concept plan application and stage 1 project application for the moore theological college, king street newtown

prepared on behalf of Moore Theological College by **TRAFFIX** traffic & transport planners
ref: 09 057 november 2009 report version 6

transport and accessibility assessment report

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contents

1. introduction

TRAFFIX has been commissioned by the Moore Theological College to undertake a traffic impact assessment of a proposed Concept Plan Application and Stage 1 Project Application for the existing Moore College precinct at Newtown. The report has been prepared in support of the overall Environmental Assessment report that was prepared by JBA Urban Planning Consultants, which is an application made under Part 3A of the Environmental Planning and Assessment Act, 1979. This 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 investigations in response to Council's and the RTA's requirements and also responds to the Director General's Requirements. It relates to a Concept Plan for the redevelopment of Moore Theological College (MTC), Newtown and Stage 1 Project Application for a new library building.

The report has been prepared by JBA Urban Planning Consultants Pty Ltd, for the proponent, Moore Theological College (MTC) and is based on information provided by Allen Jack + Cottier Architects.

The MTC currently has some 318 students studying full time at the Newtown campus and almost 5,000 students in over 50 countries studying by external studies. There are currently 76 staff, including 24 Faculty staff. The existing facilities are not adequate to meet the future needs of the College for staff or students and to address this, the College undertook a master planning exercise to explore options for expansion of the campus and its facilities.

On 4 February 2009, the Director-General of the Department of Planning issued the requirements for the preparation of an Environmental Assessment to accompany a Concept Plan and Project Application for the project. The Concept Application relates to the use and building envelopes comprising a total floor area of some 30,000 square metres, together with an indicative number of apartments, height and building footprints, road layout and landscaping across the site.

The objectives of the Concept Plan and Project Application are to:

- protect the future physical expansion and academic development of MTC;
- build on the special qualities of MTC;
- allow development flexibility within the certainty of a structured framework;
- enhance MTC's physical identity and address;
- conserve and enhance the heritage buildings on and in proximity to MTC site;
- strengthen access within and around the campus;
- enhance the campus environment; and
- engage with the community.

With over 318 students studying full time at the Newtown campus and almost 5,000 students in over 50 countries studying by external studies, the existing facilities are not adequate to meet the future expanding needs of the College. Student numbers are predicted to increase progressively to 600 students (with 110 staff) over the next decade and ultimately reaching 1,200 students (with 190 staff).

2. location and site

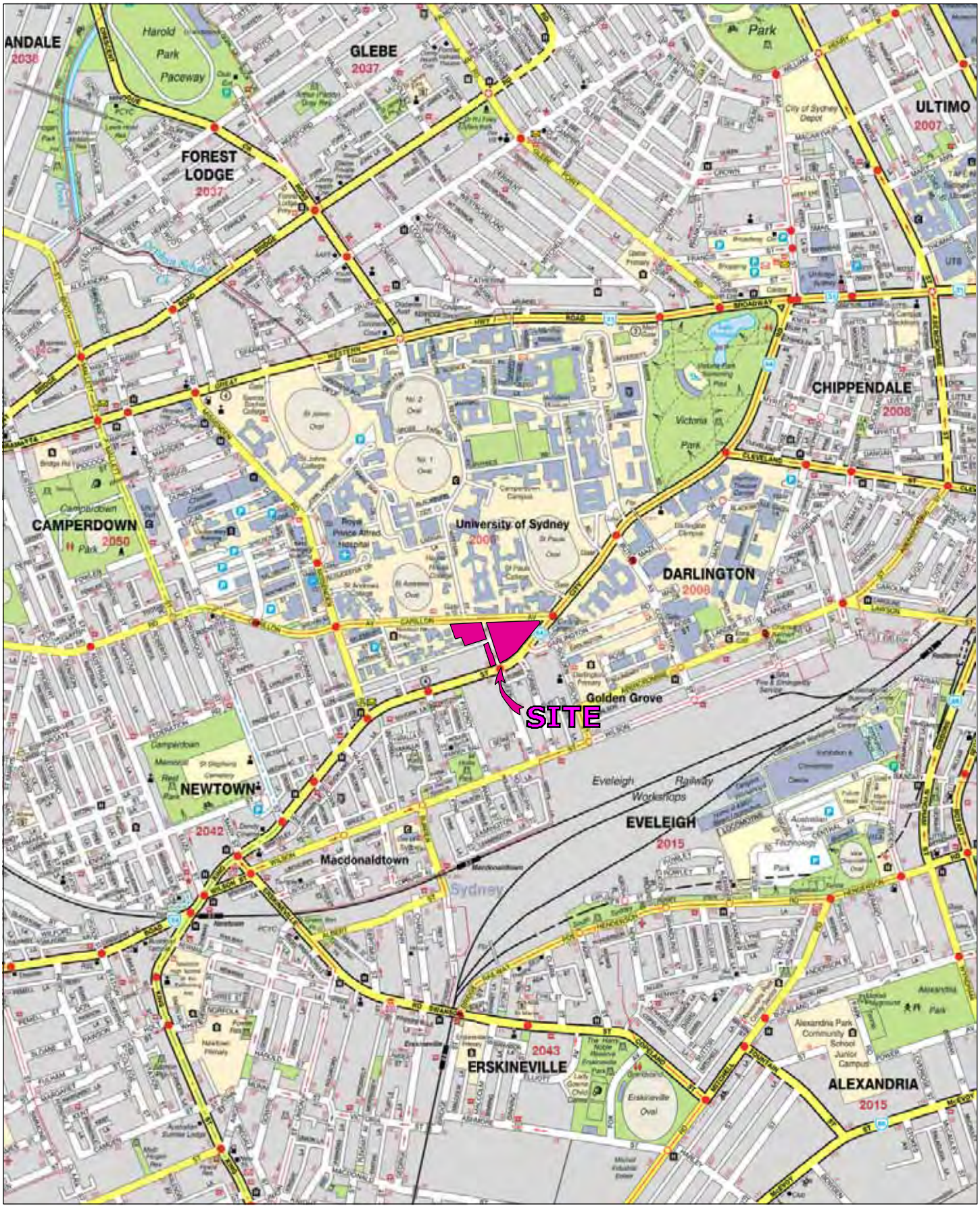
The Moore Theological College Campus is located in suburb of Newtown within the City of Sydney local government area (LGA). The site has a northern boundary to the Carillon Avenue, and southern boundary to King Street.

MTC is strategically located within the institutional hub comprising Sydney University and the Royal Prince Alfred Hospital. Broadway and the CBD are readily accessible

The Concept Plan site is approximately 1.31ha in area and is wedge-shaped, comprising numerous allotments occupied by various educational, residential, campus, and administration buildings. For the purposes of this Concept Plan the MTC campus has been divided into Site A, Site B and Site C, as shown in **figures 1 and 2**.

Site A comprises the majority of the MTC campus and includes all the academic and administration spaces, as well as some residential buildings and retail uses. The buildings include:

- a three storey brick library and administration building at the corner of Carillon Avenue and King Street, with parking for 12 spaces accessed via King Street;
- 3 x two storey residential semi detached buildings fronting King Street;
- a two storey academic building known as the Knox Building fronting King Street;
- 3 x two/three storey mixed use buildings containing ground floor retail fronting King Street;
- a four storey dining hall building;
- a three storey residential college fronting Carillon Avenue (former Mary Andrews College);
- 9 x two storey residential terraces and one two storey fronting Little Queen Street;
- a two storey building known as Deaconess House;
- A four storey building; and
- a lawn and parking area within the centre of Site A, with vehicular access to the internal car park via Little Queen Street.



Source: UBD 2006

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impact assessment: part 3A application

