asongroup

Prepared for

LORETO NORMANHURST

Transport Assessment Report

Loreto Normanhurst Long-Term Master Plan
91-93 Pennant Hills Road, Normanhurst

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Revision History

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Appendices

1 Introduction

1.1 Overview

Ason Group has been engaged by Loreto Normanhurst to prepare a Transport Assessment (TA) to support a State Significant Development Application (SSDA) for a proposed long-term Master Plan for Loreto Normanhurst (herein referred to as the School), located at 91-93 Pennant Hills Road, Normanhurst. The School is located within the Hornsby Shire Council Local Government Area (LGA) and has therefore been assessed against that Council's planning controls.

The Master Plan – which will guide the development of the School over the next 30 years - seeks to gradually redevelop or replace existing buildings with a view to improving access, movement and spatial relationships within the School's grounds, while simultaneously facilitating the future growth (students) of the School.

At this time, immediate works, which include the Stage 1 development, have been largely defined (to be completed by approximately 2027), while the timing of later Master Plan stages (through to approximately 2047) remain to be finalised. As such, this TA provides an assessment of the access, traffic and parking characteristics of the Master Plan up until 2027 as well as an assessment of the complete Master Plan.

The Stage 1 development, for which approval is also sought as part of this SSDA, consists of replacing the existing boarding facilities with a new boarding house and basement car park, and refurbishment works to the Mary Ward building. A separate Transport Statement (TS) has been produced for Stage 1, within the context of this Master Plan assessment. The report of which (*Transport Statement Report; Loreto Normanhurst Boarding House, 91-93 Pennant Hills Road, Normanhurst*, Version 1, dated 22/01/2019, Ason Group (Stage 1 Report)) is provided as **Appendix A**.

Although the ultimate Master Plan year is 2047, it is noted that it is difficult to forecast traffic conditions for this assessment year. Thus, for the purposes of this TA, an ultimate assessment of 2036 has been adopted, which aligns with the data available from the Sydney Traffic Forecasting Model (STFM), which is data based on forecast major land use and infrastructure projects/strategies across Sydney.

1.2 Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) were issued by the DPE on 12 January 2018 in regard to the Master Plan; the SEARs outline the key areas for consideration in any subsequent development application (i.e. in this SSDA) with specific requirements providing the scope for an assessment of potential traffic and transport impacts arising from the Master Plan. The SEARs include

general traffic and transport assessment requirements, as well as detailed site-specific assessment requirements prepared by the RMS.

Table 1 below provides a summary response to each of the general SEARs, while **Table 2** provides a summary response to each of the site-specific SEARs raised by the RMS. Both tables also provide a reference to section of this TA providing a more detailed analysis of each requirement.

Table 1: Secretary's Environmental Assessment Requirements - General

SEARs - General	Summary Response	TA Section
The relevant planning policies and strategic objective to be addressed by Environmental Impact Statement include: ▪ NSW State Priorities; ▪ The Greater Sydney Regional Plan, A Metropolis of three cities; ▪ NSW Future Transport Strategy 2056; ▪ State Infrastructure Strategy 2018 – 2038 Building the Momentum; ▪ Sydney's Cycling Future 2013; ▪ Sydney's Walking Future 2013; ▪ Sydney's Bus Future 2013; ▪ Crime Prevention Through Environmental Design (CPTED) Principles; ▪ Healthy Urban Development Checklist, NSW Health; ▪ Better Placed – an integrated design policy for the build environment of NSW; ▪ Greater Sydney Commission's Western City District Plan; ▪ Better Placed – An integrated design policy for the built environment of NSW 2017; and	The relevant planning policies and strategic objectives are considered within this Transport Assessment.	
Accurate details of the current daily and peak hour vehicle, public transport, pedestrian and cycle movement and existing traffic and transport facilities provided on the road network located adjacent to the proposed development.	This TA Report provides an overview of public transport, pedestrian connectivity, bicycle networks and all traffic and transport facilities of the existing School.	3 & 6
An assessment of the operation of existing and future transport networks including the bus network and their ability to accommodate the forecast number of trips to and from the development.	This TA Report provides an assessment of public transport, pedestrian, bicycle trips and the ability of the network to accommodate the additional trips generated by the 2027 and 2047 Master Plan.	9
Details of estimated total daily and peak hour trips generated by the proposal, including vehicle, public transport, pedestrian and bicycle trips based on surveys of the existing and similar schools within the local area.	A detailed assessment of the potential peak hour vehicle trip generation of the 2027 and 2047 Master Plan is provided in Section 8. Further information regarding public transport, pedestrian, and bicycle trips is detailed in Section 9.	8 & 9
The adequacy of public transport, pedestrian and bicycle networks and infrastructure to meet the likely future demand of the proposed development.	Section 9 provides information regarding adequacy of existing public transport and pedestrian infrastructure to accommodate the future demand of the Master Plan. The implementation of a Green Travel Plan (GTP) would encourage a switch from private vehicle use to non-car modes by all students and staff at the School.	9

	TfNSW Guidelines state that bus services influence the travel mode choices of sites within 400 metres (5 minutes' walk) of a bus stop; the School is highly accessible by bus services operating along Pennant Hills Road, with bus stops located outside the School. TfNSW Guidelines state that train services influence the travel mode choices of sites within 800 metres (10 minutes' walk) of a train station. The Site is currently 650m from Normanhurst Station. The Site is accessible for pedestrians approaching from all directions with appropriate footpath facilities and a pedestrian overbridge providing safe access over Pennant Hills Road and a direct linkage to the train station. The School is therefore adequately catered for by the extensive transport amenities in the area.	
The impact of the proposed development on existing and future public transport infrastructure within the vicinity of the site in consultation with Roads and Maritime Services and Transport for NSW and identify measures to integrate the development with the transport network.	A Consultation Meeting was requested via email in November 2018. During a telephone conversation between Ason Group and RMS in December 2018 with regards to the request, the assessment methodology was discussed, and it was agreed that RMS would provide traffic forecast data from the STFM to inform this assessment. This was confirmed in following email correspondence, with data provided by RMS on 5 December 2018. Once RMS have had the opportunity to review the application in detail and require a meeting, Ason Group would be available when necessary.	
Details of any upgrading or road improvement works required to accommodate the proposed development.	It is not expected that upgrading or road improvement works are required as part of the development. The 2027 Master Plan is not expected to have a material impact on the road network. It is difficult to predict the traffic conditions of the road network in 2047, however this assessment has adopted an ait is not expected that the Ultimate Master Plan would not have a material impact on the road network in 2047 given that a GTP would be implemented at the School. The GTP would encourage a change in travel behaviour, thus decreasing the traffic impacts of the School.	8
Details of travel demand management measures to minimise the impact on general traffic and bus operations and to encourage sustainable travel choices and details programs for implementation, including the preparation of a Green Travel Plan.	A Travel Plan Framework has been outlined in Section 9.4. The GTP is intended to develop a package of site-specific measures to promote and maximise the use of sustainable travel modes, including walking, cycling, public transport and car sharing. This draft package would be further developed at CC and OC stages, and it is expected that a suitable condition of consent would be imposed requiring approval by Council.	9
The impact of trips generated by the development on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for upgrading or road improvement works, if required. Traffic modelling is to be undertaken using, but not limited to, SIDRA network modelling for current and future years.	Section 8 details the methodology undertaken for the traffic assessment, including SIDRA modelling of the key intersections of Pennant Hills Road / Normanhurst Road / Osborn Road and Pennant Hills Road / Mount Pleasant Avenue.	8
The proposed active transport access arrangements and connections to public transport services.	As discussed in Section 6, the School is already highly accessible by public transport. Further, bicycle parking and End of Trip Facilities would be provided in compliance with Council requirements for each of the buildings developed as part of the Master Plan.	7

The proposed access arrangements, including car and bus pick- up/drop-off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones.	An existing pick-up / drop-off facility and is provided on Osborn Road. As detailed in Section 10, all access and internal design components have been designed in accordance with the appropriate Australian Standards.	10
Measures to maintain road and personal safety in line with CPTED principles.	Crime prevention through environmental design (CPTED) is a multi-disciplinary approach to deterring criminal behaviour. The three principles of CTPED involve: ▪ Natural surveillance – this involves a design which places activities and physical features in a way that facilitates natural surveillance of that area. For example, if parking areas aren't located in locked, secured facilities they should have natural surveillance. ▪ Access Control – access can be restricted by physical barriers which can increase an effort to conduct a crime ▪ Ownership – criminal and antisocial behaviour thrive in isolated and unused places. Fences, paving, art, signs, good maintenance and landscaping are some physical ways to express ownership. Identifying intruders is much easier in a well-defined space. The CTPED principles that have been incorporated from a traffic and transport perspective to maintain road and personal safety are as follows: ▪ Compliance with Australian Standards (Access & Parking). ▪ Provision of access gates which can be closed during out of School hours.	10
Proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries.	Bicycle parking, including end of trip facilities is to be provided in accordance with Council requirements for each building to be developed as part of the Master Plan.	7
Proposed number of on-site car parking spaces and corresponding compliance with existing parking codes and justification for the level of car parking provided on-site.	As discussed in Section 7, the additional car parking required would be provided in accordance with Council's DCP. The car parking currently accessed via Pennant Hills Road and Mount Pleasant Avenue would be replaced with underground car parking, with the number of spaces to remain the as per the Status Quo. The existing car parking accessed via Osborn Road is to be consolidated into 1 underground car park with the additional parking required to service the 2027 and 2047 Master Plans to be provided in the same consolidated car park.	7
Details of emergency vehicle access arrangements.	Emergency access arrangements would remain as per the current arrangements, with access provide via multiple points across the School Campus.	N/A
An assessment of road and pedestrian safety adjacent to the proposed development and the details of required road safety measures.	Section 5.4 provides as summary of the historical crash data at the key intersections around the School. It is worthy of note that Mount Pleasant Avenue would not be subject to any increased traffic volumes as result of the Master Plan, with the pick-up / drop-off and additional parking accessed via Osborn Road. This strategy recognises the safety benefits that signals provide. There have been no recorded fatal accidents at the Osborn Road / Pennant Hills Road intersection and only 1 serious injury. The pedestrian footbridge across Pennant Hills Road provides a safe route to the northern side of the road	5 & 6

	and exiting footpaths in the vicinity of the School are of a high quality (soft gradient, minimal holes, etc.)	
Service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times).	The existing servicing dock which is located centrally on the Site is to be moved as part of the new boarding facilities. The loading dock is currently accessed via Mount Pleasant Avenue and the proposed loading dock would also be accessed via Mount Pleasant Avenue, with the arrangements to remain as currently required. The maximum servicing vehicle required is a 6.4m SRV.	7 & 10

Table 2: Secretary's Environmental Assessment Requirements - RMS

SEARs - RMS	Summary Response	TA Section
Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required). The following signalised intersections are to be examined/modelled as a result of the development: ▪ Pennant Hills Road at Osborn Road / Normanhurst Road intersection ▪ Pennant Hills Road at Mount Pleasant Avenue intersection	As above, SIDRA intersection analysis has been conducted of the nominated intersections. A detailed assessment of the potential peak hour vehicle trip generation of the 2027 and 2047 Master Plan is provided in Section 8.	8
Details of the proposed site access and the parking provisions with the proposed development including compliance with the requirements of the relevant Australian Standards (i.e. turn paths, sight distance requirements, aisle widths, etc).	A description of the Master Plan Proposal is provided in Section 2 and an assessment of the relevant Australian Standards is provided in Section 10.	2 & 10
Detailing vehicle circulation, proposed number of car parking spaces and compliance with the appropriate parking codes.	One of the overall aims of the Master Plan is remove cars from within the main School campus, with most of the parking required to meet the demands of the School to be provided in a consolidated car park accessed off Osborn Road The additional parking required is to be provided in accordance with the Council's DCP as discussed in Section 7.	7
Details of light and heavy vehicle movements (including vehicle type and likely arrival and departure times). Details of service vehicle movements (including vehicle type and likely arrival and departure times).	The additional car movements associated with the Proposal are discussed in Section 8. Servicing arrangements are to remain consistent with the current arrangements.	8, 7 & 10
To ensure the above requirements are fully addressed, the transport and traffic study must properly ascertain the cumulative study area traffic impacts associated with the development (and any other known proposed developments in the area). This process provides an opportunity to identify a package of traffic and transport infrastructure measures required to support future development. Regional and local intersection and road improvements, vehicular access options for adjoining sites, public transport needs, the timing and cost of infrastructure works, and the identification of funding responsibilities associated with the development should be identified.	The School is also proposing to develop an Early Learning Centre (ELC), which is subject to a separate Development Application process. The ELC traffic generation as discussed in the ELC Report.	8

Roads and Maritime will also require (in due course) the provision of a traffic management plan for all demolition/construction activities, detailing vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures.	Noted. A CTPMP has been developed for the Stage 1 DA. The Stage 1 Report (detailing) the CTPMP is provided as Appendix 1. This would form the basis for the CTPMPs for each of the Master Plan TAs and would be developed further in consultation with Council and the Sydney Coordination Office as part of Construction Certificate works for each Master Plan building.	

1.3 Transport Assessment Objectives

The key objectives of this Transport Assessment are:

- To provide an appropriate response to the SEARs;
- To establish that the development of the School in accordance with the Master Plan is compliant and consistent with the relevant Council planning guidelines;
- To establish that the vehicle trip generation of the School further to the implementation of the Master Plan can be appropriately accommodated by the local road network;
- To demonstrate that there is an appropriate and sustainable allocation of car parking across the School; and
- To demonstrate that all proposed access driveways, car parks and service facilities can be designed to provide full compliance with the relevant Australian Standards.

To achieve these objectives, this TA provides an assessment of the existing and future operation of the road network servicing the School, as well as other traffic and transport related issues including car parking requirements, vehicle access, and public and active transport accessibility. The following key tasks have been undertaken in the preparation of this TA:

- A review of the existing and proposed future road network providing access for the School, with specific consideration of the NorthConnex Motorway currently under construction.
- The quantification of existing and future traffic flows in key roads and at key intersections providing access for the School, including the commission and review of peak period traffic surveys.
- An assessment of the traffic generation and distribution characteristics of the School further to the Master Plan, including surveys of School access points (vehicular and pedestrian); Travel Mode surveys of existing School students and staff; forecast student and staff growth patterns provided for under the Master Plan; and existing and proposed School and public transport services available to students and staff.
- A detailed assessment of the potential impact of additional traffic flows on the key roads and intersections within the local road network.

- An assessment of internal access, parking and servicing provisions with reference to the appropriate Australian Standards.

1.4 Reference Documents

As stated, the School is located within the Hornsby LGA and as such has been assessed with regard to that Council's planning documents, including:

- Hornsby Development Control Plan 2013 (DCP 2013); and
- Hornsby Local Environmental Plan 2013 (LEP 2013).

This TA also references general access, traffic and parking guidelines, including:

- NSW Future Transport Strategy 2056;
- State Infrastructure Strategy 2018 - 2038 Building the Momentum;
- Sydney's Cycling Future 2013;
- Sydney's Walking Future 2013;
- Sydney's Bus Future 2013;
- RMS (formerly RTA) Guide to Traffic Generating Developments (RMS Guide)
- Australian Standard 2890.1 (2004): Off-street Car Parking (AS2890.1)
- Australian Standard 2890.2 (2002): Off-street Commercial Vehicle Facilities (AS2890.2)
- Australian Standard 2890.3 (2015): Bicycle Parking (AS2890.3)
- Australian Standard 2890.6 (2009): Off-street Parking for People with Disabilities (AS2890.6)

Finally, Ason Group recently prepared a Transport Assessment supporting the development of an Early Learning Centre (ELC) on School land in Mount Pleasant Avenue. While the ELC would operate independently of the School, the traffic and transport characteristics of the ELC – detailed in the *Traffic Impact Assessment, Loreto Normanhurst: Proposed Early Learning Centre*, November 2018 (ELC Report) - have necessarily been considered in this TA.

1.5 Report Structure

This report is structured as follows:

- Section 2 provides a summary of the Master Plan.
- Section 3 describes the existing Site conditions, Section 4 details the existing travel characteristics of the School, and Section 5 details the local road network and parking conditions.
- Section 6 describes public transport, pedestrian and cycling links available to students and staff.
- Section 7 outlines the parking requirements applicable to the Master Plan.
- Section 8 assesses the traffic characteristic of the Master Plan, including the projected trip generation and distribution of the School and the resultant performance of the local road network.
- Section 9 assesses the public and active transport implications of the Master Plan, including sustainable travel targets, increased demand for bus services and the provision of pedestrian infrastructure.
- Section 10 outlines a Draft Construction Traffic Management Plan.
- Section 11 provides a review of proposed access, parking and servicing infrastructure with reference to the appropriate Australian Standards.
- Section 12 provides a summary of the key conclusions.

2 Overview of Proposal

2.1 Summary of Proposed Development

A detailed description of the proposed development is included in the Statement of Environmental Effects (SEE) which this TA accompanies. In summary, the SSDA proposes a 30-Year Master Plan for the School which in turn will provide for the following:

- An increase in the student population from 1,150 to 1,600 by 2027, and from 1,600 to 2,000 by 2047;
- Establishment of 10 new building envelopes across the site for education and ancillary uses including student accommodation;
- An Early Learning Centre (as discussed, this is being delivered separately from the long-term Master Plan and therefore has been assessed separately);
- The creation of new spaces for students from Kindergarten through to Year 4, noting that the School currently provides Primary School from Year 5 only;
- New sporting facilities, and improved utilisation of the existing sporting grounds;
- An upgrade/replacement of existing boarding facilities;
- The removal of traffic from most parts of the Site to improve the pedestrian environment;
- Three new underground off-street parking facilities to reduce the demand for on-street parking; and
- The retention of vehicular access to the Site from Osborne Road, Pennant Hills Road and Mount Pleasant Avenue.

With reference to the broader Master Plan works, the initial stages of the Master Plan (including the Stage 1 development) – which is expected to be completed by 2027 – provides for:

- A new boarding house to accommodate up to 216 boarders, including a basement car park (40 parking spaces) to be accessed via Mount Pleasant Avenue (discussed in the Stage 1 Report provided as Appendix A);
- New sporting facilities, including a multi-use hall and all-weather playing field;
- A underground car park to be provided underneath the all-weather playing field; and
- Upgrades to administration and staff areas.

The ELC, which is discussed in the ELC Report and subject to a separate DA, would result in additional traffic generation on Mount Pleasant Avenue. The increase in students of 450 up to 2027 includes the

provision of 80 ELC places. Therefore, the total increase in School places by 2027 would be 370 students.

As stated, the remainder of the Master Plan works would be completed after 2027 as practical; importantly, each additional stage of Master Plan development would be subject to future detailed assessment.

Detailed plans prepared by Allen Jack + Cottier Architects are provided elsewhere in the SEE. A copy of the vision for the Master Plan is provided below.

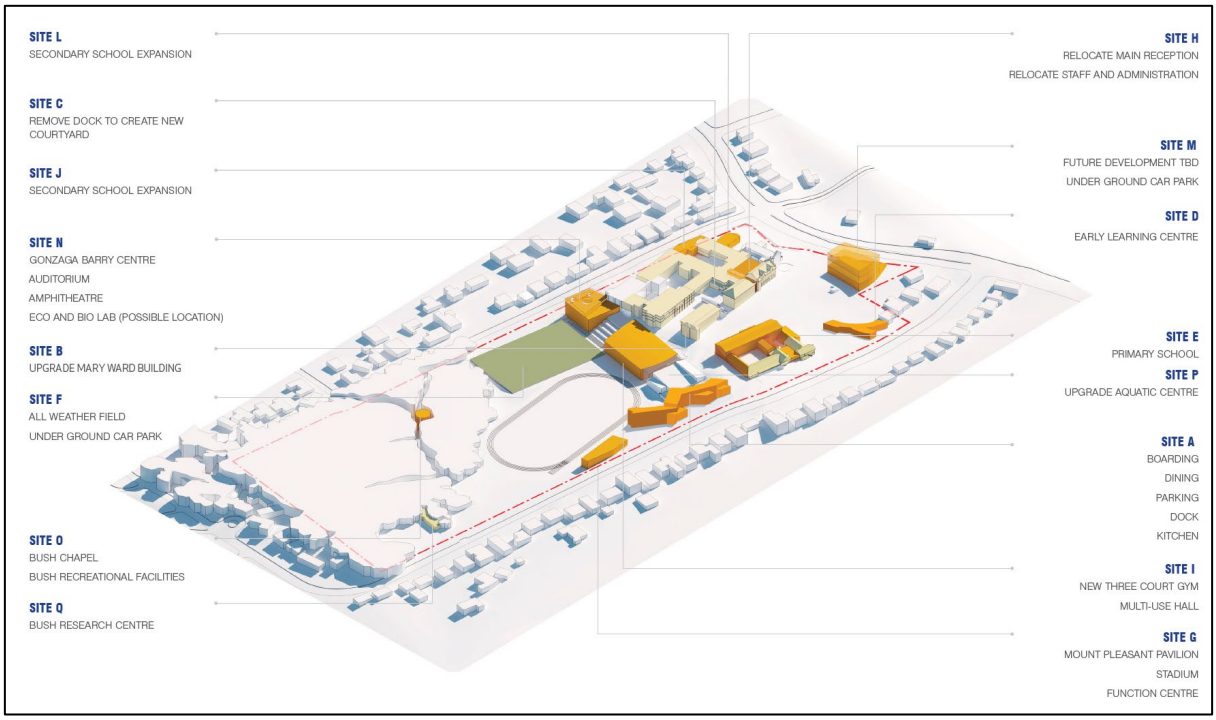

Figure 1: Proposed Master Plan Building Envelopes

3 Existing Site Conditions

3.1 Location

As stated, the School is located within Hornsby Shire Council LGA, and lies approximately 14 kilometres north-east of Parramatta and 30 kilometres north-west of the Sydney CBD. The Site is bound by Pennant Hills Road to the north, residential dwellings to the south, Mount Pleasant Avenue to the east, and Osborn Road to the west. The broader area in which the School lies is predominantly residential in nature.

