Issue History

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Moriah College, Queens Park

Traffic Impact Assessment Peer Review

1. Introduction

1.1 Background

A State Significant Development Application (SSD-10352) for the redevelopment of Moriah College, located at Queens Park Road, Queens Park, is currently being assessed by the Department of Planning, Industry and Environment (DPIE). The proposal includes:

- The demolition of existing buildings and facilities, allowing for the construction of a new four-storey building
- Increasing the cap on enrolments by 240 students from 1,600 to 1,840 school students by 2036
- Increasing the number of staff by 29 members from 286 to 315
- Increasing the capacity of the early learning centre (ELC) by 50 children from 80 to 130 children.

1.2 Review Scope

Bitzios Consulting (Bitzios) was engaged by the DPIE to undertake an independent peer review of the Transport and Access Impact Assessment (TIA) and supporting documents prepared by The Transport Planning Partnership (TTPP) as part of the Environmental Impact Statement (EIS), and:

- Review the Applicant's EIS prepared by Urbis.
- Review the Submissions prepared by Waverly Council (Council), Transport for New South Wales (TfNSW), and Randwick Council.
- Review the Applicant's Response to Submissions (RtS) and amended TIA and subsequent submissions to the RtS.
- Provide comments and advice relating to the following:
  - Validity of existing traffic conditions including traffic volumes and intersection performance, review of SIDRA modelling
  - Validity of mode share assumptions, current and future travel patterns
  - Impacts of proposed and increased staff and student numbers on the road network
  - Demand for queuing spaces at the York Road pick/up drop-off
  - Adequacy of proposed road network upgrades

The following sections identify the relevant sections of each document where additional detail is required and/or where there are deficiencies.

1.3 Documents

The following is a list of the documents which have been reviewed or consulted as a part of this peer review, and their corresponding reference within this document:

- **Transport and Accessibility Impact Assessment** (TTPP, 12 June 2020)

- Hereafter referred to as ‘Traffic Impact Assessment’

- **Moriah College Green Travel Plan (GTP)** (TTPP, April 2020)
  - Hereafter referred to as ‘Green Travel Plan’ or ‘GTP’
- **Proposed Road Upgrades – Concept Design Drawings** (TTPP, December 2019)
- **Moriah War Memorial College Existing Conditions Road Safety Audit** (GHD, August 2019)
  - Hereafter referred to as ‘Road Safety Audit’
- **Waverley Council Development Control Plan (DCP) 2012** – Amendment 8 (Waverley Council, July 2020).
  - Hereafter referred to as ‘Waverley Council DCP’ or ‘DCP’
- **Moriah College Transport, Traffic and Parking Plan** (Moriah College, unknown)
  - Hereafter referred to as ‘Transport Traffic and Parking Plan’.

2. Site Inspection

2.1 Background

An afternoon site inspection was undertaken around 3:00 PM to 4:00 PM on Wednesday 2nd September, 2020. A morning site inspection was undertaken the day after around 7:30 AM on Thursday 3rd September, 2020.

The site inspection involved a drive-through of the surrounding area to gather observations on the current traffic environment during the school peak hour periods. The streets which were covered include:

- York Road
- Queens Park Road
- Newland Street
- Darley Road
- Baronga Avenue.

2.2 Existing Traffic Environment

The following observations were noted from the site inspections as being relevant to this analysis. For clarity, York Road traffic is designated as either ‘Northbound’ or ‘Southbound’, acknowledging that due to road curvature there are sections which are travelling more in the westbound or eastbound direction respectively.

AM Peak Period

- The morning peak period was observed to be busiest in the hour period between 7:40 AM and 8:40 AM.
- During this period, traffic conditions were extremely poor on the streets around the school, with high delays and long queues
- The York Road / Baronga Avenue intersection had a number of observed issues with traffic flow, including:
  - Downstream blockages caused by the York Road / Darley Road intersection occasionally queues back to this intersection, restricting southbound traffic on York Road
  - Downstream blockages caused by congestion on Baronga Avenue northbound occasionally queues back to this intersection, impacting the ability of further vehicles to turn into the street.

This was noted to affect left turns on York Road southbound, which would consequently block through vehicles until the blockage was cleared.

- Local blockages caused by vehicles entering the school site via Gate 4 occasionally queues into the southbound travel lane on York Road, preventing through vehicles from passing. This was observed to be dependent on driver behaviour, with drivers rarely queueing close to the kerb side of the road to minimise their impact on other traffic. Some aggressive drivers were observed to pass waiting vehicles, but were noted to have minimal clearance when doing so.
- Between heavy southbound traffic flow on York Road and the aforementioned issues, the right turn from York Road to Baronga Avenue functioned very poorly, with queues extending back around the curve on York Road almost to the Darley Road traffic signals.
- Due to the length of the above queue, the site inspector had difficulties in joining the queue from Darley Road / York Road traffic signals west approach. The left turn slip lane entailed that a gap had to be sought in both travel lanes, with sufficient capacity in the median-side queue lane to complete the turn.

- The York Road / Queens Park Road intersection had the following observations recorded:
  - There were long delays on Queens Park Road travelling westbound towards York Road, with queues observed to extend back as far as O'Sullivan Lane (around 160m).
  - Due to the heavy traffic flows on York Road in both directions, there were insufficient gaps for vehicles to safely turn right from Queens Park Road onto York Road. This movement was noted as very difficult to perform during the busiest part of the peak hour, particularly because of the way that right turning vehicles into Queens Park Road blocked the egress right turn.
  - The turning pocket on York Road northbound turning right into Queens Park Road was observed to be nearly at capacity on a number of instances. Due to the adjacent parking lane and pedestrian refuge, if the queue spilled out, it would block the northbound through traffic on York Road.
- The Queens Park Road / Baronga Avenue roundabout had the following observations recorded:
  - The southern approach (northbound traffic) on Baronga Avenue was noted to occasionally be delayed and have long queues, causing a shockwave which propagated to the Baronga Avenue mid-block pedestrian crossing and beyond, all the way to the York Road side of the street.
  - This is exacerbated by vehicles entering and leaving the drop-off layby on the western side of Baronga Avenue near the roundabout
  - A significant proportion of the drivers travelling north on Baronga Avenue turned right at the roundabout, presumably to travel in the direction of Bronte or Bondi Junction.
- The Queens Park Road / Newland Street intersection had the following observations recorded:
  - Newland Street is part of the Queens Park Local Traffic Area, and is controlled by a "STOP" priority at Queens Park Road.
  - Southbound queueing was observed on Newland Street, extending past Newland Lane (around 75m long).
  - Queues at this location appeared to be influenced by proximity to the Queens Park Road / Baronga Avenue roundabout, which is located around 40m to the west.

- During the busiest part of the peak hour period, York Road southbound was observed to have a very long, slow-moving queue, with evidence that it extended beyond Birrell Street (some 900m away from Baronga Avenue). As York Road southbound traffic should have un-opposed flow all the way to the Darley Road traffic signals, it is highly likely that this queue is artificial in nature. While it is difficult to identify a specific cause, it is expected that the following items are contributing factors:
  - Access / Egress movements from school driveways
  - Pick-up and drop-off movements at the various points around the school
  - Blockages at the York Road / Baronga Avenue intersection
  - Blockages from the Darley Road traffic signals.