Moore College Site

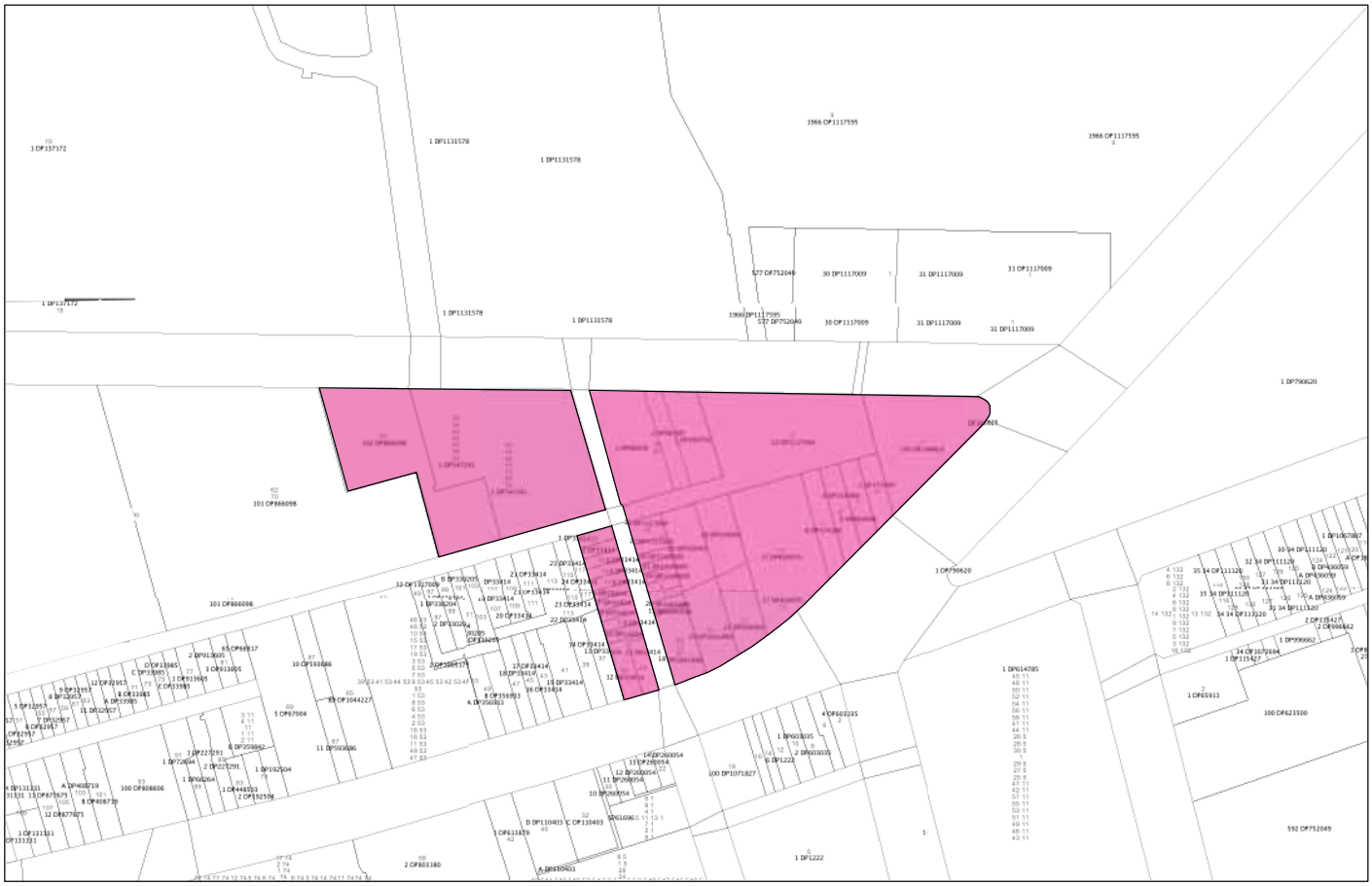
little queen street, Newtown

figure 1

location

prepared on behalf of moore college

by **traffix traffic & transport planners**



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lands department cadastre map

0 100m

aerial photograph: dated january 2007

0 100m

impact assessment: part 3A application

Moore College Site

little queen street, Newtown

figure 2

site

prepared on behalf of moore college

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Site B contains 4 residential buildings associated with MTC. The buildings include two single storey semis on the corner of Little Queen Street and Carillon Avenue; and two single storey semis on the corner with Little Queen Street and Campbell Street.

Site C includes a row of 10 two storey terraces which front Little Queen Street and 2 x single storey semi-detached dwellings on the corner with Little Queen Street and King Street.

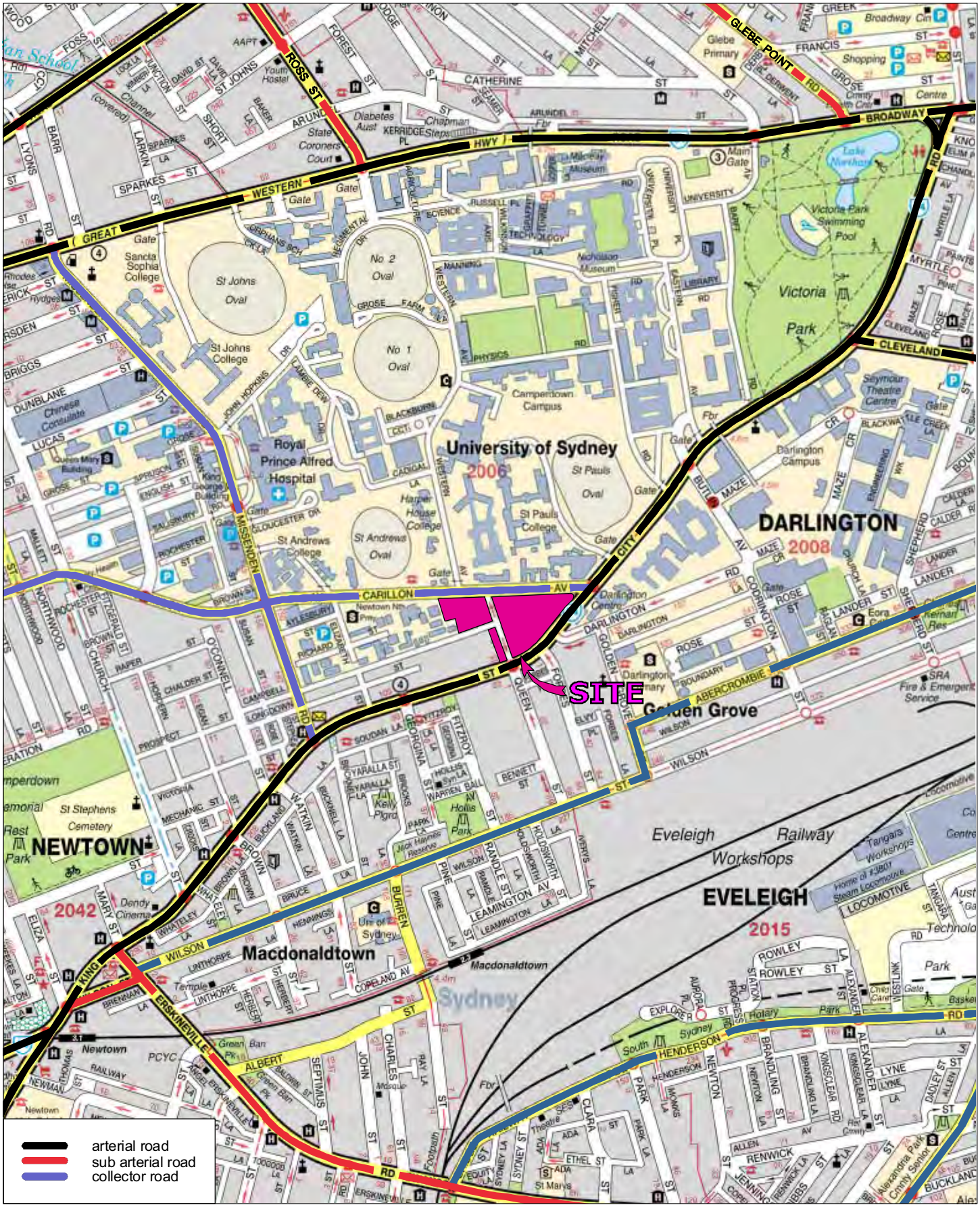
Reference should also be made to the Photographic Record presented in **appendix 1**, which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

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:

- King Street: is an important RTA State Road (SH 1 – the Princes Highway) carrying some 22,000 vehicles per day in the vicinity of the site and serving as a vital link between the Sydney CBD and the southern suburbs. It forms the southern site boundary;
- Missenden Road: is a sub-arterial road connecting Parramatta Road in the north with King Street in the south, which lies to the west of the site. It is also an important local access to the RPA Hospital and Sydney University. It carries some 9,500 vehicles per day;
- Carillon Avenue: is a sub-arterial road connecting Missenden Road to the west and King Street to the east. It is an important local access route to Sydney University and the Moore Theological College. It carries about 11,000 vehicles per day.
- Campbell Street: is a local road providing access to the rear of properties fronting both Carillon Avenue and King Street. It also traverses through the subject site. It carries a daily traffic volume of about 350 vehicles per day.
- Little Queen Street is a local access road (a shared zone) providing a local connection between Carillon Avenue and King Street. It runs one-way northbound, north of Campbell Street (about 200 vehicles per day) and one way southbound, south of Campbell Street (about 150 vehicles per day).



impact assessment: part 3A application

Moore College Site

little queen street, Newtown

figure 3

road hierarchy

prepared on behalf of moore college

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It can be seen from figure 3 that the site is conveniently located with respect to the arterial road system serving the region, while local access is available using the above routes.

3.2 overview of existing traffic conditions

King Street is a divided road that carries three lanes in each direction generally north of Carillon Avenue; and two lanes in each direction slightly to the south of Carillon Avenue in the vicinity of Darlington Road. It has clearway restrictions on both sides and forms traffic signal controlled intersections with both Carillon Avenue and Missenden Road.

The intersection of Carillon Avenue with King Street incorporates a single right turn lane (recently altered

by the RTA from a dual right turn lane) for the movement from King Street into Carillon Avenue (north to west). It also includes a left turn slip lane for the movement into Carillon Avenue.

