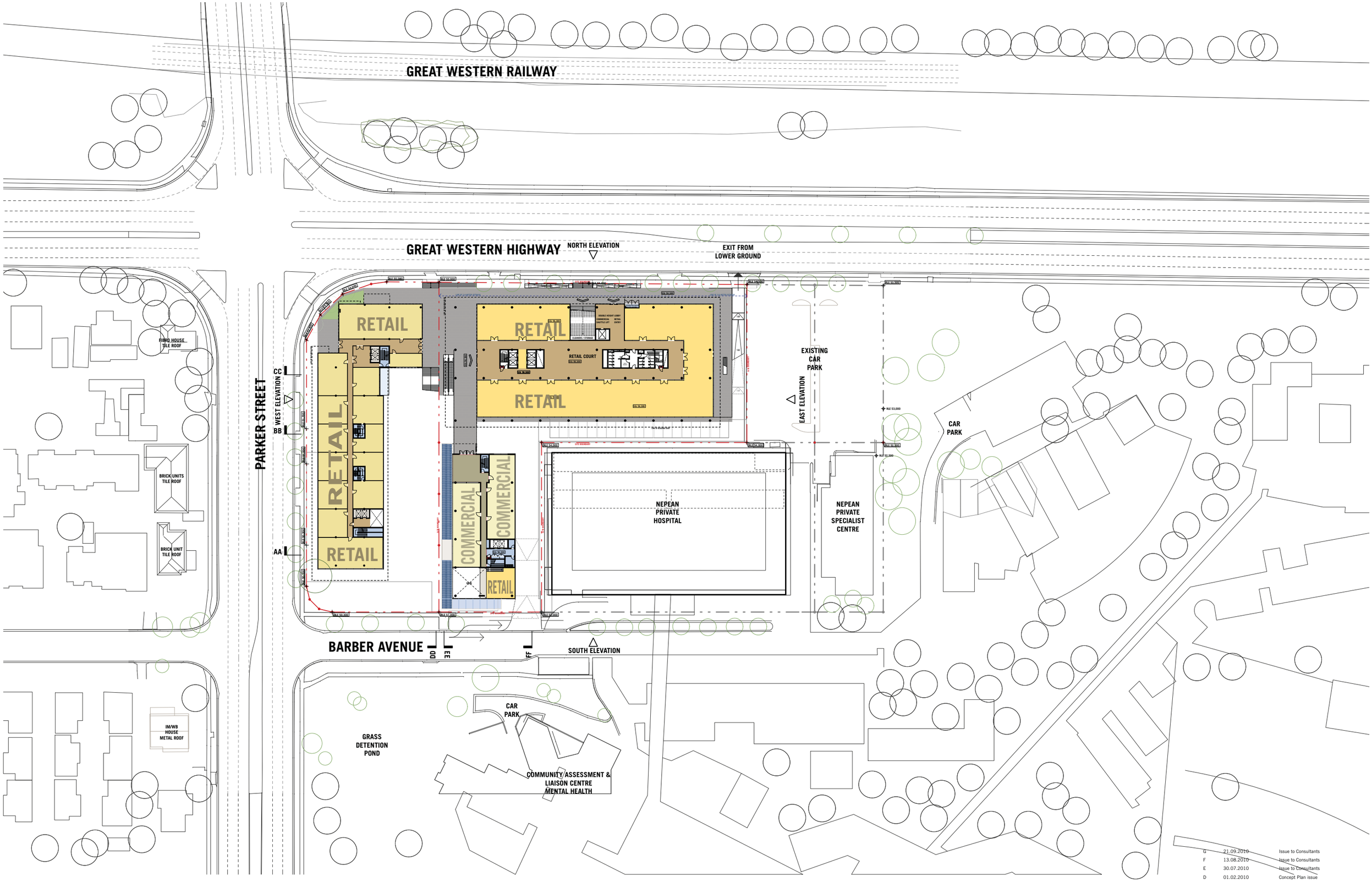
View looking east along Barber Avenue with the site on the left of the photo.

View looking north along Parker Street towards Derby Street with the site in the far distance.

View looking east along Derby Street on approach to Parker Street.

cp appendix b

concept plan (extracts)



Rev.	Date	Approved by	Revision Notes
G	21.09.2010		Issue to Consultants
F	13.08.2010		Issue to Consultants
E	30.07.2010		Issue to Consultants
D	01.02.2010		Concept Plan issue

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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
CONCEPT PLAN
DRAWING TITLE
Ground Plan
Illustrative Plans

SCALE 1:500@A1, 50%@A3	JOB No. 09007	DRAWN ML/MH/AH	NORTH
STATUS FOR INFORMATION	DWG No. CP14	REV G	

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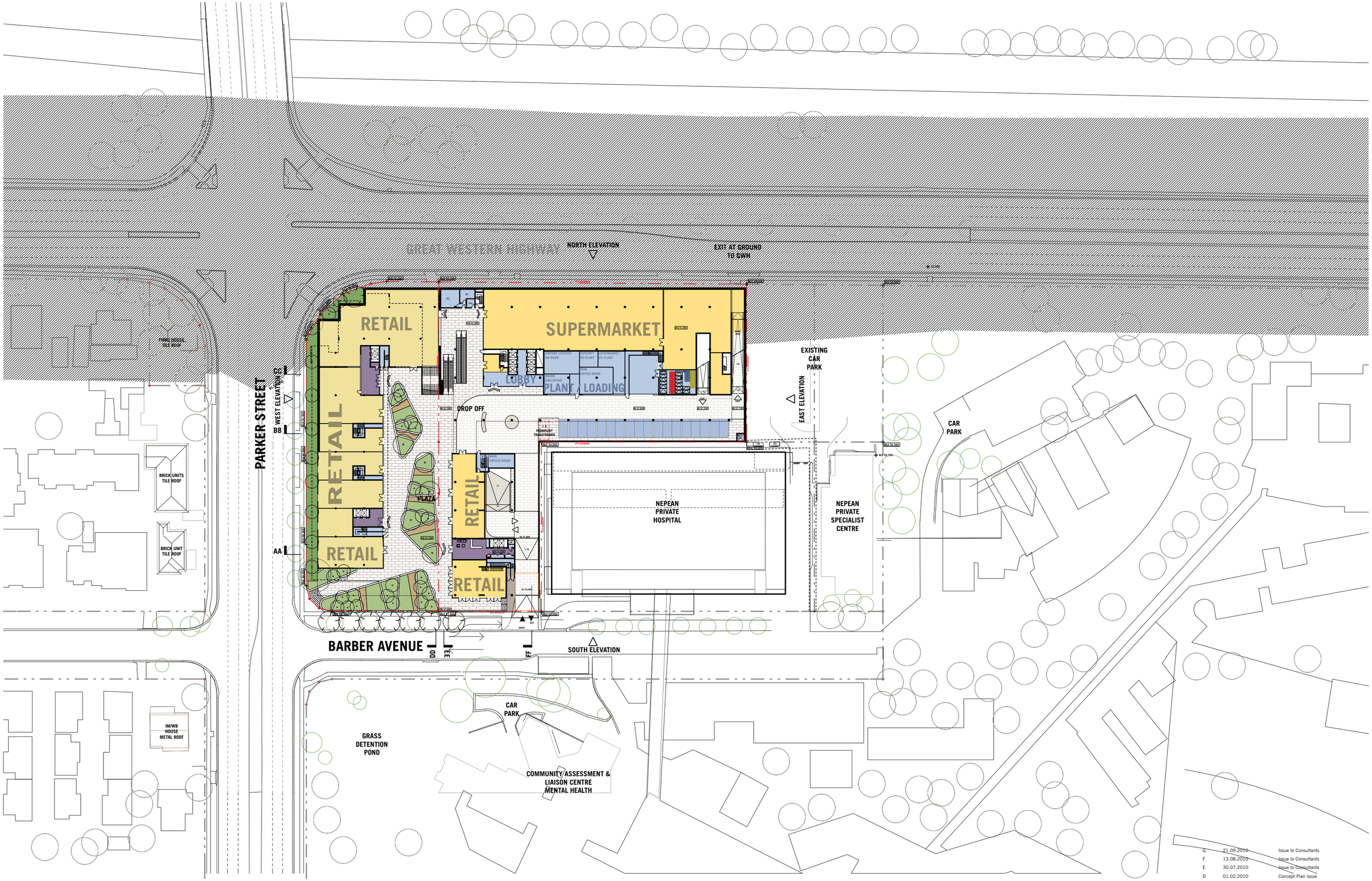

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PROJECT TITLE

BARBER AVENUE, KINGSWOOD

CONCEPT PLAN

DRAWING TITLE

Lower Ground Plan
Illustrative Plans

SCALE	JOB No.	DRAWN	NORTH
1:500@A1, 50%@A3	09007	ML/MH/AH	
STATUS: FOR INFORMATION	DWG No. CP13	REV G	

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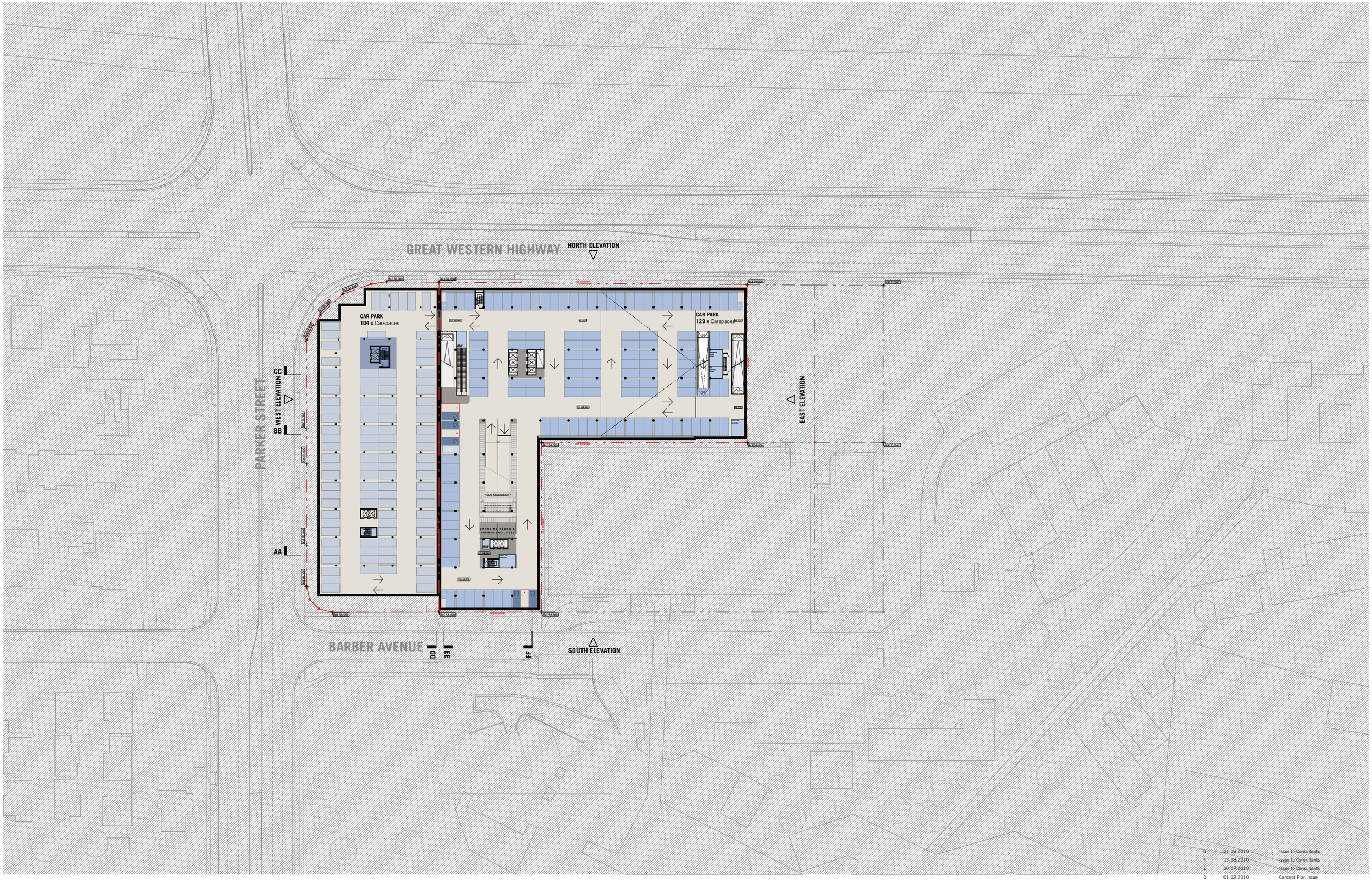

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E	30.07.2010		Issue to Consultants
D	01.02.2010		Concept Plan issue

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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
CONCEPT PLAN