PM Peak Period

- The afternoon peak period was observed to be busiest in the hour period between 3:10 PM and 4:10 PM.
- During this period, traffic conditions were moderately congested on the streets around the school, with delays and queues at key locations
- The York Road / Baronga Avenue intersection had a number of observed issues with traffic flow, including:
  - The right turn from York Road to Baronga Avenue functioned very poorly, with queues extending back around the curve on York Road most of the time. On average, it is estimated that the observed queues were around 120m long.
  - Around 3:30 PM, a spike in buses was observed, with five (5) buses waiting in the queue to turn right into Baronga Avenue. Given their larger size and need for a longer gap to safely complete the turn, the buses contributed to an increase in queues and delays for this movement.
  - Downstream blockages caused by the York Road / Darley Road intersection occasionally queues back to this intersection, restricting southbound traffic on York Road and Baronga Avenue.
- The York Road / Queens Park Road intersection had the following observations recorded:
  - There were long delays on Queens Park Road travelling westbound towards York Road, with queues observed to extend back as far as Denison Street (around 130m). This was noted to affect the discharge of southbound vehicles turning right from Denison Street onto Queens Park Road, with some signs of queueing on this approach.
- The Queens Park Road / Baronga Avenue roundabout had the following observations recorded:
  - The southern approach (northbound traffic) on Baronga Avenue was observed to have a queue of around five (5) vehicles
  - The southern departure (southbound traffic) on Baronga Avenue was observed to experience delays around 3:30 PM, with a downstream queue that extended the entire length of Baronga Avenue, exacerbated by pedestrian activity at the mid-block zebra crossing. It was noted that the travel time was almost 5 minutes from the top of Baronga Avenue to the bottom, a distance of around 230 metres.
- A total of eight (8) buses were observed simultaneously queueing on the Baronga Avenue kerbside layby lane around 3:45 PM.

- The following items are noted regarding the school access and egress gates and pick-up / drop-off queueing operations:
  - The queue entering Gate 1 on York Road southbound was observed to queue out of the available turning lane on some occasions. Any further queueing would block the York Road southbound travel lane.
  - The queue on York Road southbound near Baronga Avenue for secondary school student pick-up and drop-off operations extends back around the curve on York Road, a distance of around 200m on average. Vehicles were observed to be waiting prior to the release of school students.
  - The departure of vehicles from the secondary school student pick-up and drop-off layby caused friction in the York Road southbound traffic stream, resulting in a general slow-down of traffic in this direction.
  - It was observed that there were consistently queues of at least two (2) vehicles at site egress gates, with vehicles waiting for safe gaps to enter the York Road traffic stream. It was unclear how extensive queueing was within the site.

3. Transport and Accessibility Impact Assessment Report

3.1 Existing Conditions

3.1.1 Existing Drop-off/Pick-up Activities

Pick-up and Drop-off operations for the Primary School use Gate 1 off York Road on the western side of the school. The Traffic Impact Assessment comments that the operations generally operate satisfactorily, and that queues are wholly stored within the site. This contradicts with our site observations, which noted on multiple occasions that queues extended onto York Road within the auxiliary left turn lane in both the AM and PM peaks. Evidence of this is provided in Figure 3.2 and Figure 3.2.

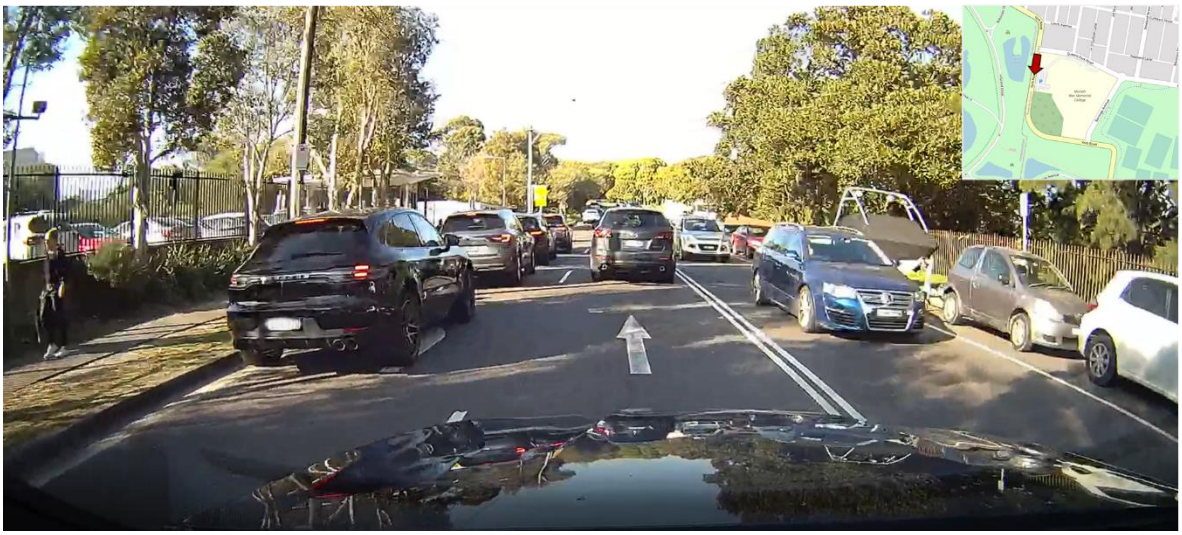

Figure 3.1: Gate 1 Queues - York Road Southbound AM

Figure 3.2: Gate 1 Queues - York Road Southbound PM

Pick-up and Drop-off operations for the Secondary School use the kerbside lay-by on York Road on the southern side of the school, with a total storage area of around four to five vehicles at any given time. The queues are stored in the shoulder lane on York Road southbound.

Pick-up and Drop-off operations for the ELC use the 13 car parking spaces designated for this use within the southern on-site car park accessed via Gate 4.

An additional pick-up and drop-off layby is provided on the northern end of Baronga Avenue. During the AM peak, a maximum of two (2) vehicles were observed using this zone. However, it is noted that vehicles using this zone tended to travel through the kerbside lane to avoid the northbound queue, which would be impacted by the proposed kerb build-out and extension of the mid-block pedestrian crossing.

3.1.2 Public Transportation

The Traffic Impact Assessment reports that:

- The existing bus services for the school generally operate below capacity
- The existing bus bay on Baronga Avenue can accommodate around nine (9) buses at maximum capacity
- No more than four (4) buses were observed at any one time during either the school AM or PM peak hour periods
- The existing bus bay was observed to operate satisfactorily, with spare capacity for additional services.

The following items are noted regarding these statements:

- The bus bay appears to conflict with the aforementioned pick-up and drop-off layby on Baronga Avenue. No indication of a bus zone was found in the parking restriction signage north of the pedestrian crossing. Notwithstanding this, buses were observed to wait in this area.
- During site observations, a total of nine (9) buses were observed queueing in the layby at around 3:45 PM. This occupied the entire kerbside on Baronga Avenue, with no spare capacity for additional services as seen in Figure 3.3.
- Buses queued through No Stopping restrictions near the pedestrian crossing, resulting in safety risks for pedestrians due to limited sightlines.
- Any increase in bus services would potentially result in queueing out of the kerbside bay during the busiest period, blocking the northbound travel lane on Baronga

Avenue. This is only exacerbated by the proposed kerb build-out at the pedestrian crossing, which would result in a reduction of queueing capacity.