The intersection of Missenden Road with King Street is a 'T' junction which provided two lanes on all approaches, with no turn bays provided.

The intersection of Carillon Avenue with Missenden Road is a signal controlled cross intersection with two through lanes on all approaches, as well as a 30 metre right turn bay in Carillon Avenue (for movements east to north) and a 40 metre right turn bay in Missenden Road (for movements north to west).

In a more local context, the Concept Plan area is served by Campbell Street which traverses in an east-west direction and is situated between Carillon Avenue and King Street. It carries two-way flow along its length. It forms the stem of a 'T' junction with Little Queen Street at its eastern end. Little Queen Street is a shared zone and presently carries one-way flow northbound (north of Campbell Street, with exits only onto Carillon Avenue) and one-way southbound (south of Campbell Street, with exits only onto King Street. As discussed further below, separate discussions have been held with Sydney City Council officers and approval in principle has already been given to the closure of the

southern section of Little Queen Street (between King Street and Campbell Street) to through traffic movement, subject to RTA approval. This is in support of the proposed redevelopment under the Concept Plan application.

The site is presently accessed onto all street frontages via multiple driveway crossings. This includes an access onto King Street to the immediate south of Carillon Avenue, which serves the existing at-grade parking. This is proposed to be closed under the Concept Plan Application, with consequent benefits to King Street traffic flow conditions and safety. Indeed, the opportunity is being taken under the current application to rationalise and consolidate all existing driveways.

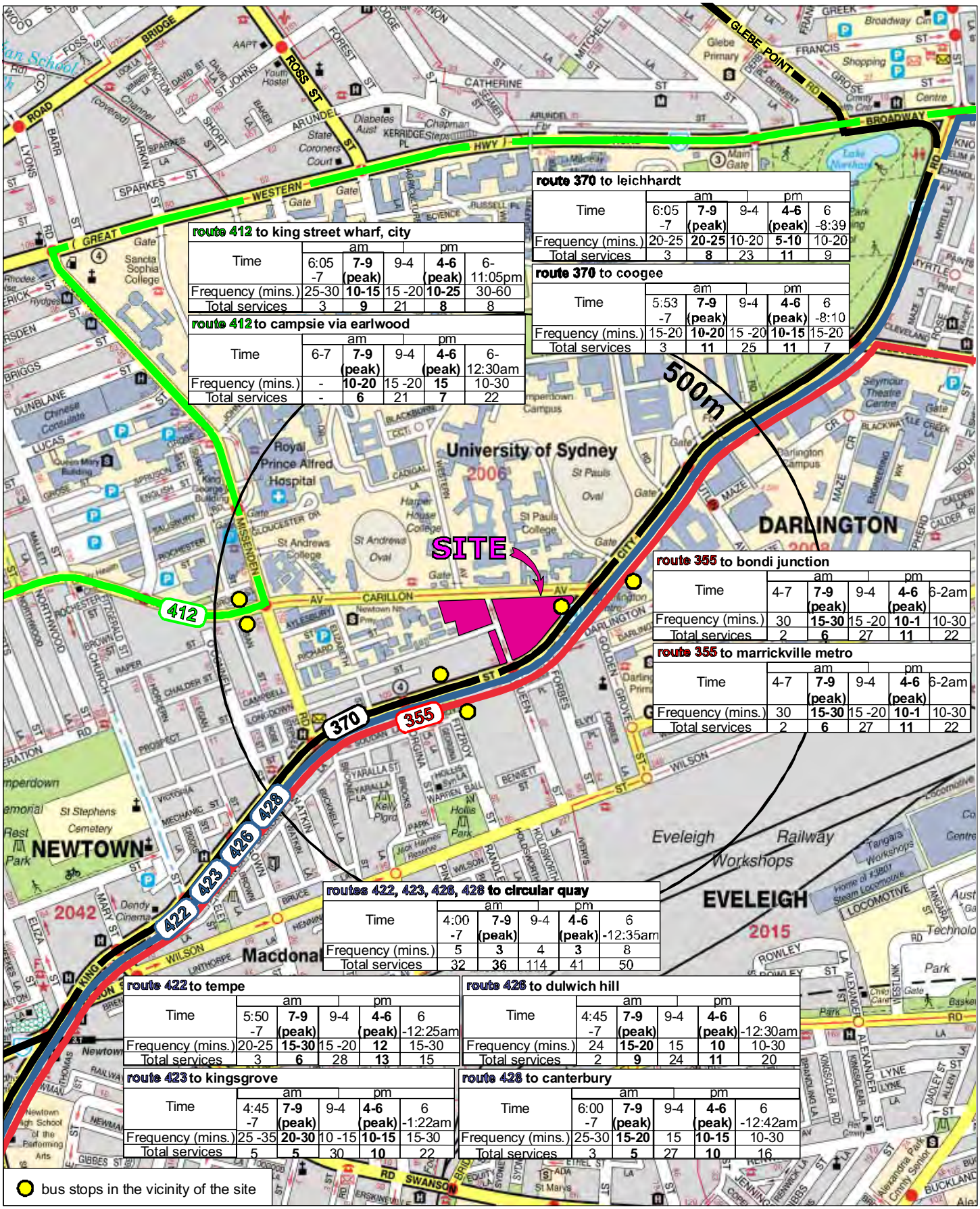
3.3 existing site generation

The site presently accommodates 318 full time students and 76 staff, including 24 faculty (teaching) staff. The levels of staff and students vary significantly over the week and at different times of the day and in addition, much of their cumulative parking demands and associated traffic generation are distributed throughout the local road system and accordingly are very dispersed, with minimal on-site parking currently provided (26 spaces).

For the purpose of assessment, no attempt has therefore been made to quantify the existing traffic generation of the uses on the site, on the basis that all impacts will now be consolidated onto the site, so that in a local context these impacts will be a net increase. This is clearly a worst case scenario as in effect, this traffic is already on the road network and will create impacts at all intersections of interest, as assessed further below.

3.4 existing public transport services

The site benefits from excellent access to bus services as shown in **figure 4**. These services are important for both the journey-to-work as well as student and other trips, with direct services provided to the Sydney CBD, Leichhardt, Bondi Junction, Marrickville Metro, Canterbury, Kingsgrove, Tempe, Campsie and Coogee.



route 412 to king street wharf, city

Time	am			pm	
	6:05 -7	7-9 (peak)	9-4	4-6 (peak)	6- 11:05pm
Frequency (mins.)	25-30	**10-15**	15 -20	**10-25**	30-60
Total services	3	**9**	21	**8**	8

route 412 to campsie via earlwood

Time	am			pm	
	6-7	7-9 (peak)	9-4	4-6 (peak)	6- 12:30am
Frequency (mins.)	-	**10-20**	15 -20	**15**	10-30
Total services	-	**6**	21	**7**	22

route 370 to leichhardt

Time	am			pm	
	6:05 -7	7-9 (peak)	9-4	4-6 (peak)	6 -8:39
Frequency (mins.)	20-25	**20-25**	10-20	**5-10**	10-20
Total services	3	**8**	23	**11**	9

route 370 to coogee

Time	am			pm	
	5:53 -7	7-9 (peak)	9-4	4-6 (peak)	6 -8:10
Frequency (mins.)	15-20	**10-20**	15 -20	**10-15**	15-20
Total services	3	**11**	25	**11**	7

route 355 to bondi junction

Time	am			pm	
	4-7	7-9 (peak)	9-4	4-6 (peak)	6-2am
Frequency (mins.)	30	**15-30**	15 -20	**10-1**	10-30
Total services	2	**6**	27	**11**	22

route 355 to marrickville metro

Time	am			pm	
	4-7	7-9 (peak)	9-4	4-6 (peak)	6-2am
Frequency (mins.)	30	**15-30**	15 -20	**10-1**	10-30
Total services	2	**6**	27	**11**	22

routes 422, 423, 426, 428 to circular quay

Time	am			pm	
	4:00 -7	7-9 (peak)	9-4	4-6 (peak)	6 -12:35am
Frequency (mins.)	5	**3**	4	**3**	8
Total services	32	**36**	114	**41**	50

route 422 to tempe

Time	am			pm	
	5:50 -7	7-9 (peak)	9-4	4-6 (peak)	6 -12:25am
Frequency (mins.)	20-25	**15-30**	15 -20	**12**	15-30
Total services	3	**6**	28	**13**	15

route 426 to dulwich hill

Time	am			pm	
	4:45 -7	7-9 (peak)	9-4	4-6 (peak)	6 -12:30am
Frequency (mins.)	24	**15-20**	15	**10**	10-30
Total services	2	**9**	24	**11**	20

route 423 to kingsgrove

Time	am			pm	
	4:45 -7	7-9 (peak)	9-4	4-6 (peak)	6 -1:22am
Frequency (mins.)	25 -35	**20-30**	10 -15	**10-15**	15-30
Total services	5	**5**	30	**10**	22

route 428 to canterbury

Time	am			pm	
	6:00 -7	7-9 (peak)	9-4	4-6 (peak)	6 -12:42am
Frequency (mins.)	25-30	**15-20**	15	**10-15**	10-30
Total services	3	**5**	27	**10**	16

bus stops in the vicinity of the site

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impact assessment: part 3A application

Moore College Site

little queen street, Newtown

figure 4

transport routes and timetable summaries (monday to Friday)

prepared on behalf of moore college

by **traffix traffic & transport planners**

MTC is located at the intersection of Carillon Avenue and King Street. The College is also therefore approximately 10 minutes walk from Redfern, McDonaldtown and Newtown Railway stations.