DRAWING TITLE
Basement 01
Illustrative Plans

SCALE 1:500@A1, 50%@A3	JOB No. 09007	DRAWN ML/MH/AH	NORTH
STATUS FOR INFORMATION	DWG No. CP12	REV G	

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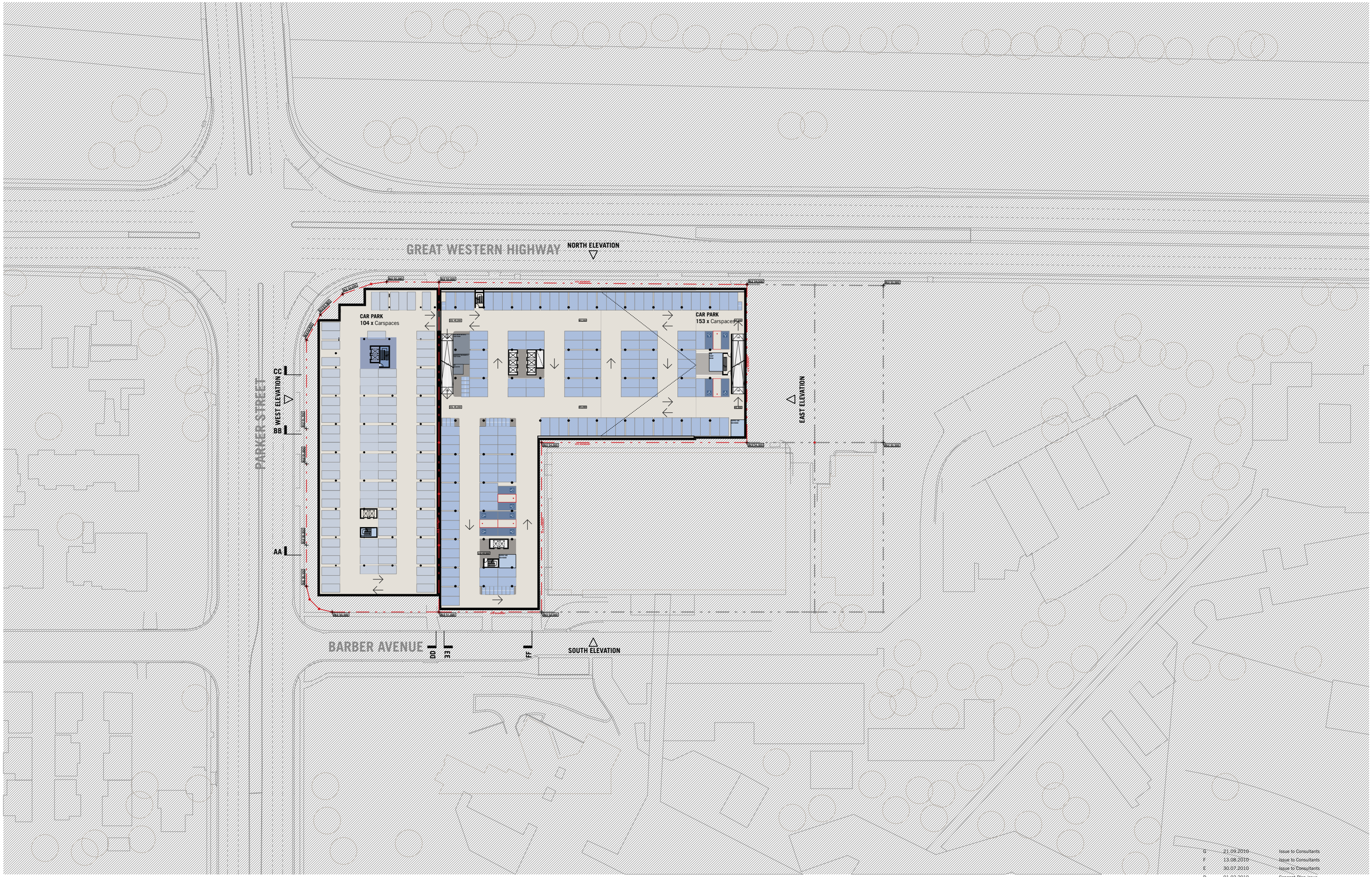

Rev.	Date	Approved by	Revision Notes
G	21.09.2010		Issue to Consultants
F	13.08.2010		Issue to Consultants
E	30.07.2010		Issue to Consultants
D	01.02.2010		Concept Plan issue

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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
CONCEPT PLAN
DRAWING TITLE
Basement 02
Illustrative Plans

SCALE **1:500@A1, 50%@A3**	JOB No. **09007**	DRAWN **ML/MH/AH**	NORTH
STATUS **FOR INFORMATION**	DWG No. **CP11**	REV **G**	

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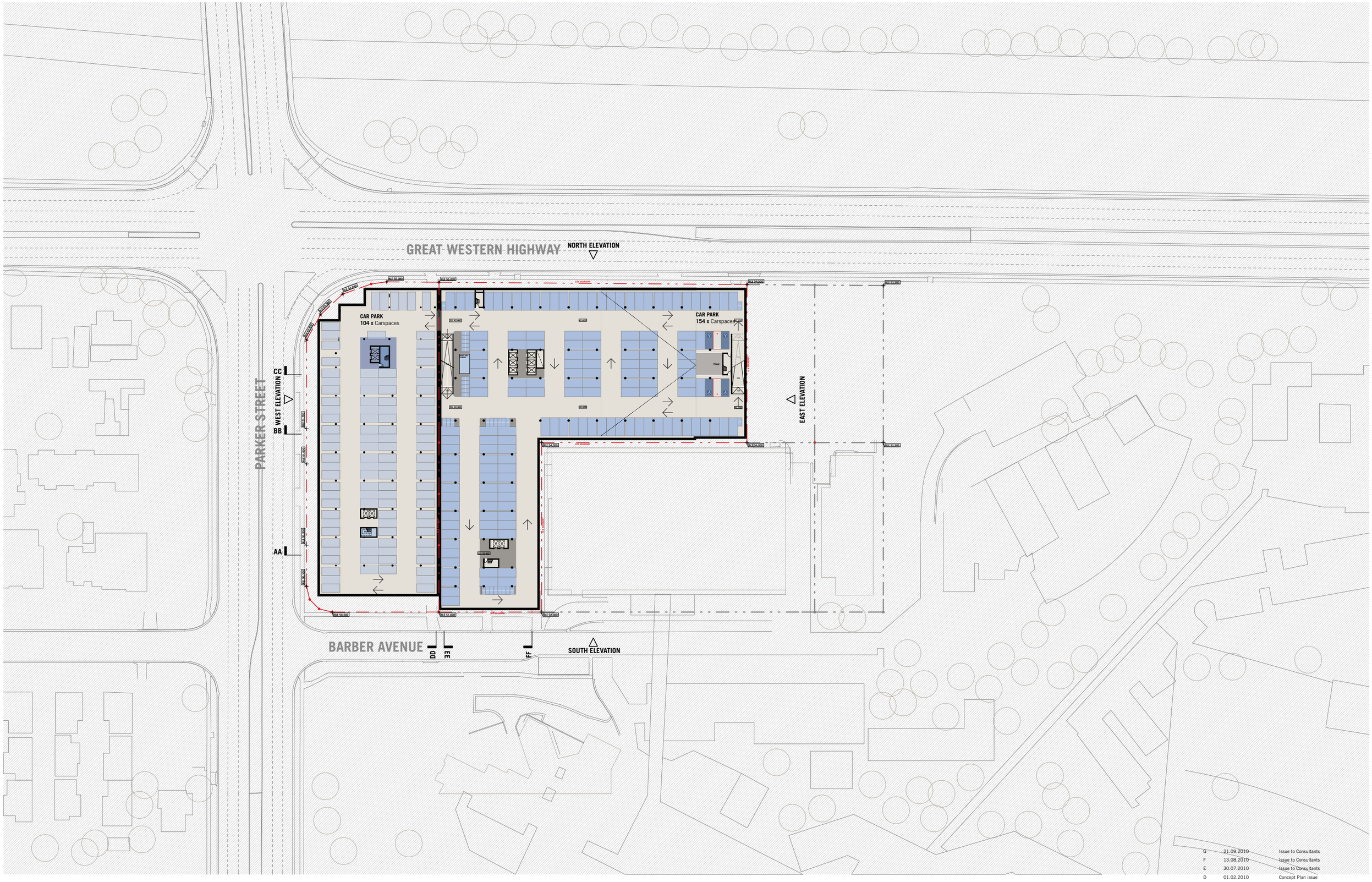

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D	01.02.2010		Concept Plan issue

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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
CONCEPT PLAN
DRAWING TITLE
Basement 03
Illustrative Plans

SCALE 1:500@A1, 50%@A3	JOB No. 09007	DRAWN ML/MH/AH	NORTH
STATUS FOR INFORMATION	DWG No. CP10	REV G	

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cp appendix c

traffic and parking summary

9234 PARKING AND TRIP GENERATION SUMMARY 10.10.01

			PARKING						TRIPS					
			Council				RTA		AM			PM		
Stage 1				demand	supply									
	Commercial/Medical	20189 GFA	1 per 40	505	335		1 per 40	505		160				160
	Serviced Apartments	4592 84 apts	1/unit	84	42		n/a	84		24				24
			1/10 vis	9										
	Retail	1554 NFA	1/26 net	60			4.5/100	70		7	20% of PM		2.4/100	38
	Supermarket (incl as retail)	1377 NFA	1/26 net	53	50		4.2/100	58		24	20% of PM		8.9/100	122
				711	449	63%		717		215				344
Stage 2														
	residential	10156												
		32 one bed	1/unit	32	32			32	1.0/unit	0.3	10		0.3	10
		74 two bed	1/unit	74	74			89	1.2/unit	0.3	22		0.3	22
		106	1/5 units visitors	22	22			22	1/5 units					
	retail	3138 NFA	1/26 net	121	121		4.5/100	141		0.4/100	15	20% of PM	2.4/100	74
				249	312	80%		284		47				106
				960	(761 provided)			1001		262				450
				21% reduction				24% reduction						

		IN	OUT	TOTAL	IN	OUT	TOTAL
STAGE 1	commercial/medical	112	48	160	48	112	160
	serv apts	4	20	24	20	4	24
	retail	7		12	19	19	38
	supermarket	24			61	61	122
		147	68	215	148	196	344
STAGE 2	residential	6	26	32	26	6	32
	retail	15		15	37	37	74
		21	26	47	63	43	106
		168	94	262	211	239	450

cp appendix d

journey to work data

http://www.transport.nsw.gov.au/tdc/maps.html

Travel Zone 1856

Traffic Volumes from Input Travel Zone TO Nominated SSD

SSD Description	SSD No.	Direction of Travel	Car Driver	Train	Bus	Vehicle Passanger	Other	Not Stated	Stayed At Home
Inner Sydney	505	east	6	16	0	0	0	0	6
Eastern Suburbs	510	east	3	4	0	0	0	0	0
St George-Sutherland	515	east	0	0	0	0	0	0	0
Canterbury-Bankstown	520	east	9	0	0	0	0	0	0
Fairfield - Liverplool	525	east	9	0	0	6	0	0	0
Outer South Western Sydney	530	south	3	0	0	0	0	0	0
Inner South Western Sydney	535	east	13	0	0	0	0	0	10
Central Western Sydney	540	east	18	18	0	0	0	6	4
Outer Western Sydney	545	west	130	10	6	7	44	9	35
Blacktown	553	east	31	8	3	0	4	0	4
Lower Northern Sydney	555	east	6	9	0	0	0	0	3
Central Northern Sydney	560	east	12	0	0	0	0	0	3
Northern Beaches	565	east	0	0	0	0	0	0	0
Total Trips			240	65	9	13	48	15	65

Direction of Travel Summary	Volume	%
North	0	0%
South	3	1%
East	107	45%
West	130	54%
Total	240	

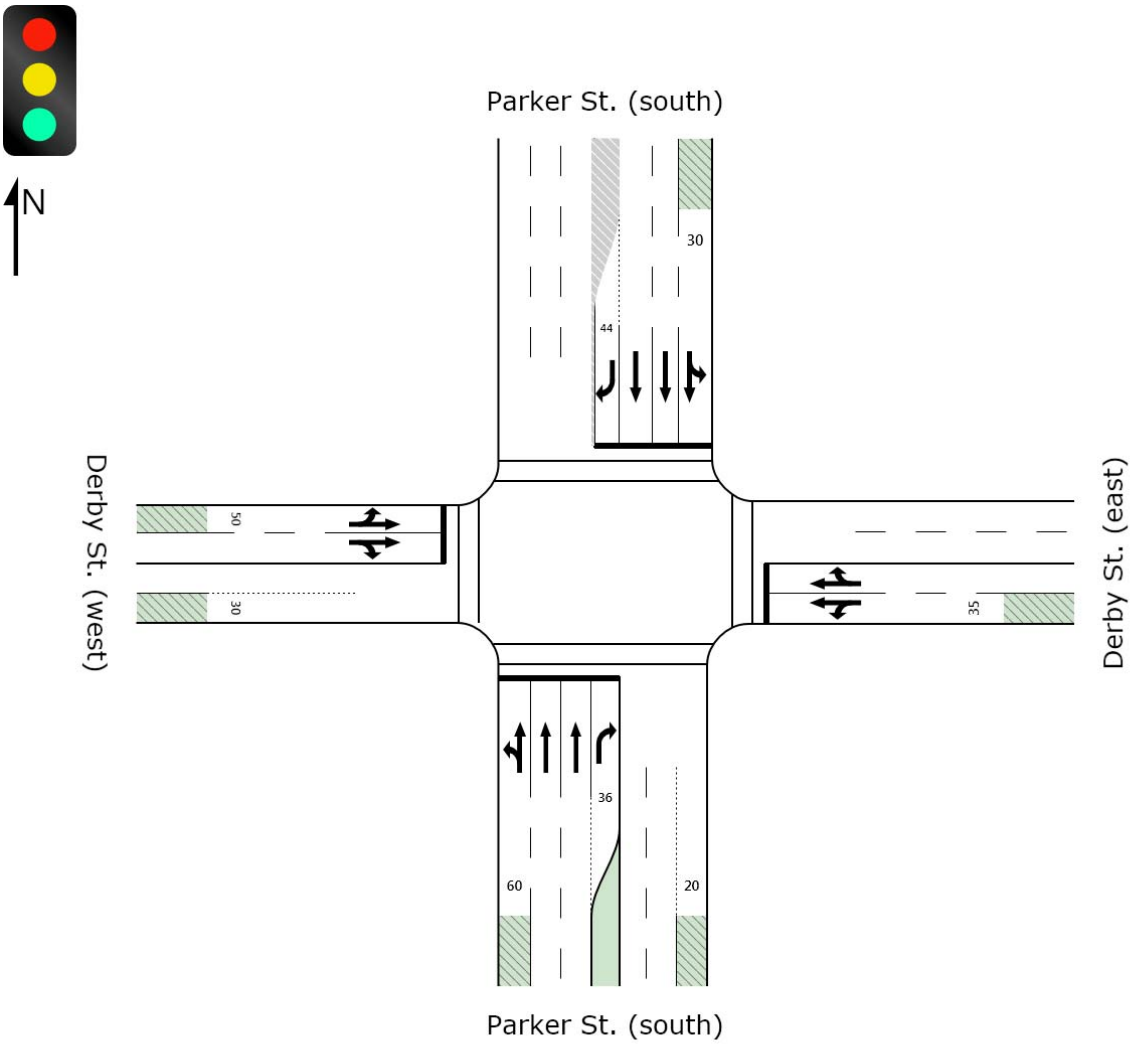
Traffic From SSD TO Input Travel Zone to Nominated SSD