Figure 3.3 below shows the observed maximum bus queueing behaviour on Baronga Avenue.

Figure 3.3: Bus Layby Queues – Baronga Avenue Southbound PM

3.2 Existing Traffic Volumes

Traffic surveys were undertaken by the Applicant at the site access gates and designated pick-up and drop-off zones on Tuesday, 28 June 2019 between 7:00 AM – 9:00 AM and 2:00 PM – 4:00 PM. It was stated that the existing site generates a total of:

- 1,151 vehicle trips during the AM 2-hour peak
- 648 vehicle trips during the PM 2-hour peak.

Intersection surveys were undertaken at the York Road / Queens Park Road, Queens Park Road / Baronga Avenue and York Road / Baronga Avenue intersections for the same time period on the same date. The peak hours of these intersections are identified as:

- AM Peak: 7:45 AM – 8:45 AM
- PM Peak: 3:00 PM – 4:00 PM.

The following items are noted regarding these statements:

- The surveyed volumes are not necessarily representative of the entirety of the existing site traffic generation. Surveys would not capture vehicle trips which do not access the site gate or any of the designated pick-up and drop-off zones.
- As on-street parking observations are not provided, the volume of such traffic is unclear. However, a number of anecdotal pick-up and drop-offs were observed in non-designated locations during our site inspection.

3.3 Existing Travel Patterns

3.3.1 Existing Mode Share

The Traffic Impact Assessment presents a summary of the mode share assumptions for staff and students on-site. It is noted that:

- Data was collected from school staff and parents via an email survey in June 2019
- Of the total number of students and staff, the following response rates were achieved:
  - Out of 595 Primary Students, 512 responses were received (86%)
  - Out of 860 Secondary Students, 496 responses were received (58%)

- Out of 286 Staff, 75 responses were received (26%).

- Average car occupancy numbers were reported as:
  - Staff: 2.6 persons per vehicle (including driver)
  - Primary school: 2.65 passengers per vehicle
  - Secondary school: 2.62 passengers per vehicle.
- Arrival and departure profiles for staff and students are presented in 30 minute time slices, with the comment that the overall arrival patterns reflect a morning peak between 7:30 AM and 8:30 AM and an afternoon peak between 3:00 PM and 4:00 PM.

The following comments on the data collection and analysis findings are made:

- While student response rates were generally a majority proportion, it is noted that staff responses were only received from 26% of the staff members which is considered to be a relatively low response rate for the purpose of determining existing staff travel patterns.
- It is noted that a very high percentage of staff members are recorded as travelling to work via car (primarily drivers), amounting to a total of 95%.
- The average car occupancy numbers for staff members do not appear to be reflective of the existing travel modes as reported in Table 3.2 of the Traffic Impact Assessment. Staff members who are reported as driving to work amount to:
  - Car Driver (no passengers): 71%
  - Car Driver (with passengers): 22%
  - Car Passenger (only passenger): 1%
  - Car Passenger (other passengers): 1%.
- Based on these numbers, out of the 75 responses received there were:
  - 53 car drivers who travelled alone (car occupancy of 1)
  - 17 car drivers who travelled with passengers (car occupancy of 2+)
  - 1 car passenger who was the only passenger (car occupancy of 2)
  - 1 car passenger where there were other passengers (car occupancy of 3+).
- The average car occupancy as calculated from these volumes is 1.28 persons per vehicle (including driver), assuming minimum number of passengers where detail is not provided. To achieve a persons per vehicle rate of 2.6 as reported in the Traffic Impact Assessment would require at least 7 persons per vehicle for drivers who carried multiple passengers, which is understood to not be possible.
- Similar calculations can be performed for primary and secondary school students, which report around 2.6 passengers per vehicle. This is considered to be high, considering that around 25% of the students were dropped off alone.
- Further clarity should be provided on the calculation of average car occupancy numbers, and how they have been derived from the survey results.
- It is noted that the morning peak hour period of the school is different to that of the surrounding road network, offset earlier by 15 minutes.

3.3.2 Peak Hour Trip Generation Rate

The trip generation of the existing school site was calculated through an application of the mode share results to the approved school caps.

The following is noted in the Traffic Impact Assessment:

- The site is anticipated to generate the following number of trips to each type of travel mode as summarised in Table 3.1.

Table 3.1: Existing School Peak Hour Trip Generation

Travel Mode	Existing	Approved School Cap
Car	990 – 1,436 trips	1,054 – 1,545 trips
Walking	26 – 28 trips	27 – 31 trips
Public Bus	24 – 44 trips	25 – 48 trips
School Bus	332 – 757 trips	365 – 832 trips
Train	3 trips	3 trips

- The 'scaled up' school enrolments to the current approved cap results in an additional:
  - 59 Primary School students
  - 86 Secondary School students
  - 0 staff members.
- The peak hour trip generation has been profiled based on the travel questionnaire survey findings. The proportions of school students and staff arriving and departing in the peak hours are reported in Section 3.3.1 of the Traffic Impact Assessment as follows:
  - Staff: AM Peak – 42% PM Peak – 40%
  - Primary School: AM Peak – 79% PM Peak – 81%
  - Secondary School: AM Peak – 42% PM Peak – 19%

The following comments on the existing peak hour trip generation calculations are noted:

- No justification is provided as to why the scaling up of student enrolments is not accompanied by a commensurate increase in staff members, which would presumably increase the number of car trips in the Approved School Cap scenario.
- The peak hour trip generation profiles do not appear to reflect the staff and student travel pattern proportions shown in Figures 3.1 and 3.2 of the Traffic Impact Assessment. These proportions are read as follows:
  - Staff: AM Peak – 42% PM Peak – 40%
  - Primary School: AM Peak – 79% PM Peak – 81%
  - Secondary School: AM Peak – 77% PM Peak – 90%
- While the staff and Primary School patterns are consistent, the Secondary School profiles are significantly higher than the reported profiles. As the source data is unavailable, it is unclear whether the discrepancy is with the reported numbers or the plotted figures. However, it is noted that the reported proportions for Secondary School appear to low, with only 19% of the total high school population departing school in the afternoon peak hour.
- The existing school peak hour trip generation estimates are summarised in Table 3.5 of the Traffic Impact Assessment. The methodology for how the peak hour vehicle trip generation was calculated from the previous information is unclear. Upon investigation, it is assumed that the methodology is as follows:
  - The total persons trip generation for the existing school enrolments outlined in Table 3.3 of the Traffic Impact Assessment was extracted for those that travelled via car, either as drivers or passengers.

- These car trip generation numbers were multiplied by the peak hour trip generation profiles in Section 3.3.1 of the Traffic Impact Assessment for the respective school groups and peak period.
- For the Primary and Secondary Schools Dropped Off (with other passengers) category, the number of students was divided by the average car passenger occupancy to determine the number of unique vehicles generated.
- The calculated number represents the volume of vehicle trips associated with each different student group. For each incoming trip that does not end at the school (e.g. parents dropping off their child at school before going to work), an equivalent outbound trip is generated. That is, a single child being dropped off would generate one (1) incoming trip and one (1) outgoing trip.