These services provide a very high level of public transport accessibility which is comparable to a CBD location in many respects. Nevertheless, the educational nature of the proposed uses and in particular issues relating to part-time staff and student travel during the evenings and on weekends require a higher level of parking than might otherwise be the case.

3.5 existing intersection performances

For the purposes of the assessment of traffic impacts of this development, surveys were undertaken to establish the performance of the existing road system during the AM peak period. This was established as being the more critical peak period as most students and staff in the morning coincides with the on-street peak period, while in the afternoon a more dispersed trip profile occurs.

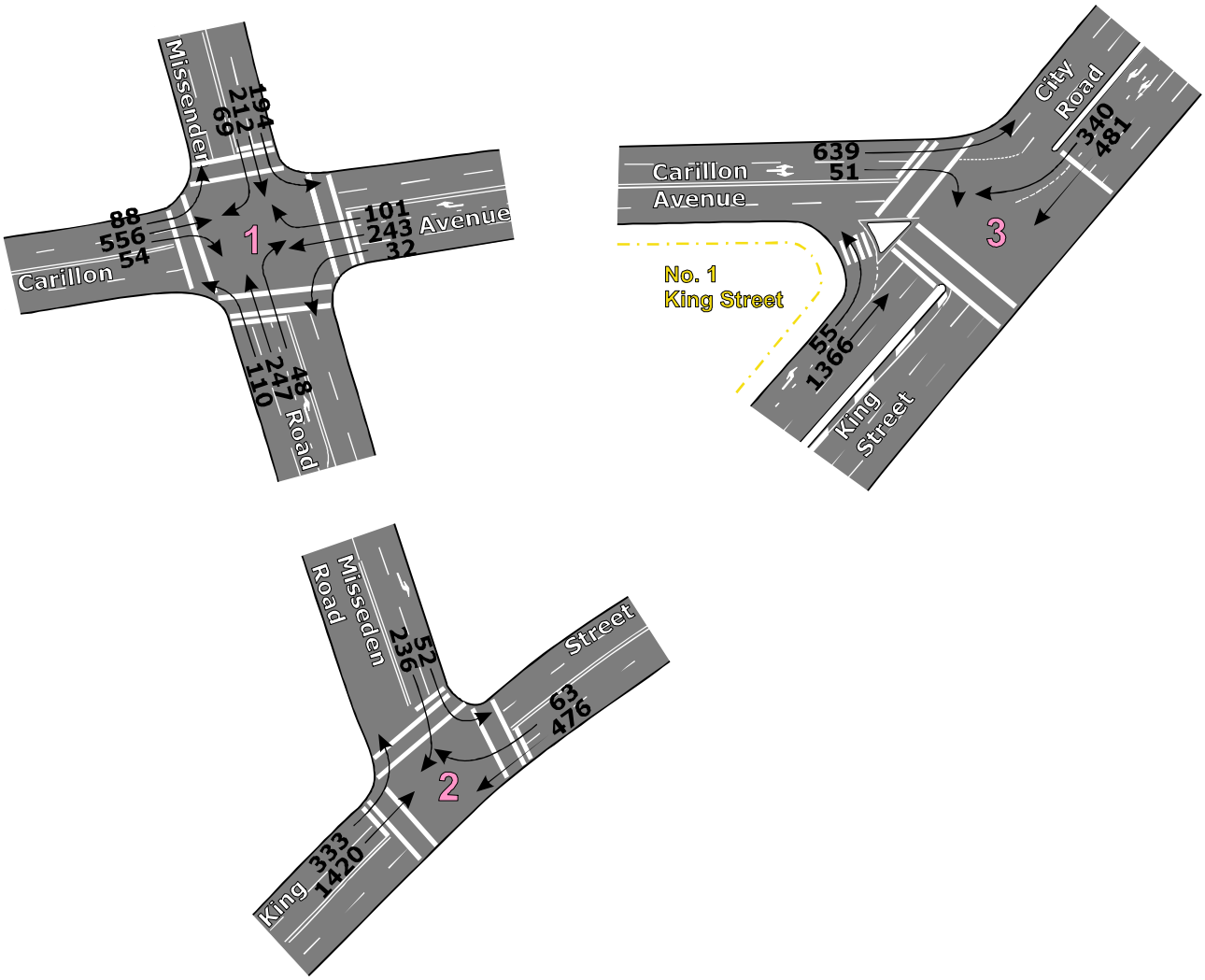
Surveys were therefore undertaken at the following intersections between 7am and 9am on Tuesday 1st April 2009:

- King Street (City Road) and Carillon Avenue;
- King Street and Missenden Road; and
- Carillon Avenue and Missenden Road.

Surveys were also undertaken locally which covered the following intersections:

- Little Queen Street and King Street;
- Little Queen Street and Campbell Street; and
- Little Queen Street and Carillon Avenue.

The results of the survey at the critical (signal controlled) intersections are presented in **figure 5**, which show the peak flows over the maximum hour at each intersection, typically between 7.45am and 8.45am. Based on these survey results, the above signal controlled intersections were analysed using the SIDRA computer program to determine their performance under existing traffic conditions.



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aerial photograph

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impact assessment: part 3A application
Moore College Site
little queen street, Newtown

figure 5
existing am peak traffic volumes

prepared on behalf of moore college
by **traffix traffic & transport planners**

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 DS approaches 1, it is usual to attempt to keep DS to less than 0.9. When DS 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.

The results of the modelling for each intersection are summarised in table 1 for all approaches. It will be noted in this regard that conditions at all other times will be improved, with lower delays.

table 1: existing intersection performance during the am peak period

Intersection Description	Control	Time Period	Degree of Saturation	Intersection Delay (secs)	Level of Service
King/Carillon	Signals	AM	0.977	56.7	E
King/Missenden	Signals	AM	0.849	29.9	C
Carillon/Missenden	Signals	AM	0.901	44.8	D

It is noted that the delays above relate to average delays in the case of traffic signal. It can be seen from table 1 that all the above intersections operate generally satisfactorily during the AM peak period with the exception of the intersection of Carillon Avenue with King Street which is at capacity. This results from the recent change from a dual right turn lane into Carillon Avenue and this changed has caused an increase in delays and a change from Level of Service D to level of service E. Reference should be made to the SIDRA outputs provided in **appendix 3a** which show the performance of individual approaches and movements at these intersections.

The local intersections identified above all experienced negligible volumes along Little Queen Street, with a maximum flow of 11 veh/hr out onto Carillon Avenue. This traffic is associated with minimal delays and single vehicle queuing.

In this regard, 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 the following sections.

4. description of proposed development

A detailed description of the Concept Plan application is provided in the Environmental Assessment report prepared by JBA Urban Planning Consultants. The MTC redevelopment proposal, as shown in **appendix 2**, includes the following:

- demolition of:
  - Mary Andrews College (18-28 Carillon Avenue)
  - MTC Dining Hall (2-16 Carillon Avenue)
  - 7 x 2 storey terraces (1-13 Little Queen Street)
  - 2 x 2 storey terraces (3-5 King Street)
  - A 2 storey terrace (7 King Street)
  - mixed use building (27-31 King Street)
  - the rear of mixed use building (21-25 King Street)
  - the 4 residential buildings on Site B (30-44 Carillon Avenue)
  - the weatherboard building at 48 Carillon Avenue
- redevelopment of Site A including:
  - construction of a new 7 storey library (Building A1)
  - refurbishment of Buildings A3, A4, A5 and A7
  - construction of an additional third storey to the existing two storey residential terraces
  - construction of a new 5 storey residential college and teaching facilities (Building A8)
  - construction of the campus green and associate private outdoor recreation areas
  - entries and circulation thoroughfares between King Street and Carillon Avenue.
- construction of 4 new residential college/flat buildings at Site B including:
  - Building B1 (6 storeys) WEST
  - Building B2 (9 storeys) CENTRAL
  - Building B3 (6 storeys) EAST
  - Building B4 (4 storeys) SOUTH
  - associated private open space
- conservation works to Site C for continued use as residential uses;
- construction of two associated basement and level car parks; and
- associated public domain improvements.

As shown in appendix b, the proposed Concept Plan generally retains the existing distribution of land uses across the site. Academic uses are primarily located within Site A and are predominantly on the first two levels around a central Campus Green. A new library is proposed on the corner of King Street and Carillon Avenue, with teaching and office/administration uses located throughout Buildings A2, A3, A5, A7, and A8. Retail uses will be maintained at the ground level of Buildings A3, A4 and A5 to provide activation to the King Street frontage. Buildings A6 and the upper levels of A8 will continue to be used for student accommodation.