SSD Description	SSD No.	Direction of Travel	Car Driver	Train	Bus	Vehicle Passanger	Other	Not Stated	Stayed At Home
Inner Sydney	505	east	37	3	0	0	0	0	0
Eastern Suburbs	510	east	10	0	0	0	0	4	0
St George-Sutherland	515	east	4	0	0	0	0	0	0
Canterbury-Bankstown	520	east	23	0	0	0	0	0	0
Fairfield - Liverplool	525	east	45	1	0	6	0	0	0
Outer South Western Sydney	530	south	53	0	3	0	0	7	7
Inner South Western Sydney	535	east	31	0	0	0	0	6	0
Central Western Sydney	540	east	54	12	0	6	0	12	0
Outer Western Sydney	545	west	1703	49	18	132	166	483	17
Blacktown	553	east	169	18	0	5	0	32	4
Lower Northern Sydney	555	east	20	0	0	0	1	7	0
Central Northern Sydney	560	east	86	3	0	3	0	18	0
Northern Beaches	565	east	0	0	0	0	0	4	0
Total Trips			2235	86	21	152	167	573	28

Direction of Travel Summary	Volume	%
North	0	0%
South	53	2%
East	479	21%
West	1703	76%
Total	2235	

cp appendix e

sidra outputs (existing and future)


N
Parker St. (south)
Derby St. (west)
Derby St. (east)
Parker St. (south)
30
44
50
30
35
36
60
20

MOVEMENT SUMMARY

Site: EX - AM

Derby St. and Parker St.
Scenario: Existing
Period: AM
Signals - Fixed Time Cycle Time = 143 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Parker St. (south)											
1	L	83	2.0	0.674	29.5	LOS C	10.3	73.6	0.64	0.91	18.5
2	T	1524	2.0	0.675	24.8	LOS B	34.5	245.5	0.77	0.70	37.5
3	R	132	2.0	1.000[3]	49.3	LOS D	10.0	70.9	0.94	0.86	11.6
Approach		1739	2.0	1.000	26.9	LOS B	34.5	245.5	0.78	0.72	35.0
East: Derby St. (east)											
4	L	36	2.0	0.243	48.7	LOS D	2.7	19.2	0.77	0.72	11.9
5	T	127	2.0	0.462	50.5	LOS D	12.3	87.9	0.91	0.76	21.7
6	R	52	2.0	0.462	58.1	LOS E	12.3	87.9	0.91	0.83	23.0
Approach		215	2.0	0.462	52.0	LOS D	12.3	87.9	0.88	0.77	20.9
North: Parker St. (south)											
7	L	104	2.0	0.532	25.7	LOS B	4.8	34.2	0.52	0.74	19.1
8	T	1404	2.0	0.577	15.2	LOS B	28.1	200.2	0.62	0.56	45.6
9	R	177	2.0	0.747	38.2	LOS C	9.1	64.8	0.95	0.88	14.3
Approach		1685	2.0	0.748	18.3	LOS B	28.1	200.2	0.64	0.61	41.2
West: Derby St. (west)											
10	L	59	2.0	0.325	43.3	LOS D	4.7	33.6	0.73	0.75	13.2
11	T	115	2.0	0.325	47.2	LOS D	9.3	66.5	0.86	0.70	22.5
12	R	29	2.0	0.325	56.1	LOS D	9.3	66.5	0.87	0.81	23.4
Approach		203	2.0	0.325	47.3	LOS D	9.3	66.5	0.82	0.73	20.8
All Vehicles		3842	2.0	1.000	25.6	LOS B	34.5	245.5	0.73	0.67	35.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	50.3	LOS E	0.2	0.2	0.84	0.84
P3	Across E approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
P5	Across N approach	53	51.2	LOS E	0.2	0.2	0.85	0.85
P7	Across W approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
All Pedestrians		212	35.2				0.68	0.68

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: EX - PM

Derby St. and Parker St.
Scenario: Existing
Period: PM
Signals - Fixed Time Cycle Time = 143 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Parker St. (south)											
1	L	58	2.0	0.680	29.7	LOS C	10.4	74.0	0.64	0.95	18.7
2	T	1569	2.0	0.679	24.8	LOS B	34.8	247.6	0.77	0.70	37.9
3	R	108	2.0	0.760	53.3	LOS D	8.5	60.2	0.76	0.90	10.9
Approach		1736	2.0	0.760	26.8	LOS B	34.8	247.6	0.77	0.72	35.7
East: Derby St. (east)											
4	L	67	2.0	0.459	49.6	LOS D	4.9	34.6	0.79	0.74	11.8
5	T	124	2.0	0.626	54.5	LOS D	15.1	107.8	0.96	0.81	20.7
6	R	92	2.0	0.626	62.1	LOS E	15.1	107.8	0.96	0.84	22.0
Approach		283	2.0	0.626	55.8	LOS D	15.1	107.8	0.92	0.80	19.7
North: Parker St. (south)											
7	L	72	2.0	0.365	25.4	LOS B	3.4	24.0	0.51	0.73	19.3
8	T	1295	2.0	0.533	14.6	LOS B	25.0	178.0	0.59	0.54	46.3
9	R	222	2.0	1.000[3]	45.2	LOS D	11.7	83.5	1.00	0.89	12.5
Approach		1588	2.0	1.000	19.3	LOS B	25.0	178.0	0.64	0.59	40.2
West: Derby St. (west)											
10	L	69	2.0	0.426	45.3	LOS D	6.0	43.1	0.76	0.76	12.7
11	T	104	2.0	0.426	50.1	LOS D	10.2	72.8	0.88	0.72	21.7
12	R	57	2.0	0.426	60.9	LOS E	10.2	72.8	0.92	0.81	22.3
Approach		231	2.0	0.426	51.3	LOS D	10.2	72.8	0.85	0.76	20.0
All Vehicles		3838	2.0	1.000	27.3	LOS B	34.8	247.6	0.73	0.68	34.1

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	50.3	LOS E	0.2	0.2	0.84	0.84
P3	Across E approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
P5	Across N approach	53	51.2	LOS E	0.2	0.2	0.85	0.85
P7	Across W approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
All Pedestrians		212	35.2				0.68	0.68

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: EX+Dev - AM

Derby St. and Parker St.
Scenario: Existing+Development
Period: AM
Signals - Fixed Time Cycle Time = 143 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Parker St. (south)											
1	L	83	2.0	0.677	29.6	LOS C	10.4	73.8	0.64	0.91	18.4
2	T	1530	2.0	0.678	24.9	LOS B	34.7	246.9	0.77	0.70	37.4
3	R	130	2.0	1.001	49.3	LOS D	10.0	70.9	0.94	0.86	11.6
Approach		1743	2.0	1.000	26.9	LOS B	34.7	246.9	0.78	0.72	35.0
East: Derby St. (east)											
4	L	36	2.0	0.243	48.7	LOS D	2.7	19.2	0.77	0.72	11.9
5	T	127	2.0	0.462	50.5	LOS D	12.3	87.9	0.91	0.76	21.7
6	R	52	2.0	0.462	58.1	LOS E	12.3	87.9	0.91	0.83	23.0
Approach		215	2.0	0.462	52.0	LOS D	12.3	87.9	0.88	0.77	20.9
North: Parker St. (south)											
7	L	107	2.0	0.548	26.0	LOS B	4.9	35.1	0.52	0.74	19.0
8	T	1425	2.0	0.586	15.4	LOS B	28.8	204.7	0.62	0.57	45.5
9	R	177	2.0	0.749	38.3	LOS C	9.1	65.1	0.95	0.88	14.2
Approach		1709	2.0	0.749	18.4	LOS B	28.8	204.7	0.65	0.61	41.1
West: Derby St. (west)											
10	L	59	2.0	0.325	43.3	LOS D	4.7	33.6	0.73	0.75	13.2
11	T	115	2.0	0.325	47.2	LOS D	9.3	66.5	0.86	0.70	22.5
12	R	29	2.0	0.325	56.1	LOS D	9.3	66.5	0.87	0.81	23.4
Approach		203	2.0	0.325	47.3	LOS D	9.3	66.5	0.82	0.73	20.8
All Vehicles		3871	2.0	1.000	25.6	LOS B	34.7	246.9	0.73	0.68	35.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	50.3	LOS E	0.2	0.2	0.84	0.84
P3	Across E approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
P5	Across N approach	53	51.2	LOS E	0.2	0.2	0.85	0.85
P7	Across W approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
All Pedestrians		212	35.2				0.68	0.68

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Parker-Derby EX+Dev - PM

Derby St. and Parker St.
Scenario: Existing+Development
Period: PM
Signals - Fixed Time Cycle Time = 143 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker St. (south)											
1	L	58	2.0	0.680	29.9	LOS C	10.5	74.5	0.65	0.95	18.6
2	T	1576	2.0	0.682	24.9	LOS B	35.0	249.2	0.77	0.70	37.8
3	R	137	2.0	1.001	47.8	LOS D	10.0	70.9	0.94	0.86	11.9
Approach		1771	2.0	1.000	26.9	LOS B	35.0	249.2	0.78	0.72	35.5
East: Derby St. (east)											
4	L	67	2.0	0.459	49.6	LOS D	4.9	34.6	0.79	0.74	11.8
5	T	124	2.0	0.650	55.7	LOS D	15.3	108.8	0.97	0.81	20.4
6	R	92	2.0	0.650	63.2	LOS E	15.3	108.8	0.97	0.84	21.8
Approach		283	2.0	0.649	56.7	LOS E	15.3	108.8	0.93	0.81	19.5
North: Parker St. (south)											
7	L	147	2.0	0.754	44.1	LOS D	8.0	57.2	0.74	0.83	12.7
8	T	1327	2.0	0.546	14.7	LOS B	25.9	184.2	0.60	0.54	46.1
9	R	221	2.0	0.999[3]	45.5	LOS D	11.7	83.5	1.00	0.89	12.4
Approach		1696	2.0	1.000	21.3	LOS B	25.9	184.2	0.66	0.61	38.2
West: Derby St. (west)											
10	L	69	2.0	0.450	46.2	LOS D	6.4	45.3	0.77	0.77	12.6
11	T	120	2.0	0.450	50.3	LOS D	11.0	78.0	0.89	0.73	21.6
12	R	57	2.0	0.450	61.1	LOS E	11.0	78.0	0.92	0.82	22.2
Approach		246	2.0	0.450	51.7	LOS D	11.0	78.0	0.86	0.76	20.1
All Vehicles		3996	2.0	1.000	28.1	LOS B	35.0	249.2	0.75	0.68	33.4