The School in its local context is shown in **Figure 2** which also indicates the key roads providing access to the School.

3.2 School Population

The School currently has a cap of some 1,150 students and employs approximately 300 staff.

3.3 Site Access

The Site has 6 vehicle access points including:

- 2 two-way car park access driveways to Osborn Road;
- Separate entry / exit driveways to the drop-off/pick up facility off Osborn Road;
- 1 two-way car park access driveway to Pennant Hills Road; and
- 1 two-way car park access driveway to Mount Pleasant Avenue.

Figure 2: Site and Road Hierarchy

4 Existing School Travel Characteristics

4.1 Travel Mode Survey

In consultation with the School, Ason Group prepared a survey which was made available to all students and staff via the Survey Monkey application. The purpose of the survey was to determine key traffic and parking characteristics of existing students and staff, including:

- Travel mode for both the arrival and departure trips;
- For those students and staff driving or being driven, car occupancy;
- Arrival and departures peak periods;
- On and off-site parking demand.

4.2 Student Surveys

Approximately 75% of the existing 1,150 students responded to the survey, providing an excellent data set. The results of the student surveys are discussed below.

4.2.1 Student Travel Mode

Figure 3 provides details of the surveyed student travel modes.

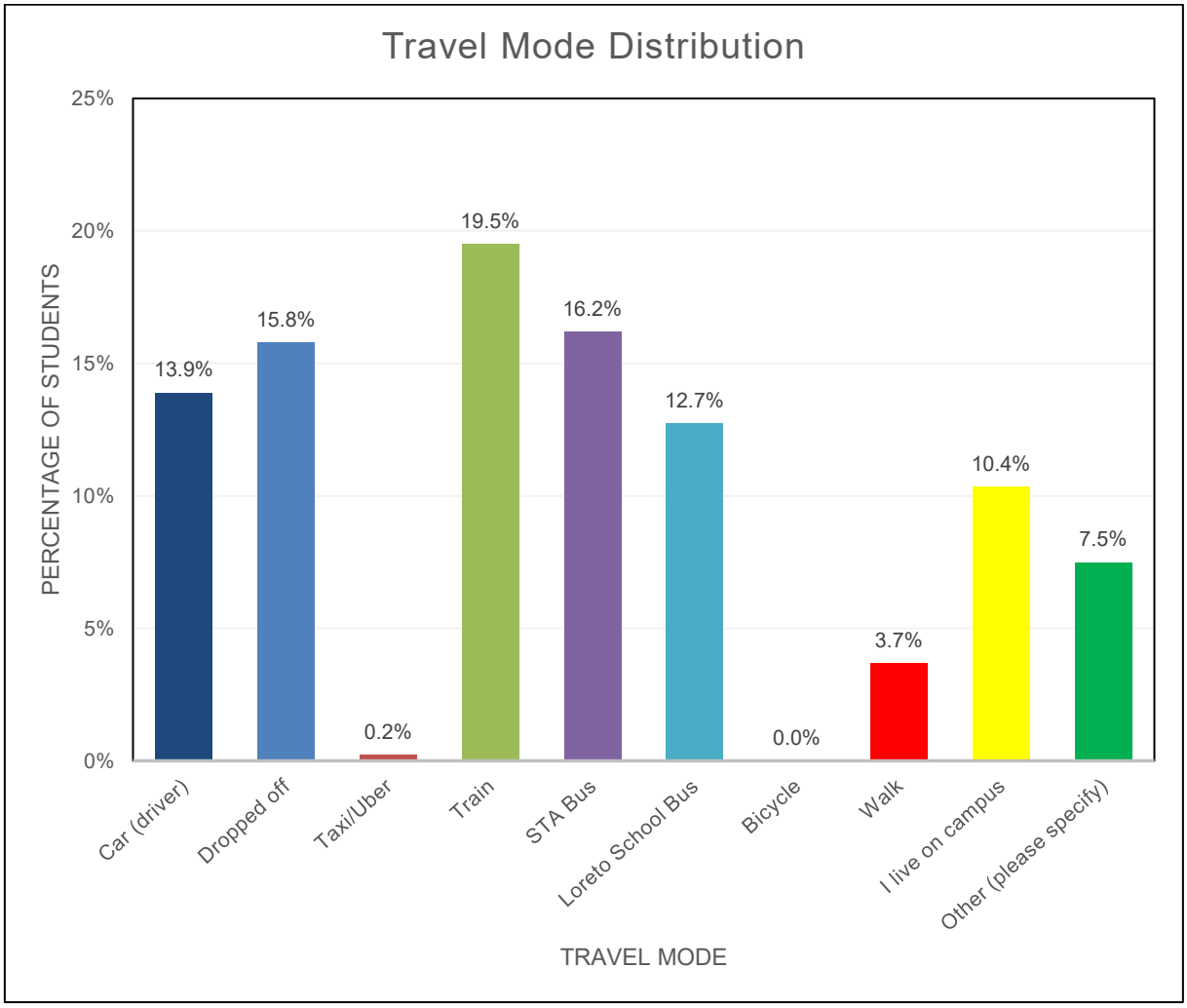

Figure 3: Student Travel Mode

It is noted that the survey reports 7.5% of students with a travel mode as 'other'; based on a review of the survey information, it is apparent that this response was generally provided by students undertaking multi-modal trips, such as being driven to a railway station and then catching the train to Normanhurst Station and then walking to the School. Importantly, such trips would not generally include a private vehicle trip to/from the School itself.

In summary, the student travel mode survey indicates that:

- Approximately 30% of students drive or are driven to/from the School
- Approximately 70% of students use public and/or active transport modes to travel to/from the School (includes 10% which live on-campus).

4.2.2 Student Arrival and Departure Peak Periods

Figure 4 provides details of the surveyed student arrival times, while **Figure 5** provides details of the surveyed student departure times.

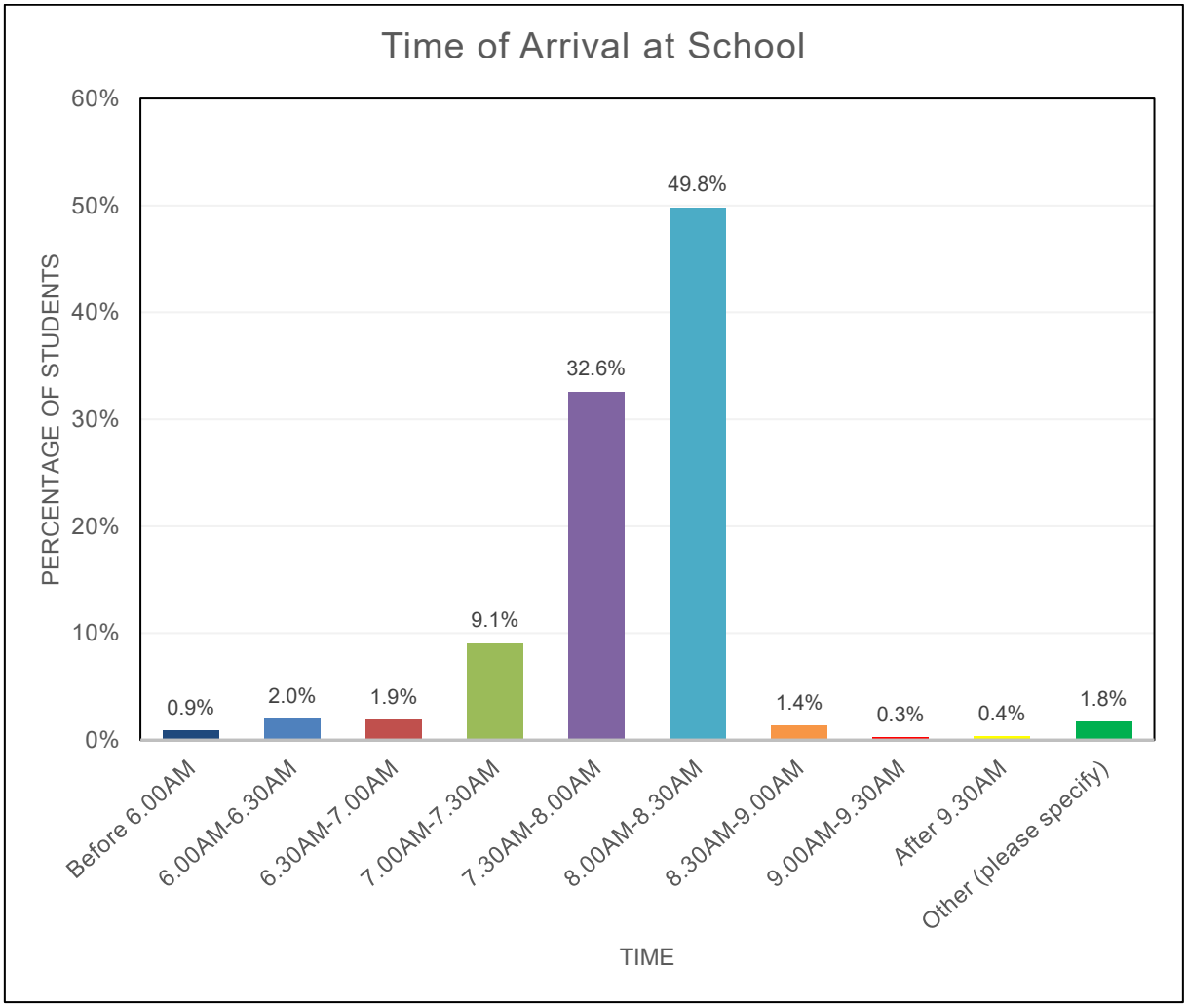

Figure 4: Student Time of Arrival

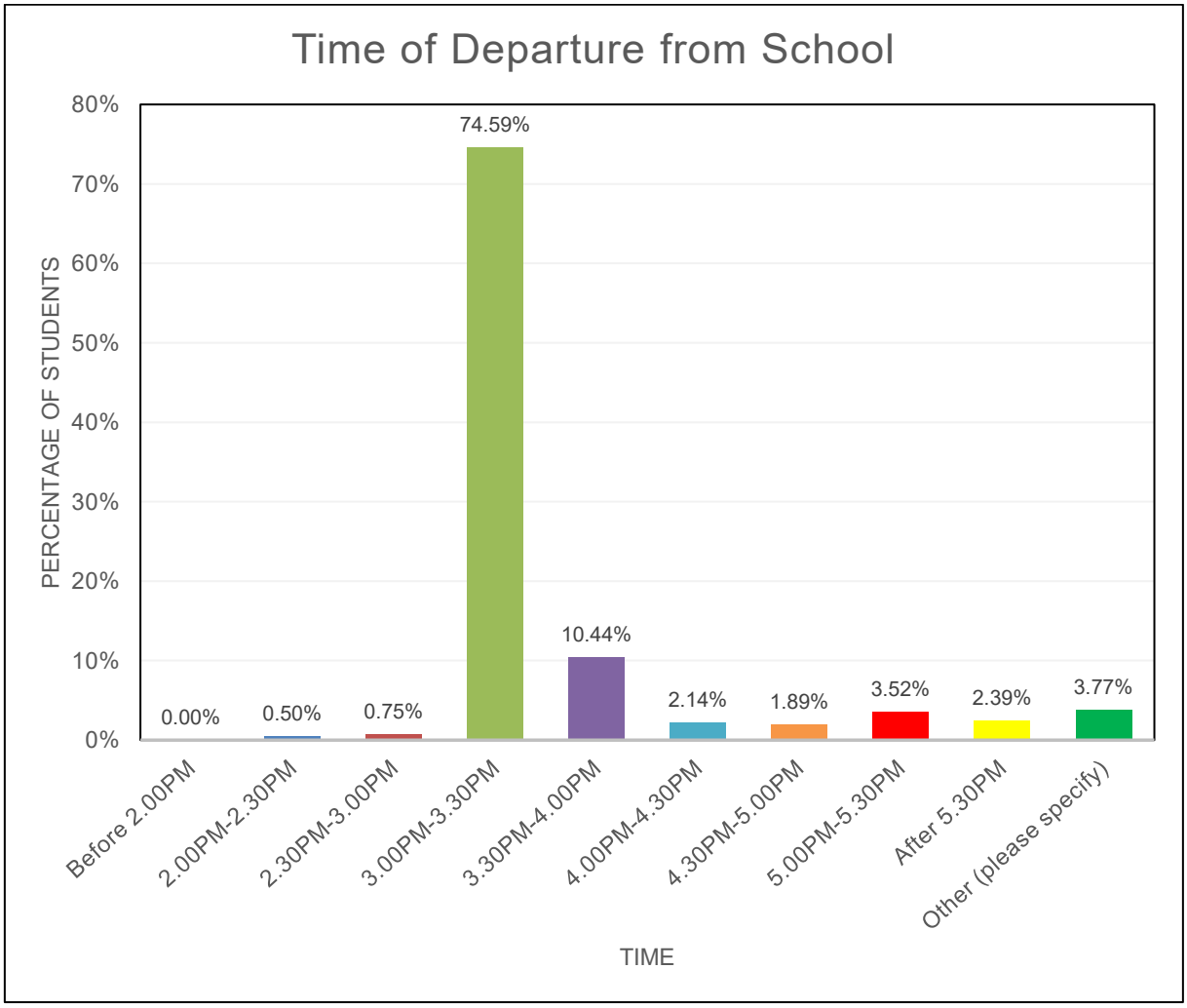

Figure 5: Student Time of Departure

In summary, the survey of student arrival and departure times indicates that:

- Students arrive at School over a 90-minute period between 7:00am and 8:30am, with the highest percentage of trips occurring in the 30-minute period 8:00am to 8:30am, i.e. in the period immediately before School starts. The spread of arrival times in the morning peak is largely attributed to students having sports training and other activities scheduled before School starts.
- Conversely, the majority of students depart the School within the 30-minute period 3:00pm – 3:30pm, i.e. immediately after School ends.

4.3 Staff Travel Surveys

Approximately 70% of the existing 300 staff responded to the survey, again providing an excellent data set. The results of the staff surveys are discussed below.

4.3.1 Staff Travel Mode

Figure 6 provides details of the surveyed staff travel modes.

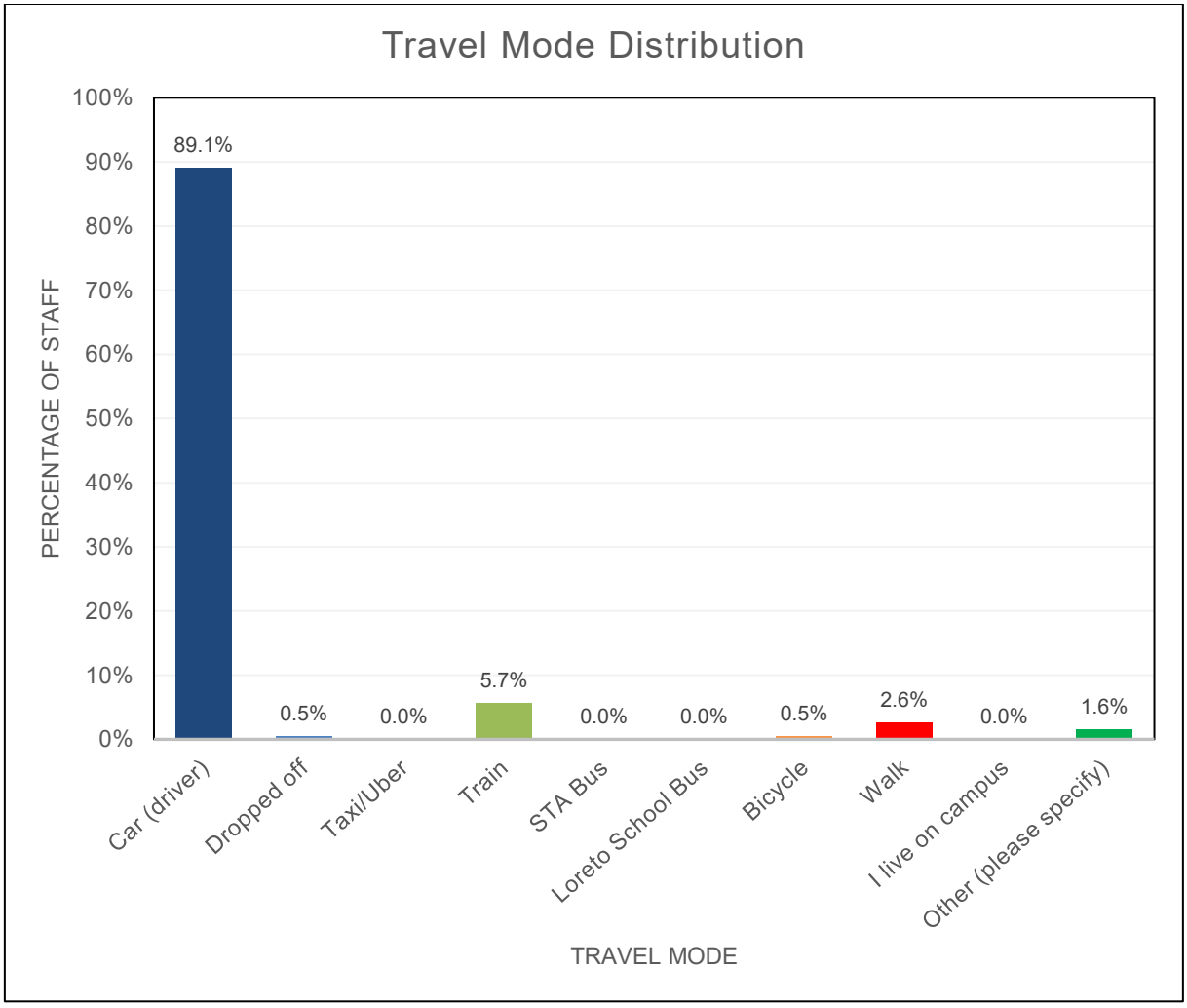

Figure 6: Staff Travel Mode

In summary, the staff travel mode survey indicates that:

- Approximately 90% of staff drive or are driven to/from the School
- Approximately 10% of staff use public and/or active transport modes to travel to/from the School.

4.3.2 Staff Arrival and Departure Peaks

Figure 7 provides details of the surveyed staff arrival times, while **Figure 8** provides details of the surveyed student departure times.