Sites B and C will also continue to be used for student accommodation. Two levels of basement car parking will be located on Site B. Elevated open space areas will be located between Buildings B1, B2 and B3.

The parking and traffic impacts arising from the Concept Plan are discussed in the following sections. Reference should be made to the plans submitted separately to the Department of Planning, some of which are presented at reduced scale in appendix 2 for ease of reference. It is emphasised that these plans are to be amended slightly to accommodate changes required for the Preferred Projects.

It is also noted that the above three sites 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 facilities will be drawn from the on-site population, so that there will be a high proportion of walking trips, thereby containing external travel demand.

5. transport, traffic and accessibility

5.1 introduction

The traffic impact assessment undertaken in this report, as discussed in this section below, is premised upon the maintenance of very high levels of public transport utilisation as presently occurs, particularly during the day on weekdays. This is presently achieved through reliance by staff, students and visitors on the excellent bus and rail services that are available in very close proximity to the site, as discussed in Section 3 of this report.

Nevertheless, to the extent that private transport is currently used, these parking demands generally occur on-street, including within local residential areas. These demands are atypical in that they relate to peak activity levels on weekends and during the evenings, with many student placements in various suburbs around Sydney, which requires travel at times when public transport services are not as attractive as during the day on weekdays. In this respect, the College has unique travel characteristics. It is therefore emphasised that the principle objective of the Concept Plan is to remove these parking impacts to within the site, which is expected to result in a concentration of traffic activity associated with the site; but no significant increase in traffic activity in the region generally. That is, the application responds to existing demands to a significant extent, with only limited capacity to accommodate future growth.

The main traffic impacts associated with the development will therefore relate mainly to the concentration of traffic activity that is currently spread throughout the locality; to within the site. To the limited extent that the on-site parking will accommodate additional growth from the proposed expansion, the application of DCP No. 11 parking controls still achieves the suppression of travel demand generally. This is because DCP No. 11 parking rates are restrictive and less than the RTA's "unconstrained" parking rates embodied in the RTA's Guideline. The Concept Plan also proposes various initiatives as discussed below, including the 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.

5.2 parking requirements

5.2.1 parking rates and provision

DCP 11 sets guideline parking rates for a range of development types. The rates will be used during the detailed design and development of future Project Applications for the site. The 'nominal' parking rate applicable to the subject Project Application for tertiary education establishments is 1 space per 2 staff plus an additional 1 space per 20 full time students. At this stage, specific staffing levels and rosters are not known and will be the subject of later project applications. Accordingly, regard has been given separately to the expected requirements of the predominantly administrative (including library) uses on site A; and the residential uses on Sites B and C.

Site A Parking

The uses on Site A include:

- 16,884m2 of teaching/administration (Functional) area (including 4,866m2 teaching area and 10,658m2 library area);
- 624m2 of ancilliary retail (Functional area); and
- 3,260m2 of residential area, excluding foyers and comprising 9 existing terraces and 13 x five bedroom dwelling units (Functional area).

In the absence of staff and student numbers to be on site at any one time, a theoretical approach has been taken to enable the application of the generic DCP rates for students and staff. An average density of 25 student/100m2 has been assumed, which at the DCP rate of 1 space/20 students equates to a rate of 1 space/80m2. A staff density of 2 staff/100m2 (teaching and admin combined) has also been assumed (i.e. 1 staff per 12 students) which at the DCP rate of 1 space/2 staff equates to 1 space/100m2. With 4,866m2 of teaching/ancilliary area an average rate for staff and students combined of 1 space/90m2 has been adopted. This results in a need for 55 parking spaces. It is considered that this is the minimum level of provision.

The library is essentially ancilliary and will involve moderate staff and predominantly student walking trips. Based on the rate derived above, it would require 118 spaces. However, it is considered that provision of 60 spaces (equivalent to about 1 space/180m2) would be sufficient for staff and students, bearing in mind also that the library will be available to the general public.

The retail uses (624m2) attract a requirement of 1 space/50m2 (small shops) and this results in a need for 13 spaces.

The residential component comprises 9 terraces which require 9 spaces. The 13 five bedroom units nominally require 19 spaces, based on 1.2 spaces/unit, including 3 visitor parking proposed, resulting in a total of 28 residential spaces. It is considered however that this is inadequate for large units based on experience with current student needs, and provision of a minimum of 2.0 spaces per 2 bedroom unit is more appropriate. This increases the residential parking from 28 spaces to 38 spaces. In summary, based on the above analysis, Site A nominally requires 166 spaces, as follows:

- 55 spaces for staff and students;
- 60 library spaces;
- 13 retail spaces; and
- 38 residential spaces

In response, 170 spaces are proposed. These are able to be accommodated based on the principles established in the Concept Plan conceptual drawings, with all access via Carillon Avenue. It is noted however that the Stage 1 Project Application proposes the construction of only 68 of these spaces in Stage 1, as discussed further in the Project Application section of this report, in support of the library building.

It is also noted that it may be desirable to accommodate the residential component of Site A (a minimum of 28 spaces but desirably 38 spaces as discussed) within the Site B parking area, so that all residential parking can be consolidated. The provision of a total of 170 spaces within Site A would in this situation provide a degree of flexibility to accommodate higher demands as may occur with higher staff and/or student densities; or for occasional higher peaks on special occasions. This would in turn mean that an additional (minimum) 28 spaces would need to be provided on Site B. This can be considered further in subsequent Project Application/s.

Site B and Site C Parking

Site B includes residential uses with a total floor area of 12,712m2 (Functional area), comprising 77 residential units for students and Faculty families, indicatively:

- 12 two bedroom units;
- 29 three bedroom units;
- 20 four bedroom units; and
- 16 five bedroom units.

This accommodation is for long stay students who in many cases have families. Based on DCP No. 11, these require 101 parking spaces as follows:

- 12 two bedroom units at 0.8/unit 9.6 spaces;
- 29 three bedroom units at 1.2/unit 34.8 spaces
- 20 four bedroom units at 1.2/unit 24.0 spaces
- 16 five bedroom units at 1.2/unit 19.2 spaces
- 77 units visitors at 1/5 units 13.0 spaces.

It can be seen that Sites B and C together require 112 spaces based on DCP No. 11. However, this does not take full account of the likely demands associated with the larger dwellings (3, 4 and 5 bedroom), based on experience with existing student needs. These size units are not specifically considered under DCP No. 11 and additional parking would also be permitted under the RTA's Guidelines. Accordingly, it is recommended that an average provision of 2.0 spaces per unit be provided for the larger four and five bedroom units, which results in a need for:

- 12 two bedroom units at 0.8/unit 9.6 spaces;
- 29 three bedroom units at 1.2/unit 34.8 spaces
- 20 four bedroom units at 2.0/unit 40.0 spaces
- 16 five bedroom units at 2.0/unit 32.0 spaces
- 77 units visitors at 1/5 units 13.0 spaces.

It can be seen that there is a need for a total of 130 spaces. If the additional minimum 28 residential spaces and desirable 38 spaces required for Site A are included, then this results in a need for 158 and 168 spaces respectively.

In response, the Concept Plan proposes 170 spaces within Site B which is considered satisfactory. It will also be noted that subsequent Project Applications will be able to attune parking more accurately to future needs as they become apparent.

It is emphasised that these demands are not all additional demands as these used already occur on-street, with limited on-site parking. The development will therefore result in the displacement of existing on-street parking demands which will improve the amenity of residential precincts and improve access to the locality for other businesses and institutions.

5.2.2 disabled parking

This is a matter for assessment during later Project Application/s and compliance with relevant Australian Standards is proposed. Refer to Project Application reports. As a guide, 2-3% of all parking should be provided as disabled parking (i.e. 10 spaces across all sites).

5.2.3 servicing

The road system essentially retains all existing on-street loading, but with the controlled use of Little Queen Street, between King Street and Campbell Street, which is to be secured with bollards as discussed with Council officers.

It is recommended that as all existing on-street demands associated with existing uses on Sites A, B and C are to be removed from on-street, there is ample opportunity to establish a 15 metre loading area within Carillon Avenue adjacent to the main lobby serving the library. This is a matter that requires consideration by Council's traffic committee, noting that on-street demands will reduce as a consequence of the proposed development.

Finally, a loading dock is provided within the plaza area. This enables a truck to enter via Carillon Avenue, reverse into the dock, then exit onto Little Queen Street or Campbell Street. This dock is central to all uses within Sites A, B and C.

Servicing of the residential component of the development will be accommodated on-street by Councils garbage services, which will be assessed for all relevant Project Applications.