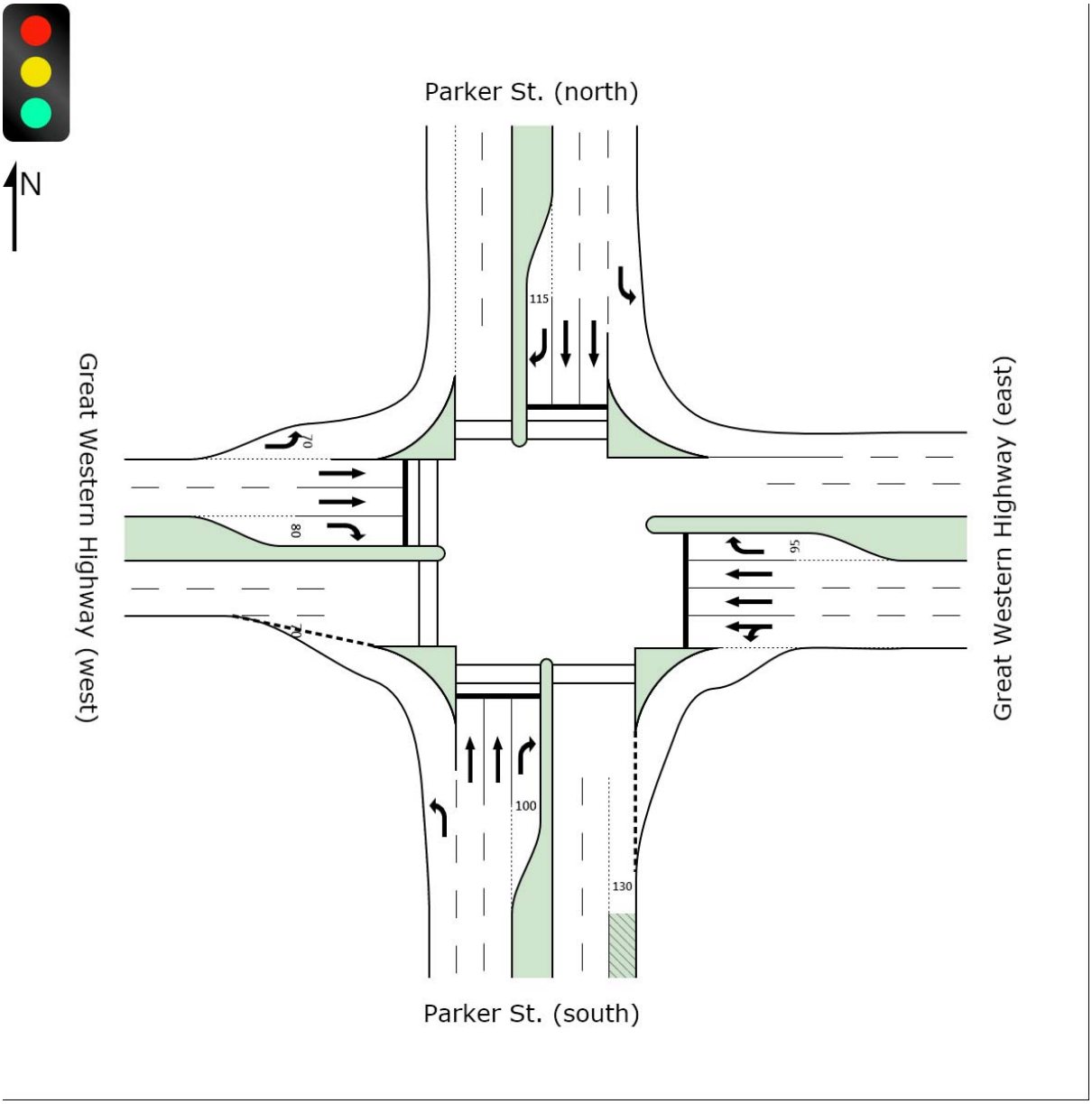
Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	50.3	LOS E	0.2	0.2	0.84	0.84
P3	Across E approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
P5	Across N approach	53	51.2	LOS E	0.2	0.2	0.85	0.85
P7	Across W approach	53	19.7	LOS B	0.1	0.1	0.52	0.52
All Pedestrians		212	35.2				0.68	0.68

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).


N
Parker St. (north)
Great Western Highway (west)
Great Western Highway (east)
Parker St. (south)
115
70
80
95
100
130

MOVEMENT SUMMARY

Site: EX - AM

Great Western Highway - Parker St
Scenario: Existing
Period: AM
Signals - Fixed Time Cycle Time = 138 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Parker St. (south)											
1	L	403	2.0	0.307	13.7	LOS A	10.0	71.0	0.37	0.71	45.2
2	T	857	2.0	0.503	28.7	LOS C	21.1	150.2	0.76	0.67	32.8
3	R	102	2.0	0.864	88.3	LOS F	9.4	66.7	1.00	0.93	15.9
Approach		1362	2.0	0.864	28.7	LOS C	21.1	150.2	0.66	0.71	32.9
East: Great Western Highway (east)											
4	L	127	2.0	0.369	35.1	LOS C	14.0	99.3	0.73	0.83	29.9
5	T	689	2.0	0.809	55.4	LOS D	19.4	138.4	0.94	0.85	20.3
6	R	248	2.0	1.000[3]	109.0	LOS F	22.5	160.5	1.00	1.06	13.9
Approach		1064	2.0	1.000	65.5	LOS E	22.5	160.5	0.93	0.90	18.9
North: Parker St. (north)											
7	L	344	2.0	0.190	9.5	NA[9]	NA[9]	NA[9]	0.00	0.65	48.5
8	T	1633	2.0	0.961	69.4	LOS E	69.6	495.3	1.00	1.12	15.5
9	R	152	2.0	1.311	372.9	LOS F	26.9	191.3	1.00	1.52	3.4
Approach		2129	2.0	1.311	81.4	LOS F	69.6	495.3	0.84	1.07	13.9
West: Great Western Highway (west)											
10	L	153	2.0	0.084	7.6	NA[9]	NA[9]	NA[9]	0.00	0.60	46.4
11	T	446	2.0	0.674	58.3	LOS E	15.6	111.2	0.99	0.83	17.4
12	R	145	2.0	0.579	70.1	LOS E	11.0	78.6	0.99	0.81	17.1
Approach		744	2.0	0.674	50.2	LOS D	15.6	111.2	0.79	0.78	19.9
All Vehicles		5300	2.0	1.311	60.3	LOS E	69.6	495.3	0.80	0.90	19.0

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.
9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	46.3	LOS E	0.2	0.2	0.82	0.82
P5	Across N approach	53	46.3	LOS E	0.2	0.2	0.82	0.82
P7	Across W approach	53	20.4	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		159	37.6				0.73	0.73

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: EX - PM

Great Western Highway - Parker St
Scenario: Existing
Period: PM
Signals - Fixed Time Cycle Time = 138 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Parker St. (south)											
1	L	221	2.0	0.179	15.2	LOS B	6.5	46.6	0.38	0.71	43.6
2	T	1308	2.0	0.768	34.0	LOS C	36.8	261.8	0.91	0.82	29.9
3	R	135	2.0	1.140	223.4	LOS F	18.5	131.4	1.00	1.29	7.3
Approach		1664	2.0	1.140	46.8	LOS D	36.8	261.8	0.85	0.84	25.0
East: Great Western Highway (east)											
4	L	139	2.0	0.488	39.9	LOS C	17.8	126.8	0.81	0.84	28.0
5	T	905	2.0	1.071	127.5	LOS F	39.7	282.3	0.96	1.26	11.2
6	R	248	2.0	1.000[3]	109.0	LOS F	22.5	160.5	1.00	1.06	13.9
Approach		1293	2.0	1.071	114.5	LOS F	39.7	282.3	0.95	1.18	12.6
North: Parker St. (north)											
7	L	339	2.0	0.187	9.5	NA[9]	NA[9]	NA[9]	0.00	0.65	48.5
8	T	1295	2.0	0.765	33.9	LOS C	36.7	261.3	0.91	0.82	24.8
9	R	153	2.0	1.313	372.5	LOS F	26.9	191.3	1.00	1.52	3.4
Approach		1786	2.0	1.314	58.2	LOS E	36.7	261.3	0.74	0.85	17.8
West: Great Western Highway (west)											
10	L	492	2.0	0.271	7.6	NA[9]	NA[9]	NA[9]	0.00	0.60	46.4
11	T	647	2.0	0.977	96.7	LOS F	29.0	206.6	1.00	1.19	12.1
12	R	243	2.0	0.969	85.5	LOS F	19.4	137.8	1.00	0.93	14.7
Approach		1382	2.0	0.977	63.0	LOS E	29.0	206.6	0.64	0.93	17.2
All Vehicles		6125	2.0	1.313	68.1	LOS E	39.7	282.3	0.79	0.94	17.5

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.
9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	46.3	LOS E	0.2	0.2	0.82	0.82
P5	Across N approach	53	46.3	LOS E	0.2	0.2	0.82	0.82
P7	Across W approach	53	20.4	LOS C	0.1	0.1	0.54	0.54
All Pedestrians		159	37.6				0.73	0.73

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: EX+Dev - AM

Great Western Highway - Parker St
Scenario: Existing+Development
Period: AM
Signals - Fixed Time Cycle Time = 138 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Parker St. (south)											
1	L	403	2.0	0.310	14.3	LOS A	10.3	73.6	0.38	0.72	44.6
2	T	857	2.0	0.503	28.7	LOS C	21.1	150.2	0.76	0.67	32.8
3	R	102	2.0	0.864	88.3	LOS F	9.4	66.7	1.00	0.93	15.9
Approach		1362	2.0	0.864	28.9	LOS C	21.1	150.2	0.67	0.71	32.8
East: Great Western Highway (east)											
4	L	212	2.0	0.399	26.4	LOS B	15.9	112.9	0.63	0.83	34.3
5	T	755	2.0	0.875	57.6	LOS E	22.0	156.7	0.91	0.89	19.8
6	R	248	2.0	1.000[3]	109.0	LOS F	22.5	160.5	1.00	1.06	13.9
Approach		1215	2.0	1.000	62.7	LOS E	22.5	160.5	0.88	0.91	19.6
North: Parker St. (north)											
7	L	344	2.0	0.190	9.5	NA[9]	NA[9]	NA[9]	0.00	0.65	48.5
8	T	1643	2.0	0.968	72.3	LOS F	71.4	508.7	1.00	1.14	15.1
9	R	152	2.0	1.311	372.9	LOS F	26.9	191.3	1.00	1.52	3.4
Approach		2140	2.0	1.311	83.7	LOS F	71.4	508.7	0.84	1.09	13.6
West: Great Western Highway (west)											
10	L	153	2.0	0.084	7.6	NA[9]	NA[9]	NA[9]	0.00	0.60	46.4
11	T	480	2.0	0.726	60.0	LOS E	17.0	121.1	1.00	0.87	17.0
12	R	251	2.0	1.000[3]	81.8	LOS F	19.4	137.8	1.00	0.88	15.2
Approach		883	2.0	1.000	57.1	LOS E	19.4	137.8	0.83	0.83	18.4
All Vehicles		5600	2.0	1.311	61.6	LOS E	71.4	508.7	0.80	0.91	18.7

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.
9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	60.3	LOS F	0.2	0.2	0.93	0.93
P5	Across N approach	53	60.3	LOS F	0.2	0.2	0.93	0.93
P7	Across W approach	53	30.7	LOS D	0.1	0.1	0.67	0.67
All Pedestrians		159	50.4				0.85	0.85

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: GWH Parker EX+Dev - PM

Great Western Highway - Parker St
Scenario: Existing+Development
Period: PM
Signals - Fixed Time Cycle Time = 138 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker St. (south)											
1	L	221	2.0	0.180	15.3	LOS B	6.6	47.1	0.38	0.71	43.5
2	T	1308	2.0	0.768	34.0	LOS C	36.8	261.8	0.91	0.82	29.9
3	R	135	2.0	1.140	223.4	LOS F	18.5	131.4	1.00	1.29	7.3
Approach		1664	2.0	1.140	46.8	LOS D	36.8	261.8	0.85	0.84	25.0
East: Great Western Highway (east)											
4	L	265	2.0	0.570	31.4	LOS C	23.5	167.4	0.75	0.85	31.6
5	T	1071	2.0	1.247	237.0	LOS F	65.4	465.7	0.94	1.60	6.7
6	R	248	2.0	1.000[3]	109.0	LOS F	22.5	160.5	1.00	1.06	13.9
Approach		1584	2.0	1.247	182.5	LOS F	65.4	465.7	0.92	1.39	8.6
North: Parker St. (north)											
7	L	339	2.0	0.187	9.5	NA[9]	NA[9]	NA[9]	0.00	0.65	48.5
8	T	1312	2.0	0.775	34.1	LOS C	37.5	266.7	0.91	0.83	24.7
9	R	153	2.0	1.313	372.5	LOS F	26.9	191.3	1.00	1.52	3.4
Approach		1804	2.0	1.314	58.2	LOS E	37.5	266.7	0.75	0.85	17.8
West: Great Western Highway (west)											
10	L	492	2.0	0.271	7.6	NA[9]	NA[9]	NA[9]	0.00	0.60	46.4
11	T	716	2.0	1.085	166.5	LOS F	41.8	297.4	1.00	1.47	7.7
12	R	251	2.0	1.000[3]	81.8	LOS F	19.4	137.8	1.00	0.88	15.2
Approach		1458	2.0	1.085	98.4	LOS F	41.8	297.4	0.66	1.08	12.3
All Vehicles		6511	2.0	1.314	94.5	LOS F	65.4	465.7	0.80	1.03	13.8