- It is noted that this methodology would have to make the following assumptions:
  - In the case that there are multiple passengers in a car, all passengers are assumed to be school students
  - The average car occupancy values for students that were reported in Section 3.1 of the Traffic Impact Assessment are calculated based only on the statistics of students who travelled with multiple passengers. That is, sole passenger trips were not included in the calculations.
- It is unclear if it is a reasonable assumption that all car passengers are school students. Any deviation from this assumption in reality would increase the number of vehicles generated by the school.
- There are a number of uncertainties in the traffic generation methodology, peak hour profiles, and average car occupancy statistics. The method of calculation of the values in Table 3.5 of the Traffic Impact Assessment, as well as all assumptions which have been made, should be clarified before a meaningful judgement on appropriateness can be made.

3.4 Parking Assessment

3.4.1 Existing Car Parking

According to the travel questionnaires undertaken by the Applicant, 265 out of 286 staff members currently drive to work. This is substantially higher than the number of existing parking spaces allocated to staff, which is 171 parking spaces.

As such, it is anticipated that some portion of staff members must be parking off-site, presumably in on-street parking. The Transport Traffic and Parking Plan only stipulates restrictions to parent and Year 12 student car parking, placing no limitations on the staff parking catchment.

Furthermore, the data from the travel questionnaires also estimates that there are 51 secondary school students that arrive to school as a car driver with no passengers. It is expected that these would be Year 12 students, who (with permission) are allowed to drive a vehicle to and from Moriah College. As no parking spaces are provided on-site for student parking, these students are also required to park on-street. The Transport Traffic and Parking Plan identifies a zone within which student parking is prohibited. The zone encompasses the majority of Queens Park, including everything to the west of Bourke Street (inclusive). It is noted that this area does not include Centennial Park.

The effects of this parking behaviour on surrounding streets has not been commented on in the Traffic Impact Assessment, beyond an overarching statement on the high percentage of

parking occupancy on the surrounding streets. It is expected that school-related parking will be a contributing factor in this parking demand.

3.4.2 Future Car Parking

It is acknowledged that there are no car parking rates for educational facilities outlined in the Waverley Council DCP. As a part of the development, it is proposed that an additional 15 car parking spaces are provided on-site to cater for the increase of 26 school staff members. This was calculated on the basis of providing additional spaces proportional to the current staff to parking ratio, which TTPP has nominated as 'satisfactory' based on existing car parking provisions for staff.

While it is agreed that the school is not required to provide parking for all staff members, and restrictions may force a shift in travel mode if parking is unavailable, the appropriateness of the existing on-site parking should consider the poor state of on-street parking capacity around the school site. The development proposal represents an intensification of use of the school site, and a future under-provision of on-site staff parking with no restrictions to off-site parking is expected to result in a further deterioration of the nearby street parking conditions, potentially affecting resident and public amenity.

Furthermore, while it is acknowledged that Year 12 students are prohibited by the Transport Traffic and Parking Plan to park in the local vicinity of the school, there will nonetheless be an increase in parking demand. Neither enforcement methods nor compliance with the parking plan has not been verified, and it is unclear if this will be sufficient in mitigating the parking impacts.

3.5 Pick-up and Drop-off Facilities

The proposed future pick-up and drop-off facilities for the primary school (Gate 1) and ELC (Gate 4) are proposed to be retained on-site.

The future pick-up and drop-off facility for the secondary school is proposed to be moved from York Road southbound to within the site via a loop road system. This facility is the subject of the following discussion.

Appendix B of the Traffic Impact Assessment shows the proposed future layout for the southern Gate 4 carpark. The following items are noted regarding this layout:

- It is noted that adjustments have been made to the existing parking layout, including a removal of a parking aisle and changes to the spaces designated for ELC pick-up and drop-off. It should be ensured that there is no net reduction in on-site parking compared to the existing layout.
- The propagation of the loop road past car parking spaces could potentially lead to conflict between arriving / exiting vehicles and pick-up / drop-off queues. As the majority of parking spaces are 90-degree angled parking, vehicles will require up to the full width of the aisle to access and depart the parking spaces.
- It is noted that staff will be advised to avoid arriving / departing during pick-up and drop off times, but this may not always be possible. Furthermore, visitors to the site will not be aware of this. Conflict between these two parties could lead to safety risks within the car park.
- A parking compliance check should be undertaken to ensure that the proposed layout is compliant with AS2890 standards, including scraping checks for the car park ramps.

Detailed queueing analysis does not appear to have been undertaken to determine the average number of vehicles in the system in the future development scenario. Notwithstanding this, the future queue length has been estimated at around 36 vehicles. This is based off an existing queue observation of around 23 vehicles in the afternoon on York

Road, plus an estimated increase of 15 incoming vehicles in the PM peak hour due to the proposed increase in number of secondary school students.

The following comments are made in regard to the future secondary school queueing at this location:

- It is unclear how the summation of 23 existing vehicles and 15 additional incoming vehicles has produced a future queue estimation of 36 vehicles. The cited 15 additional incoming vehicles represents only the Stage 1 incoming volumes, and makes no account for Stage 2 and Ultimate staging.
- It is acknowledged that it is unlikely that all incoming vehicles will be queueing simultaneously in the future, and that they will be distributed throughout the hour in some manner.
- The existing observations only capture the effects of queues caused by the current level of school enrolment. These are expected to increase up to the approved school cap, and should be accounted for when undertaking a future queueing analysis.
- A queue of 36 vehicles will result in a queue length of approximately 216m, assuming a queue distance of 6m per vehicle. The on-site system capacity is measured to be around 240m, therefore it is likely that queues will be contained within the site. However, this queue will extend through the majority of the car park, causing conflict with the car parking spaces (see above comments).

No queueing analysis appears to have been undertaken in regard to the other pick-up / drop-off systems. They should also be analysed, particularly the primary school 'Go With The Flow' system, to demonstrate that the growth in school capacity will not result in an increase in queues onto York Road at Gate 1 such as to impact southbound traffic.

3.6 Traffic Assessment

3.6.1 Future Traffic Generation

The Traffic Impact Assessment modelling has evaluated the scenarios and years outlined in Table 3.2.

Table 3.2: Modelled Scenarios

Scenario	Existing	2023	2030	2036
Base	Yes	Yes	Yes	Yes
Stage 1	No	Yes	Yes	Yes
Stage 2	No	No	Yes	Yes
Ultimate	No	No	No	Yes
Ultimate + Reduction	No	No	No	Yes
Ultimate + Reduction + Improvement	No	No	No	Yes

The 'Reduction' scenario refers to an aspirational 10% modal shift away from car use, based on the implementation of travel demand management measures.

The 'Improvement' scenario refers to the proposed intersection upgrades.

The following comments are made in regard to the future trip generation for Stage 1, Stage 2, Ultimate and Reduction development scenarios:

- The peak hour trip generation rates used to calculate the traffic generation of the proposed development are based on the rates calculated in Section 3.3.1 of the Traffic Impact Assessment. The methodology in calculating these rates has been questioned earlier in this peer review report. If any amendments are made to the trip rates, there will be a subsequent change in the generated vehicles per hour.

- Generally, the assumptions made in terms of incoming and outgoing trip splits are accepted to be valid for staff and school students.
- In the 'Reduction' scenario, it is noted that the 10% modal shift away from private vehicles is determined to result in a very significant decrease in ultimate trip generation from:
  - 196 vph to 59 vph in the AM peak
  - 108 vph to 22 vph in the PM peak.
- It is unclear how the 'Reduction' scenario net increase in vehicle trips was derived. Clarification should be provided on the calculation methodology and assumptions.