5.3 pedestrians and bicycles

The existing pedestrian and bicycle network linkages, as well as pedestrian safety amenity in general, are to be improved through the following initiatives:

- Removal of all existing at-grade parking to basements, accessed via Carillon Avenue, so that pedestrian only movement is provided at Ground Level within the site;
- Introduction of a plaza within Site A to provide a predominant pedestrian function, with only occasional use by service vehicles. It is recommended that this plaza be signposted as a shared zone to reinforce its predominant pedestrian role;
- Closure of Little Queen Street between King Street and Campbell Street, with use of bollards to provide service and emergency vehicle access when required. This is the subject of a separate application to Council but has been agreed in principle (refer Appendix 4);
- The DCP also requires that 1 bicycle space per 20 staff/students also be provided. These will be provided within the basement car parks and on campus as part of subsequent Project Applications. In addition to the secure parking areas, showers and change rooms will be provided to further encourage students to use bicycles.
- Connectivity to all footpath systems in the locality on all public roads, with the ability to access bus services on King Street and Missenden Road, as well as rail services.

In summary, the development of the public road network within the site provides an internal system of footpaths that will allow pedestrians to move freely within and through the site. This system links with the existing pedestrian network external to the site. Safe crossing opportunities are available on all desire-lines.

It is expected that cyclists will continue to use the road carriageways that are provided as a shared on road facility. This is considered appropriate and in addition, cyclists will have access to both basement and at-grade racks.

5.4 pedestrian safety

The internal design and particularly vehicle access locations has taken due account of pedestrian safety. The internal design removes all vehicular activity from within the site (other than occasional service vehicles using the plaza) with resultant safety and amenity benefits. Pedestrian movements across vehicular crossings on all road frontages are also improved. All driveways are designed as standard laybacks so that pedestrians have priority and are in accordance with AS 2890.1 and AS 2890.2, which includes the provision of appropriate sight lines.

The existing footpath crossings in King Street across Little Queen Street and across Carillon Avenue at Little Queen Street are to be improved by the provision of a raised section of footpath to provide a continuous flush footpath crossing. This will also slow traffic.

5.5 travel demand measures

5.5.1 taxi services

Taxi services will be able to access the site directly via the existing road system. It is recommended that consideration be given to the provision of a short taxi rank in Carillon Avenue adjacent to the site. This is also made possible by the removal of extensive existing on-street demands to within the site.

5.5.2 car share and car pool arrangements

It is considered that car share arrangements for staff could form an integral part of future Project Applications. This would be prepared having regard for relevant guidelines. In general, a parking system such as “GoGet” could be considered which has potential application to all non-resident land uses and this will be effective in reducing staff parking demands in particular. It is expected that adoption of a car share and ride share policy will also encourage reduces car dependency for non-resident trips. The implementation of a car share policy is a matter that can be conditioned having regard for relevant guidelines in association with individual applications.

It is recommended that consideration could be given to provision of an on-street car share space in Carillon Avenue. This would ensure a high level of visibility to the principle academic uses and is therefore preferable to basement parking.

5.5.3 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 educational uses, a target of far greater than 10% is considered achievable. Specifically, the provision of a total of 340 parking spaces on the site is expected to be responsive to existing demands associated with 318 student body (and 76 staff), as

well as some of the expansion to 600 students (and 110 staff) that will occur within a decade. Beyond that the college is expected to increase to 1,200 students (and 190 staff) at ultimate capacity. These long term demands for students as well as staff clearly cannot be accommodated on-site with only 340 spaces, so that a heavy and increasing reliance on public transport and other non-car modes is expected to occur over time. The task of managing this demand will involve promoting the use of other travel modes including public transport, cycling and walking as discussed above and in addition, the preparation of a Transport Access Guide is recommended for inclusion as a condition of consent, for application to staff and students.

5.6 traffic impacts

5.6.1 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 use which has particular and unique characteristics.

The existing staff and student body that uses the Moore Theological College (318 students) presently reside throughout the metropolitan area and commute to the College by various modes of transport, with some using private cars. These trips are spread over weekdays and weekend-days. The provision of on-site residential accommodation will therefore eliminate these student trips to a significant extent in the short term, with travel within the broader region actually being reduced. This ‘internalisation’ of trips has obvious benefits relating to reduced travel demand.

In the medium term, student numbers are expected to increase from 318 to 600 (within a decade). The proposed development will accommodate some of this growing demand, including additional staff demands.

The main traffic impact will therefore result from the consolidation of all parking within the site which will not increase traffic in the wider region, but will have the effect of focussing traffic impacts locally onto Carillon Avenue, where the access driveways are proposed.

For assessment purposes, it is expected that the 170 resident spaces provided within Site B (which serve a total of 99 dwellings units associated with the total sites – A, B and C) will generate trips at a maximum of 50% of the RTA's generation, given that these residents are students and will generally not be required to leave the site. Hence, adoption of a rate of 0.28 trips per dwelling unit/hr is considered reasonable. This results in 25 veh/hr during the AM peak period. This is expected to reduce slightly in the PM peak, due to the wide spread of finishing times of students on any given day.

The 170 spaces within the Site A car park relate mainly to staff and visitors. It may be assumed that about 35% of all spaces will be used by visitors, with occasional use of spaces for 'external' students (i.e. those not living on campus) and this accounts for some 55 spaces. Traffic activity associated with these 55 spaces will be spread throughout the day, with perhaps 10 veh/hr during the AM peak. The balance of 115 spaces would be available for use mainly by staff. At a normal commercial premises, these spaces would generate 0.8 trips/space/hr based on the RTA's Guideline respective trip (2.0 veh/hr/100m2) and parking rates (2.5 spaces/100m2). With the part-time nature and variable roster times of the teaching staff in particular, a reduced rate of about 0.5 trips/space/hr is considered reasonable. The 115 spaces will therefore generate some 55 veh/hr during the AM peak. That is, the overall Site A car park will generate 65 veh/hr during the critical AM peak based on these assumptions.

5.6.2 traffic distributions

As discussed above, the overall development under the Concept Plan is expected to generate peak trips during the AM peak as follows:

Site A Car Park – AM Peak	52 in, 13 out	65 veh/hr
Site B Car Park – AM Peak	20 in, 5 out	25 veh/hr

These trips are expected to split equally to the east and west along Carillon Avenue, so that traffic increases will be as follows:

Carillon Avenue East of Site	36 in, 9 out	45 veh/hr
Carillon Avenue West of Site	36 in, 9 out	45 veh/hr

The impact of the above traffic generation and distribution onto the surrounding intersections is indicated by the future performance of the surrounding critical intersection. These intersections have been previously assessed under existing traffic conditions in Section 3.

5.6.3 Weekday peak period traffic impacts

As mentioned previously, these trips are not net additional trips as they already occur in association with on-street parking in the locality as a comparable level. Some of this traffic would already pass through the intersections assessed in Section 3, while some would not, particularly that associated with parking on the eastern side of King Street within Darlington. Accordingly, it is considered reasonable to assume that 50% of the above traffic is 'new' traffic through these intersections, which is an impact that arises solely from the concentration of parking onto the site. On this basis, the additional traffic will be moderate as follows (which assumes no use of Campbell Street to test a worst case scenario):

Carillon Avenue East of Site 18 in, 5 out 23 veh/hr

Carillon Avenue West of Site 18 in, 5 out 23 veh/hr

Based on these volumes, traffic conditions at intersections assessed in Section 3 were reanalysed, with the following results:

table 2: future intersection performance during the am peak period

Intersection Description	Control	Time Period	Degree of Saturation	Intersection Delay (secs)	Level of Service
King/Carillon	Signals	AM	0.979	63.4	E
King/Missenden	Signals	AM	0.856	30.6	C
Carillon/Missenden	Signals	AM	0.909	45.7	D

Reference should be made to the SIDRA outputs provided in **appendix 3b** which show the performance of individual approaches and movements at these intersections. It is evident that there is no change in levels of service at any intersection and in addition, delays are only marginally affected.

5.6.4 environmental amenity impacts

The assessment of environmental impacts within residential areas is an important consideration. In this regard, traffic volumes on key roads will alter due to the removal of existing on-street parking to within the site. Hence, the environmental amenity of local roads can be expected to improve as a consequence of the development.

5.6.5 demolition traffic impacts

It is anticipated that a detailed demolition and construction traffic management plan will be prepared as part of individual Project Applications, taking due account of proposed development stages.

5.6.6 site access arrangements

The development will make reliance on the developed road system as shown on the submitted Concept Plan documentation (refer to appendix 2). All accesses comply with relevant standards and will operate safely and efficiently. The following accesses are proposed:

- Car access to Site A via a combined entry-exit driveway onto Carillon Avenue. This is designed for uninterrupted two-way flow and a 6m wide driveway is sufficient in view of the moderate traffic volumes, with a peak volume of only 65 veh/hr at this access during the critical AM peak. This driveway is located 90 metres west of King Street and it is will be noted from the Sidra outputs that queues extend beyond this driveway. Accordingly, it is recommended that movements be limited to left-in and left-out only;
- Car access to Site B via a combined entry-exit driveway onto Carillon Avenue. This is designed for uninterrupted two-way flow and a 6m wide driveway is sufficient in view of the moderate traffic volumes, with a peak volume of only 25 veh/hr at this access during the critical AM peak. This driveway is located about 170 metres west of King Street and while queues extend beyond this

driveway based on the Sidra outputs, the distance is sufficient to allow flexibility with the access and restricting movements to left-in and left-out movements is not considered necessary;

- Truck access to Site A via the proposed plaza, using a one-way flow through arrangement, which can be reinforced with a management plan if necessary;
- It is noted that all other driveways, including the existing car park access onto King Street south of Carillon Avenue, are to be removed and the kerbline reinstated.