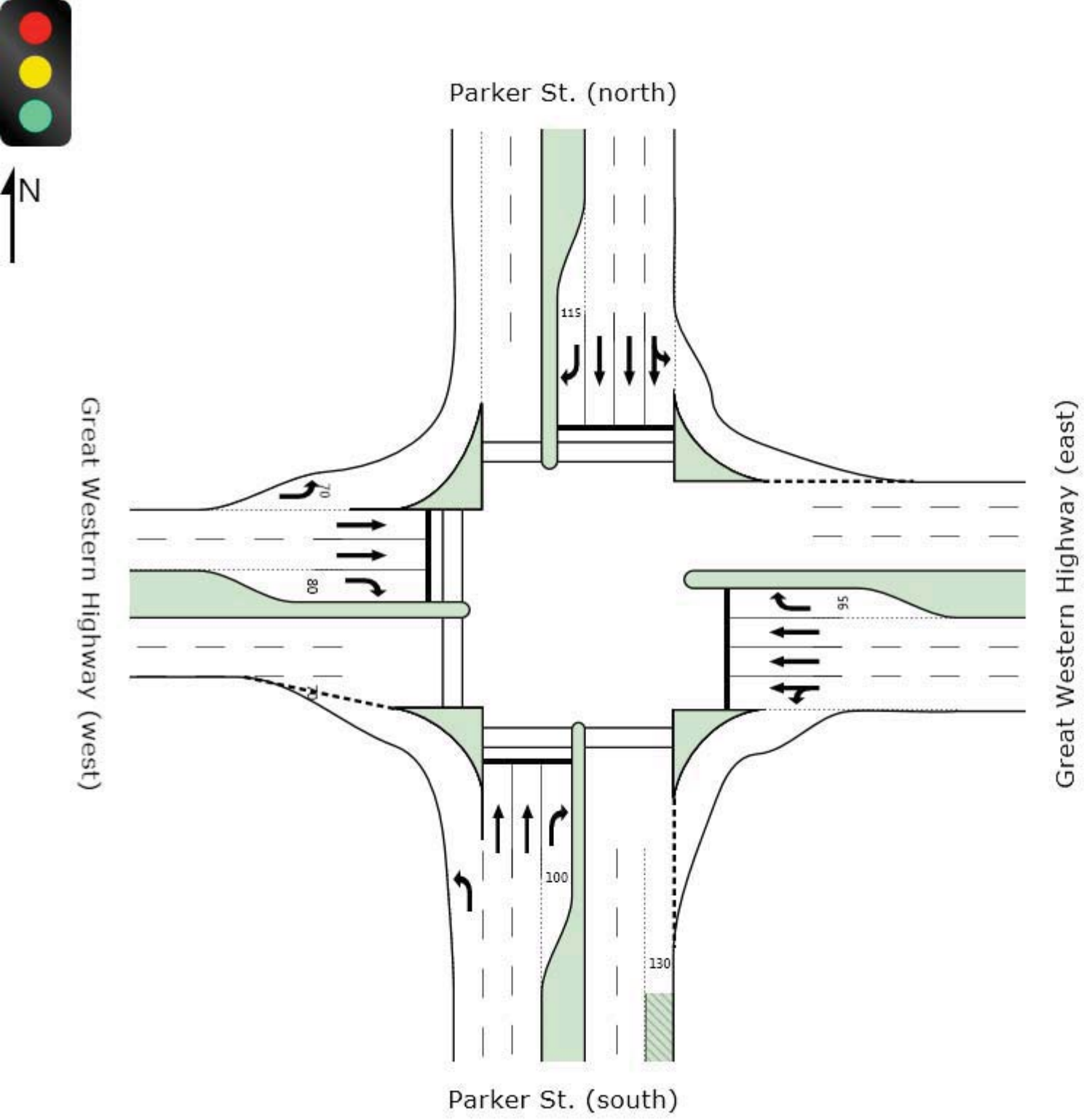
Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.
9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	60.3	LOS F	0.2	0.2	0.93	0.93
P5	Across N approach	53	60.3	LOS F	0.2	0.2	0.93	0.93
P7	Across W approach	53	30.7	LOS D	0.1	0.1	0.67	0.67
All Pedestrians		159	50.4				0.85	0.85

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).


Parker St. (north)
N
115
70
80
95
100
130
Great Western Highway (west)
Great Western Highway (east)
Parker St. (south)

MOVEMENT SUMMARY

Site: GWH Parker EX+Dev (New Geometry/Phase Times) - PM

Great Western Highway - Parker St
Scenario: Existing+Development (New Geometry/Phase Times)
Period: PM
Signals - Fixed Time Cycle Time = 138 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker St. (south)											
1	L	221	2.0	0.220	23.2	LOS B	9.0	64.2	0.53	0.75	36.7
2	T	1308	2.0	1.059	139.2	LOS F	72.9	519.1	1.00	1.44	11.5
3	R	135	2.0	0.489	67.5	LOS E	10.2	72.3	0.96	0.80	19.5
Approach		1664	2.0	1.059	118.0	LOS F	72.9	519.1	0.93	1.30	13.0
East: Great Western Highway (east)											
4	L	265	2.0	0.501	30.4	LOS C	19.4	138.2	0.71	0.94	32.1
5	T	1071	2.0	1.097	145.4	LOS F	52.4	373.4	0.95	1.38	10.1
6	R	248	2.0	1.000[3]	109.0	LOS F	22.5	160.5	1.00	1.06	13.9
Approach		1584	2.0	1.097	120.5	LOS F	52.4	373.4	0.92	1.26	12.1
North: Parker St. (north)											
7	L	339	2.0	0.626	36.1	LOS C	24.8	176.6	0.83	0.87	24.6
8	T	1181	2.0	0.821	46.2	LOS D	33.2	236.7	0.97	0.89	20.5
9	R	274	2.0	1.009	124.3	LOS F	26.8	190.7	1.00	1.11	9.4
Approach		1794	2.0	1.009	56.2	LOS D	33.2	236.7	0.94	0.92	18.0
West: Great Western Highway (west)											
10	L	492	2.0	0.271	7.6	NA[9]	NA[9]	NA[9]	0.00	0.60	46.4
11	T	716	2.0	0.898	70.6	LOS F	27.6	196.6	1.00	1.04	15.2
12	R	251	2.0	1.000[3]	81.8	LOS F	19.4	137.8	1.00	0.88	15.2
Approach		1458	2.0	1.000	51.3	LOS D	27.6	196.6	0.66	0.87	19.7
All Vehicles		6500	2.0	1.097	86.6	LOS F	72.9	519.1	0.87	1.09	14.7

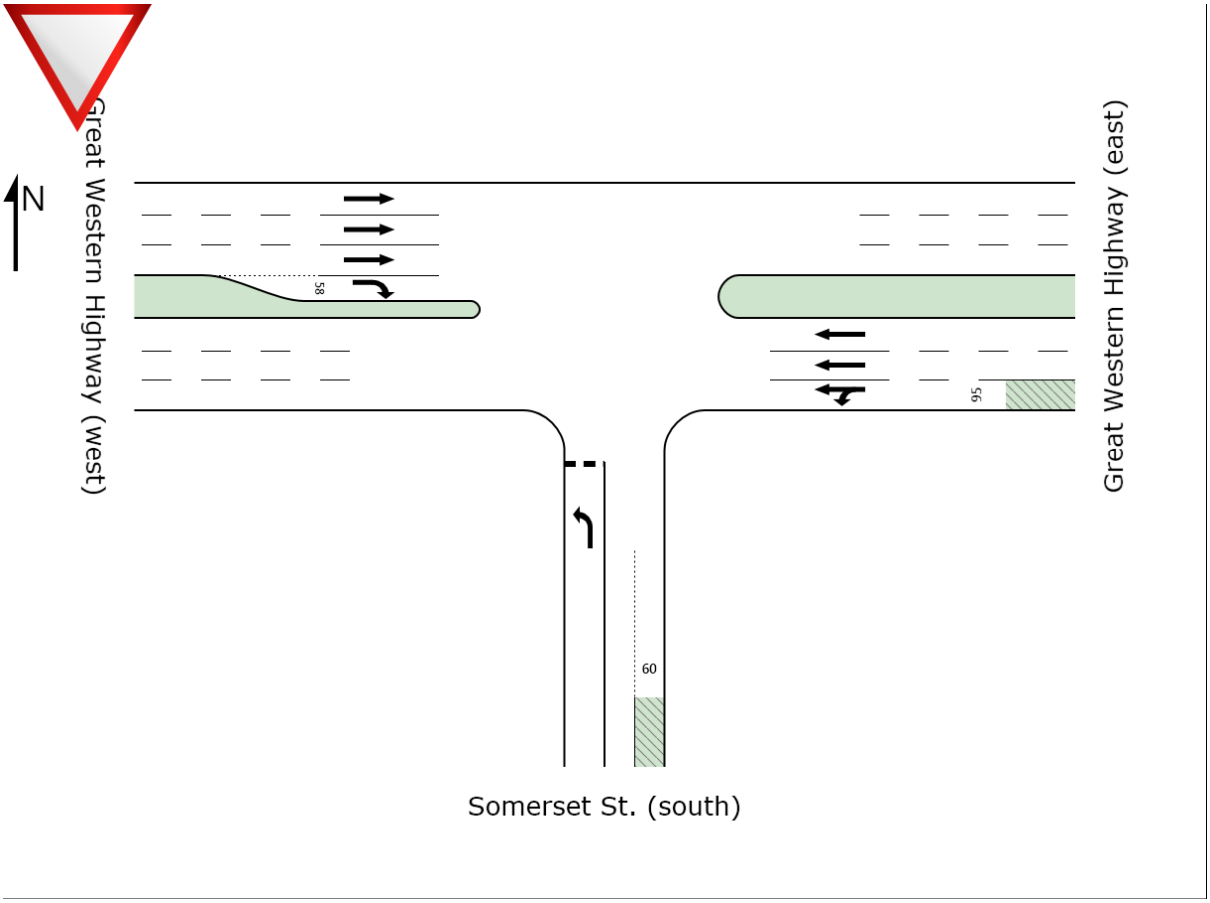
Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.
9 Continuous movement

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	55.7	LOS E	0.2	0.2	0.90	0.90
P5	Across N approach	53	58.4	LOS E	0.2	0.2	0.92	0.92
P7	Across W approach	53	43.0	LOS E	0.2	0.2	0.79	0.79
All Pedestrians		159	52.4				0.87	0.87

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).


N
Great Western Highway (west)
Great Western Highway (east)
58
95
60
Somerset St. (south)

MOVEMENT SUMMARY

Site: EX - AM

Great Western Hwy & Sommerset St
Scenario: Existing
Period: AM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Somerset St. (south)											
1	L	236	2.0	0.333	11.8	LOS A	1.8	13.0	0.61	0.91	40.1
Approach		236	2.0	0.333	11.8	LOS A	1.8	13.0	0.61	0.91	40.1
East: Great Western Highway (east)											
4	L	96	2.0	0.159	7.5	LOS A	0.0	0.0	0.00	0.92	46.7
5	T	819	2.0	0.159	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		915	2.0	0.159	0.8	LOS A	0.0	0.0	0.00	0.10	58.4
West: Great Western Highway (west)											
11	T	783	2.0	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	187	2.0	0.314	13.6	LOS A	1.7	11.8	0.67	0.92	40.1
Approach		971	2.0	0.314	2.6	LOS A	1.7	11.8	0.13	0.18	55.0
All Vehicles		2121	2.0	0.333	2.8	NA	1.8	13.0	0.13	0.22	53.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: EX - PM

Great Western Hwy & Sommerset St
Scenario: Existing
Period: PM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Somerset St. (south)											
1	L	244	2.0	0.427	14.4	LOS A	2.5	17.6	0.73	1.00	38.3
Approach		244	2.0	0.427	14.4	LOS A	2.5	17.6	0.73	1.00	38.3
East: Great Western Highway (east)											
4	L	66	2.0	0.194	7.5	LOS A	0.0	0.0	0.00	1.02	46.7
5	T	1054	2.0	0.195	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1120	2.0	0.195	0.4	LOS A	0.0	0.0	0.00	0.06	59.1
West: Great Western Highway (west)											
11	T	1016	2.0	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	149	2.0	0.317	15.9	LOS B	1.6	11.3	0.75	0.95	38.1
Approach		1165	2.0	0.317	2.0	LOS B	1.6	11.3	0.10	0.12	56.1
All Vehicles		2529	2.0	0.427	2.5	NA	2.5	17.6	0.11	0.18	54.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: EX+Dev - AM

Great Western Hwy & Sommerset St
Scenario: Existing+Development
Period: AM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Somerset St. (south)											
1	L	244	2.0	0.371	12.6	LOS A	2.1	15.0	0.65	0.94	39.5
Approach		244	2.0	0.371	12.6	LOS A	2.1	15.0	0.65	0.94	39.5
East: Great Western Highway (east)											
4	L	96	2.0	0.172	7.5	LOS A	0.0	0.0	0.00	0.94	46.7
5	T	895	2.0	0.172	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		991	2.0	0.172	0.7	LOS A	0.0	0.0	0.00	0.09	58.5
West: Great Western Highway (west)											
11	T	783	2.0	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	187	2.0	0.343	14.6	LOS B	1.8	13.0	0.71	0.95	39.2
Approach		971	2.0	0.342	2.8	LOS B	1.8	13.0	0.14	0.18	54.7
All Vehicles		2205	2.0	0.371	3.0	NA	2.1	15.0	0.13	0.23	53.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: GWH - Somerset EX+Dev - PM

Great Western Hwy & Sommerset St
Scenario: Existing+Development
Period: PM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