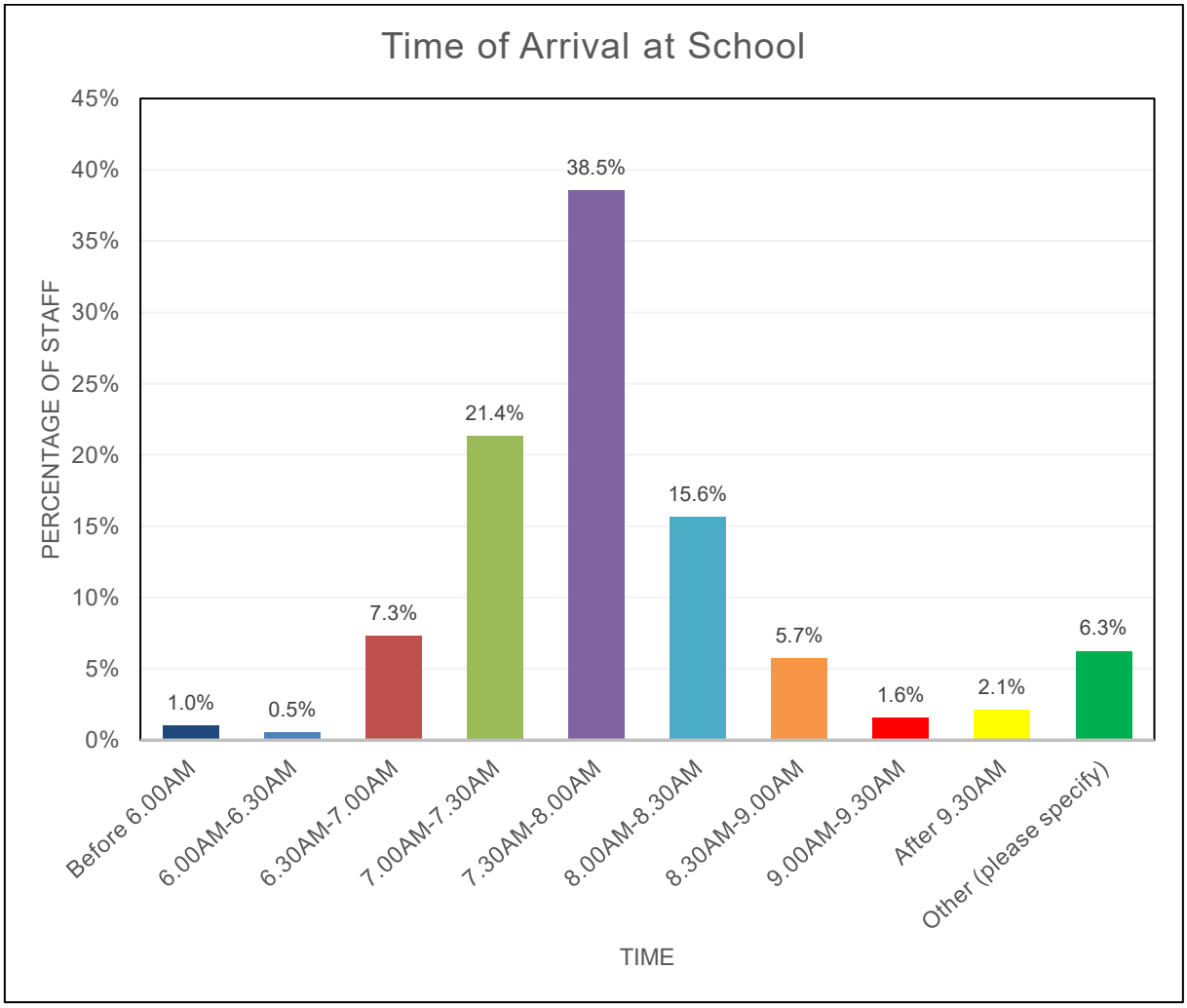

Figure 7: Staff Time of Arrival

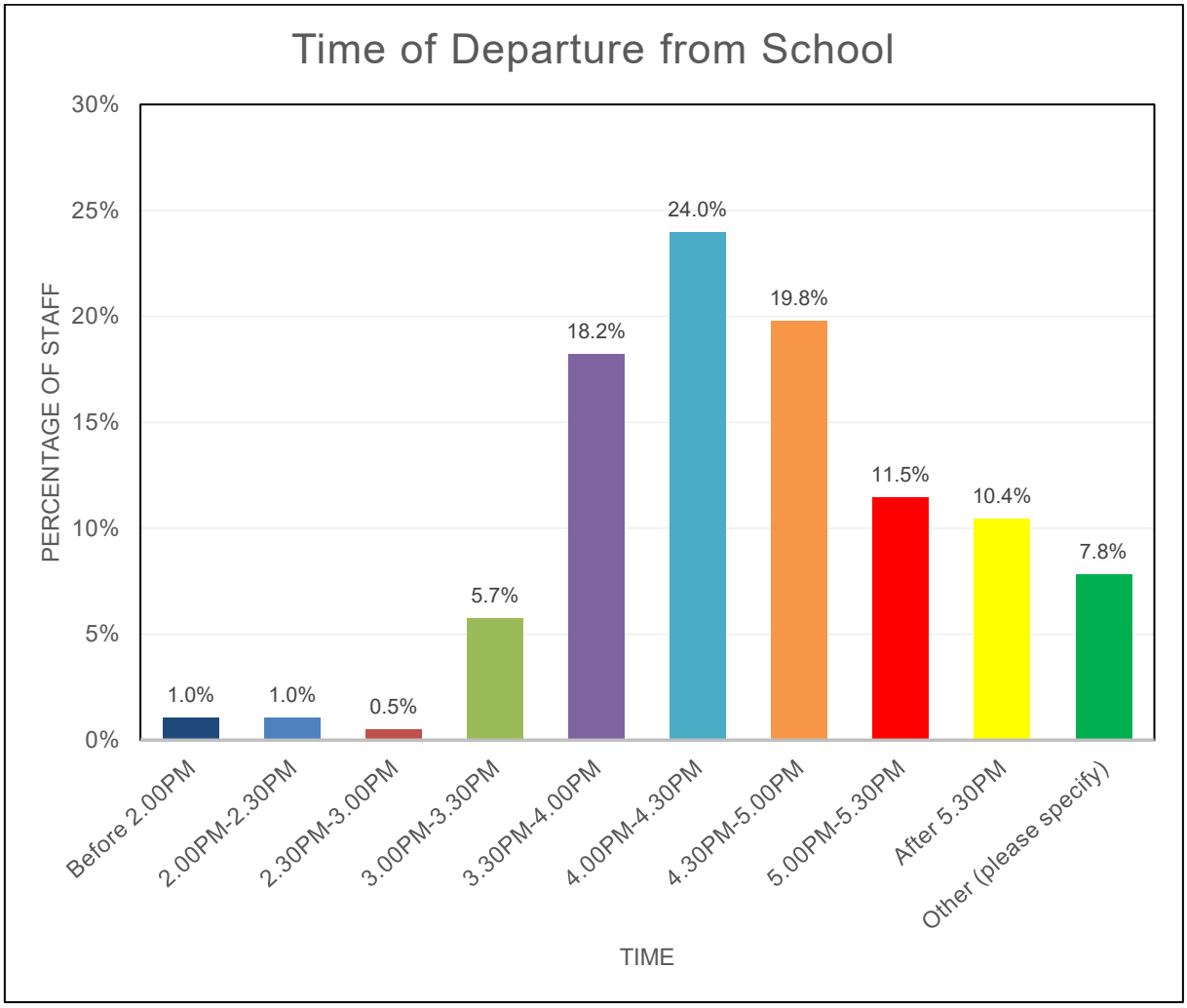

Figure 8: Staff Time of Departure

In summary, the survey indicates that staff arrive and depart the School over significantly broader periods than students.

4.3.3 Travel Mode Summary

With reference to sections above, **Table 3** provides a summary of travel modes for both students and staff.

Table 3: Existing Mode Share Summary

Travel Mode	Existing Mode Share of Students	Existing Mode Share of Staff
Vehicle driver	13.9%	89.1%
Dropped Off	15.8%	0.5%
Taxi / Uber	0.2%	0.0%
Train	19.5%	5.7%
STA Bus	16.2%	0.0%
Loreto School Bus	12.7%	0.0%
Bicycle	0.0%	0.5%
Walk	3.7%	2.6%
Live on Campus	10.4%	0.0%
Other mode	7.5%	1.6%

4.4 Existing School Traffic Generation

With reference to the Travel Survey information outlined in sections above, an estimate of the peak traffic generation of the School in the broader AM arrival and PM departure peak periods considers the following:

- Student drop-off/pick-up: Generate both and arrival and departure trip in both the AM peak and PM peak periods.
- Student car driver: Generate an arrival trip in the AM peak period and a departure trip in the PM peak period.
- Staff car driver: Generating an arrival trip in the AM peak period and a departure trip in the PM peak period.
- For students and staff travelling to the school by car, car occupancy (i.e. how many students and/or staff per vehicle).

In regard to this last factor – car occupancy – the surveys found that the average car occupancy for students was approximately 1.2 students per vehicle, while for staff it was essentially 1 staff member per vehicle.

Further to consideration of these factors, the AM peak hour generation of the School occurs in the hour 7:30am – 8:30am, while the PM peak hour generation of the School occurs in the hour 3:00pm – 4:00pm. With reference to the traffic surveys (detailed in **Section 5** below) it is noted that the AM School peak hour coincides with the AM commuter peak hour at the intersection of Pennant Hills Road / Osborn

Road / Normanhurst Road, while the PM School peak hour has marginally lower flows than the commuter peak hour 3:15pm – 4:15pm).

During these peak hours, the School currently generates:

- AM Peak Hour:
  - 331 arrival trips
  - 125 departure trips
- PM Peak Hour:
  - 129 arrival trips
  - 285 departure trips

4.5 Trip Distribution

With reference to the Travel Survey, the intersection surveys (reported in Section 5) and on-site observations, trips are generally distributed in the following manner:

- Approximately 65% of all trips are to/from Osborn Road, being trips to/from Car Park 2 and Car Park 3; to/from the on-site Set Down facility (see Figure 12 below); and to/from on-street parking.
- Approximately 20% of all trips are to/from Mount Pleasant Avenue, being trips to Car Park 4 (see Figure 12 below); on-street drop-off/pick-up; and on-street parking.
- Approximately 15% of all trips are shared between the Car Park 1 driveway off Pennant Hills Road (see Figure 12 below); on-street drop-off/pick-up in Normanhurst Road; and on-street parking in roads north of Pennant Hills Road.

4.6 Car Parking

The School currently provides 179 car parking spaces across campus; the location of these parking spaces is shown in **Figure 9**.

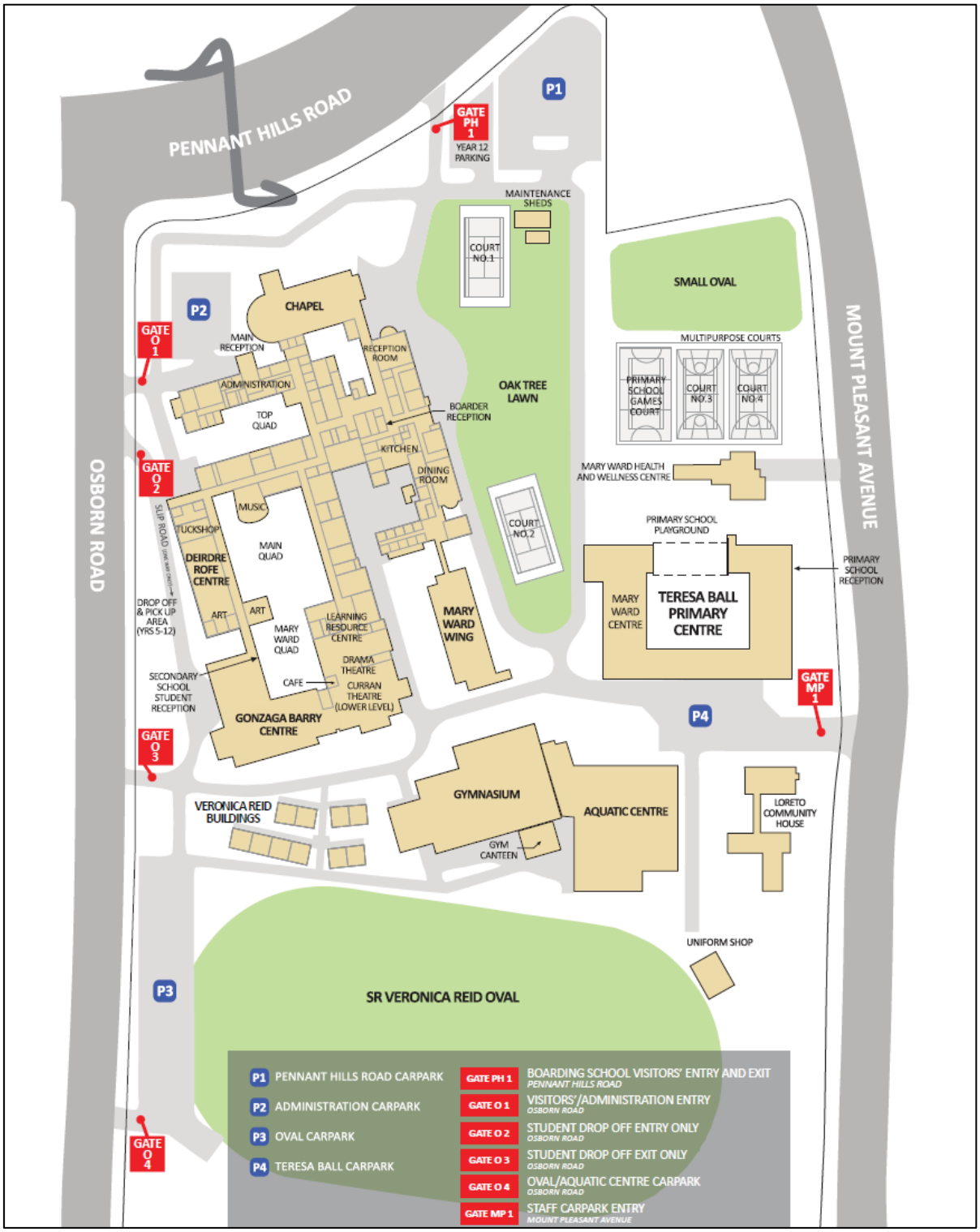

Figure 9: Loreto Car Park Locations

The Travel Mode survey indicates the following areas were used for parking:

- Students:
  - Approximately 50% within the School grounds;
  - Approximately 12% in Osborn Road;
  - Approximately 16% in Mount Pleasant Avenue;
  - Approximately 16% on-street north of Pennant Hills Road.
- Staff:
  - Approximately 66% within School grounds;
  - Approximately 6% in Osborn Road; and
  - Approximately 28% in Mount Pleasant Avenue.

5 Existing Road Network

5.1 Road Hierarchy

The key roads in the vicinity of the School are shown **Figure 2** and are summarised below:

- **Pennant Hills Road** – an RMS State Road (HW13) located north of the Site that provides a connection between North Parramatta and Wahroonga and carries in the order of 50,000 vehicles per day.
- **Osborn Road** – a local road that generally runs in a north-south direction to the south and west of the Site. It connects with Pennant Hills Road in the north and Currawong Avenue in the south before terminating to the south west of the Site.
- **Mount Pleasant Avenue** – a local road that runs in a north-south direction along the eastern frontage of the Site. It connects to Pennant Hills Road to the north via a signalised intersection and terminates to the south west of the Site. Access to Waratah Way is provided to the south of the Site, which is an access road for the Adventist Aged Care facility only.
- **Normanhurst Road** – a local road that generally runs in a north-south direction located to the north-west of the Site which connects to Osborn Road and Pennant Hills Road via a signalised intersection and provides access to Normanhurst Train Station.

5.2 Traffic Surveys

Traffic surveys were undertaken at the intersections of Pennant Hills Road / Osborn Road / Normanhurst Road and Pennant Hills Road / Mount Pleasant Avenue during extended AM (7:00am – 10:00am) and PM (2:00pm – 6:00pm) peak periods. The traffic flows during the School peak hours (as determined in **Section 4**) are summarised in the figures below.

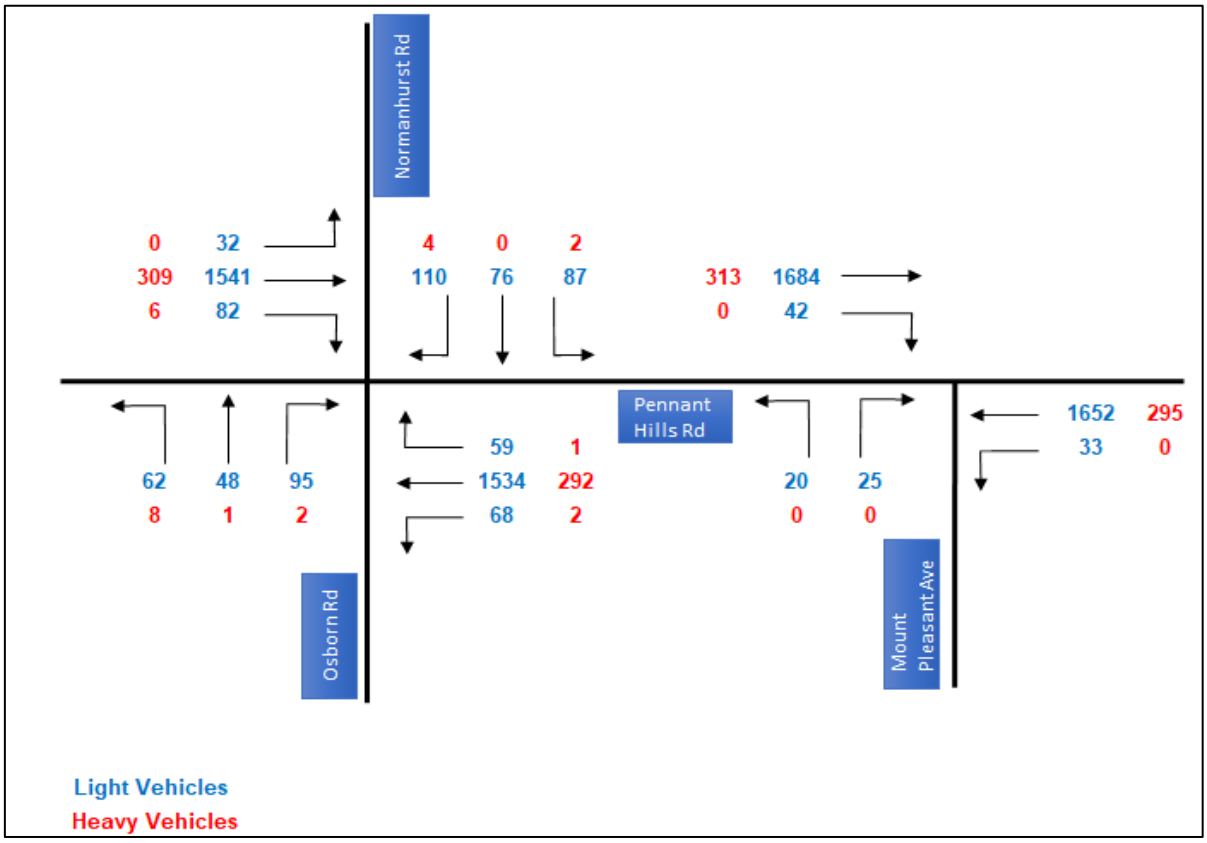

Figure 10: AM Existing Traffic Flows

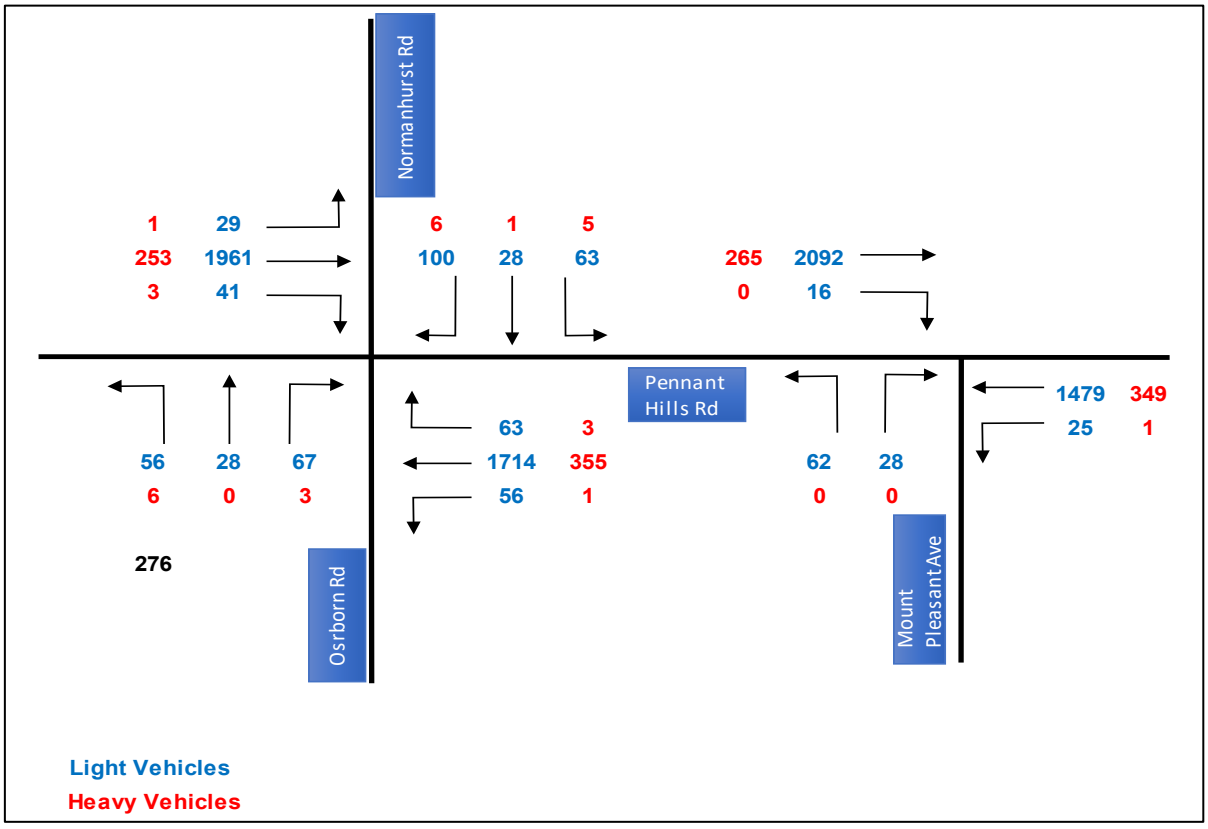

Figure 11: PM Existing Traffic Flows

5.3 Intersection Analysis

The key intersection of Pennant Hills Road / Osborn Road / Normanhurst Road and Pennant Hills Road / Mount Pleasant Avenue have been assessed using the RMS approved SIDRA intersection model. The SIDRA model provides a number of key outputs for the following performance measures:

- Degree of Saturation (DOS): The DOS is defined as the ratio of demand (arrival) flow to capacity.
- Average Vehicle Delay (AVD): The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service (see below). For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.
- Level of Service (LOS): This is a comparative measure that provides an indication of the operating performance, based on AVD. For signalised and roundabout intersections, LOS is based on the average delay to all vehicles, while at priority-controlled intersections LOS is based on the worst approach delay.

Table 4 provides a summary of RMS LOS parameters.

Table 4: RMS Level of Service Summary

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 & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

The existing performance of the key intersections is reported in **Table 5**, noting that the Pennant Hills Road / Mount Pleasant Avenue intersection operates akin to a seagull intersection and therefore has been modelled in SIDRA as such. Full SIDRA reports are provided in **Appendix B**.

Table 5: Existing Intersection Performance

Intersection	Control Type	Period	Degree of Saturation	Average Delay	LOS
Pennant Hills Road / Normanhurst Road / Osborn Road	Signals	AM	0.737	28.8	C
		PM	0.734	22.8	B
Pennant Hills Road / Mount Pleasant Avenue	'Stop' priority	AM	0.506	132.4	F
		PM	0.424	99.4	F

With reference to Table 5:

- The intersection of Pennant Hills Road / Osborn Road / Normanhurst Road currently operates at a good LOS, though there are capacity constraints in the AM peak hour.
- The intersection of Pennant Hills Road / Mount Pleasant Avenue currently operates at a poor level of service, specifically as a result of the delay to the right turn movement Mount Pleasant Avenue to Pennant Hills Road. Observations on-site indicate that the signalised intersections to the east and west of this intersection generally 'platoon' traffic in Pennant Hills Road such that more gaps are provided for this (and other) movements than suggested by the SIDRA analysis. Notwithstanding, it is again important to note that other than the ELC (as examined in the ELC Report) the Master Plan would not generate additional trips to/from Mount Pleasant Avenue.

5.4 Accident Data

An analysis of crash statistics from the Transport for New South Wales Centre for Road Safety database, indicates that there was a total of 11 accidents at the intersection of Pennant Hills Road / Osborn Road / Normanhurst Road during the 5-year period 2013 – 2017 inclusive. These included a series of crashes ranging from non-casualty to moderate injury, with only 1 serious injury recorded and no fatalities. This volume of crashes is not unusual for a road such as Pennant Hills Road which carries high volumes of traffic.

There were 7 crashes were reported at the intersection of Pennant Hills Road / Mount Pleasant Avenue in the same 5-year period, including one fatal incident.

Figure 12 shows all crash locations in the vicinity of the School, while **Table 6** summarises the historical crash data for the intersection of Pennant Hills Road / Mount Pleasant Avenue. It is our understanding that this intersection has undergone review by Council and RMS previously which included consideration for signalisation; however, this was not supported by RMS on the basis that it was located in close proximity to the intersection of Pennant Hills Road / Osbourne Road / Normanhurst Road.