Sight distances to/from the proposed driveways exceed the requirements of AS2890.1 and AS 2890.2 and all driveways will operate safely.

5.6.7 internal design aspects

The detailed design of individual Project Applications will be subject to separate assessment and compliance with AS 2890.1 and AS 2890.2 as appropriate.

6. conclusions – concept plan

The following matters are noteworthy:

- The proposed Concept Plan follows the principles discussed in the Preliminary Environmental Assessment report but with a substantially reduced level of development intensity (from 85,0000m2 to 30,000m2);
- The proposed development is intended to provide for limited expansion, with the primary focus being the provision of residential dwelling units and improved facilities for existing and future students;
- Traffic impacts have been assessed on the basis of the land use scenario outlined in this report and can be readily accommodated, with no significant change in travel in the region but with a stronger focus of traffic activity on the Carillon Avenue frontage where driveway accesses are proposed;
- Travel demand in the region will be reduced in the short to medium term through the 'internalisation' of trips that presently involve students travelling to the college from remote accommodation. These students will be able to walk to the College;
- In the longer term (10 years and beyond) the limited on site parking (340 spaces for 1,200 students and 190 staff) will require a significantly increased reliance on public transport and other alternate (non-car) travel modes. This will require travel demand measures to be implemented and this can be conditioned in relation to individual project Applications, including provision of end-user facilities, improved pedestrian linkages, improved taxi facilities, the introduction of car share arrangements and the preparation of a Transport Access Guide for all users;
- The containment of adequate parking on-site will remove the present reliance on on-street parking in the locality by both staff and students, so that the amenity of these residential areas will be improved. This includes 170 spaces on Site A and 170 spaces on Site B, with much of this demand already occurring but involving on-street and other public parking;
- The proposed access driveways comply fully with the requirements of AS2890.1; satisfactory and will minimise conflicts;

- The access and internal design arrangements will be able to comply with the requirements of AS 2890.1 and AS 2890.2, subject to further assessment in subsequent Project Applications.

It is therefore concluded that based on this Transport and Accessibility report and having regard for the matters raised by Council, the RTA and the DoP, the proposed Concept Plan is supportable on traffic and transport planning grounds. The Plan establishes a comprehensive framework to facilitate subsequent staged Project Application/s.

The assessment of the Stage 1 (Library) Project Application is considered in the following section.

7. project application – library

Introduction

A separate Project Application has been prepared and also forms part of this report. It is concerned with the construction of the library building on Site A. The proposal is consistent with the Concept Plan application principles as discussed in the previous sections of this report. The library building includes a total floor area of about 10,658m2 and will include teaching and administration areas as well as the library. Plans showing the Project Application are provided in **appendix 5**.

Parking

It is noted that the proportion of teaching areas is flexible and not yet established and could in any event change over time. For the purpose of assessment, it has been assumed that up to 4,350m2 of teaching/ancilliary area is likely. With an average parking rate for staff and students combined of 1 space/90m2 as adopted in the Concept Plan Application, a need for about 55 spaces results. The library is essentially ancilliary and will require an additional 60 spaces as assessed in the Concept Plan application. Hence, a need for about 115 spaces is evident. In response, the Project Application provides 106 spaces which is considered satisfactory in the circumstances and is generally consistent with the Concept Plan. This will be provided with 68 spaces within Site A and 38 within Site B. The balance of parking for Site A under the Concept Plan (to serve subsequent floor area) will be provided under later Project Application/s.

The 'temporary' at-grade parking for 38 spaces on Site B to serve the library is also part of this Project Application and plans for this are provided in **appendix 6**. The car park is designed in full compliance with AS 2890.1 and incorporates a driveway onto Carillon Avenue (serving 17 spaces); and a driveway onto Campbell Street (serving 21 spaces). It is proposed that all 38 spaces will be allocated so that there is no requirement for a turning facility.

Traffic Generation

The 68 parking spaces within Site A are expected to generate some 28 veh/hr during the AM peak period, based on the rates established in the Concept Plan application, pro-rated accordingly. This will depend upon the proportion of these spaces that are allocated for visitors, noting that the rate assumes that 30% of all parking is for visitors (including any external students who do not reside on the campus). These volumes can be readily accommodated. The 17 spaces within Site B are accessed via Carillon Avenue and generate about 8 veh/hr during peak periods which is minimal. This is also comparable to the generation associated with the 21 space car park with access onto Campbell Street.

Access Design

The access design for Site A is an interim arrangement pending later stages and the proposed driveways is fully compliant with AS 2890.1, with access to only 68 spaces. This will be closed under the Concept Application and relocated about 30 metres further west. Both access driveways to Site B are also temporary, with one onto Carillon Avenue (serving 17 spaces) and one onto Campbell Street serving 21 spaces. These will both be closed under the Concept Plan and replaces with a single driveway onto Carillon Avenue, further to the west.

Internal Design

The internal design is in accordance with the requirements of AS 2890.1 and will operate safely and efficiently. Reference should be made to the swept path analysis in **appendix 7**.

Bicycles

A bike store is provided on Basement Level 1 for use by staff and students. It is recommended that some bike racks also be provided on Level 1 (Ground Floor) for use by visitors.

appendix 1

photographic record

View looking south-west along King Street at Little Queen Street.

View north south-west along King Street on approach to Missenden Road.

View looking north along the site frontage to King Street approaching Carillon Avenue.

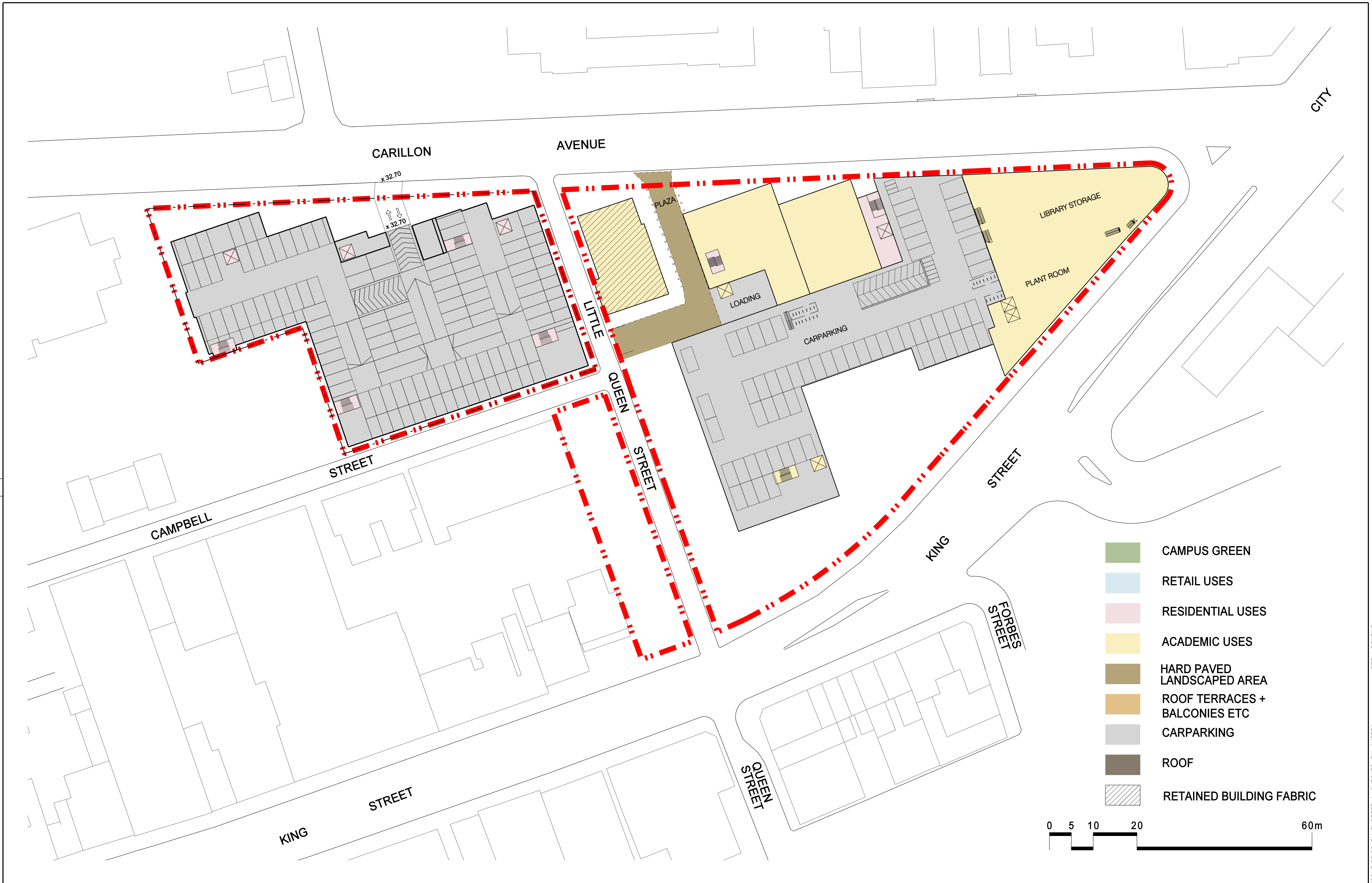
View looking east along Carillon Avenue towards King Street.