3.6.2 Background Traffic Growth

A Base scenario was prepared for existing year, 2023, 2030 and 2036. Future background growth rates were based on predictions extracted from the RMS Strategic Traffic Forecasting Model (STFM).

However, upon review of the provided SIDRA models, it was noted that some volumes remained unchanged at Queens Park Road / Baronga Avenue. The west approach volumes on Queens Park Road (W) show no growth between existing, 2023, 2030 and 2036 base scenarios. Additionally, the south approach volumes on Baronga Avenue (S) remain consistent between 2023, 2030 and 2036 base scenarios.

Due to uncertainty in the method of application of background growth, all growth rate assumptions should be detailed in the body of the assessment report.

3.6.3 Future Traffic Distribution

The distribution assumptions for future development traffic have not been clarified in the Traffic Impact Assessment. Trips have been distributed through the road network, with a heavy emphasis on vehicles entering the network southbound at York Road and Queens Park Road. Evidence should be provided to demonstrate why this is the expected path of travel with reference to the drop-off and pick-up locations and the origin and destination of trips.

4. Traffic Modelling

TTPP has prepared SIDRA intersection models for the following three (3) intersections:

- York Road / Baronga Avenue
- Queens Park Road / Baronga Avenue
- York Road / Queens Park Road.

The model development was reviewed, and the following comments are noted for each intersection.

4.1 General Comments

- Section 2.9 of the Traffic Impact Assessment outlines the Existing Intersection Performance as modelled with SIDRA Intersection 8 software.
- No evidence of base model calibration is provided in the report, including validation to back-of-queue survey data or site observations. Calibration details should be clarified to justify that base models are fit-for-purpose for future testing.
- When compared to our site observations (see Section 2.2), the base existing SIDRA models do not appear to reflect the traffic conditions. This is discussed in detail in the sections below.

- The scope of the modelled road network is limited to the three (3) main intersections located near the school. However, these intersections should not be modelled in isolation. The York Road / Darley Road intersection is noted to affect the performance of the York Road / Baronga Avenue intersection, with downstream blockages causing a significant pushback of the queue. This has not been considered in the modelling, which consequently shows uninterrupted eastbound flow on York Road which is not representative of the existing peak period traffic conditions.
- The pedestrian crossing at the mid-point of Baronga Avenue has not been modelled in SIDRA. Given the proximity of the crossing to the school gate (Gate 3), it is frequently used during the peak hour periods. Vehicles are currently required to stop to allow pedestrians to cross, with queues propagating towards Queens Park Road to the north and York Road to the south. This would reduce the available capacity of the road, affecting performance at the respective intersections. For example, this would impart delays to the left turn from York Road to Baronga Avenue, which has been modelled as a free-flowing departure with minimal delays.
- It is noted that models have been prepared for the network peak hour periods: 7:45 AM – 8:45 AM and 3:00 PM – 4:00 PM. The AM development peak is different from the AM network peak, with the former being the hour starting from 7:30 AM. Any superimposition of development and network traffic should be for the same time period.

4.2 York Road / Baronga Avenue

4.2.1 Geometry Coding

- It is noted that York Road (West) has been modelled as two (2) approach lanes, a through lane and a short 45m left turn lane into Baronga Avenue. There is no existing linemarking at the intersection delineating two (2) turning lanes.
- The lane is observed to be around 5.3 wide at the intersection, as measured from Nearmap satellite imagery. This does not allow safe adequate width for two (2) side-by-side lanes.
- It is considered unlikely that the road will be utilised in this manner, particularly given the fact that the approach is largely unopposed and traffic flow should be continuous. The only exceptions will be when there is downstream queueing causing blockages, where aggressive drivers may seek to navigate around the turning queue.
- In lieu of justification for this geometric arrangement, this intersection model does not reflect the actual intersection operation. The modelling is expected to show greater delays compared to reality for the right turn from York Road into Baronga Avenue, as the movement is modelled as being opposed by an extra lane of traffic.
- Vehicle speeds on York Road are set to 40km/h. It is noted that the school zone on York Road starts further to the west of the subject intersection, therefore the normal speed limit should apply in this section.

4.2.2 Calibration

- In both peak hour periods, the modelling shows delays and queues for the right turn movement into Baronga Avenue. However, the modelled queues during the morning are shorter than typical AM peak hour conditions experienced on this approach.
- In both peak hour periods, the modelling shows un-opposed, free-flowing traffic from the west approach on York Road. This does not reflect typical peak hour traffic conditions at this location, which observes downstream blockages caused by either the Darley Road signals or queues on Baronga Avenue northbound.

4.3 Queens Park Road / Baronga Avenue

4.3.1 Geometry Coding

- Generally, the modelled geometry was found to be adequate in representing existing geometry.

4.3.2 Calibration

- Generally, the modelled intersection queue results were reflective of typical traffic conditions, with one main exception.
- Friction in the traffic stream was caused by southbound vehicles on Baronga Avenue interfacing with downstream queues from York Road, the pedestrian crossing, and parking vehicles. This was observed to generate blockages on the southern departure of the roundabout, causing delays as it prevented vehicles from exiting the roundabout.
- The model does not observe any blockages on this departure.

4.4 York Road / Queens Park Road

4.4.1 Geometry Coding

- It is noted that Queens Park Road (East) has been modelled as two (2) approach lanes. There is no existing linemarking at the intersection delineating two (2) turning lanes.
- However, it is acknowledged that the wide flare of the kerb allows side-by-side vehicles at the Give Way line (which match site observations), therefore the arrangement is acceptable.

4.4.2 Calibration

- The Queens Park Road (E) approach is modelled as showing a maximum of 14m of queueing. This is not reflective of typical site conditions during peak hour periods, which has higher delays and longer queues on Queens Park Road.

4.5 Future Modelling

4.5.1 Model Syntax

The syntax of the future models relative to the base model was reviewed and found to generally be suitable. Discrepancies related to the traffic demands and background traffic growth have been highlighted earlier in Section 3.6, and will not be reiterated in this section.

The proposed Seagull intersection has been coded as a Staged Crossing at Sign-Controlled Intersection network, which is appropriate as this is in accordance with SIDRA technical advice. However, the following items are noted regarding the setup of the seagull network:

- The Lane Length for the right turn pocket from York Road to Queens Park Road in Stage 1 of the network is coded as 500m instead of the actual 40m, which will overestimate the capacity of the turning movement.
- The vehicle speeds are set to 60km/h at this intersection, whereas they are 40km/h in all other models.

4.5.2 Model Results

Notwithstanding the earlier concerns regarding base model validity, the model results report an expectedly consistent decrease in intersection performance through the scenarios.

Mitigation measures are proposed at York Road / Baronga Avenue and Queens Park Road / York Road. These are discussed further in Section 5.

The last two scenarios 'With Reduction' and 'With Reduction + Improvements' show a significant increase in performance, with overall LoS reported as between LoS A and B with 2036 Ultimate development including modal shift traffic loads. It is acknowledged that the proposed intersection upgrades are effective in ameliorating the modelled traffic issues, and result in significant decreases in delays and queues, particularly at the two York Road intersections.