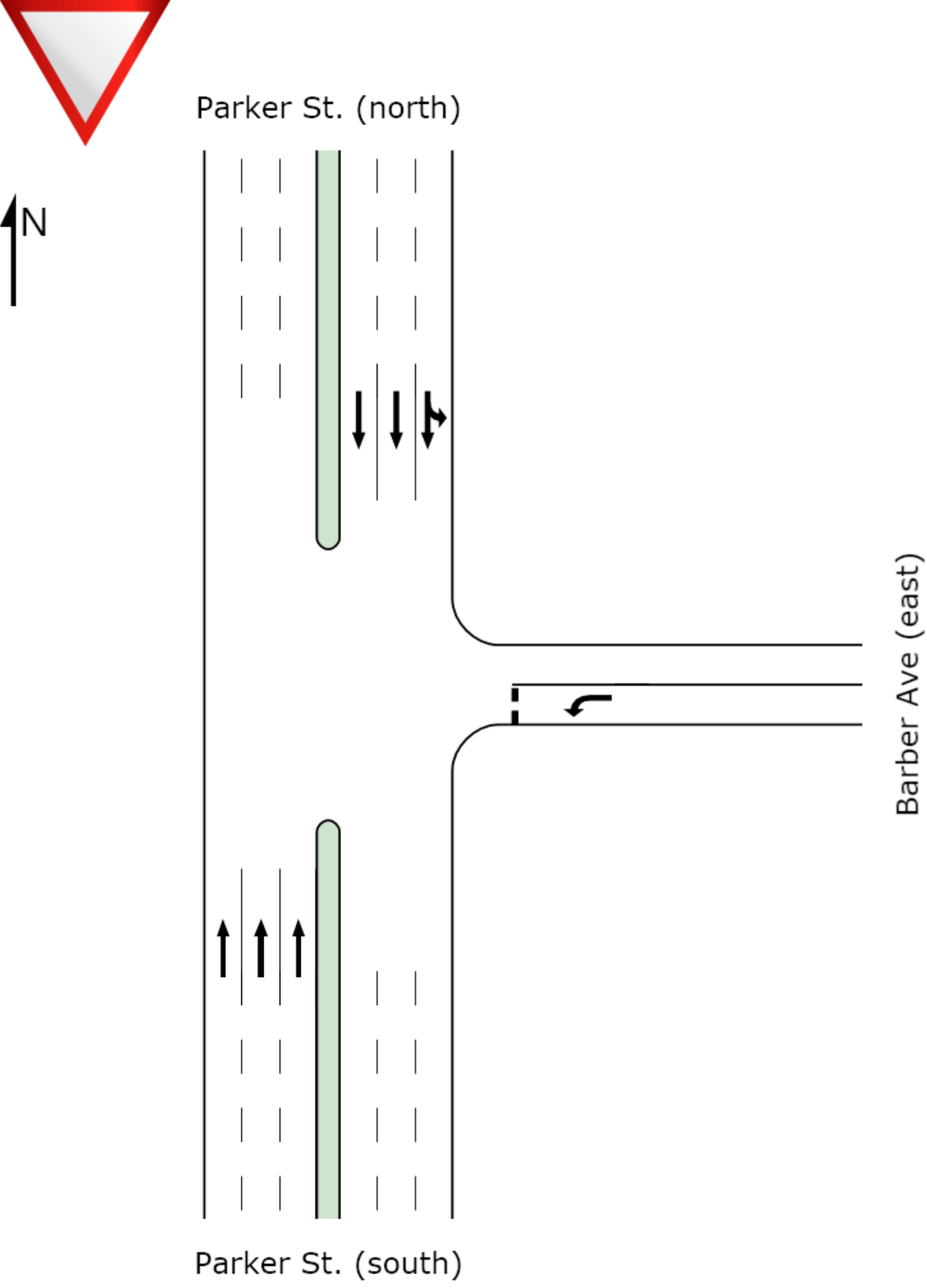
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Somerset St. (south)											
1	L	293	2.0	0.555	16.7	LOS B	3.6	25.7	0.80	1.09	36.8
Approach		293	2.0	0.556	16.7	LOS B	3.6	25.7	0.80	1.09	36.8
East: Great Western Highway (east)											
4	L	66	2.0	0.209	7.5	LOS A	0.0	0.0	0.00	1.03	46.7
5	T	1134	2.0	0.208	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1200	2.0	0.208	0.4	LOS A	0.0	0.0	0.00	0.06	59.1
West: Great Western Highway (west)											
11	T	1016	2.0	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	149	2.0	0.349	17.3	LOS B	1.8	12.5	0.78	0.97	36.9
Approach		1165	2.0	0.349	2.2	LOS B	1.8	12.5	0.10	0.12	55.8
All Vehicles		2658	2.0	0.556	3.0	NA	3.6	25.7	0.13	0.20	53.6

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION


Parker St. (north)
N
Barber Ave (east)
Parker St. (south)

MOVEMENT SUMMARY

Site: EX - AM

Barber Ave. - Parker St. priority
EX - AM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker St. (south)											
2	T	1425	2.0	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1425	2.0	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
East: Barber Ave (east)											
4	L	24	2.0	0.100	21.4	LOS B	0.4	2.7	0.85	0.95	35.2
Approach		24	2.0	0.100	21.4	LOS B	0.4	2.7	0.85	0.95	35.2
North: Parker St. (north)											
7	L	76	2.0	0.302	8.8	LOS A	0.0	0.0	0.00	1.31	53.1
8	T	1661	2.0	0.301	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1737	2.0	0.301	0.4	LOS A	0.0	0.0	0.00	0.06	69.1
All Vehicles		3186	2.0	0.301	0.4	NA	0.4	2.7	0.01	0.04	69.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: EX - PM

Barber Ave. - Parker St. priority
EX - PM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker St. (south)											
2	T	1609	0.0	0.275	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1609	0.0	0.275	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
East: Barber Ave (east)											
4	L	100	0.0	0.351	22.1	LOS B	1.5	10.8	0.86	1.01	34.9
Approach		100	0.0	0.350	22.1	LOS B	1.5	10.8	0.86	1.01	34.9
North: Parker St. (north)											
7	L	52	0.0	0.274	8.7	LOS A	0.0	0.0	0.00	1.36	53.1
8	T	1553	0.0	0.275	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1604	0.0	0.275	0.3	LOS A	0.0	0.0	0.00	0.04	69.4
All Vehicles		3314	0.0	0.350	0.8	NA	1.5	10.8	0.03	0.05	67.7

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: FUT - AM

Barber Ave. - Parker St. priority
FUT - AM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker St. (south)											
2	T	1425	2.0	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1425	2.0	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
East: Barber Ave (east)											
4	L	48	2.0	0.232	25.5	LOS B	0.9	6.4	0.88	0.98	33.2
Approach		48	2.0	0.231	25.5	LOS B	0.9	6.4	0.88	0.98	33.2
North: Parker St. (north)											
7	L	280	2.0	0.339	8.8	LOS A	0.0	0.0	0.00	0.96	53.1
8	T	1661	2.0	0.339	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1941	2.0	0.339	1.3	LOS A	0.0	0.0	0.00	0.14	67.2
All Vehicles		3415	2.0	0.339	1.1	NA	0.9	6.4	0.01	0.09	67.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

MOVEMENT SUMMARY

Site: Parker Barber FUT - PM

Barber Ave. - Parker St. priority
FUT- PM
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Parker St. (south)											
2	T	1609	0.0	0.275	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1609	0.0	0.275	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
East: Barber Ave (east)											
4	L	187	0.0	0.762	37.0	LOS C	4.6	32.3	0.95	1.26	28.4
Approach		187	0.0	0.760	37.0	LOS C	4.6	32.3	0.95	1.26	28.4
North: Parker St. (north)											
7	L	267	0.0	0.313	8.7	LOS A	0.0	0.0	0.00	0.95	53.1
8	T	1553	0.0	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	70.0
Approach		1820	0.0	0.313	1.3	LOS A	0.0	0.0	0.00	0.14	67.1
All Vehicles		3617	0.0	0.760	2.6	NA	4.6	32.3	0.05	0.14	63.8

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).

Approach LOS values are based on the worst delay for any vehicle movement.

SIDRA INTERSECTION

8. project application (stage 1)

8.1 introduction

This Project Application relates to the stage 1 development as discussed in the part a (Concept Plan) section of this report. It includes the eastern portion of the Concept Plan area and includes:

- Development of 84 serviced apartments
  - 72 one bedroom; and
  - 12 two bedroom
- 20,191m^2 GFA of commercial floor area;
- 2,931m^2 NFA of retail area (same as lettable area) including a 1,531m^2 local supermarket;
- Provision of 449 parking spaces; and
- Provision of 60 motorcycle spaces and 139 bicycle spaces.

8.2 site access arrangements

The site will be accessed using both access driveways that are proposed under the Concept Plan application. This includes an entry-exit driveway onto Barber Avenue and an exit only driveway onto the Great Western Highway.

These driveways are designed to comply with AS 2890.1 and AS 2890.2 and will operate safely and efficiently. The main driveway onto Barber Avenue is mainly associated with left turn entries and right turn exits and on this basis, a single entry and exit lane is appropriate. This also has the advantage of reducing the footpath crossing width, while also providing an improved streetscape.

8.3 parking requirements

The Stage 1 parking requirements are shown in **pa appendix c** in the preceding **part a** Concept Application report. It can be seen that a total of 449 spaces are proposed, which compares with 711 spaces under Council's DCP and 717 spaces under the RTA's Guideline. This is a substantial reduction (37.5%) which will actively promote alternate travel modes in Stage 1, while also reducing traffic generation.

The development also provides 60 motorcycle spaces. This is a relatively high level of provision that acknowledges the increasing ownership of motorcycles and these in effect reduce parking and traffic demands. They may therefore be regarded as an integral component of the Travel Access Guide as the conversion of car drivers to motorcycles has environmental benefits, which is the fundamental aim of the promotion of alternate travel modes.

There are a total of 19 disabled parking spaces which are designed in accordance with AS 2890.6. This represents 4% of the total parking which complies with AS 2890.1. The drop-off area is also able to accommodate the needs of disabled drivers in taxis or being set-down by family or friends.

8.4 servicing

The Stage 1 development incorporates the service dock for the entire development (Stages 1 and 2). The dock incorporates two bays that are both capable of accommodating an MRV, which is the standard delivery vehicle under AS 2890.2. This size of truck is also suitable for use by the small supermarket (with 1,531m^2 of lettable area and only 961m^2 of trading area) which is expected to generate 3-4 MRV's per day and 10-15 small vans; all of which can be managed and accommodated within a single dock. In this regard, smaller van deliveries could occur prior to 10am, with the dedicated supermarket dock being available for MRV's after 10am.

The remaining dock would be available to serve the other retail use (2,688m^2); the commercial use (20,189m^2) and the serviced apartments. Penrith Council's DCP does not specify the quantum of

loading spaces and this is considered to be the minimum level of provision that will require a Loading Dock Management Plan to be prepared to demonstrate satisfactory operation and this is invited as a condition of consent.

It is also noted that additional short-term loading can occur within the drop-off area. Finally, it is recommended that 4 parking spaces be allocated and signposted as courier spaces for use by cars, vans and station wagons.

8.5 traffic impacts

The Stage 1 Project Application traffic generation is summarised in **pa appendix c** in the preceding **part a** Concept Application report. It can be seen the Stage 1 development is expected to generate:

- 215 veh/hr (147 in, 68 out) in the AM Peak; and
- 344 veh/hr (148 in, 196 out) in the PM Peak

That is, the Stage 1 development represents 76% of the overall development under the Concept Plan. Accordingly, intersection performances will be slightly improved from that shown in Table 3 of Section 6 of this report, although the conclusions reached will be essentially unchanged.

8.6 travel access guide

It is proposed that a Travel Access Guide will be prepared in response to a suitable condition of consent. This would include the promotion of alternate travel modes and travel demand measures including car sharing, public transport availability (bus, rail and taxi), cycle and pedestrian routes and linkages, bicycle end-user facilities and motorcycle parking. The provision of a drop-off area on the Lower Ground Floor will be particular benefit to taxi use, which is a form of public transport.

8.7 internal design aspects

A swept path analysis has been prepared and is presented in **pa appendix g**. It is evident that there the overall plans are supportable in principle and comply with the 'nominal' requirements of AS 2890.1. It is recommended that a standard condition of consent be imposed requiring compliance with AS 2890.1 and 2890.1.

8.8 bicycle and pedestrian facilities

The submitted plans incorporate bicycle storage facilities within the development (139 spaces), as well as shower and change room facilities. The plans also depict the proposed pedestrian network, which connects to the existing pedestrian network serving buses and trains as well as the adjoining Hospital campus.

8.9 demolition and construction impacts

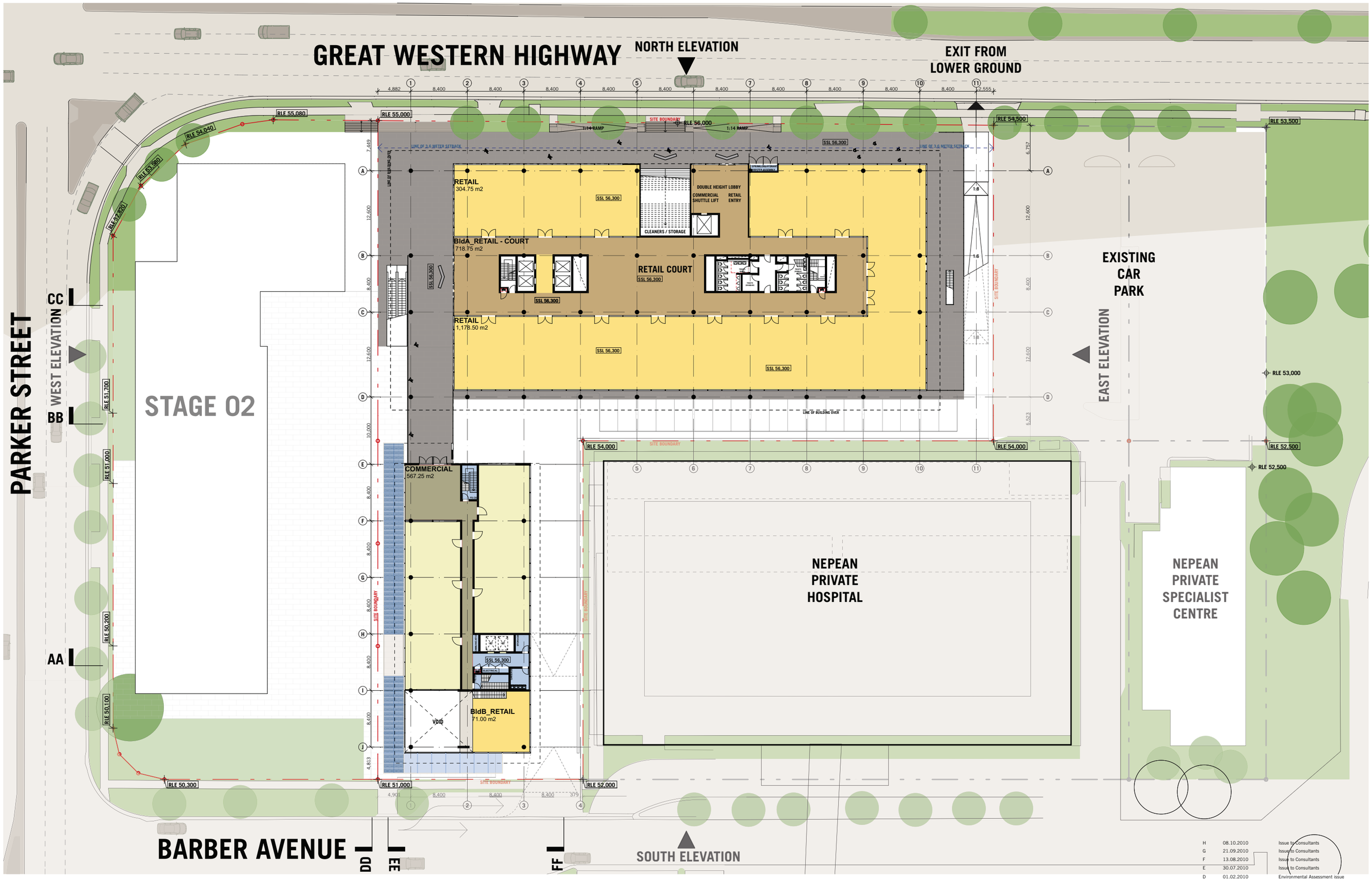
A condition is invited seeking preparation of a detailed Demolition and Construction Traffic Management Plan. It is anticipated that all such activity will be focussed on Barber Avenue and the Plan will need to be prepared in consultation with the appointed builder. It will need to address requirements during each stage (demolition, site preparation, excavation, construction, fit-out and landscaping) and will need to include consideration of times of operation, truck access routes, site access, average truck frequencies, truck sizes, parking for construction workers, work zone requirements, pedestrian control, traffic management plans and any road occupancy applications. These are matters that cannot be addressed at this time although in principle, there are considered to be no obvious constraints to the preparation of a safe and efficient Management Plan.