View looking west along Carillon Avenue towards Missenden Road.

View looking south along Missenden Road on approach to Carillon Avenue.

appendix 2

concept plan (extracts)



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Drawing Status
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Project
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CONCEPT PLAN

NEWTOWN

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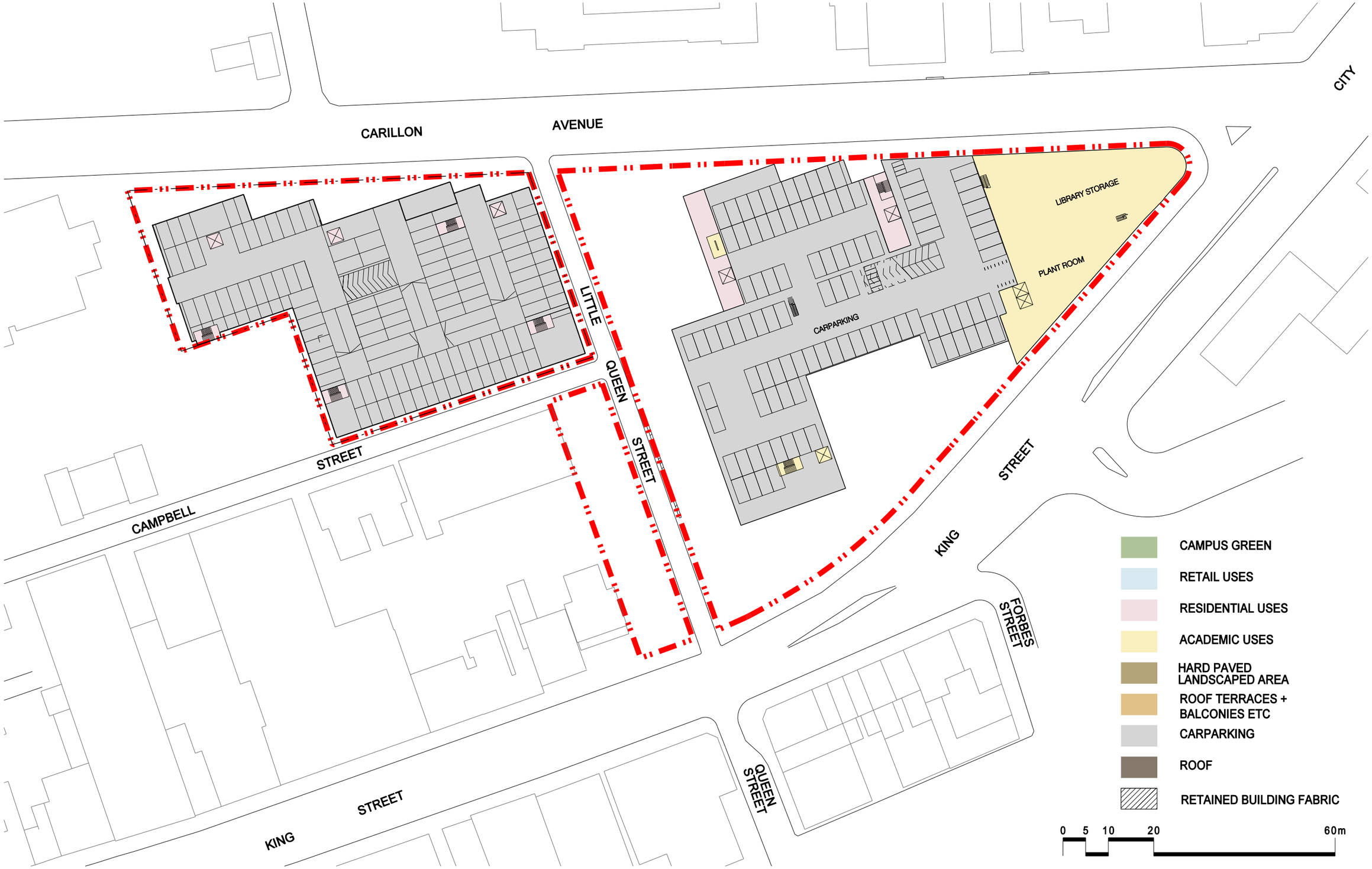

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CONCEPT PLAN

NEWTOWN

Drawing Title
BASEMENT 2 PLAN

NORTH

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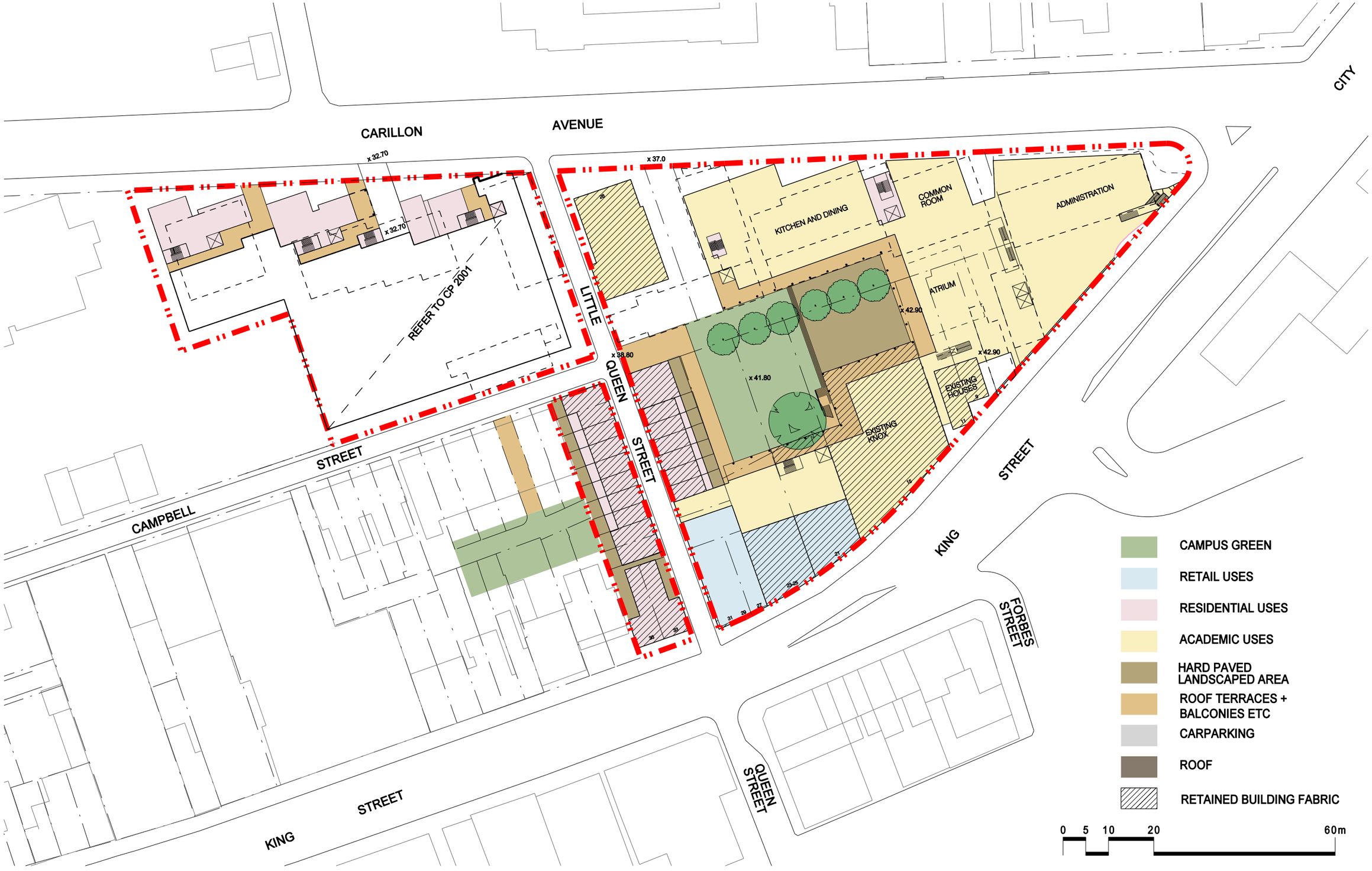

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CONCEPT PLAN

NEWTOWN

Drawing Title
LEVEL 1 PLAN

NORTH

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