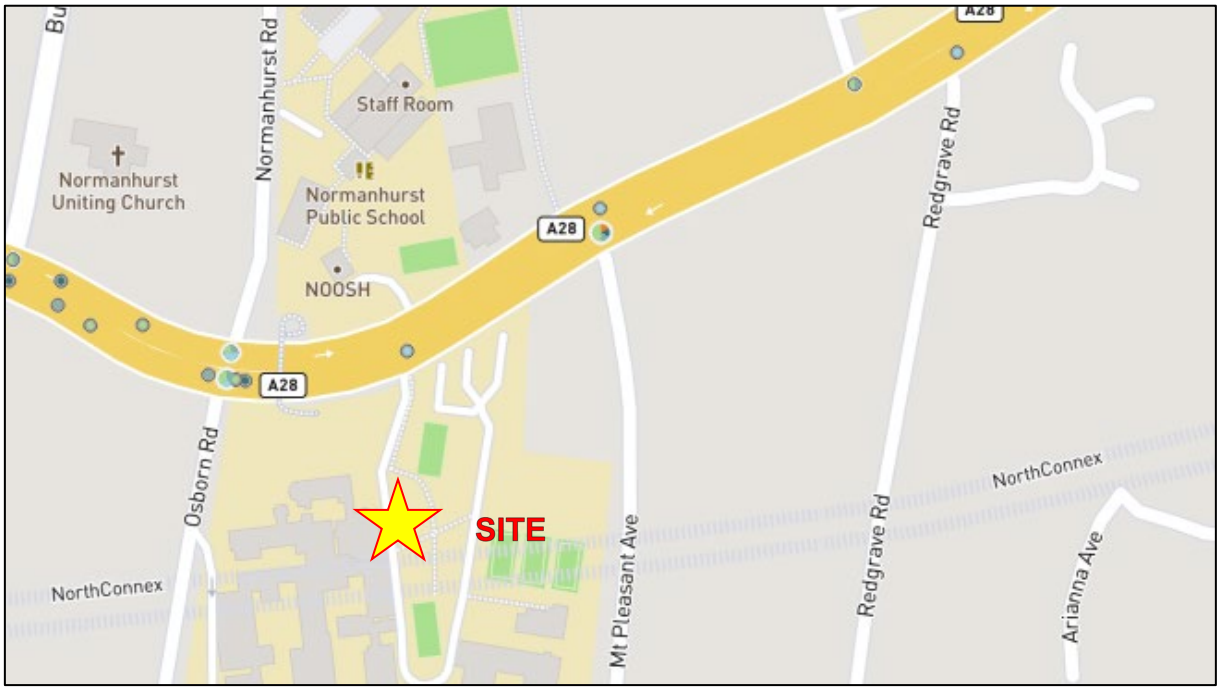

Figure 12: Historical Crash Locations

Table 6: Historical Crash Data

Year	Degree of Crash	RUM Code	RUM Description
2013	Moderate Injury	21	Right through
2014	Serious Injury	21	Right through
	Non-Casualty	39	Other same direction
2015	Fatal	74	Out of control on carriageway
	Non-Casualty	16	Left near
2016	Other/Minor Injury	39	Other same direction
	Non-Casualty	21	Right through

6 Public Transport, Cycling and Pedestrian Access

6.1 Public Transport

The Site is well serviced by local public transport infrastructure. The public and active transport local to the Site are presented in **Figure 13** and summarised below.

6.2 Railway Services

The Public Transport Guidelines state that train services influence the travel mode choices of areas within 800 metres walk (approximately 10 minutes) of a train station. In this regard, Normanhurst Train Station is approximately 700 metres to the north west, within the range of 800 metres as presented in Figure 13. Normanhurst Station services the T1 – North Shore Line with services every 10-15 minutes during the commuter peak periods in both directions of travel (towards Hornsby and Central Station via Strathfield).

6.3 Bus Services

The Public Transport Guidelines state that bus services influence the travel mode choices of areas within 400 metres walk (approximately 5 minutes) of a bus stop. It is noteworthy that there are bus stops within 400 metres walking distance from the Site on Pennant Hills Road and Normanhurst Road, as shown in Figure 13.

There are three bus routes within walking distance, which are listed below:

- Bus service 587 – Hornsby to Westleigh loop service
- Bus service 589 – Sydney Adventist Hospital to Hornsby
- Bus service M60 – Hornsby to Parramatta

The Site has good access to bus services, noting that bus routes 589 and M60 are serviced by bus stops on Pennant Hills Road and have high frequencies of services in the commuter peak periods.

6.4 Pedestrian Accessibility

Pedestrian access is provided by footpaths along Mount Pleasant Avenue, Pennant Hills Road and Osborn Road. There is also a pedestrian bridge Pennant Hills Road, which provides access from the Site's frontage across to Normanhurst Road providing a safe route from the School across Pennant Hills Road to the station.

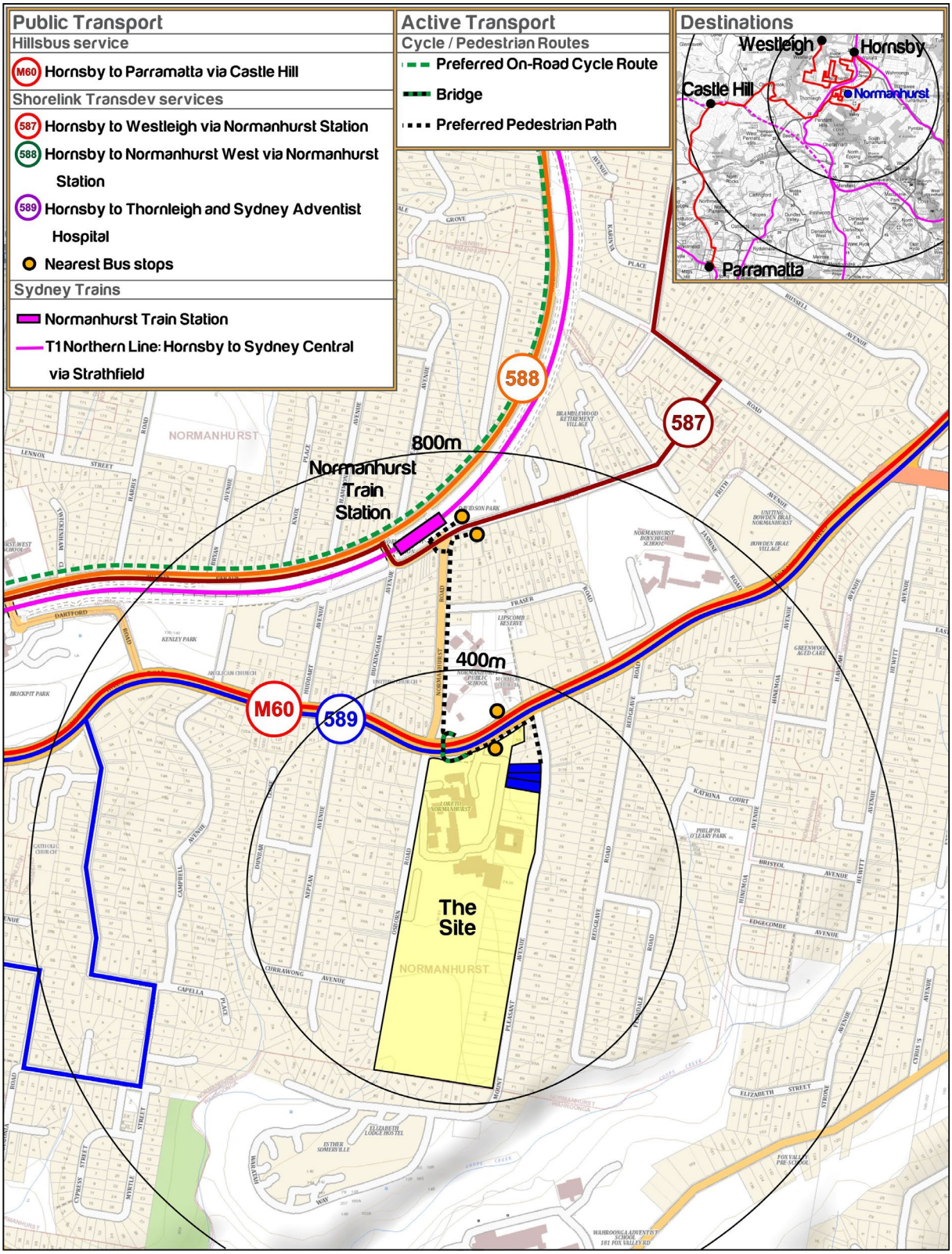

Figure 13: Public Transport Network

6.5 Cycle Routes

There are currently limited cycling facilities and routes provided within the proximity of Loreto. However, Council are currently undertaking a review of the Hornsby Shire Bike Plan with the aim to prioritise the development of local connections to and from areas that will generate demand for cycling trips such as town centres, public recreation facilities, schools/colleges, rail stations and Hornsby Hospital.

7 Parking & Servicing Requirements

7.1 Car Parking

7.1.1 Master Plan Parking Requirement

Parking for the additional staff and students which would result from the Master Plan has been proposed in accordance with Council's DCP 2013. The minimum parking rates for Educational Establishments in Council's DCP 2013 are as follows:

- 1 space per full time teacher; and
- 1 space per 2 students of driving age.

As stated, the School currently employ around 300 staff. The required increase in staff as part of the Proposal is currently unknown however, based on Ason Group's experience working on other school developments, an average of 1 staff member per 10 students is generally required. For the purposes of developing a parking requirement, the assessment methodology allocates 37 additional staff members for the increase of 370 students by 2027; and a further 40 staff by 2047 for the additional increase of 400 students. As such, the additional parking requirement would be:

- 37 additional staff parking spaces by 2027; and
- 40 additional staff parking spaces by 2047.

With regard to student parking, at this time it is expected that the increase in students as part of the Master Plan Stage 1 works would largely be across the earlier school years (i.e. Kindergarten to Year 4)., with only minor student increases in the (existing) older classes. Only Year 12 students are currently permitted to drive to School. Based on current projections it is expect that there would be an increase in 28 Year 12 students by 2027 and a further 50 by 2047 (78 total). Therefore, the following additional parking requirement would be:

- 14 additional student parking spaces by 2027; and
- 25 additional student parking spaces by 2047

7.1.2 Master Plan Parking Provision

Considering the existing 179 spaces, and the additional parking required, a total of 295 parking spaces are required to be provided on-site to service the 2047 Master Plan. The Travel Surveys found that there is also a proportion of staff and students who parking in the surrounding streets. A key aim of the Master Plan is to ensure that all the parking demands of the School are accommodated on School

grounds. Therefore, appropriate car parking is to be provided which removes the demand on on-street car parking whilst also recognising the change in travel behaviour from single use car travel to alternative modes as a result of Green Travel Plans.

As discussed, the Teresa Ball Car Park (Car Park 4 as per Figure 9) would be removed as part of the Master Plan, with 42 parking spaces to instead be provided as basement parking under the new boarding house. Car Park 1 (accessed off Pennant Hills Road) which provides 45 spaces, would be replaced with basement parking in a similar location under the Master Plan, while new underground parking accessed from Osborn Road would provide for the additional future parking demand. These 2 car parks would therefore provide 87 parking spaces. The remainder of the parking requirements are to be provided in a consolidated underground car park accessed off Osborn Road.

The design of the consolidated car park is currently being developed. However, it is envisaged that this would be delivered by 2027 in part to accommodate the additional demand generated by the increase in students and remove the demand from on-street parking. The detailed design of the car park would be subject to a separate DA process, where the number of spaces required to be provided would be derived. It is noted that as this assessment is to confirm the overall vision for the School, with the increase in student (and staff) numbers and the traffic impacts associated with that a key component of this assessment. Therefore, it is deemed appropriate to determine the final parking requirements as the Master Plan is developed over the next 10 years.

The level of parking required is indicative only given that it is based on current demands. The School is committed to promoting alternate modes of transport and intends to prepare and implement a Green Travel Plan (GTP) across the School. This will be beneficial in reducing car reliance, which is in line with Government policy. Therefore, the parking demands of the School in 30 years is likely to be less than assumed in this assessment. In anticipation of this, the car parks designed as part of the Master Plan can all be repurposed for other uses, should it be required.

7.1.3 Pick-up / Drop-Off Facilities

The School currently provides a dedicated pick-up and drop-off facility off Osborn Road; our observations indicate that the facility operates efficiently, and that queue lengths are accommodated on-site rather than extending into Osborn Road.

As part of the design development for the consolidated car park accessed off Osborn Road, the drop-off and pick-up facilities would be reviewed with the potential for them to be provided as part of it.

Based on current trends and projections for student growth, the additional drop-off and pick-up demand, it is estimated that an additional 117 students would be dropped-off/picked-up in the AM and PM peak periods respectively by 2027. Taking account of those students dropped-off / picked up with others

(mostly siblings at the School), this equates to an additional 78 vehicles per hour generated by the drop-off / pick-up demand.

In the longer term (through to 2047) an additional 233 students would be dropped-off/picked-up in the AM and PM peak periods respectively. Taking account of those students dropped-off / picked up with others, this equates to an additional 155 vehicles per hour generated by the drop-off / pick-up demand.

7.1.4 Accessible Parking

Council's DCP 2013 requires that 2-3% of spaces be accessible spaces for Educational Establishments. As such, based on the additional parking requirement, the following accessible spaces would be required:

- 1-2 additional accessible spaces by 2027; and
- 1-2 additional accessible spaces by 2047.

7.1.5 Bicycle Parking

Council's DCP 2013 requires that bicycle spaces be provided at the following rates for Educational Establishments:

- 1 bicycle rack per 20 full-time staff or part thereof; and
- 5 bicycle racks per class (between Years 5 and 12).

Council's DCP 2013 also has the following requirements for End of Trip Facilities:

- The provision of lockers for staff at a rate of 1 per 3 staff bicycle racks or part thereof; and
- End of trip facilities for staff in the form of at least 1 shower cubicle with ancillary change rooms for every 10 bicycle racks.

The Master Plan would provide bicycle parking and end of trip facilities such as to provide full compliance with Council's DCP 2013.

7.1.6 Motorcycle Parking

Council's DCP 2013 requires that motorcycle parking be provided at the following rates:

- 1 space suitable for motorcycles per 50 car parking spaces, or part thereof.

As such, based on the total parking requirement estimates, the following accessible spaces would be required:

- 4 motorcycle spaces by 2027; and
- 6 motorcycle spaces by 2047.

7.2 Servicing and Waste Collection

The existing servicing dock which is located centrally on the Site is to be moved as part of the Stage 1 development. Further details are provided in the Stage 1 Report.

The proposed loading dock has been designed to accommodate a 6.4 metre Small Rigid Vehicles (SRV).

8 Traffic Assessment

8.1 Master Plan Trip Generation

8.1.1 Additional Trip Generation: Students

Based on the Travel Survey data, at present some 30% of students drive to and from the School daily, including car drivers (Year 12 students) and car passengers (using the drop-off/pick-up facility).

However, in the future the expectation is that the majority of additional students would be represented by years Kindergarten to Year 4. These younger students generally have significantly different travel mode characteristics than older students; in the context of this assessment, the primary difference is that a higher proportion of younger students will be dropped-off/picked-up daily. Based on surveys undertaken by Ason Group at numerous primary schools across Sydney, it is estimated that an average (across years Kindergarten to Year 4) of some 40-50% of these students would be dropped-off/picked-up daily.

Based on current projections for the proposed increase in student numbers (370 students to 2027, and an additional 400 students to 2047), and accounting for a reasonable car occupancy (i.e. more than 1 student per car) as reported in the Travel Surveys. The resulting vehicles would then generate an arrival trip and departure trip, 100% of which are expected to be generated in the identified morning and afternoon peak hours for Years K – 4. For Years 5 – 12, 82% are expected to arrive in the morning peak hour (7:30am – 8:30am) and 87% are expected to depart in the identified afternoon peak hour (3:00pm – 4:00pm), as per the Travel Surveys. The resulting additional trips in the morning peak hour are summarised in the **Table 7** below.

Table 7: Additional Student Trips Morning Peak Hour by Year: 2027

AM	K - Yr 2	120	Car Occupancy	AM Arrival	AM Departure
Vehicle driver	0%	0			
Dropped Off	55%	66	1.5	44	44
Taxi / Uber	0%	0			
Train	10%	12			
STA Bus	10%	12			
Loreto School Bus	25%	30	15	2	2
Bicycle	0%	0			
Walk	0%	0			
Live on Campus	0%	0			
Other mode	0%	0			
	100%			**46**	**46**

AM	Yr 3 - 4	90	Car Occupancy	AM Arrival	AM Departure
Vehicle driver	0%	0			
Dropped Off	50%	45	1.5	30	30
Taxi / Uber	0%	0			
Train	15%	14			
STA Bus	10%	9			
Loreto School Bus	25%	23	15	2	2
Bicycle	0%	0			
Walk	0%	0			
Live on Campus	0%	0			
Other mode	0%	0			
	100%			**32**	**32**

AM	Yr 5 - 6	0	Car Occupancy	AM Arrival	AM Departure
Vehicle driver	0%	0			
Dropped Off	35%	0	1.5	0	0
Taxi / Uber	0%	0			
Train	15%	0			
STA Bus	12%	0			
Loreto School Bus	25%	0	15	0	0
Bicycle	0%	0			
Walk	3%	0			
Live on Campus	10%	0			
Other mode	0%	0			
	100%			**0**	**0**

AM	Yr 7 - 12	40	Car Occupancy	AM Arrival	AM Departure
Vehicle driver	13.9%	6	1.5	4	
Dropped Off	15.8%	6	1.5	4	4
Taxi / Uber	0.2%	0			
Train	19.5%	8			
STA Bus	16.2%	7			
Loreto School Bus	12.7%	5	15	0	0
Bicycle	0.0%	0			
Walk	3.8%	2			
Live on Campus	10.4%	4			
Other mode	7.5%	3			
	100%			**8**	**5**

Table 8 provides the total morning peak hour trip generation expected as a result of the increase of students to 2027.

Table 8: Total Student AM Trip Generation: 2027

Travel Mode	Total Mode Share	311	Vehicle AM Arrival	Vehicle AM Departure
Vehicle driver	1.8%	6	4	0
Dropped Off	37.7%	117	78	78
Taxi / Uber	0.0%	0		
Train	10.7%	33		
STA Bus	8.8%	28		
Loreto School Bus	18.5%	58	4	4
Bicycle	0.0%	0		
Walk	0.5%	2		
Live on Campus	20.9%	65		
Other mode	1.0%	3		
	100%	**311**	**86**	**82**

As can be seen, there would be a total of 311 additional students arriving at the School during the morning peak hour, with 123 travelling by car. As a result, there would be a total of 160 veh/hr travelling to / from the School (82 arrivals / 78 departures). There would also be an additional 8 School bus trips (4 arrivals / 4 departures) generated in the morning peak hour.

The resulting additional trips in the afternoon peak hour are summarised in the **Table 9** below.

Table 9: Additional Student Trips Afternoon Peak Hour by Year: 2027

PM	K - Yr 2	120	Car Occupancy	AM Arrival	AM Departure
Vehicle driver	0%	0			
Dropped Off	55%	66	1.5	44	44
Taxi / Uber	0%	0			
Train	10%	12			
STA Bus	10%	12			
Loreto School Bus	25%	30	15	2	2
Bicycle	0%	0			
Walk	0%	0			
Live on Campus	0%	0			
Other mode	0%	0			
	100%			**46**	**46**

PM	Yr 3 - 4	90	Car Occupancy	AM Arrival	AM Departure
Vehicle driver	0%	0			
Dropped Off	50%	45	1.5	30	30
Taxi / Uber	0%	0			
Train	15%	14			
STA Bus	10%	9			
Loreto School Bus	25%	23	15	2	2

Bicycle	0%	0			
Walk	0%	0			
Live on Campus	0%	0			
Other mode	0%	0			
	100%			**32**	**32**

PM	**Yr 5 - 6**	**0**	**Car Occupancy**	**AM Arrival**	**AM Departure**
Vehicle driver	0%	0			
Dropped Off	35%	0	1.5	0	0
Taxi / Uber	0%	0			
Train	15%	0			
STA Bus	12%	0			
Loreto School Bus	25%	0	15	0	0
Bicycle	0%	0			
Walk	3%	0			
Live on Campus	10%	0			
Other mode	0%	0			
	100%			**0**	**0**

PM	**Yr 7 - 12**	**43**	**Car Occupancy**	**AM Arrival**	**AM Departure**
Vehicle driver	14%	6	1.5		4
Dropped Off	16%	7	1.5	5	5
Taxi / Uber	0%	0			
Train	20%	8			
STA Bus	16%	7			
Loreto School Bus	13%	5	15	0	0
Bicycle	0%	0			
Walk	4%	2			
Live on Campus	10%	4			
Other mode	8%	3			
	100%			**5**	**9**

Table 10 provides the total afternoon peak hour trip generation expected as a result of the increase of students to 2027.

Table 10: Total Student PM Trip Generation: 2027

Travel Mode	Total Mode Share	314	Vehicle AM Arrival	Vehicle AM Departure
Vehicle driver	1.9%	6		4
Dropped Off	37.5%	118	78	78
Taxi / Uber	0.0%	0		
Train	10.8%	34		
STA Bus	8.9%	28		
Loreto School Bus	18.5%	58	4	4
Bicycle	0.0%	0		
Walk	0.5%	2		
Live on Campus	20.9%	65		
Other mode	1.0%	3	0	0
	100%	**314**	**82**	**86**

As can be seen, there would be a total of 314 additional students departing the School during the afternoon peak hour, with 124 travelling by car. As a result, there would be a total of 160 veh/hr travelling to / from the School (78 arrivals / 82 departures). There would also be an additional 8 School bus trips (4 arrivals / 4 departures) generated in the afternoon peak hour.

Application of the above methodology for the 2047 Master Plan results in the following additional trip generation over the existing School.