8.10 conclusions on project application

Having regard for the above matters, the Project Application for Stage 1 development is supportable in traffic and transport planning terms, subject to appropriate conditions as discussed. This Project Application should also be viewed in the context of the Concept Plan Application.

pa appendix f

project application plans



Rev.	Date	Approved by	Revision Notes
H	08.10.2010		Issue to Consultants
G	21.09.2010		Issue to Consultants
F	13.08.2010		Issue to Consultants
E	30.07.2010		Issue to Consultants
D	01.02.2010		Environmental Assessment issue

Nominated Architect Nicholas Turner 6695
ABN 86 064 084 911

DLCS Quality Endorsed Company ISO 9001:2000
Licence Number 4168

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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
ENVIRONMENTAL ASSESSMENT
DRAWING TITLE
GROUND
Plans

SCALE 1:250@A1, 50%@A3	JOB No. 09007	DRAWN ML/MH/AH	NORTH
STATUS FOR INFORMATION	DWG No. EA14	REV H	

TURNER + ASSOCIATES
L1 410 Crown Street Surry Hills NSW 2010 Australia
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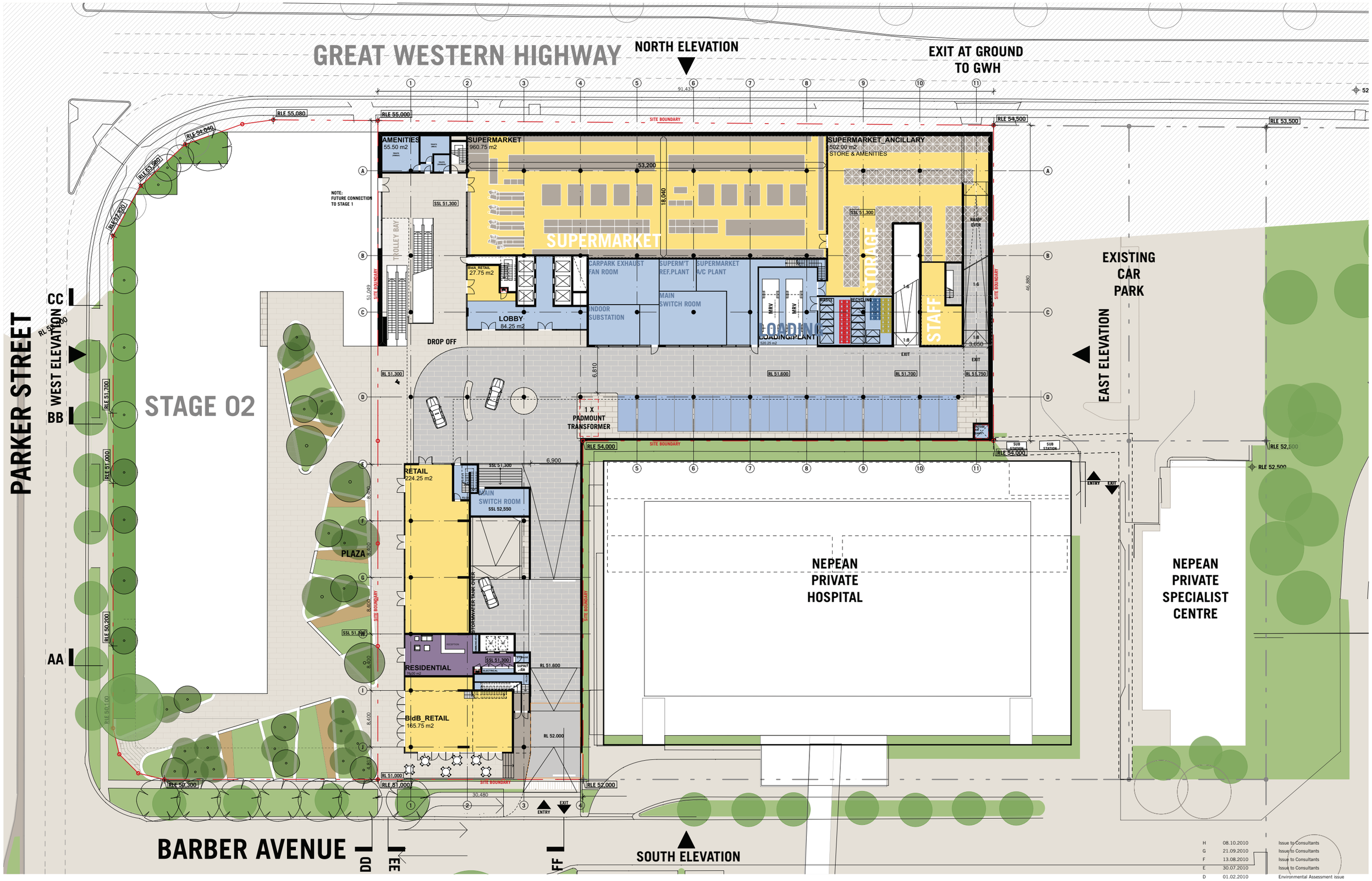

Rev.	Date	Approved by	Revision Notes
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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
ENVIRONMENTAL ASSESSMENT
DRAWING TITLE
LOWER GROUND
Plans

SCALE	JOB No.	DRAWN	NORTH
1:250@A1, 50%@A3	09007	ML/MH/AH	
STATUS	DWG No.	REV	
FOR INFORMATION	EA13	H	

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Rev.	Date	Approved by	Revision Notes
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G	21.09.2010		Issue to Consultants
F	13.08.2010		Issue to Consultants
E	30.07.2010		Issue to Consultants
D	01.02.2010		Environmental Assessment issue

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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
ENVIRONMENTAL ASSESSMENT
DRAWING TITLE
BASEMENT 01
Plans

SCALE: 1:250@A1, 50%@A3	JOB No.: 09007	DRAWN: ML/MH/AH	NORTH
STATUS: FOR INFORMATION	DWG No.: EA12	REV: H	

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GREAT WESTERN HIGHWAY

NORTH ELEVATION

PARKER STREET

WEST ELEVATION

EAST ELEVATION

BARBER AVENUE

SOUTH ELEVATION

CC

BB

AA

DD

EE

FF

STAGE 02

NOTE:
FUTURE CONNECTION
TO STAGE 1

CARPARK
5,418.75 m2
153 x Carspaces

SITE BOUNDARY

RAMP
[1:40]

SSL 45.200

45.200

45.900

SUPPLY AIR
FAN ROOM

COLD WATER METER &
PUMP ROOM

RAINWATER TREATMENT &
PUMP ROOM

ESL
REGULATOR

FIRE
PUMP
ROOM

RLE 55.080
RLE 55.000
RLE 54.040
RLE 53.980
RLE 53.920
RLE 54.500
RLE 53.500
RLE 54.000
RLE 52.500
RLE 51.700
RLE 51.000
RLE 50.200
RLE 50.100
RLE 50.300
RLE 52.000

Rev.	Date	Approved by	Revision Notes
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G	21.09.2010		Issue to Consultants
F	13.08.2010		Issue to Consultants
E	30.07.2010		Issue to Consultants
D	01.02.2010		Environmental Assessment issue

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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
ENVIRONMENTAL ASSESSMENT
DRAWING TITLE
BASEMENT 02
Plans

SCALE 1:250@A1, 50%@A3	JOB No. 09007	DRAWN ML/MH/AH	NORTH
STATUS FOR INFORMATION	DWG No. EA11	REV H	

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GREAT WESTERN HIGHWAY

NORTH ELEVATION

PARKER STREET

WEST ELEVATION

CC

BB

AA

DD

EE

FF

EAST ELEVATION

SOUTH ELEVATION

BARBER AVENUE

STAGE 02

NOTE:
FUTURE CONNECTION
TO STAGE 1

CARPARK
5,417.75 m2
154 x Carspaces

SITE BOUNDARY

RAMP
1:40

DIESEL FUEL
STORAGE

Plant

RLE 55,080
RLE 55,000
RLE 54,500
RLE 53,500
RLE 54,040
RLE 53,980
RLE 53,920
RLE 54,000
RLE 52,500
RLE 51,700
RLE 51,000
RLE 50,200
RLE 50,100
RLE 50,300
RLE 51,000
RLE 52,000

SSL 42,400
42,400
43,100

Rev.	Date	Approved by	Revision Notes
H	08.10.2010		Issue to Consultants
G	21.09.2010		Issue to Consultants
F	13.08.2010		Issue to Consultants
E	30.07.2010		Issue to Consultants
D	01.02.2010		Environmental Assessment issue

Nominated Architect Nicholas Turner 6695
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PROJECT TITLE
BARBER AVENUE, KINGSWOOD
ENVIRONMENTAL ASSESSMENT
DRAWING TITLE
BASEMENT 03
Plans

SCALE 1:250@A1, 50%@A3	JOB No. 09007	DRAWN ML/MH/AH	NORTH
STATUS FOR INFORMATION	DWG No. EA10	REV H	

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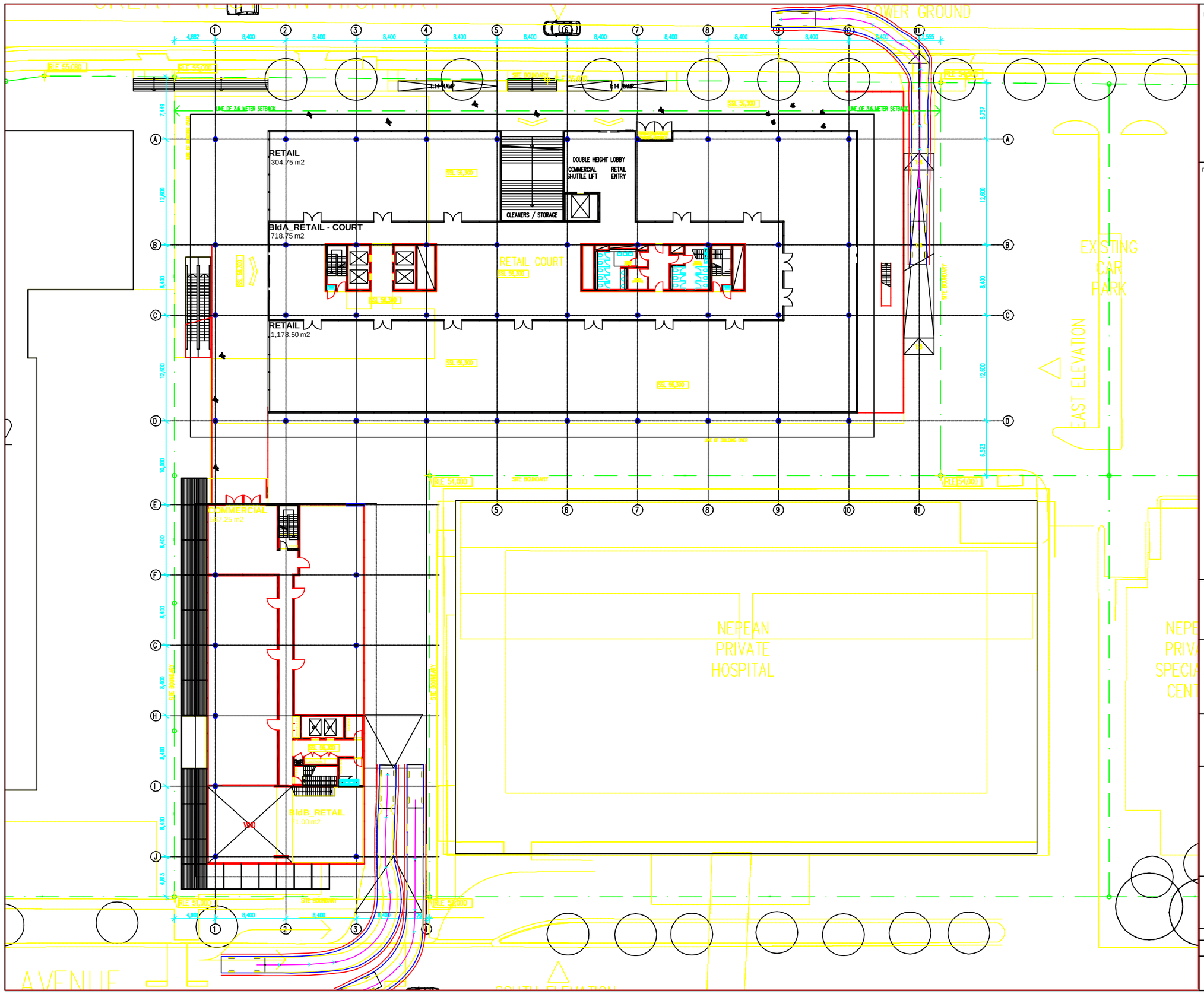
cp appendix g