No mitigation measures are proposed at the Queens Park Road / Baronga Avenue roundabout. The Traffic Impact Assessment states that in the 2036 Ultimate scenario, this roundabout is 'tipped to operate from LoS C to D in the AM Peak', and that it is 'still considered an acceptable intersection performance'. However, it makes no comment on the reported 95th percentile queue of 311m on the southern approach. Given that Baronga Avenue itself is only 225m long, there would be significant traffic and safety concerns with a queue that extends the entire frontage street of the school site through the pedestrian crossing. This finding also reinforces the need for network modelling, as the effects of these long queues are not felt by upstream intersections in isolated modelling.

It is observed that the reported intersection statistics are the average delay in seconds, the Level of Service and the 95th Percentile Back of Queue. As the modelled intersections are priority-controlled, the reported results are for the worst movement for each performance indicator.

However, the way that the results have been presented can lead to confusion in interpreting outputs. The movement with the greatest delays and lowest LoS may not necessarily be the one that generates the longest queues; however, in the report tables, they are presented side-by-side for each intersection.

Furthermore, a queue length in isolation does not hold a great deal of meaning. The approach and directionality of the queue should be identified, to ensure that readers have a full understanding of the implications. It is suggested that results are presented at minimum by Approach at each intersection, as opposed to by Intersection.

4.5.3 Model Scenarios

Improvements have only been modelled for the 2036 Ultimate scenario. However, it is noted that the proposed development Stages 1 and 2 are postulated for design years 2023 and 2030 respectively. Given the poor performance of the intersections prior to Ultimate traffic loads, it is likely that improvements will be necessary at an earlier stage. Modelling should be undertaken to assist in the determination of upgrade staging.

An Ultimate + Improvement scenario was not prepared. Given the aspirational nature of the 'Reduction' mode share shift, a presentation of traffic conditions where it is not achieved should be provided for conservative reasons.

The final modelled scenario is modelled for 2036. A design horizon under background growth assumptions for the proposed road upgrades has not been evaluated.

4.6 Modelling Recommendations

The following recommendations are made regarding the modelling methodology and scope:

- Provide evidence of model calibration and validation to real life conditions to ensure confidence in a robust Existing Base model
- Widen scope of modelling to include:
  - Darley Road / York Road traffic signals
  - Pedestrian Crossing (Zebra) on Baronga Avenue.

- Adjust York Road / Baronga Avenue geometry to remove short turning lane on west approach – otherwise, provide evidence of road utilisation in this manner
- Model intersections together with SIDRA Network, per the SEARs, to replicate the effects of queue pushback
- Clarify the adopted background growth rates for the modelled network
- Clarify the adopted traffic distribution for development-generated traffic
- Prepare a 2036 Ultimate + Improvements scenario to demonstrate future intersection performance where aspirational mode shift targets are not met.
- Consider preparing 2023 Stage 1 + Improvements and 2030 Stage 2 + Improvements scenarios to inform required staging of upgrades.
- Present modelling results for each intersection on a by-Approach basis to ensure greater clarity of information.

5. Proposed Mitigation Measures

5.1 Proposed Intersection Upgrades

TTPP has proposed the following intersection upgrades:

- York Road / Queens Park Road: Upgrade to Seagull intersection
- York Road / Baronga Avenue : Upgrade for left-turn slip lane on York Road.

Given the issues with the modelling outlined in Section 4, the comparisons between Base and Upgraded scenarios may not be reflective of actual traffic conditions. For this reason, a clear statement on the appropriateness of all proposed mitigation measures cannot be made. However, a measured discussion of each upgrade is outlined in the subsequent sections.

5.2 York Road and Queens Park Road - Seagull Intersection

As the poor performance at this intersection is primarily caused by right turn movements from Queens Park Road to York Road, a seagull intersection is considered appropriate in mitigating the delays. The design should allow sufficient median width to allow at least one (1) vehicle to safely store with adequate clearance between the travel lanes.

Furthermore, it is noted that Bus Route 357 performs the following movements at this intersection:

- Left turn from Queens Park Road to York Road
- Right turn from York Road to Queens Park Road.

The design of the seagull must take into account bus swept paths.

5.3 York Road and Baronga Avenue – Slip Lane

The implementation of a left-turn slip lane from York Road to Baronga Avenue forces a change in priority, where left turning vehicles into Baronga Avenue must give way to right turning filters. This is expected to benefit right turning vehicles due to the reduction in opposing traffic flow.

The proposed widening of the roadway and formalisation of two (2) travel lanes in on this approach via delineation increases the road capacity, which will likely alleviate the effect of left-turning queues blocking the southbound through movement on York Road.

However, this upgrade will have little to no beneficial effect on right turning vehicles where the Baronga Avenue northbound departure is already at capacity, preventing any vehicles

from entering Baronga Avenue. These conditions are expected to be exacerbated in the future years.

5.4 Travel Demand Measures

5.4.1 Management of Travel Demand

The Traffic Impact Assessment finds, via a staff and student questionnaire, that the majority percentage of visitors to and from the site travel via car out of convenience. It goes on to state that one of the underlying measures to reduce this percentage would be to reduce the convenience of car travel via the restriction of on-site car parking.

For parents and students, a reduction of on-site parking provision is unlikely to reduce the convenience of car travel as the vast majority of traffic is generated by trips to and from the pick-up and drop-off bays. For staff members, given the presence of on-street parking on the surrounding streets, including unrestricted parking in Centennial Park, a reduction in on-site parking without further measures is likely to only result in a shift of the parking demand from on-site car parks to on-street parking in the area.

5.4.2 Future Estimated Mode Shifts

The Traffic Impact Assessment anticipates a 10% modal shift of the three (3) main traffic streams to the school – staff, primary students and secondary students – away from private vehicles. The anticipated change in method of travel is summarised in Table 5.1 for each of the site visitors.

Table 5.1: Anticipated Mode Shifts

Method of Travel	Staff	Primary Students	Secondary Students
Car Driver (no passengers)	-11%	-	-4%
Car Driver (with passengers)	+1%	-	+3%
Dropped Off (only passenger)	0%	-12%	-11%
Dropped Off (with other passengers)	0%	+2%	+2%
Walk	+2%	+3%	+2%
Cycling	+2%	+2%	+2%
Train / Bus	+6%	+5%	+6%

A substantial decrease in sole-driver or sole-passenger trips is observed in favour of increases to carpooling, walking, cycling and public transport. While the minor shifts towards walking and cycling may be supported by the improved infrastructure and facilities, the most significant shift towards public transportation is not as well-received. The anticipated shift towards trains and buses is between 5% - 6%.

A review of the travel demand measures associated with public transport identified only the following:

- Provision of public transport timetables on noticeboards
- Provision of an Opal card or GoGet car share discounts or incentives
- Discussions with TfNSW to provide additional and more frequent bus services to and from the Campus.

Given that students at the College should be eligible for a School Opal pass, it is unlikely that they could be sufficiently incentivised via the provision of a stock Opal pass. Furthermore, the Traffic Impact Assessment states that based on on-site observations, the

existing bus services generally operate below capacity. As such, it is unlikely that the provision of additional bus services will generate any substantial attraction to the mode of travel.

Furthermore, travel via train is noted to be an unlikely mode of travel for staff and students, which is reflected in the lack of proposed initiatives to promote this travel type. While there are bus services connecting Bondi Junction station to Moriah College, it requires planning around connecting trips into a journey. Given that that Traffic Impact Assessment finds that convenience is the greatest contributor in travel, it is unlikely that there can be an appreciable shift to trains without more drastic action.