Table 11: Total Student AM Trip Generation: 2047

Travel Mode	Total Mode Share	577	Vehicle AM Arrival	Vehicle AM Departure
Vehicle driver	3.1%	18	12	0
Dropped Off	37.6%	217	145	145
Taxi / Uber	0.0%	0		
Train	12.7%	74		
STA Bus	10.5%	61		
Loreto School Bus	19.6%	113	8	8
Bicycle	0.0%	0		
Walk	1.1%	6		
Live on Campus	13.6%	79		
Other mode	1.7%	10		
	100%	**577**	**164**	**152**

As can be seen from **Table 11**, there would be a total of 577 additional students arriving at the School during the morning peak hour, with 235 travelling by car. As a result, there would be a total of 302 veh/hr travelling to / from the School (157 arrivals / 145 departures). There would also be an additional 16 School bus trips (8 arrivals / 8 departures) generated in the morning peak hour.

Table 12 provides the additional afternoon trip generation of the School by 2047. As can be seen, there would be a total of 588 additional students departing the School during the afternoon peak hour, with 238 travelling by car. As a result, there would be a total of 305 veh/hr travelling to / from the School (146 arrivals / 159 departures). There would also be an additional 16 School bus trips (8 arrivals / 8 departures) generated in the evening peak hour.

Table 12: Total Student PM Trip Generation: 2047

Travel Mode	Total Mode Share	588	Vehicle AM Arrival	Vehicle AM Departure
Vehicle driver	3.3%	19		13
Dropped Off	37.3%	219	146	146
Taxi / Uber	0.0%	0		
Train	12.8%	75		
STA Bus	10.6%	62		
Loreto School Bus	19.5%	115	8	8
Bicycle	0.0%	0		
Walk	1.1%	7		
Live on Campus	13.6%	80		
Other mode	1.8%	10	0	0
	100%	**588**	**154**	**167**

8.1.2 Additional Trip Generation: Staff

As discussed in regard to car parking, it is estimated that the student increases will result in a requirement for an additional 37 staff by 2027 and an additional 40 staff by 2047 (to a total of 77 additional staff members). Based on existing staff travel mode characteristics (which found that the majority of staff currently drive to School), it is estimated that the additional staff would generate:

- An additional 19 vehicle trips in the AM peak hour and 9 vehicle trips in the PM peak hour by 2027; and
- A total of 34 additional vehicle trips in the AM peak hour and 15 vehicle trips in the PM peak hour by 2047.

8.1.3 Total Additional Traffic Generation

With reference to sections above, **Table 13** provides a summary of the estimated total additional traffic generation of the School by 2027, and by 2047.

Table 13: Additional School Traffic Generation

Year	Total Increase	AM Peak Hour Trips	PM Peak Hour Trips
2027			
Students	370	168	168
Staff	37	19	9
Total Additional Trips	-	**187**	**177**
2047			
Students	770	318	321
Staff	70	34	15
Total Additional Trips	-	**352**	**336**

8.2 Trip Distribution

The distribution of these additional trips will be based on the provision of car parking and drop-off/pick-up facilities across the School. However, would be generated to/from the intersection of Pennant Hills Road / Osborn Road / Normanhurst Road as the pick-up / drop-off facilities are locate on Osborne Road, as would the additional parking provision.

With regard to the direction distribution of trips at this intersection (and at the intersection of Pennant Hills Road / Mount Pleasant Road) there is no expectation that the existing distribution of trips (i.e. to/from the north, east and west) would be different to the existing distribution of trips.

8.3 Trip Assignment

With reference to sections above, the assignment of these additional trips to the key intersections is shown in **Figure 14** for 2027 and **Figure 15** for 2047.

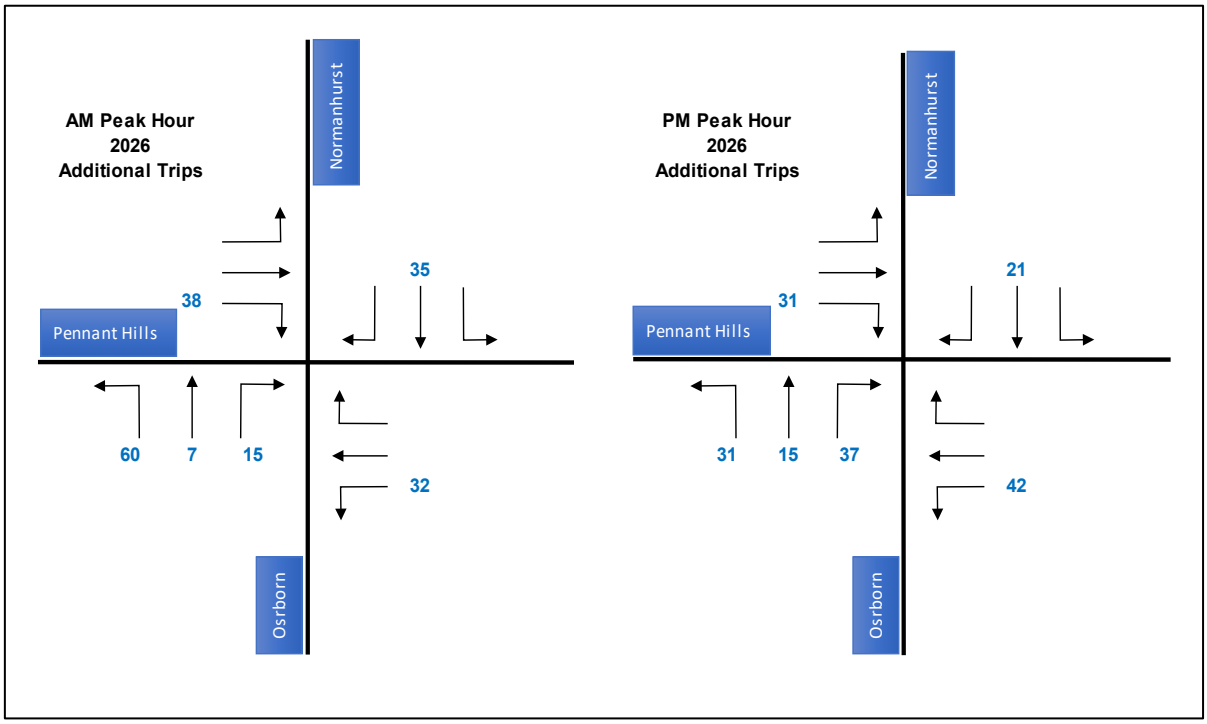

Figure 14: Additional Traffic Generation: 2027

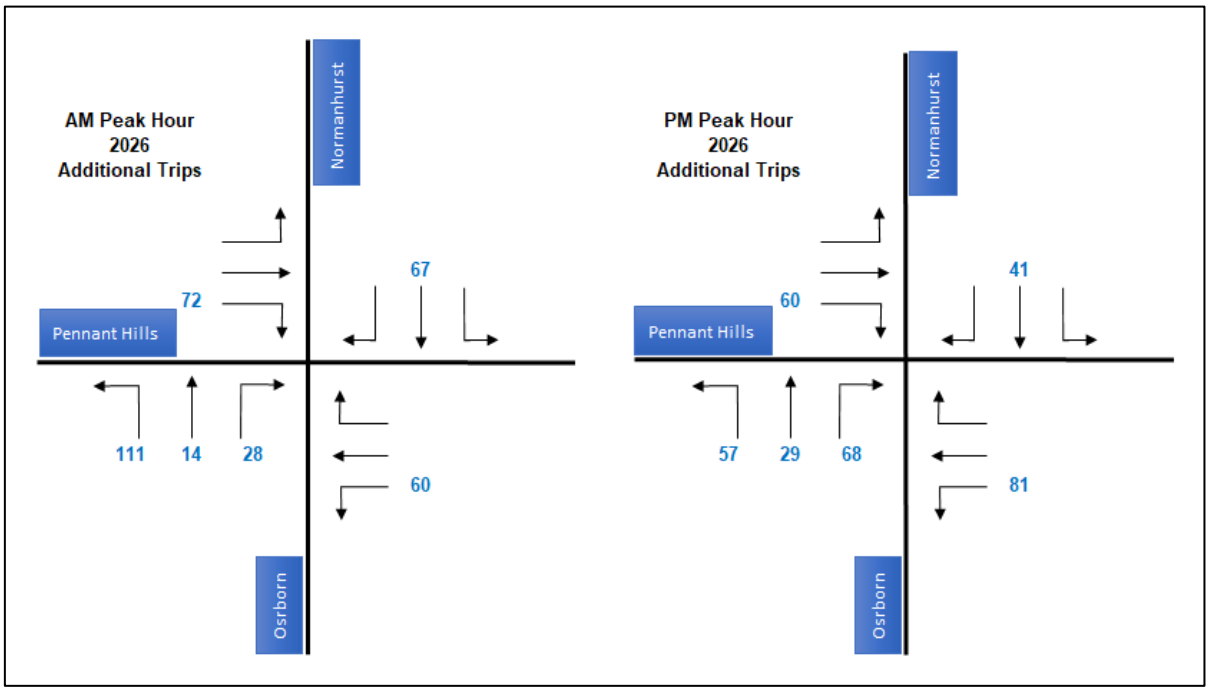

Figure 15: Additional Traffic Generation: 2047

8.4 Pennant Hills Road Through Flows

For assessing the traffic impacts of the Master Plan, it is critical to understand the future operation of the Pennant Hills Road / Osborn Road / Normanhurst Road intersection, notably as the operation of NorthConnex would have a significant impact on the traffic flows along Pennant Hills Road. Therefore, as already mentioned, Ason Group requested the forecast data for the local area adopted in the STFM from RMS. The STFM data is based on forecast major land use and infrastructure projects/strategies across Sydney and is therefore the most appropriate source for future traffic flows. The projections of the SFTM are provided in the assessment years of 2026 and 2036, therefore to remain consistent with this, the Master Plan traffic generation has been assessed under the same scenarios (i.e. the additional traffic expected by 2027 has been assessed for the year 2026 and the traffic expected by 2047 has been assessed for the year 2036).

It is worthy of note here that the 2036 assessment therefore provides a conservative assessment, as not all the traffic expected to be generated by the ultimate 2047 Master Plan would be on the road network by 2036. It is difficult to forecast the traffic conditions in 2047, therefore this approach to the assessment is deemed to be the most appropriate at this stage.

For the 2026 forecast year, the STFM indicates that there are significant reductions in the Pennant Hills Road traffic flows further to the opening of NorthConnex. On average, the STFM indicates that traffic flows in Pennant Hills Road will reduce between 2016 and 2026 by:

Morning Peak Hour:

- 2.15% per year northbound
- 1.6% per year southbound

Afternoon Peak Hour:

- 2.3% per year northbound
- 1.0% per year southbound

The STFM data does come with a number of caveats; in some instances, the model factors in infrastructure projects that have yet to be formally committed, while conversely some significant growth areas may not be included in the model. Notwithstanding, in the case of Pennant Hills Road – and specifically this northern section of Pennant Hills Road – it is certainly apparent that NorthConnex will result in a significant reduction in traffic volumes, and that there are no known significant projects which would feed additional traffic to this section of road.

Regardless, it must be stated that this is the best forecast data available, and as such Ason Group has applied the reduction percentages shown above to the existing surveyed traffic flows to obtain forecast flows for 2026; it is noted that these reductions apply only to through movements in Pennant Hills Road, with no information available to suggest any significant change in turning movements.

The resulting total flows at the intersection for the year 2026 are shown in **Figure 16** below, with the corresponding flows for 2036, which have been derived with the same methodology, provided as **Figure 17**.

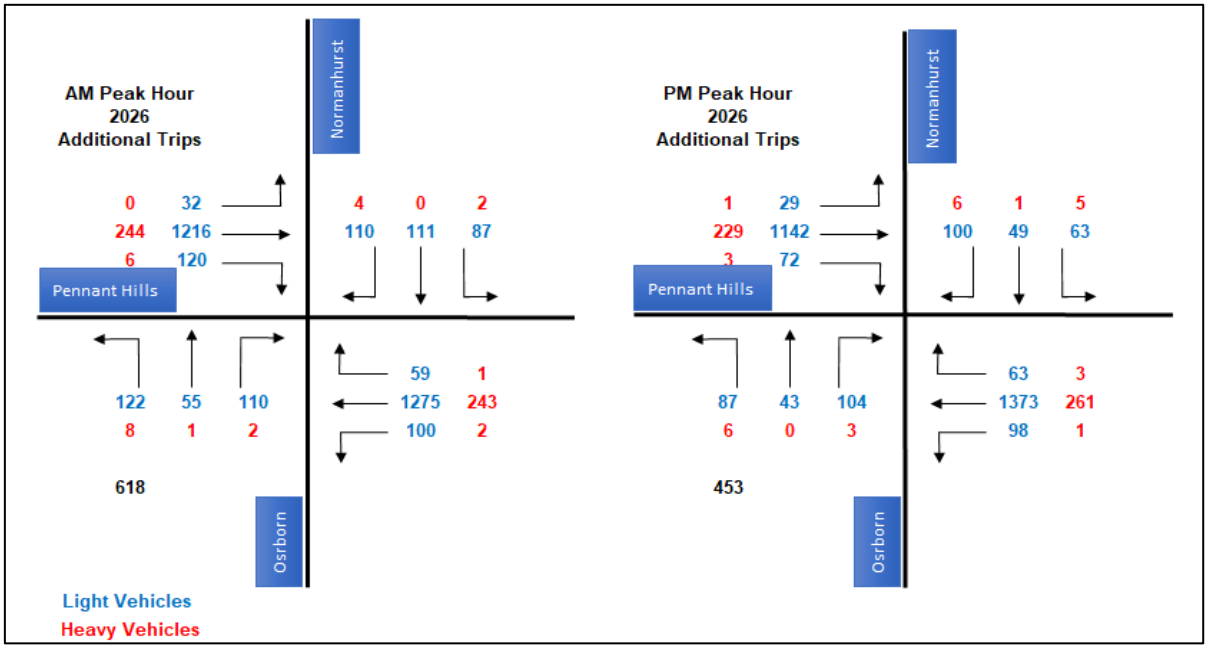

Figure 16: Total Peak Hour Vehicle Trips 2026

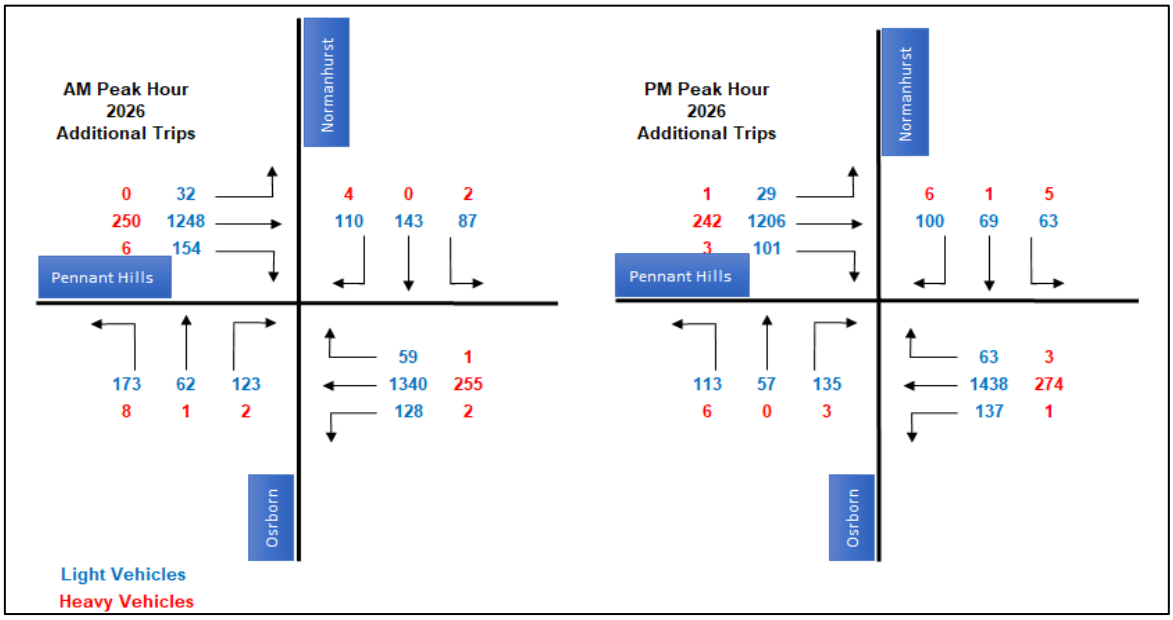

Figure 17: Total Peak Hour Vehicle Trips 2026

8.5 Intersection Performance

8.5.1 2027 Base Case Intersection Operations

To assess the traffic impacts of the Proposal in 2026, the base case in 2026 (which excludes traffic generated by the proposed student increase) has been established which takes account of the traffic flows expected along Pennant Hills Road following WestConnex becoming operational. The results of the SIDRA intersection analysis are provided by **Table 14**. It should be noted that as a result of the reduced flows on Pennant Hills Road, the green phases on Osborn Road and Normanhurst Road have been provided more time, which facilitates greater flows out of these roads.

Table 14: 2026 Base Case Intersection Performance

Intersection	Control Type	Period	Degree of Saturation	Average Delay	LOS
Pennant Hills Road / Normanhurst Road / Osborn Road	Signals	AM	0.646	32.4	C
		PM	0.596	24.6	B

The SIDRA results show that the performance of the intersection would not materially change between now and 2026, with the queues and DOS slightly improving and AVD and LOS remaining consistent. This is a direct result of reduced traffic flows along Pennant Hills Road (notably heavy vehicles) due to WestConnex.

8.5.2 2027 with Development Intersection Operations

In order to assess the traffic impact of the Master Plan in 2026, the additional development traffic generated as a result of the additional students and associated staff were added into the SIDRA modelling.

A comparison of the 2026 Base Case and the 2026 Base Case + Development results is shown in **Table 15**.

Table 15: 2026 Intersection Performance Comparison

Intersection	Period	2026 Base Case			2026 Base Case + Development		
		DOS	AVD	LOS	DOS	AVD	LOS
Pennant Hills Road / Normanhurst Road / Osborn Road	AM	0.646	32.4	C	0.673	33.4	C
	PM	0.596	24.6	B	0.612	28.3	B

The results show that the intersection would continue to operate with acceptable LOS, DOS and AVD which is consistent with the "Base Case". The overall intersection performance indicates that the student increase to 1,600 students is supportable.

The queue in the right-turn bay from Pennant Hills Road into Osborn Road in the morning peak exceeds the existing capacity of the turn bay (by approx. 2-3 vehicles). However, it is noted that this right-turn bay runs as part of a variable phase, and thus due to the increased demand would be "Called" as is permitted by the TCS plan and signal operations. A sensitivity assessment has been conducted which included these phases running for each cycle, which found that the queue in the right-turn bay reduced to remain within the capacity of the bay. The results of this sensitivity assessment are provided in **Table 16**.

Table 16: 2026 Base with Development Sensitivity Assessment

Intersection	Control Type	Period	Degree of Saturation	Average Delay	LOS
Pennant Hills Road / Normanhurst Road / Osborn Road	Signals	AM	0.726	31.0	C

As can be seen, although the Degree of Saturation does increase, the intersection would still operate with consistent Levels of Service, with a degree of spare capacity and acceptable delays. Therefore, if there is an increase demand for the right-turners, the signals capable of clearing the queue, without impacting through flows on Pennant Hills Road.

In summary, under the student increase proposed as part of the 2027 Master Plan, the 2026 operation results in comparable levels of operation with the 2026 baseline scenario and is therefore acceptable. The impact of the additional students up to the 2047 (assessment year of 2036) is provided below.

8.5.3 2036 Intersection Operations

A comparison of the 2026 Base Case (based on existing staff and student numbers) results with the 2036 Base Case + Development (which includes the additional traffic generated by the School following the increase of 770 students and 77 staff) results is shown in **Table 17**.

Table 17: 2036 Intersection Performance Comparison

Intersection	Period	2026 Base Case			2036 Base Case + Development		
		DOS	AVD	LOS	DOS	AVD	LOS
Pennant Hills Road / Normanhurst Road / Osborn Road	AM	0.646	32.4	C	0.753	36.6	C
	PM	0.596	24.6	B	0.682	29.4	C

The results show that the intersection would continue to operate with acceptable LOS, DOS and AVD which (although have increased) are still consistent with the "2026 Base Case". The overall intersection performance indicates that the student increase of 770 students and 77 is therefore supportable.

As with the 2026 scenario, the queue in the right-turn bay on Pennant Hills Road into Osborn Road in the morning peak exceeds the existing capacity of the turn bay. Despite this, the intersection still is shown to operate with acceptable LOS, DOS and AVD. Conducting the same sensitivity assessment as with the 2026 scenario (i.e. running the right each cycle rather than as a variable phase) results in the right-turn bay being able to accommodate the demand.

Table 18: 2026 Base with Development Sensitivity Assessment

Intersection	Control Type	Period	Degree of Saturation	Average Delay	LOS
Pennant Hills Road / Normanhurst Road / Osborn Road	Signals	AM	0.808	34.3	C

As can be seen, although the Degree of Saturation does increase, the intersection would still operate with consistent Levels of Service, with a degree of spare capacity and acceptable delays. Therefore, if there is an increase demand for the right-turners, the signals are already capable of clearing the queue, without impacting through flows on Pennant Hills Road.

It is worthy of note that this assessment has adopted a year of 2036. However, the Master Plan is a 30-year plan to 2047. Therefore, a proportion of the traffic assessed for the 2036 scenario, would not be on the road network until the ultimate year of 2047. Thus, this assessment represents a conservative scenario. Despite this, the Master Plan proposal is supportable and acceptable from a traffic impact perspective.

8.6 Construction Traffic Impacts

A detailed Construction Traffic and Pedestrian Management Plan (CTPMP) will be provided as part of detailed construction management plan submitted under the conditions of any approval for each stage of the Master Plan. For the purposes of this TA report, the general principles for managing construction traffic would be consistent with that proposed as part of the Stage 1 DA Report which is provided as Appendix A.