swept path analysis



notes

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no.	revision note	by.	date

client

Aesthete No 3 Pty Ltd

scale

1:400 @ A3

project

Part 3A Nepean Hospital

drawing prepared by

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traffic and transport planners
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PO Box 1061 potts point nsw 1035
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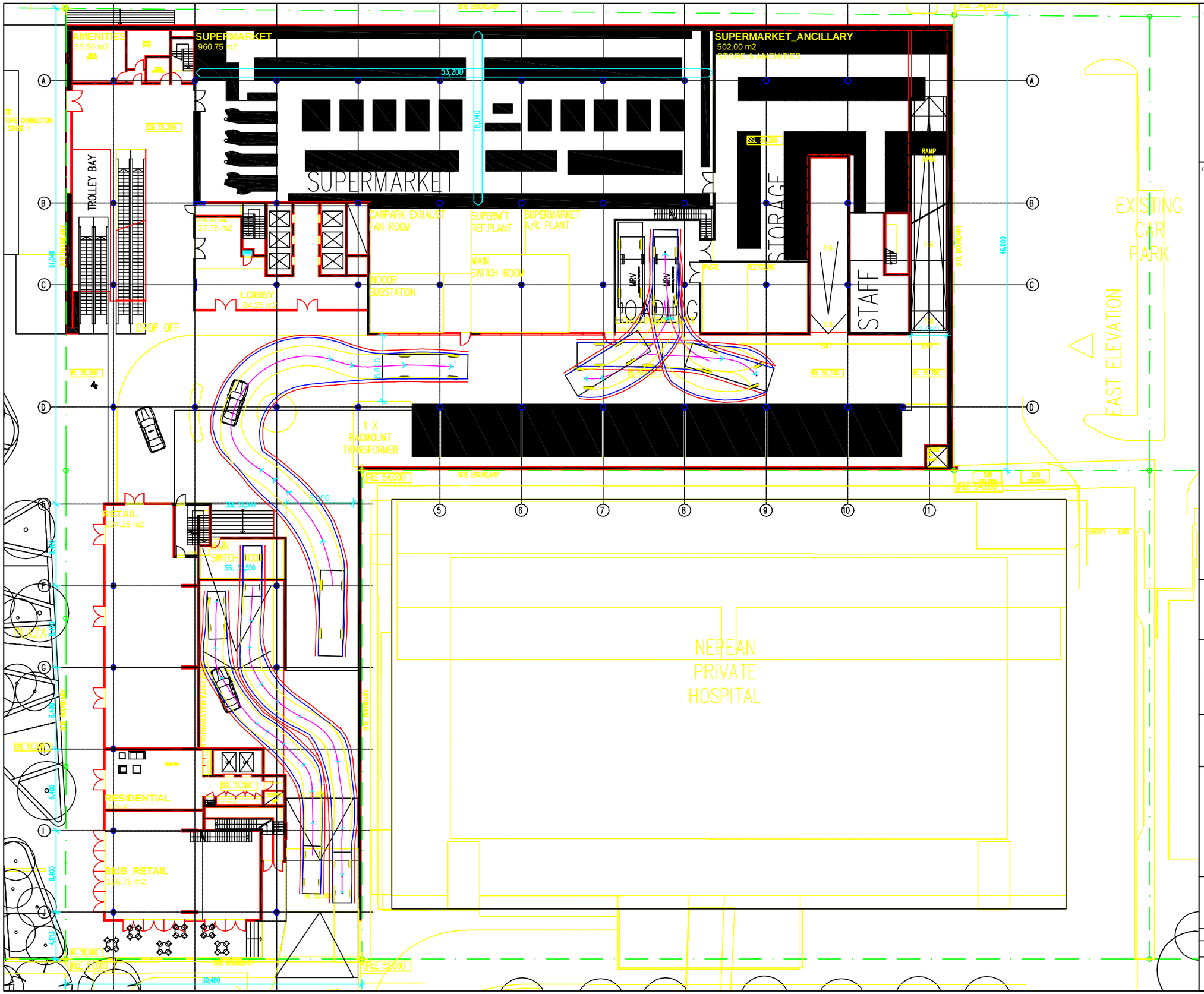
drawing title

Ground Level- Swept Path

drawn:	checked:	date:

09 234	PA	TX_03	-
project no.	drawing phase.	drawing no.	rev



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client

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scale

1:200 @ A3

0m 2 4 6 8

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drawing title

Lower Ground - Swept Path

drawn:	checked:	date:

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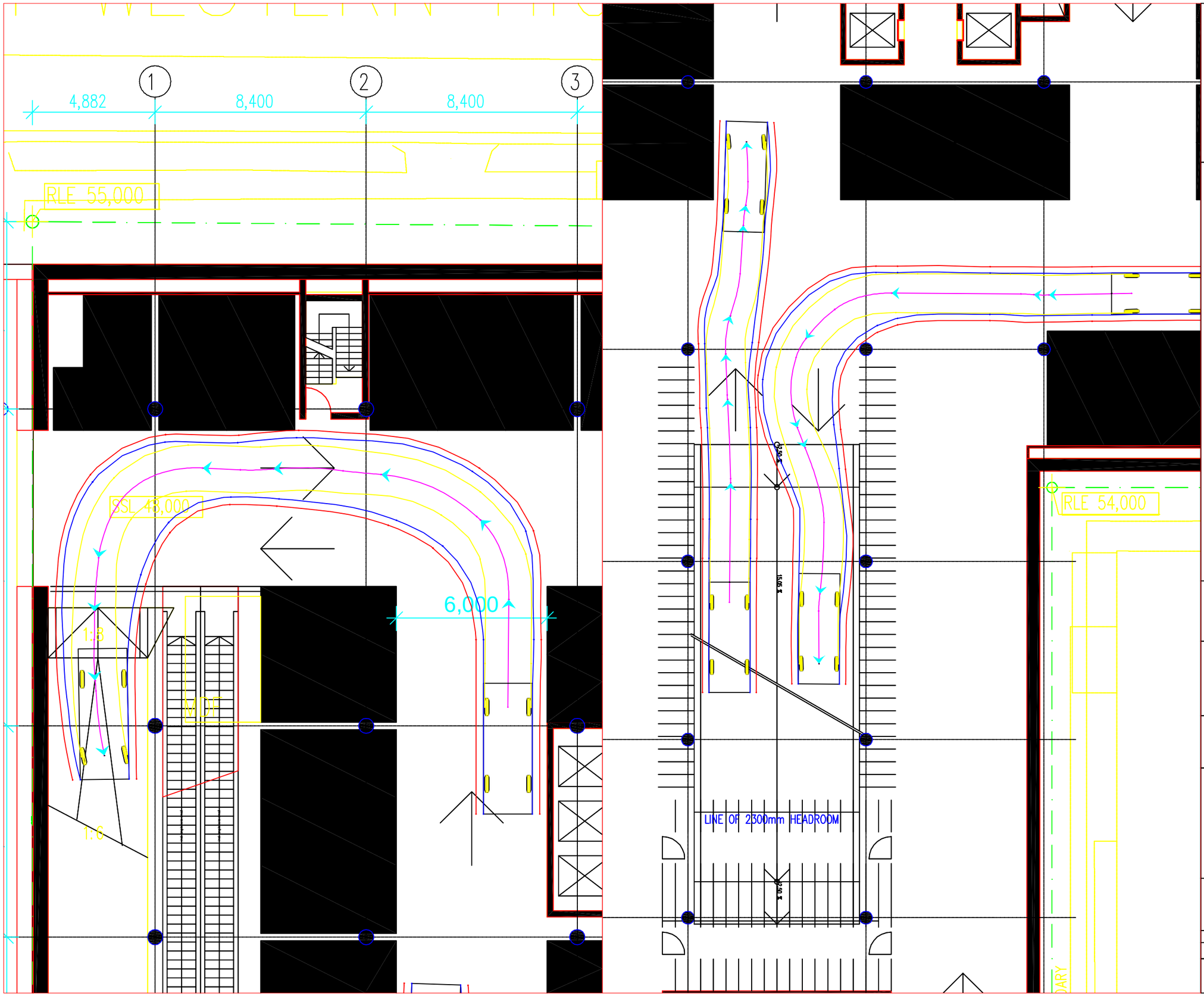
project no.	drawing phase.	drawing no.	rev



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scale

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0m 2 4 6 8

project

Part 3A Nepean Hospital

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drawing title

Basement 01 - Swept Paths

drawn:	checked:	date:

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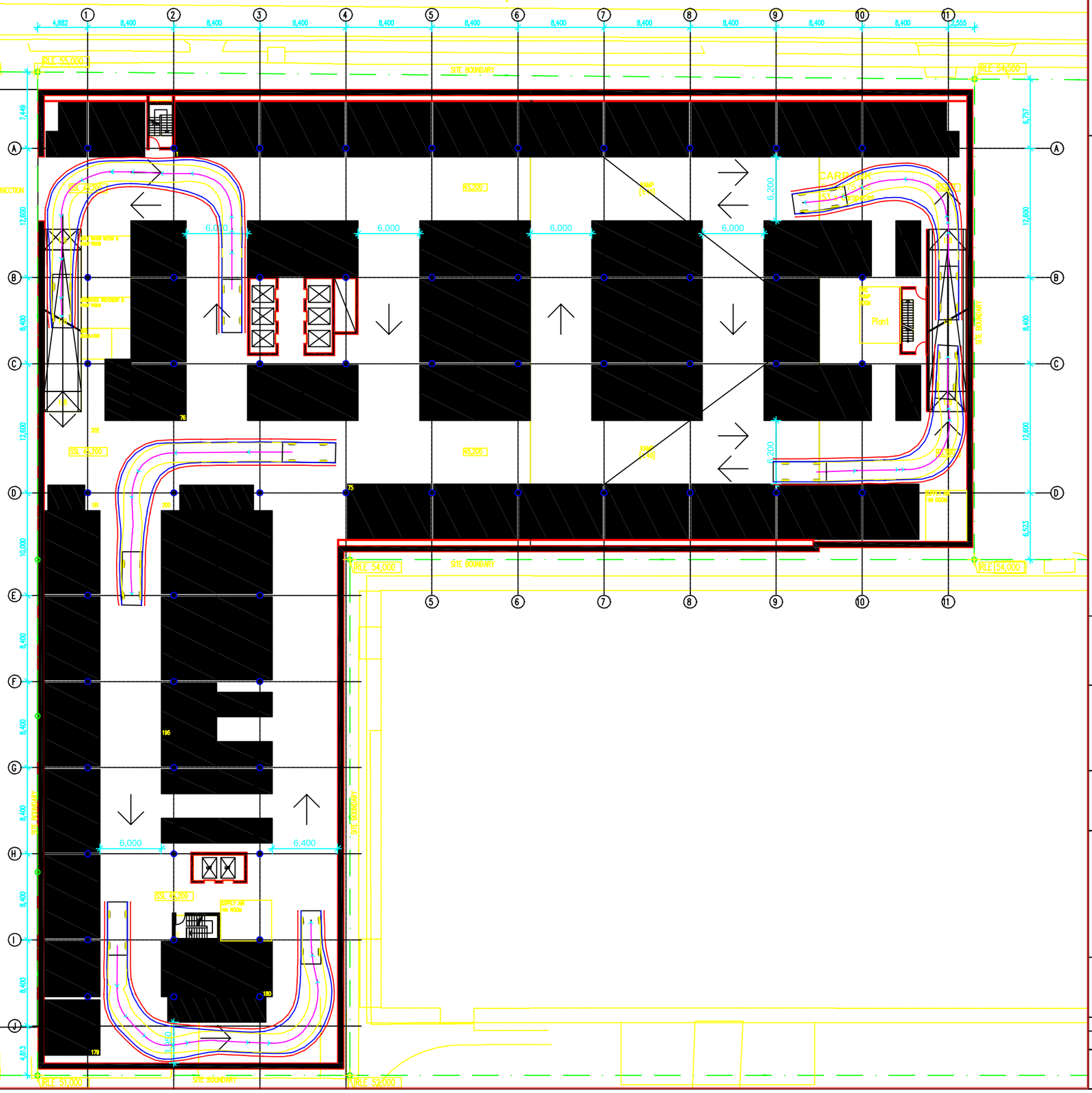
project no.	drawing phase.	drawing no.	rev

GREAT WESTERN HIGHWAY

NORTH ELEVATION

AGE 02



notes

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scale

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Part 3A Nepean Hospital

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drawing title

Basement 02- Swept Path

drawn:	checked:	date:

09 234	PA	TX_04	-
project no.	drawing phase.	drawing no.	rev