Finally, the Traffic Impact Assessment notes itself that a 3-5% modal shift is typically considered a significant achievement. The proposed 10% modal shift appears to be more of an aspirational target as opposed to a realistic estimate.

6. Response to Submissions

Comments on the adequacy of the Applicant's Response to Submissions (RtS) are detailed in **Appendix A**.

Attachment A: Responses to Submissions

Table A.1 Response to Submissions – Department of Planning

Issue Raised	Applicant's Response	Bitzios' Response
Given the likely increase in bicycle use due to increased bicycle parking and a planned cycleway on Darley Road, due to commence construction in 2020, Section 7.1 of the Traffic Impact Assessment (TIA) should be updated to include bicycles as a future estimated mode of transport.	An amended Transport Impact Assessment is provided at Appendix C. Table 7.12 includes cycling in the existing and projected modal split. A 2% increase in bicycle use is projected for staff and students which is considered achievable noting the proposed increased bicycle parking and end of trip facilities.	Agreed.
The Green Travel Plan (GTP) should be updated to include and promote increased bicycle use given the increase in end-of-trip facilities and bicycle parking proposed.	An amended GTP is provided at Appendix D. The plan includes the recommendation for a program for students to learn to ride a bicycle in a safe and responsible matter. This initiative, along with the proposed increase in end-of-trip facilities and bicycle parking is expected to result in a 2% increase in bicycle use for staff and students.	Agreed. However, a lack of off-road bicycle paths that connect Moriah College and suburbs to the north and east of Queens Park may also limit the uptake of bicycling. On-road cycling conditions may not be suitable for school-age students.

Table A.2 Response to Submissions – Transport for New South Wales

Issue Raised	Applicant's Response	Bitzios' Response
Any road modifications to be made to Baronga Ave or to Queens Park Road/York Road in the future would require review/comment from State Transit Authority to facilitate continued effective bus operations to and past the site.	Noted. The proposed road modifications are expected to the be considered by the Waverley Traffic Committee in the coming months. It is understood the State Transit Authority will be consulted as part of this process.	Noted.
Prior to the issue of an Occupation Certificate, the applicant prepare a comprehensive Travel Plan (or amend and expand the existing GTP) taking into account of the GTP initiatives outlined in the framework GTP to assist with increasing the mode share of walking and cycling.	An amended GTP is provided at Appendix D.	Noted. A comprehensive Travel Plan has been prepared by TTPP which proposes strong initiatives for walking and cycling.
A detailed Construction Pedestrian and Traffic Management Plan for various stages detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control should be submitted to the relevant consent authority for approval prior to the issue of a Construction Certificate.	Noted. A condition of consent can be imposed in relation to this comment.	A Construction Traffic and Pedestrian Management Plan for the development proposal has not been reviewed as a part of this Peer Review.

Table A.3 Response to Submissions – Waverley Council

Issue Raised	Applicant's Response	Bitzios' Response
The applicant should demonstrate that the net increase of student enrolments and staff will not further increase demand for drop off and pick up (DOPU) activities and will consequently increase traffic movements on the surrounding road network, specifically if traffic and transport issues are not adequately addressed.	The school will implement travel demand management measures to minimise its impact on the surrounding road network. The proposed measures are expected to reduce the school car use by 10%. The achievement of 10% will ensure that traffic levels post development are similar to the existing scenario. Refer amended Transport Impact Assessment at Appendix C.	There is a gross increase in site traffic as a result of the development proposal, which will increase demand for DOPU activities. The net increase in site traffic is dependent upon a reduction to both future and existing site trips. The ameliorating effect which is anticipated is to be achieved via travel demand management only. However, it is our opinion that a 10% mode shift is an optimistic estimate, and should be treated as an aspirational target only, pending any evidence to the contrary. This can take the form of a specific comparative study for a school with similar trip generation characteristics (i.e. a school with a majority of trips originating from outside of the suburb).
Council strongly recommends Moriah College take a proactive approach to encouraging students and staff to green travel modes and plan initiative to alleviate traffic and parking impacts arising from the proposed growth of the student population. Further initiatives must firstly be implemented and additional public transport services (such as bus services) guaranteed to reduce any net impact on the surrounding road network. No actual GTP or report appears to have been submitted.	A GTP accompanied the EIS lodged in November 2019. The GPT details the recommended measures that can be implemented to encourage active transport and reduce car use (especially single car trips). An updated GTP accompanies the RTS at Appendix D. In addition to the previous recommended measures proposed, the amended GTP includes: – A 'learn to ride' program to offer lessons for students learning how to ride bicycles. – An additional shuttle bus services to what is currently provided between Bondi Junction and Moriah College is recommended.	As above.
Any increase to school population should be staged over a number of years.	The proposed redevelopment is to be delivered in two key stages. It is anticipated that the proposed increase in students will occur progressively over a 15+ year timeframe. Refer Section 2.4 of this Report for further detail.	Noted. Traffic Impact Assessment makes reference to Stage 1, Stage 2 and Ultimate stages.

Issue Raised	Applicant's Response	Bitzios' Response
A revised questionnaire/study of school parents and staff (minimum of 80% response rate) on transport trends is recommended.	Overall, a response rate of 62% has been obtained from the travel questionnaire survey amongst students and staff which is considered adequate. No further questionnaire / study will be undertaken.	Parent and student responses are at an acceptable level. However, staff travel patterns are notably different, and their response rate should be considered in isolation. A response rate of only 26% was achieved with staff members, which may result in some bias of survey findings.
Consideration should be given to providing additional bicycle parking beyond the minimum amount. 'learn to ride a bike' programs could be incorporated into the school programming (eg sport activities)	The amended proposal includes an additional 52 bicycle parking spaces (now 160 in total). This exceeds the minimum statutory requirement of 108 bicycle parking spaces. A 'learn to ride' program has been included as a recommended measure in the GTP at Appendix D.	The amended proposal now provided additional bicycle parking spaces beyond the minimum required by Waverley Council's DCP. However, the existing bicycle parking arrangements have not been specified in the Traffic Impact Assessment, the existing bicycle parking provision is unclear. The minimum requirement of 108 bicycle parking spaces provided only accounts for the proposed additional students, and bicycle parking should be provided beyond the minimum if the existing provision is insufficient.
The applicant should investigate opportunities to improve and increase AM bus travel mode share in consultation with Council and the State Transit Authority (STA).	It is understood that the Mayor of Waverley Council (Councillor Paula Masselos) is currently engaging with the STA regarding increased bus services in the Local Government Area.	Noted.
Consideration should be given to providing increased shuttle bus services between the school and the Bondi Junction interchange to enable greater flexibility with students and staff using public transport	An additional shuttle bus service between Bondi Junction and the School has been included as a recommended measure in the updated GTP (Appendix D).	Noted. However, the GTP indicates that buses currently operate well below capacity, so it is unclear if additional services will result in an appreciable increase bus usage. Furthermore, it is noted that the bus zone on Baronga Avenue is already at capacity during the PM peak. The impact of additional bus queuing on Baronga Avenue should be evaluated.