9 Public & Active Transport Impacts

9.1 Introduction

Further to the determination of the number of students who would drive/be driven to the School each day, it is of course important to recognise that the majority of students will use public and active transport modes each day for the trip to/from School. The following section provides an assessment of the likely impact of the Master Plan on the surrounding public and active transport network. The initiatives and strategies which would be developed as part of the Master Plan to maximise public and active transport use by students and staff are also identified.

9.2 Public Transport

With reference to sections above, the Master Plan is expected to generate the following additional train and STA bus trips:

- 2027: 34 trips by train in the morning peak hour and 35 in the evening peak hour. 28 trips by STA bus in the morning peak hour and 28 trips in the evening peak hour.
- 2047: 107 trips by train in the morning peak hour and 142 in the evening peak hour. 105 trips by STA bus in the morning peak hour and 105 trips in the evening peak hour.

Normanhurst Station is currently serviced by at least 4 train services in both directions during the extended AM and PM peak periods. The increase of 34 train trips up to 2027 represents an additional 4 person trips per service during the peak periods. This level of additional trips would not have a significant impact on train capacities.

It is difficult to predict the transport conditions of 2047 and the number of additional trips expected to be generated by the Proposal. This is especially notable due to the constant improvements to services through Government projects such as Sydney Metro and “More Trains, More Services” and the expected change in travel behaviours. However, considering the additional 142 trips forecast to be generated by the Master Plan in the evening peak hour, this represents an additional 18 person trips per service. An 8 carriage train has a seated capacity around 900 people. When considered against the capacity of trains currently serving the network, the forecast train trips only represent around 2% of the current capacity. Thus, the additional trips expected to be undertaken by train would not have a significant impact on the capacity of services.

The bus stops on Pennant Hills Road are serviced by 7-9 services in either direction during the peak periods. The additional peak hour STA bus trips forecast by the 2027 Master Plan of 28 trips represents 3-4 additional trips per service, which would not have a significant impact on the existing bus capacities.

As with the train services, it is difficult to forecast the number of bus services that would be operating in 2047. However, the usage of STA bus services, alongside other modes of transport, would be monitored as part of the GTP.

9.3 Pedestrian Access

Based on existing travel trends, the Ultimate Master Plan Proposal is forecast to generate 21 additional pedestrian trips by 2047 in the morning and evening peak hours respectively. In addition, all the trips made by public transport will ultimately end their journey on-foot.

The footbridge across Pennant Hills Road provides a safe route through to Normanhurst Station and the footpaths in the vicinity of the Site are of a high quality (soft gradient, minimal holes, etc.). Thus, the existing infrastructure in place would be able to accommodate the increase in pedestrians travelling towards the development.

9.4 Travel Plan Framework

9.4.1 Introduction

It is proposed to prepare a Green Travel Plan (GTP) for the School in response to a suitable condition of consent. The primary objectives of the GTP will be to:

- Reduce the environmental footprint of the School;
- Promote the use of 'active transport' modes such walking and cycling, particularly for short-medium distance journeys;
- Reduce reliance on the use of private vehicles for all journeys; and
- Encourage a healthier, happier and more active social culture.

Having regard for the above, the GTP would seek to adopt the following movement hierarchy with priority given to 'active transport'.

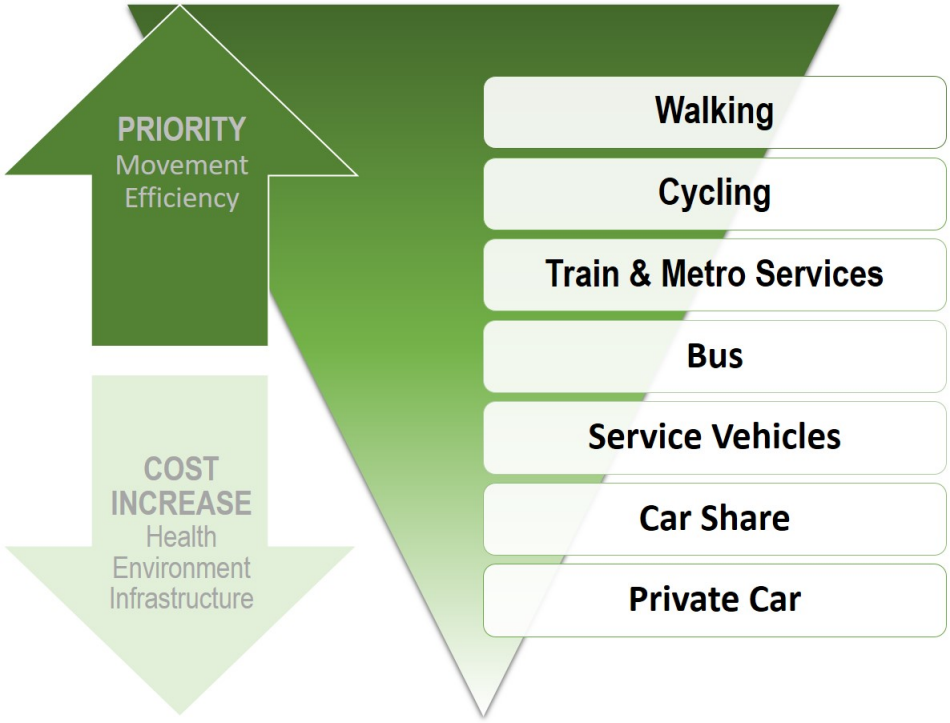

Figure 18: Movement Hierarchy

9.4.2 Site Audit & Targets

The travel behaviour surveys have informed an audit of the Site and Master Plan which has been conducted to determine existing facilities in the area and current modal splits. The audit considered the following:

- Public transport services in the area, including proximity to the site, frequency of services and accessibility;
- Existing bike and pedestrian facilities, including accessibility, connectivity and safety;
- Existing mode-split data for the Site and local area.

The existing travel patterns of staff and students have been analysed and discussed in Section 4 of this Report.

As discussed in Section 4, travel surveys in the form of questionnaires were conducted to gauge the travel patterns of existing staff and students. The surveys illustrated that a large proportion of students already travel to the School by non-car modes, namely the train and STA / School bus without the implementation of a GTP. The staff survey results illustrate that the majority of staff drive to School, which is a trend associated with Schools. Implementation of the GTP would change the travel behaviour of staff and build upon the current level of students who travel by public transport.

The mode share found from the questionnaire surveys would provide the base on which the GTP targets would be established, which would be developed in-line strategic planning policy guidelines and best practice. In this regard, **Table 19** details the existing staff and student travel mode share.

Table 19: Existing Mode Share Summary

Travel Mode	Existing Mode Share of Students	Existing Mode Share of Staff
Vehicle driver	13.9%	89.1%
Dropped Off	15.8%	0.5%
Taxi / Uber	0.2%	0.0%
Train	19.5%	5.7%
STA Bus	16.2%	0.0%
Loreto School Bus	12.7%	0.0%
Bicycle	0.0%	0.5%
Walk	3.7%	2.6%
Live on Campus	10.4%	0.0%
Other mode	7.5%	1.6%

The GTP would provide a package of Site specific measures to promote and maximise the use of sustainable travel modes, including walking, cycling, public transport and car sharing. It will include a review of existing transport choices and set targets so that the effective implementation of the plan can be assessed. These targets are to be realistic but ambitious enough to initiate substantiative behavioural change to achieve the desired outcomes. The GTP shall be reviewed regularly as part of an ongoing review to ensure it remains relevant and reflective of current conditions.

9.4.3 Action Strategies

Three main strategies have been identified and the actions required for each are detailed in **Table 20** below. The table details how the targets the specific actions to be implemented as part of the GTP and the timeframe for implementation. The School would be responsible for implementing each action or provide the responsibility to someone of their nomination.

In developing the GTP and the strategies and actions comprising it, it is recognised that the School facilitates the important process of monitoring and review.

The GTP is intended to develop a package of Site specific measures to promote and maximise the use of sustainable travel modes, including walking, cycling, public transport and car sharing. It will be further

developed at OC stage and it is expected that a suitable condition of consent would be imposed requiring approval by Council.

Table 20: Travel Plan Framework Action Table

STRATEGY	HOW IT WORKS	IMPLEMENTATION
1 Managing Car Use		
1.1 Car Sharing	Staff and students are encouraged to use a shared car (e.g. GoGet) to reduce the need for individuals to drive to School.	Provide car share spaces on-site and actively promote to staff and students.
1.2 Carpooling	Establish a car pooling program to help people find someone to share in their daily drive to School.	Prepare information sheets specific to staff and students.
2 Promoting Public Transport		
2.1 Provision of Opal Cards with Credit for a period of free rides.	The School may consider subsidising Opal tickets to increase public transport use.	Subject to School Management implementation.
2.2 Public transport for School business travel	The School would promote public transport as the first preference for staff travel on School business.	Subject to School Management implementation.
3 Promoting Cycling and Walking		
3.1 Providing End of Journey Facilities	Providing facilities such as showers, change rooms, lockers.	Bicycle parking spaces will be provided in line with Council's DCP as well as EOTF.
4 Other		
4.1 Distribution information Fact Sheet	Provides more information about the sustainable travel options.	Prepare information sheets specific to staff and students.

10 Design Commentary

10.1 Relevant Design Standards

The Site accesses, car parks and loading areas would be designed to comply with the relevant requirements of Councils DCP and the relevant Australian Standards (AS2890.1, AS2890.2 and AS2890.6). The following characteristics are noteworthy with regard to the design of the site access and car parking.

10.2 Site Access

In accordance with AS2890.1, each of the vehicle accessed are to be designed to the following requirements:

- Category 1 (combined 3-5.5m exit / entry vehicle crossing width) for developments providing 101-300 parking spaces
- Category 2 (combined 6-9m exit / entry vehicle crossing width) for developments providing 101-300 parking spaces off a local road or 25-100 parking spaces off an arterial road.

Service vehicle access is expected to comply with design requirements under AS2890.2 and accommodate the largest vehicle intended to access the Site.

10.3 Car Park Design

In general, the car parks would be designed with consideration to the above Australian Standards, with the following considered noteworthy:

- Pick up / drop off parking spaces shall be designed in accordance with User Class 3A with a minimum space length of 5.4m, width of 2.7m and a minimum aisle width of 6.2m.
- Staff parking spaces shall be designed in accordance with a User Class 1A and are to be provided with a minimum space length of 5.4m, width of 2.4m and a minimum aisle width of 5.8m.
- Accessible parking spaces shall be designed in accordance with AS2890.6 requiring a 2.4m module width, an adjacent shared area 2.4m wide and 5.4m long for both the module and shared area.
- Dead-end aisles are to be provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.

10.4 Design Summary

The internal configuration of the Site – including light and commercial vehicular access, car parking and servicing areas – are to comply with the requirements of Council's DCP and the relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6. It is concluded that the Master Plan is capable of providing safe and efficient access to, from and within the proposed development

11 Conclusions

The key findings of this Transport Assessment (TA) are:

- The State Significant Development Application (SSDA) relates to the proposed long-term Master Plan for Loreto Normanhurst (the School), located at 91-93 Pennant Hills Road, Normanhurst (the Site). The 30 year Master Plan (Proposal) generally seeks to gradually redevelop or replace existing buildings with a view to improve access, movement and spatial relationships while facilitating the future growth of the School.
- The Proposal consists of 2 key stages where by which the student cap would increase by 450 students from 1,150 to 1,600 as part of the 2027 Master Plan and a further 400 students, up to the ultimate cap of 2,000 students by 2047.
- The SSDA seeks approval for the Concept Master Plan, with detailed approval required for the boarding facilities only, and the cap of up to 1,600 students by 2027 and 2,000 students by 2047. As mentioned, the SSDA is for a long-term Master Plan and thus would be development in stages over a period of time.
- For the 2027 Master Plan, 37 additional staff car parking spaces are required and a further 40 spaces are required for the 2047 Master Plan, in accordance with Council's DCP.
- There would a minor increase of vehicular trips generated on Mount Pleasant Avenue as a result of the Proposal (3 veh/hr), with the additional parking required to be provided in a consolidated car park accessed via Osborn Road.
- Accessible parking, motorcycle parking and bicycle parking is to be provided in accordance with Council's DCP for each of the Master Plan buildings.
- The Site is well integrated with the public transport network, with a direct access to Normanhurst Station via the pedestrian footbridge and a number of bus routes serving the area within 400m of the School.
- The School is also seeking approval for an Early Learning Centre (ELC) which is subject to a separate Development Application, with the ELC traffic impacts have been considered in a separate assessment. It is worthy of note that ELC student numbers are included in the total proposed cap of 2,000 students. Therefore, the number of students assessed for this Master Plan is 770 (370 by 2027 and 400 by 2047).
- Traffic demand analysis indicates that the 2027 Master Plan (with an increase of 370 students) would result in 187 additional trips on the surrounding road network during morning evening peak hour and 177 trips in the afternoon peak hour.

- The 2047 Master Plan (resulting in a total increase of 770 students) would generate 352 additional trips on the surrounding road network during morning peak hour and 336 trips during the evening peak hour with reduced generation at other times.
- Ultimately, the Proposal would benefit from the delivery of NorthConnex in 2020. To take account of the reduced traffic flows on Pennant Hills Road, traffic forecast data adopted in the Sydney Traffic Forecast Model (STFM) has been obtained from RMS. The data indicates that are significant reductions in the Pennant Hills Road traffic flows further to the opening of NorthConnex.
- SIDRA intersection analysis indicates that the performance of the intersection would not materially change between now and 2026, with the queues and DOS slightly improving and AVD and LOS remaining consistent.
- Following the addition of development traffic associated with the 2027 Master Plan, the intersection would continue to operate with acceptable LOS, DOS and AVD which is consistent with the "Base Case". The overall intersection performance indicates that the student increase to 1,600 students is supportable.
- An ultimate Master Plan year has been assessed for 2036, which is consistent with the data obtained from the STFM. As with the 2026 assessment, the SIDRA analysis shows that the intersection would continue to operate with acceptable LOS, DOS and AVD which is consistent with the "2026 Base Case". The overall intersection performance indicates that the student increase to 1,600 students is supportable.
- A preliminary GTP has been provided which details measures that can be implemented to encourage the use of alternative modes of transport for both students and staff.
- The internal configuration of the buildings to be developed as part of the Master Plan – including light and heavy vehicular access, car parking and the servicing area – has been designed in accordance with Council's DCP and the relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6. It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

In summary, the Proposal is supportable on traffic planning grounds and will not result in any adverse impacts on the surrounding road network or the availability of on-street parking.

Appendix A

Stage 1 SSDA – Transport Statement

Prepared for

LORETO NORMANHURST

Transport Statement Report

Loreto Normanhurst Boarding House
91-93 Pennant Hills Road, Normanhurst

Ref: 0416r03v1
22/01/2019

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-	18/01/2019	Draft	R. Butler-Madden	J. Mulhaire
I	22/01/2019	Issue	R. Butler-Madden	J. Mulhaire

Table of Contents

Appendices

1 Introduction

1.1 Overview

Ason Group has been engaged by Loreto Normanhurst to provide traffic and transport planning services in regard to a State Significant Development Application (SSDA) for the proposed long-term Master Plan and Stage 1 development for Loreto Normanhurst (herein referred to as the School), located at 91-93 Pennant Hills Road, Normanhurst. The School is located within the Hornsby Shire Council Local Government Area (LGA) and has therefore been assessed against that Council's planning controls.

The Master Plan – which will guide the development of the School over the next 30 years - seeks to gradually redevelop or replace existing buildings with a view to improving access, movement and spatial relationships within the School's grounds, while simultaneously facilitating the future growth (students) of the School.

There are currently 2 phases which have been identified in development of the Master Plan, the immediate works which have already been defined are to be completed by 2027, with the later Master Plan stages through to 2047 yet to be finalised. A Transport Assessment (TA) has been prepared separately which provides an assessment of the access, traffic and parking characteristics of the Master Plan. The Master Plan assessment has been documented in the report entitled *Transport Assessment Report; Loreto Normanhurst Long-Term Master Plan, 91-93 Pennant Hills Road, Normanhurst*, Version 1, dated 17/01/2019, Ason Group (Master Plan Report).

The purpose of this Transport Statement (TS) therefore is to provide an assessment of Stage 1 (within the context of the assessment conducted for the Master Plan), which proposes a new boarding house to replace the existing facilities on-site. The location of the Stage 1 Site and its context within the School and local road hierarchy is shown by **Figure 1**.

It is important to note from the outset that the existing boarding house (which can accommodate up to 216 boarders) is to be moved to the new boarding facilities, with the existing boarding house to be upgraded and re-purposed during the later stages of the Master Plan; no increase in the number of boarders is proposed and there would be no increase in car parking as a result of Stage 1.

Figure 1: Location Plan and Road Hierarchy

1.2 Secretary's Environmental Assessment Requirements

As part of the Master Plan and Stage 1 SSDA, Secretary's Environmental Assessment Requirements (SEARs) were issued by the DPE on 12 January 2018; the SEARs outline the key areas for consideration in any subsequent development application with specific requirements providing the scope for an assessment of potential traffic and transport impacts arising from the Master Plan, with specific SEARs also provided for the Stage 1 Development.

Table 1 below provides a summary response to each of the SEARs regarding Stage 1 with this TS providing a more detailed analysis of each requirement.

Table 1: Secretary's Environmental Assessment Requirements - General

SEARs - General	Summary Response
Transport Impact Assessment must be prepared that assesses the transport impacts of the proposed stage one works within the context of the assessment undertaken for the Concept Development Application.	This TS provides an assessment of the relevant access, parking and traffic impacts of Stage 1. As discussed, the number of boarders would not be increased, nor would the car parking on the site be increased as a result of Stage 1. Therefore, there would be no traffic impacts associated with the new boarding facilities becoming operational. The existing boarding facilities would be up-graded and re-purposed for another use under the Master Plan which has yet to be defined. The traffic impacts of the Master Plan are discussed in the Master Plan Report.
Detail access arrangements for construction and measures to mitigate any associated pedestrian, cyclist or traffic impacts, including the preparation of a preliminary Construction Traffic and Pedestrian Management Plan (CTPMP) to demonstrate the proposed management of impact. The CTPMP should also consider cumulative impacts associated with other construction activities and assess road safety at any key intersections subject to heavy vehicle movements and high pedestrian activity.	Please refer to Appendix B for the Construction Traffic and Pedestrian Management Plan.
In relation to construction traffic: ▪ Assessment of cumulative impacts associated with other construction ▪ activities (if any); ▪ an assessment of road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity; ▪ details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process; ▪ details of anticipated peak hour and daily construction vehicle movements to and from the site; ▪ details of access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle; ▪ details of temporary cycling and pedestrian access during construction; ▪ details of proposed construction vehicle access arrangements at all stages of construction; and	As above, please refer to Appendix B for the Construction Traffic and Pedestrian Management Plan.

▪ traffic and transport impacts during construction, including cumulative impacts associated with other construction activities, and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact.	

1.3 Reference Documents

As stated, the School is located within the Hornsby LGA and as such Stage 1 has been assessed with regard to that Council's planning documents, including:

- Hornsby Development Control Plan 2013 (DCP 2013); and
- Hornsby Local Environmental Plan 2013 (LEP 2013).

This TA also references general access, traffic and parking guidelines, including:

- RMS (formerly RTA) Guide to Traffic Generating Developments (RMS Guide)
- Australian Standard 2890.1 (2004): Off-street Car Parking (AS2890.1)
- Australian Standard 2890.2 (2002): Off-street Commercial Vehicle Facilities (AS2890.2)
- Australian Standard 2890.3 (2015): Bicycle Parking (AS2890.3)
- Australian Standard 2890.6 (2009): Off-street Parking for People with Disabilities (AS2890.6)

1.4 Report Structure

This report is structured as follows:

- Section 2 provides a summary of Stage 1.
- Section 3 outlines the parking requirements applicable to Stage 1 and assesses the traffic characteristics of Stage, including the projected trip generation and the resultant performance of the local road network.
- Section 4 provides a review of proposed access, parking and servicing infrastructure with reference to the appropriate Australian Standards.
- Section 5 provides a summary of the key conclusions.

2 Overview of Proposal

2.1 Summary of Proposed Development

A detailed description of the proposed development is included in the Statement of Environmental Effects (SEE) which this TA accompanies. In summary, Stage 1 proposes a new boarding facility (which can accommodate up to 216 boarders) to relocate the existing boarders on the Site to upgraded facilities. It is worthy of note that the existing facilities can accommodate up to 216 boarders so there is no change proposed to the number of students at the School as part of Stage 1.

The boarding house is to be located in part on the existing Teresa Hall staff car park (which has space for 37 cars), as well as the Loreto Community House and Uniform Shop. The parking, which is accessed off Mount Pleasant Avenue, is to be replaced with a basement car park underneath the new boarding house which would accommodate 42 cars.

Two vehicular accesses are to be provided, 1 light vehicular access to the basement car with a separate access provided to the loading dock.

Refurbishment works would also be undertaken on the Mary Ward building as part of these Stage 1 works.

As already noted, the existing boarding facilities are to be moved to the new boarding house, with the existing boarding house to be upgraded and re-purposed during the later stages of the Master Plan; no increase in the number of boarders is proposed. In regard to the proposed basement car park, these parking spaces would replace the spaces currently provided in the Teresa Ball car park; therefore Stage 1 would not materially increase vehicle trip generation to Mount Pleasant Avenue.

Detailed plans prepared by Allen Jack + Cottier Architects are provided elsewhere in the SEE; copies of plans specifically relevant to the discussion of access, traffic and parking issues are provided below.

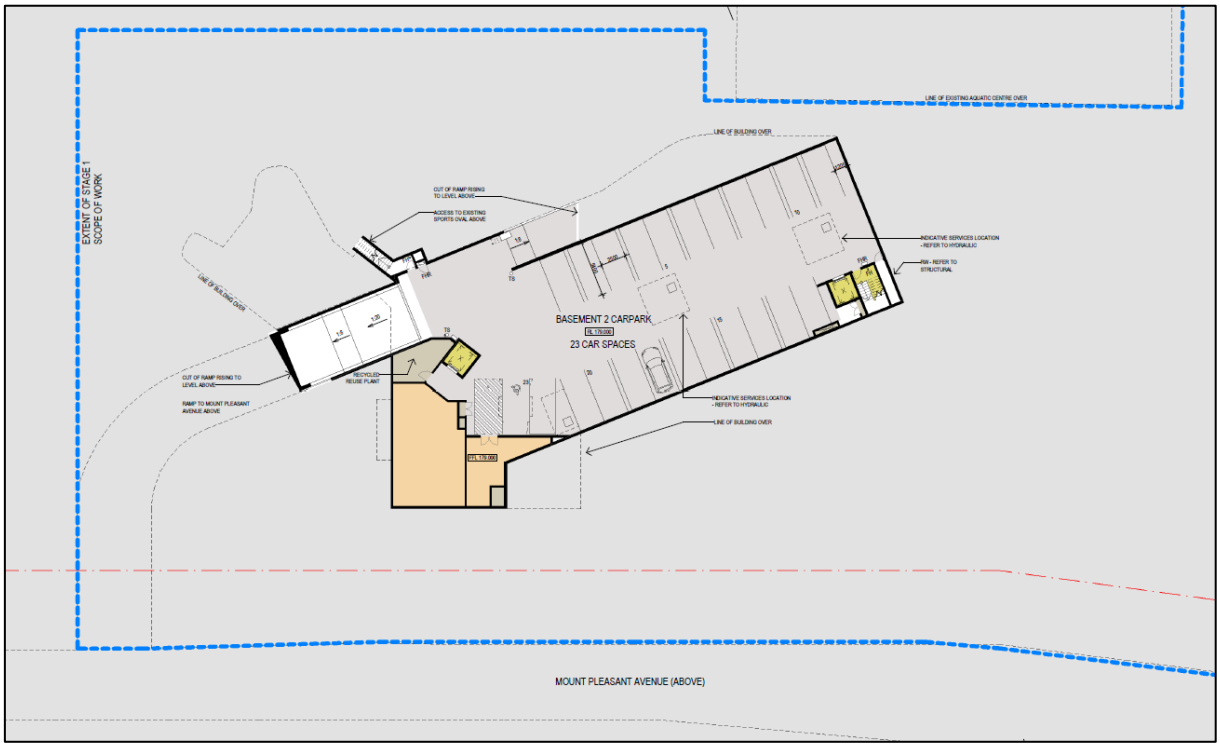


Figure 2: Boarding House Proposed Basement 2 Layout

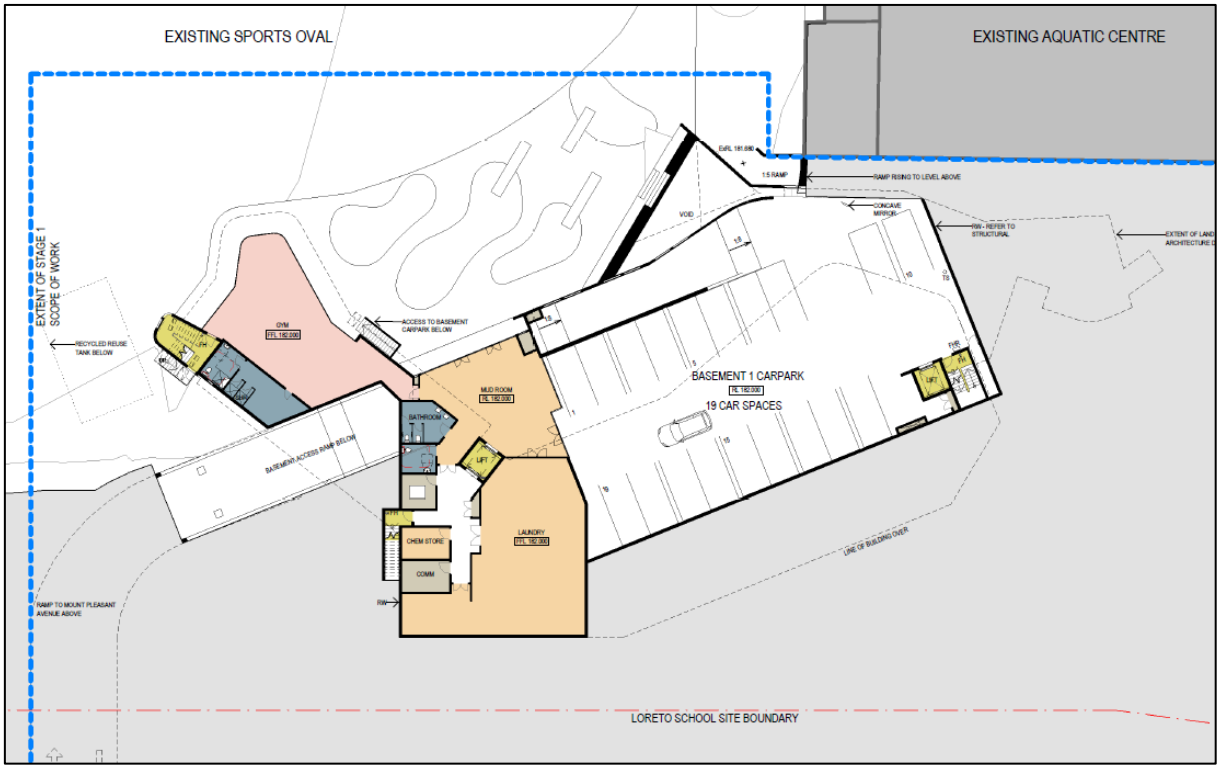


Figure 3: Boarding House Proposed Basement 1 Layout

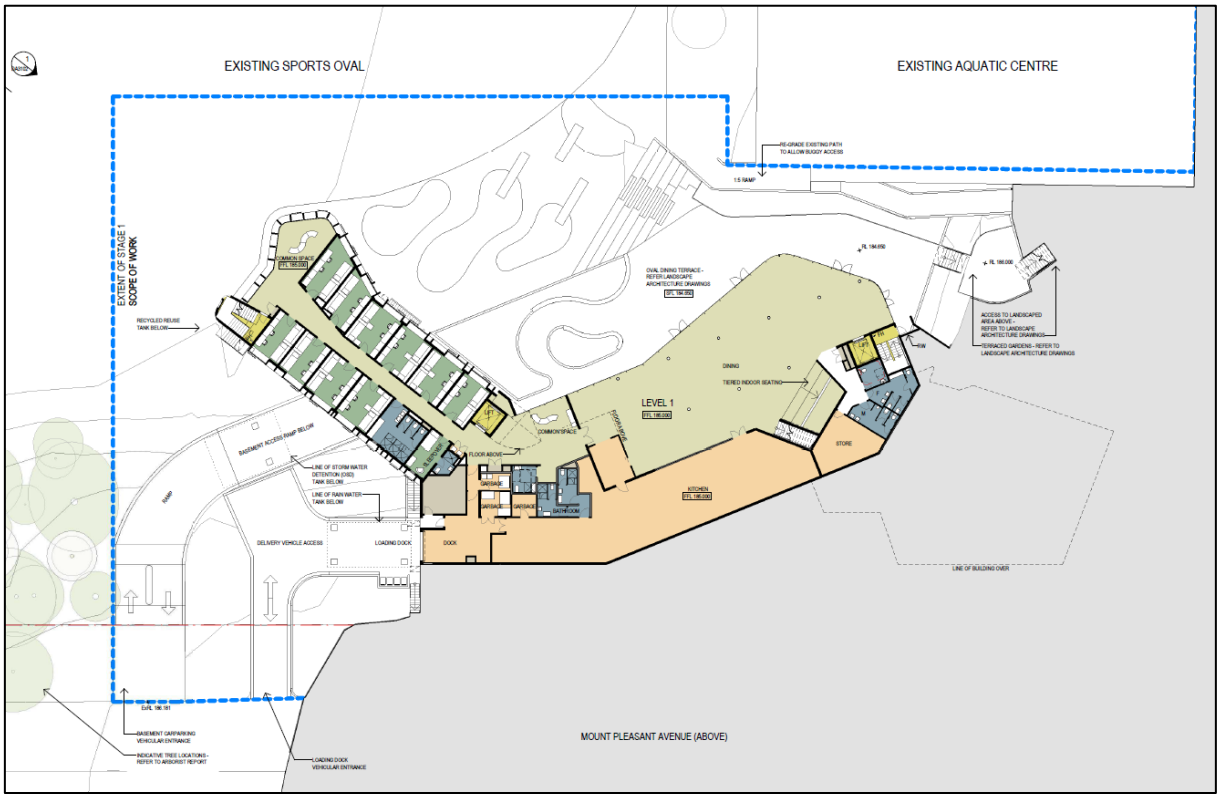


Figure 4: Boarding House Proposed Level 1 Layout

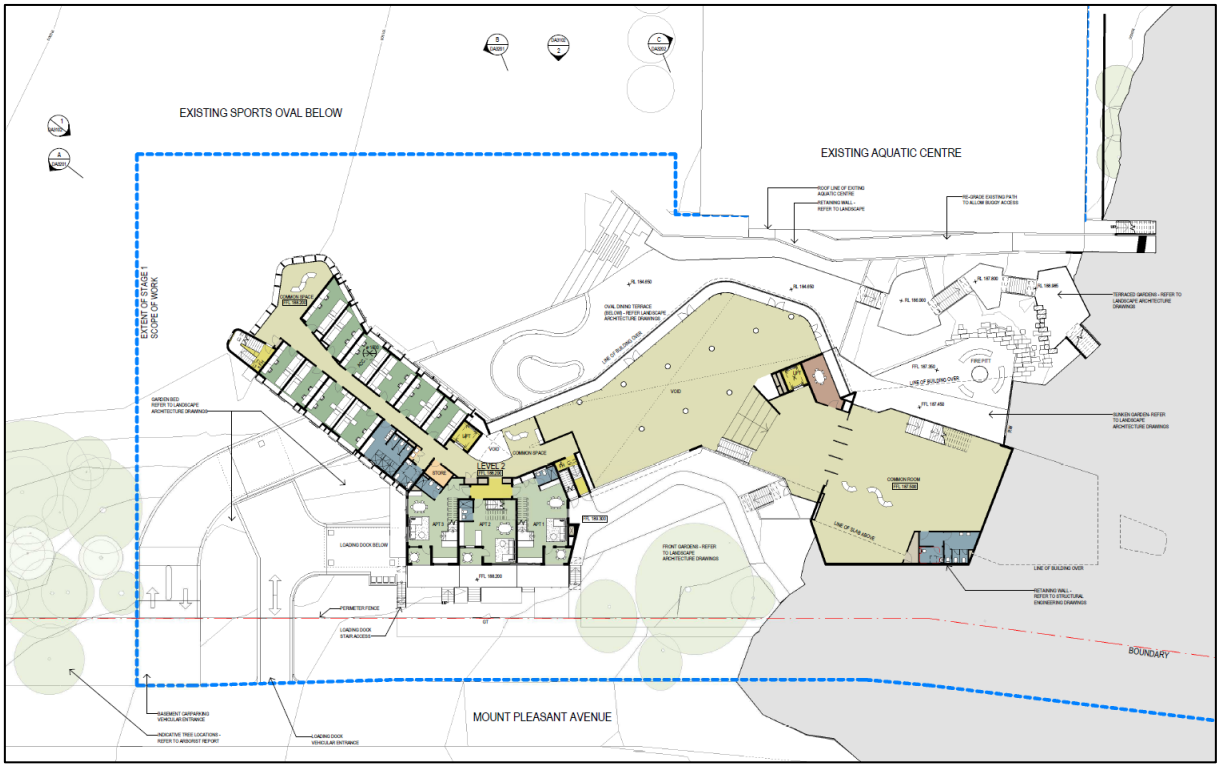


Figure 5: Boarding House Proposed Level 2 Layout

3 Parking & Servicing Requirements

3.1 Car Parking

3.1.1 Car Parking Requirements

Council's DCP 2013 does not provide a requirement for educational boarding facilities. Given that the Stage 1 proposal is a long-term boarding facility for students who attend the School, the parking demand generated by the boarding house would consist of staff working in the kitchen and dining hall.

It is worthy of note that the proposed boarding house is replacing existing facilities on-site, with no increase in students or staff proposed as a result. The existing 37 car parking spaces on the Stage 1 Site is to be replaced with a basement car park containing 42 spaces, accessed of Mount Pleasant Avenue, which is consistent with the existing arrangement and represents a small increase in parking provision.

Further, 10 parking spaces are currently dedicated for boarding house staff in the parking area next to the Chapel. The demand for boarding house staff is therefore already accommodated within School ground and would continue to be as part of the masterplan car park on Osborn Road.

3.1.2 Accessible Parking

There are no accessible parking rates for educational boarding houses provided in Council's DCP 2013. Therefore, reference has been made to Table D3.5 of Disability (Access to Premises - Buildings) Standards 2010 as per the Building Code of Australia (BCA). Residential facilities provided as part of a school are required to provide:

- 1 space for every 100 car parking spaces or part thereof.

The proposed basement car park includes 1 accessible space, which complies with the above rate.

Further, Council's DCP requires that 2-3% of spaces be accessible spaces for Educational Establishments. As such, the provision of 1 space represents 2% of the total provision (42 spaces) and is therefore consistent with Council's requirement for Educational Establishments.

3.2 Servicing and Waste Collection

The existing servicing dock which is located centrally on the Site is to be moved as part of the new boarding facilities. The loading dock is currently access via Mount Pleasant Avenue and the proposed loading dock would also be accessed via Mount Pleasant Avenue. A dedicated loading dock access

driveway would be provided adjacent to the basement car park access driveway to separate light vehicle and loading vehicle access.

The proposed loading dock has been designed to accommodate a 6.4 metre Small Rigid Vehicles (SRV). Swept path analysis provided as **Appendix A** illustrates that suitable manoeuvring room has been provided for the required servicing vehicles.

4 Traffic Assessment

4.1 Traffic Generation

It is reiterated that the Stage 1 proposal would not result in increase of students (or staff) at the School, therefore the traffic generation of the boarding house would remain consistent with the existing facilities. There would be a small increase in the number of parking spaces provided in the basement car park (5).

The Travel Surveys conducted for the Master Plan assessment (documented in the Master Plan Report), illustrated that 54% of staff arrived during the peak hour of 07.30-08.30AM. Based on a 5 additional parking spaces, there could be an additional 3 cars travelling to the School via Mount Pleasant Avenue. This nominal number of vehicles would not have a material impact on the operation of the Mount Pleasant Avenue / Pennant Hills Road intersection.

Thus, it is concluded that the traffic generation associated with the small increase parking spaces is acceptable.

4.2 Construction Traffic

A detailed Construction Traffic and Pedestrian Management Plan (CTPMP) has been prepared (provided as **Appendix B**) to detail a traffic plan during construction to minimise traffic impacts on the surrounding road network, ensure safety and efficiency for workers, pedestrians and road users, and provide information regarding the construction vehicle access routes.

5 Design Commentary

5.1 Relevant Design Standards

The site access, car park and loading areas have been designed to comply with the following relevant Australian Standards:

- AS2890.1 for car parking areas;
- AS2890.2 for commercial vehicle loading areas;
- AS2890.6 for accessible (disabled) parking.

5.2 Basement Car Park

A detailed review of the car park and related areas has been undertaken and the following characteristics are noteworthy:

- The main car park aisle has been designed with a minimum clear width of 5.5m.
- Staff parking spaces shall be designed in accordance with a User Class 1A and are to be provided with a minimum space length of 5.4m and width of 2.4m.
- A traffic signal system and convex mirrors are to be installed to ensure the safety of vehicles travelling between the basement levels. Two way flow is provided from Mount Pleasant Avenue to Basement Level 1. The car park is a sufficiently low traffic generator and with tidal traffic flows, the proposed signal system is an appropriate alternate solution which would operate in a safe and efficient manner.
- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.
- All disabled and adaptable parking spaces are to be provided in accordance with AS2890.6, which requires a space with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.

It is expected that any detailed construction drawings in relation to any modified areas of the car park or site access would comply with these Standards. Furthermore, compliance with the above Standards would be expected to form a standard condition of consent to any development approval.

Swept path analysis of the boarding house car park is provided as Appendix A, which demonstrates compliance with relevant sections of the Australian Standards.

5.3 Service Vehicle Access

The commercial (heavy) vehicle facilities of the development have been designed having regard for the operational requirements of the future tenant and the requirements of AS2890.2. In this regard the following is considered noteworthy:

- The internal design of the service area has been undertaken in accordance with the requirements of AS28090.2 for the maximum length vehicle accessing the site being a Small Rigid Vehicle of 6.4m in length.
- A minimum bay width of 3.5m is provided, and
- All service vehicles can enter and exit the site in a forward direction.

Swept path analysis is provided on the plan attached at Appendix A, which demonstrate compliance with relevant sections of AS2890.2.

5.4 Design Summary

The internal configuration of the boarding house basement car park and servicing vehicular access has been designed to comply with the requirements of Council's DCP and the relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6. It is therefore concluded that the Stage 1 proposal provides safe and efficient access to, from and within the proposed development.

6 Conclusions

The key findings of this Transport Statement (TS) are:

- This TS has been produced to support the Stage 1 Development Application, within the context of a wider State Significant Development Application (SSDA) the SSDA relates to the proposed long-term Master Plan for Loreto Normanhurst (the School), located at 91-93 Pennant Hills Road, Normanhurst (the Site). The 30 year Master Plan generally seeks to gradually redevelop or replace existing buildings with a view to improve access, movement and spatial relationships while facilitating the future growth of the School. This TS is to be submitted alongside the Master Plan assessment which has been produced in support of the SSDA.
- The Stage 1 proposal which this TS relates to forms part of the Long-term Master Plan and will facilitate refurbishment works to the Mary Ward building and the provision of a new boarding house to replace the existing facilities on-site. The existing facilities are to be upgraded and re-purposed for another use as part of the Long-term Master Plan.
- The proposed boarding house is to be located in part on the existing Teresa Hall car park, which accommodates 37 staff car parking spaces accessed of Mount Pleasant Avenue. This car park is to be replaced within basement car parking provided as part of the new boarding house. The proposed basement car park would provide a total of 42 parking spaces (including 1 accessible space).
- Council's DCP 2013 does not provide parking requirements for educational boarding facilities. However, the parking demand of the Stage 1 proposal would be limited to boarding house staff. As already noted, the boarding house and car park would be replacing existing facilities and the parking demand is therefore already accommodated on School grounds.
- Access to the boarding house is proposed on Mount Pleasant Avenue and is therefore consistent with the existing situation. Separate accesses to the car park and loading area are to be provided.
- There would be a slight increase of 5 parking spaces on the Stage 1 site which has the potential to increase traffic on Mount Pleasant Avenue by 3 vehicles during the School peak hours. However, the nominal increase in traffic would not have a material impact on the operation of the Mount Pleasant Avenue / Pennant Hills Road intersection.

  Thus, it is concluded that the traffic generation associated with the small increase parking spaces is acceptable.
- A Construction Traffic and Pedestrian Management Plan (CTPMP) for the Stage 1 proposal has been produced (provided as Appendix B) and details the likely construction haulage routes, construction hours, and mitigation measures.
- The internal configuration of the boarding house – including light and heavy vehicular access, car parking and the servicing area – has been designed in accordance with Council's DCP and the

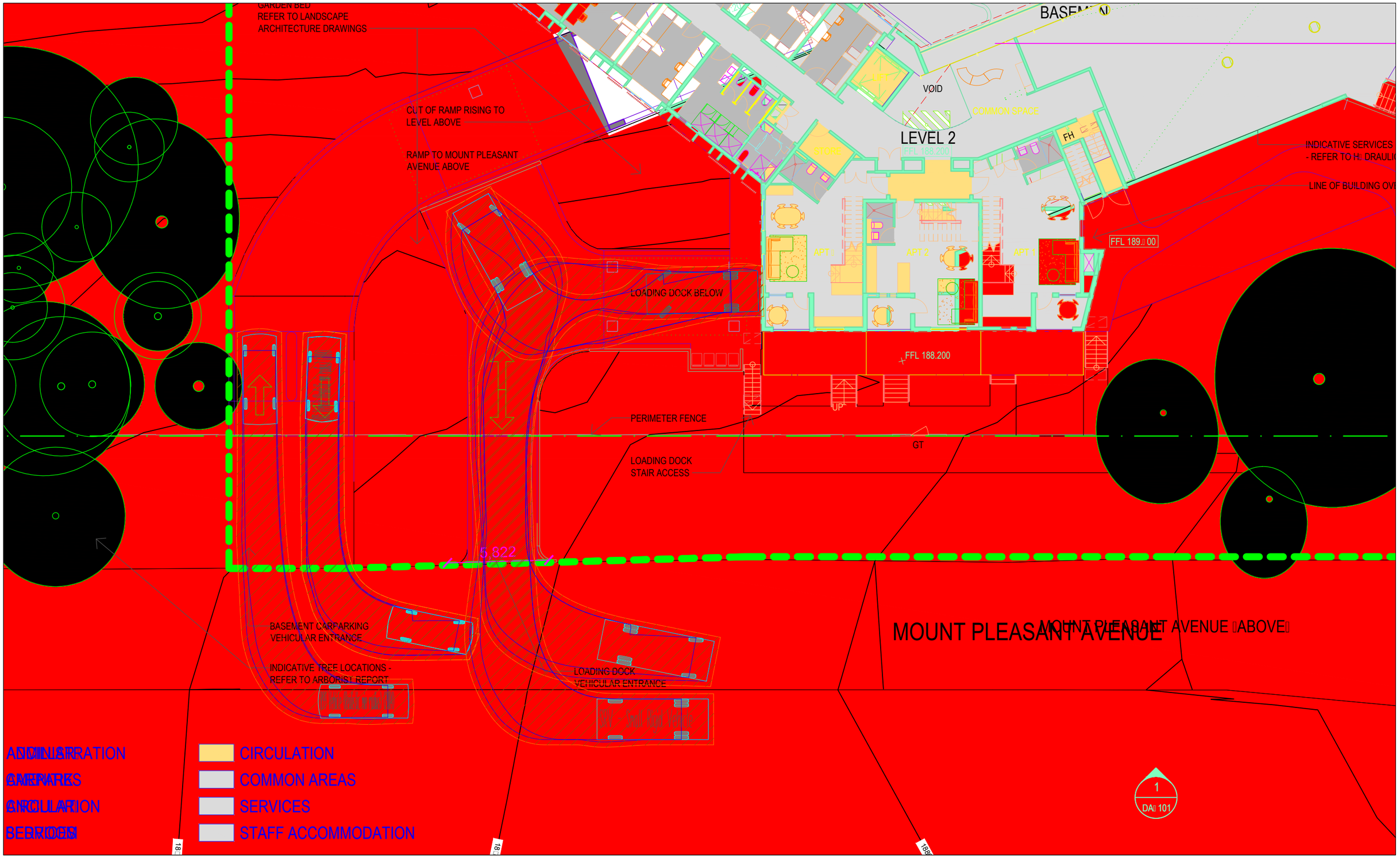
relevant Australian Standards of AS2890.1, AS2890.2 and AS2890.6. It is concluded that the Stage 1 proposal provides safe and efficient access to, from and within the proposed development.

It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

In summary, the Proposal is supportable on traffic planning grounds and will not result in any adverse impacts on the surrounding road network or the availability of on-street parking.

Appendix A

Swept Path Analysis



Revision notes:

Rev:	Date:	Notes:

For information purposes only - not for construction

Drawn By: AT

Client: ALLEN JACK+COTTIER

Project: 0821 Loreto Normanhust

Drawing Title: Proposed Servicing Layout Small Rigid Vehicle (SRV)

Date: 18-Jan-19

Scale @ A3: [scale]

Drawing Number: AG01

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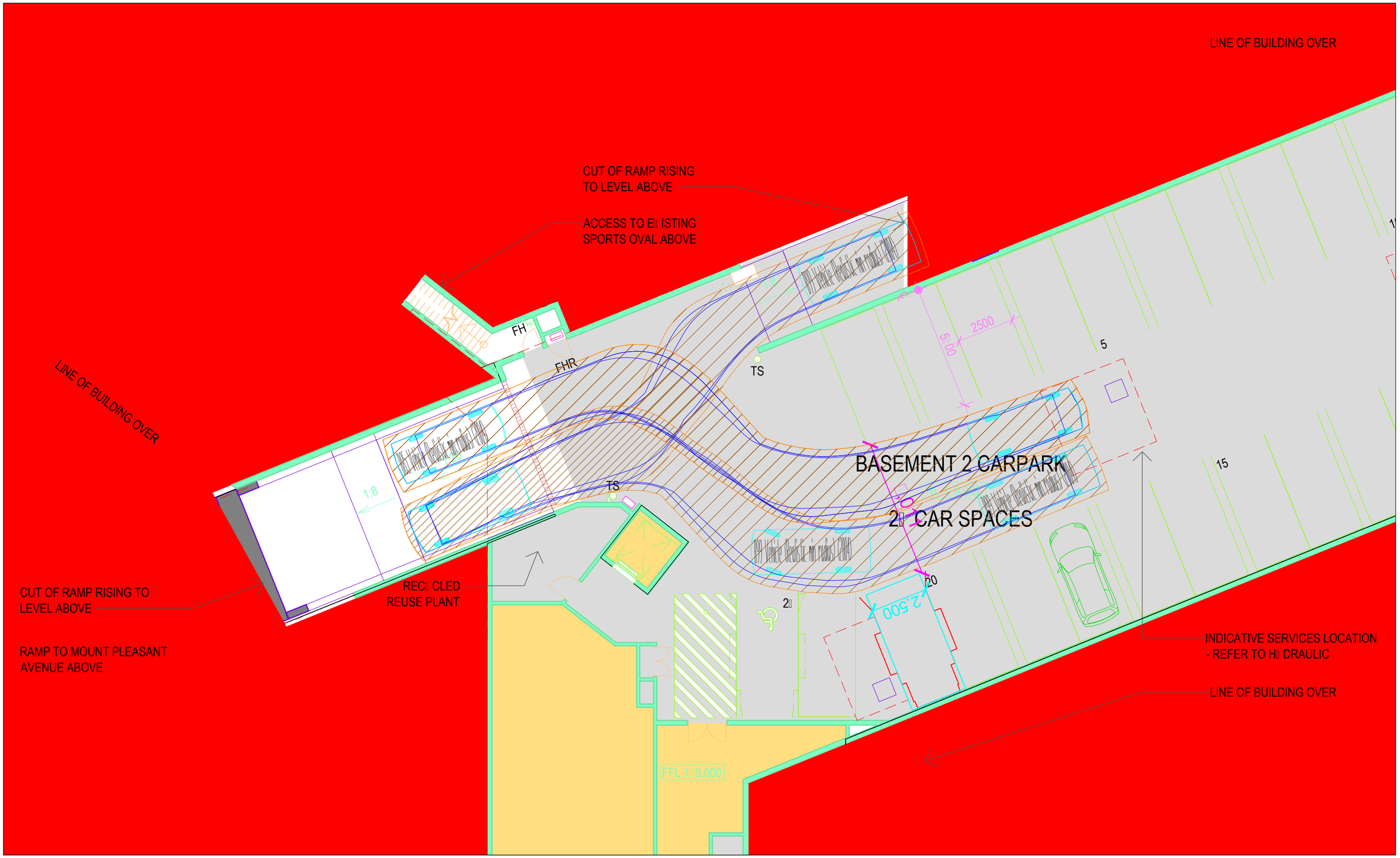

Revision notes:

Rev:	Date:	Notes:

For information purposes only - not for construction

Drawn By: AT

Client: ALLEN JACK+COTTIER

Project: 0821 Loreto Normanhust

Drawing Title: Proposed Car Parking Layout Design Checks

Date: 18-Jan-19

Scale @ A3: [scale]

Drawing Number: AG02

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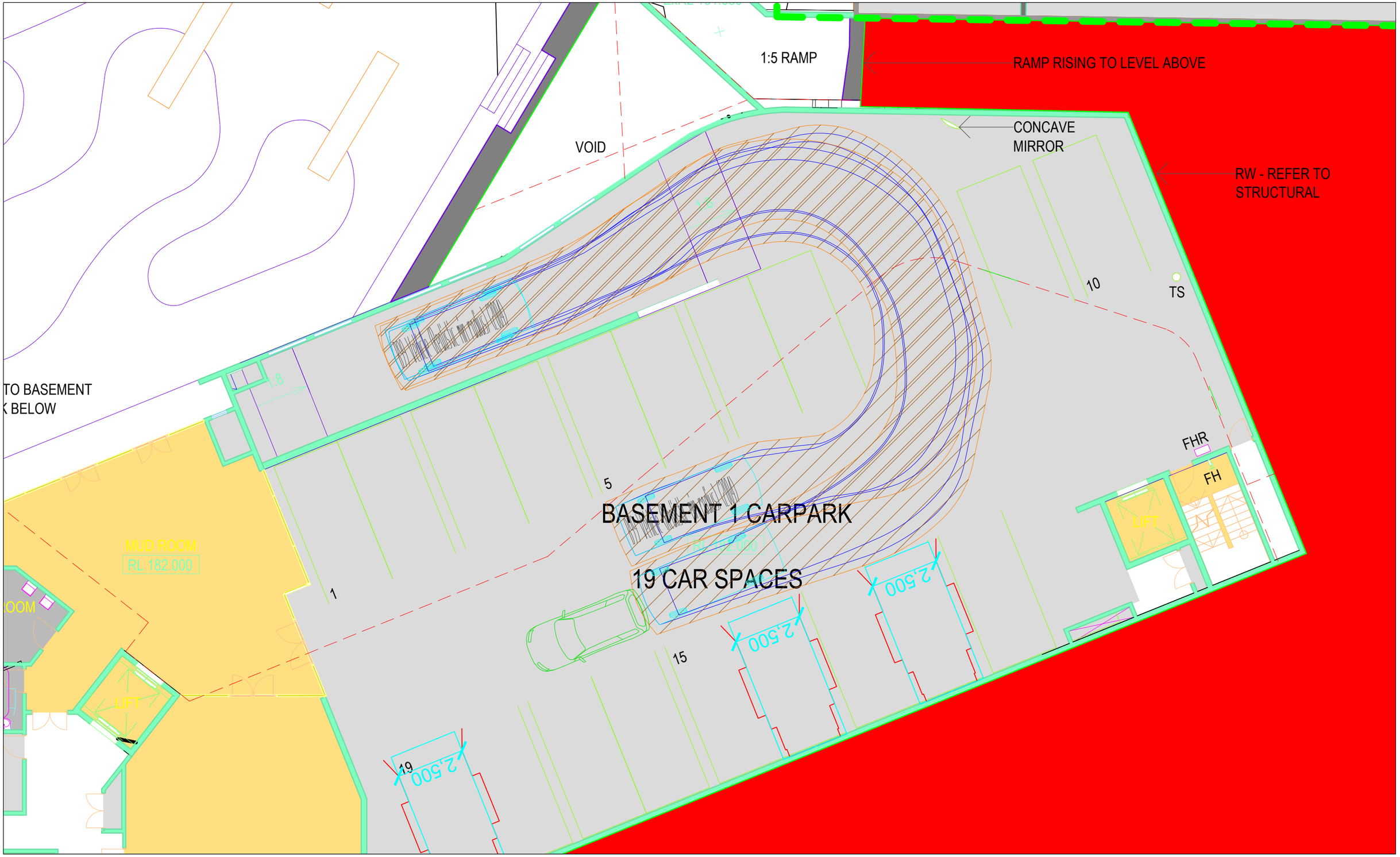

Revision notes:

Rev:	Date:	Notes:

For information purposes only - not for construction

Drawn By: AT

Client: ALLEN JACK+COTTIER

Project: 0821 Loreto Normanhust

Drawing Title: Proposed Car Parking Layout Design Checks

Date: 18-Jan-19

Scale @ A3: [scale]

Drawing Number: AG03

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Appendix B

Construction Traffic and Pedestrian Management Plan

asongroup

Prepared for

LORETO NORMANHURST

Construction & Pedestrian Traffic Management Plan

Loreto Normanhurst Stage 1 Works
91-93 Pennant Hills Road, Normanhurst

Ref: 0416r02
22/01/2019

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Document Control

Project No: 0416r02v2

Project: Loreto Normanhurst Stage 1 CPTMP

Client: Loreto Normanhurst

File Reference: 0416r02v2 CPTMP 91-93 Pennant Hills Road

Revision History

Revision	Date	Details	Author	Approved by
I	16/01/2019	Draft	V.Cheng	J. Mulhaire
II	22/01/2019	Issue	V.Cheng	J. Mulhaire

Table of Contents

Appendices

1 Introduction

1.1 Overview

Ason Group has been engaged by Loreto Normanhurst (Loreto) to prepare a Construction Pedestrian and Traffic Management Plan (CPTMP) for the Stage 1 Works (boarding school construction and Mary Ward works) at 91-93 Pennant Hills Road, Normanhurst (the Site), in response to the Secretary's Environmental Assessment Requirements (SEARS) which states:

"Construction Traffic and Pedestrian Management Plan

Stage 1 DA:

Detail proposed construction vehicle access arrangements at all stages of construction; and traffic and transport impacts during construction, including cumulative impacts associated with other construction activities, and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact.

(i) The CTPMP should also consider cumulative impacts associated with other construction activities and assess road safety at any key intersections subject to heavy vehicle movements and high pedestrian activity.

(ii) Assess cumulative impacts associated with other construction activities (if any).

(iii) Assess road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity.

(iv) Detail the construction program including anticipated construction duration and highlighting significant and milestone stages and events during the construction process.

(v) Detail anticipated peak hour and daily construction vehicle movements to and from the site.

(vi) Detail access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle.

(vii) Detail temporary cycling and pedestrian access during construction.

The purpose of this report is to detail a traffic plan for construction that would minimise traffic impacts on the surrounding road network, ensure the safety and efficiency of all workers, pedestrians and road users, and provide information regarding the construction vehicle access routes and any changed road conditions (if applicable).

It is expected that this plan would be updated should any necessary changes to the currently proposed arrangements arise in the future and would be further detailed as part of CC works for submission to Council and any other government authorities in response to the relevant conditions of consent. Any changes to this plan shall be done in consultation with the Hornsby Shire Council. Any special events (if required) would be subject to a separate request for a specific permit not covered by this report.

Please note, Ason Group is responsible for the preparation of this Plan only and not for its implementation, which is the responsibility of the project manager / builder.

1.2 CTMP Compliance with SEARs

A summary of the relevant requirements of the conditions of consent and this CTMP's compliance with each is provided below for clarity.

Table 1: SEARs Compliance Table

Reference	Requirement	Response
-	Detail proposed construction vehicle access arrangements at all stages of construction; and traffic and transport impacts during construction, including cumulative impacts associated with other construction activities, and how these impacts will be mitigated for any associated traffic, pedestrian, cyclists, parking and public transport, including the preparation of a draft Construction Traffic Management Plan to demonstrate the proposed management of the impact.	*n/a*
i)	The CTPMP should also consider cumulative impacts associated with other construction activities and assess road safety at any key intersections subject to heavy vehicle movements and high pedestrian activity.	Cumulative traffic and safety impacts of construction activities at key intersections have been outlined at Section 3.1.4 and Section 3.1.5. Construction management and coordination with these nearby construction activities have been discussed in detail at Section 2.10, 2.11, 2.12, and 2.13.
ii)	Assess cumulative impacts associated with other construction activities (if any).	Cumulative impacts have been assessed at Section 3.1.4 and 3.1.5 for Pennant Hills Road and relevant key intersections.
iii)	Assess road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity.	Cumulative traffic and pedestrian impacts have been assessed at the key intersections near the Site where construction heavy vehicles will pass through at Section 3.1.5. The proposed Site access arrangements and haul routes are described in Section 2.3 and 2.4 respectively. The proposed traffic and pedestrian impact mitigation strategies are proposed in Section 3.1.1 for restricted heavy vehicle movement schemes during peak hours. The relevant Traffic Control Plans (TCPs) for the Site can be found in **Appendix B**.

Reference	Requirement	Response
iv)	Detail the construction program including anticipated construction duration and highlighting significant and milestone stages and events during the construction process.	The anticipated construction program can be found in Section 2.1.
v)	Detail anticipated peak hour and daily construction vehicle movements to and from the site.	Refer to Section 3.1.1 for heavy vehicle movements and Section 3.1.2 for light vehicle traffic generation. It is expected that there will be a daily peak of 60 truck movements (30 in & 30 out) and a peak of 10 heavy vehicle movements per hour (5 in & 5 out). These estimated peak traffic generation are associated with the concrete pours stage.
vi)	Detail access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle.	Refer to Section 2.3 for the proposed Site access arrangements for both heavy and emergency vehicles. Section 2.4 for proposed haul routes. Section 3.2 details the Vehicle Management Principles for all vehicle movements occurring at the Site.
vii)	Detail temporary cycling and pedestrian access during construction.	Refer to Section 3.4 for Cycling and Pedestrian access during construction.

1.3 Site Location

The Site is currently situated within Lot 3 DP 1217496 of Hornsby Shire Council's LGA. The boarding school construction site is specifically located at 24-28 Mount Pleasant Avenue. The construction site is bounded by the school's aquatic centre, gym, the school's oval to the south, Mount Pleasant Avenue to the east and is surrounded by school facilities. The Site is an approximate 10-minute walk (700m) from Normanhurst Train station.

The Location and Road Hierarchy Plan presented as **Figure 2** provides an appreciation of the Site and its location.

1.4 Road Hierarchy

The road hierarchy in the vicinity of the Site is shown in Figure 1, with the following roads considered noteworthy:

- **Pennant Hills Road** – an RMS State Road (HW13) located north of the Site that provides a connection between North Parramatta and Wahroonga and carries in the order of 50,000 vehicles per day.
- **Osborn Road** – a local road that generally runs in a north-south direction to the south and west of the Site. It connects with Pennant Hills Road in the north and Currawong Avenue in the south before terminating to the south west of the Site.
- **Mount Pleasant Avenue** – a local road that runs in a north-south direction along the eastern frontage of the Site. It connects to Pennant Hills Road to the north via a signalised intersection and terminates to the south west of the Site. Access to Waratah Way is provided to the south of the Site, which is an access road for the Adventist Aged Care facility only.
- **Normanhurst Road** – a local road that generally runs in a north-south direction located to the north-west of the Site which connects to Osborn Road and Pennant Hills Road via a signalised intersection and provides access to Normanhurst Train Station.

The Site is conveniently located with primary access to the arterial and local road network serving the region (Pennant Hills Road/Cumberland Highway to the north). It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts on local roads.

Figure 1: Location Plan and Road Hierarchy

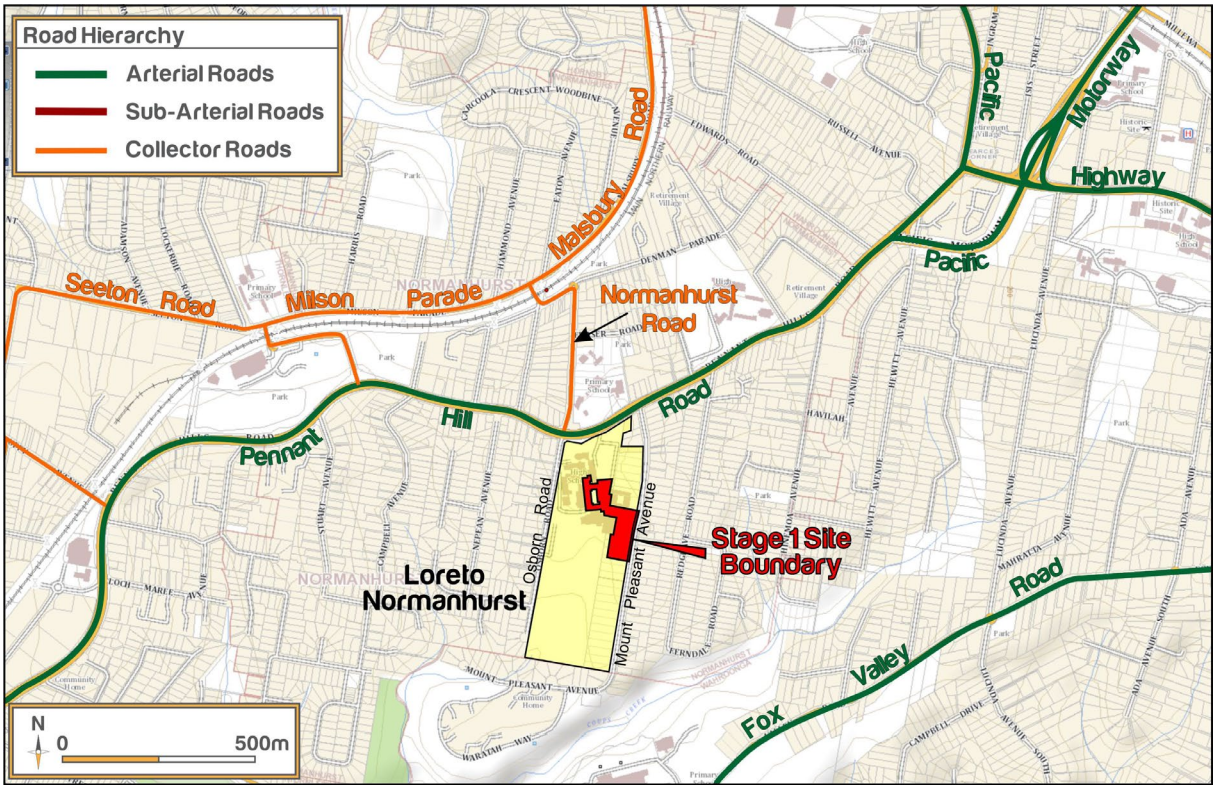

Figure 2: Road Hierarchy

1.5 Non-Car Access

The Site's proximity to public transport is shown in **Figure 3**, which highlights the locations and distances to bus and train services surrounding the Site.

Existing Train Services

The *Integrated Public Transport Service Planning Guidelines, Sydney Metropolitan Area* (Transport for NSW (TfNSW), December 2013), states that train services influence the travel mode choices of areas within 800 metres walk (approximately 10 minutes) of a train station.

It is therefore noteworthy that the Site is located within 800 metres (approximately 700 metres) from the Normanhurst train station, on the T1 North Shore Line with services every 15 minutes. Accordingly, a proportion of workers travelling to and from the Site would be expected to use the train services at Normanhurst Train station.

Existing Bus Services

Numerous bus services run within close proximity to the site, with a bus stop located immediately adjacent to the subject site. In this regard, the Site is accessible by a number of bus services. It is noteworthy that there are bus stops within 400 metres walking distance from the Site on Pennant Hills Road and Normanhurst Road. When extended to 800m, there are two bus stops located near Normanhurst Train Station providing services to Hornsby, Westleigh and Thornleigh.

There are three bus routes within 400m walking distance, which are listed below:

- Bus service 587 – Hornsby to Westleigh loop service
- Bus service 589 – Sydney Adventist Hospital to Hornsby
- Bus service M60 – Hornsby to Parramatta

The Site has good access to bus services, noting that bus routes 589 and M60 are serviced by bus stops on Pennant Hills Road and have high frequencies of services in the commuter peak periods.

Pedestrian Connectivity

Pedestrian access is provided by footpaths along Mount Pleasant Avenue, Pennant Hills Road and Osborn Road. There is also a pedestrian bridge Pennant Hills Road, which provides access from the Site's frontage across to Normanhurst Road providing a safe route from the School across Pennant Hills Road to the station.

The footpaths provided are of a high quality, with generous widths and dropped kerbs provided at points of crossing. The footpaths vary in width but most within the vicinity of the site along Mount Pleasant Avenue are at least 1.5m which are located only along the eastern side of the road.

The footpaths along Normanhurst Road connect with the pedestrian bridge across Pennant Hills Road and lead to Normanhurst Train station via a zebra crossing across Denman Parade.