Issue Raised	Applicant's Response	Bitzios' Response
Council's Infrastructure Services and Strategic Transport departments generally support the proposed road and intersection upgrades as part of the SSD application. They have provided specific comment on each of the proposed upgrades in Council's submission including: i. York Road pedestrian refuge to be upgraded to the NSW Roads and Maritime Services (RMS) standard refuge, including a 'zebra' pedestrian crossing. The concept of the pedestrian crossing on York Street is strongly supported, however a raised form of the crossing is not supported due to STA buses using this route to access the nearby Bondi Junction depot.	Concept design plans for the proposed infrastructure upgrades are presented in the TIA (refer Appendix C) and Architectural Plans Package (refer Appendix A). These will be presented to Council at the Waverley Traffic Committee once finalised. (i) As requested, the York Road pedestrian refuge is to be upgraded to either a 'zebra' crossing or a Children's crossing. The detailed design of the crossing is subject to finalisation at the Waverly Traffic Committee prior to implementation.	Agreed that the upgrade of existing pedestrian refuge to a 'zebra' or Children's crossing will have beneficial effects for pedestrians. However, the traffic impacts of pedestrian crossing at this location has not been assessed, particularly in light of the alleged constant flow of pedestrians during school peaks at this location. Furthermore, there may be safety concerns if queues on York Road extend through the crossing, blocking visibility between traffic moving in the opposite direction and pedestrians.
ii. Extension of the existing pedestrian crossing in Baronga Avenue across the layby is supported. Lighting should be reviewed for compliance with AS1158 - Lighting for Roads and Public Spaces. The crossing will likely be required to be refurbished or reconstructed.	(ii) Noted. Condition of consent can be included.	Strongly agreed. The existing gap between pedestrian crossing and footpath is unsafe and should be rectified as a part of the proposal. However, the proposed kerb build-out will prevent cars and buses from travelling through the layby. This may result in increased friction and a decrease in queue capacity, which under current bus conditions may cause operational issues. These should be noted in the Traffic Impact Assessment.
iii. The entrance to Gate 4 of the Campus needs to be set back into the property to reduce queuing back onto York Road.	(iii) As requested, the Gate 4 gateway is further set back inside the property to cater for queuing.	Noted. The new position of the gate will allow for the storage of approximately two vehicles. The adequacy of the storage should be assessed if wait times are expected at the gate.
iv. The recommended slip lane treatment to the York Road / Baronga Avenue is supported.	(iv) Noted.	Noted. However, due to deficiencies in the modelling methodology (refer to Section 4), it is unclear if this will resolve the traffic issues at the York Road / Baronga Avenue intersection.

Issue Raised	Applicant's Response	Bitzios' Response
v. The recommended 'seagull treatment' for the York Road / Queen Park Road intersection is supported. A pedestrian refuge in this location would assist community members to safely cross the wide intersection when accessing the existing pedestrian refuge or proposed Zebra Crossing on York Road to access Centennial Park.	(v) Options for a pedestrian refuge at this location are presented at Section 7.2.4 of the TIA at Appendix C. It is requested that Council further investigate the need for a pedestrian refuge noting that initial design testing has found that a refuge could result in pedestrian safety issues.	It is understood that Council refers to a pedestrian refuge on Queens Park Road, as opposed to on York Road. Some investigation on the latter locations only are presented in Section 7.2.4 of the Traffic Impact Assessment. A pedestrian refuge on Queens Park Road will assist northbound and southbound pedestrian activity along York Road, noting that Queens Park Road is between 12m and 20m wide at the intersection. It will provide a link to the proposed pedestrian crossing to the south of the intersection, connecting to Centennial Park. Applicant has not considered a pedestrian refuge at this location. However, it should be noted that any pedestrian refuge design should be capable of accommodating bus turning movements.
Council's Infrastructure Services department recommends meaningful consultation with residents to determine appropriate traffic calming measures with input from Council traffic engineers. The Department should ask the applicant to consider future LATM measures for the Queens Park residential streets to respond to projected traffic impacts on residential streets of Queens Park as a result of the proposal.	Noting that the traffic through the surrounding road network cannot be directly attributed to the College, it is requested that Council investigate this separately to determine the appropriate traffic calming measures required in the area. Consultation with residents and other agencies such as State Transit Authority should be undertaken to adequately discuss the positive and negative implications of proposed LATM plans.	Agreed.

Issue Raised	Applicant's Response	Bitzios' Response
The introduction of the slip lane at the intersection of York Road and Baronga Avenue may conflict with pedestrian traffic, particularly students alighting from bus services operating along Clovelly Road. The applicant's 'Green Travel Plan' should be amended to direct students using Clovelly Road bus services to alight immediately before Avoca Street and use the footpath along Avoca Street to access the signalised crossing over Darley Road and then the shared path through Queens Park to access the school via the Baronga Avenue Gate. The applicant should either request bicycle access from the Queens Park shared path to the Baronga Avenue zebra crossing, provide the infrastructure in coordination with Council and the Centennial Park Trust or propose an alternative route. More broadly, the proposal should have greater consideration of pedestrian and bike movements to ensure a balanced transport solution that reflects the transport hierarchy adopted in Council's People Movement Places Policy.	There is no existing pedestrian facility at the York Road and Baronga Avenue intersection and therefore the proposed slip lane is not expected to affect or conflict with pedestrian traffic. Additional measures are provided to encourage use of Queens Park shared path to access the school via Baronga Avenue.	While no formal pedestrian facility is located at the corner of York Road and Baronga Avenue, there is evidence of pedestrian activity at this location (worn grass). A slip lane would increase the number of vehicle-pedestrian conflict points if no other facilities are installed or encouraged.

Table A.4 Response to Submissions – Randwick City Council

Issue Raised	Applicant's Response	Bitzios' Response
Transport Assessment to be updated to provide for cycling within the modal split	An amended Transport Impact Assessment is provided at Appendix C. Table 7.12 includes cycling in the existing and projected modal split. A 2% increase in bicycle use is projected for staff and students which is considered achievable noting the proposed increased bicycle parking and end of trip facilities.	Noted.
A suitable Construction Traffic Management Plan should be submitted. Council recommends all construction vehicles use York Road and Oxford Street as both their arrival and departure route, to reduce impacts on our community.	An amended CTMP is provided at Appendix H. Construction vehicles are restricted to left-in and left-out access at Gate 4 due to the presence of median island on York Road. However, it is noted that both Baronga Avenue and Queens Park Road are local residential streets. Trucks travelling down lower order roads could result to undesirable outcome for the School and the local community. As such, three egress route options are provided which are to be finalised following consultation with Council and the local community. Options include: ▪ Option 1: Via Baronga Avenue and Queens Park Road to get back to York Road. ▪ Option 2: The existing median on York Road has to be shortened to allow right turn movement from the site. All construction vehicles exiting Gate 4 are only allowed to leave the site under the supervision of a traffic controller. ▪ Alternate option 2: Exiting trucks are to continue travelling along York Road towards Darley Street and Anzac Parade.	A Construction Traffic and Pedestrian Management Plan for the development proposal has not been reviewed as a part of this Peer Review.

Table A.5 Response to Submissions – Public Submissions

Issue Raised	Applicant's Response	Bitzios' Response
Traffic and Parking – increased traffic congestion.	The Transport Assessment undertaken for the proposal concludes that traffic impacts can be managed and will generally be acceptable. With the implementation of the green travel strategies, the vehicle trip generation of the proposed scheme would significantly be reduced such that it would be comparable with that generated by the existing approved school capacity. The surrounding key intersections will not be unreasonably affected by the proposal.	Due to deficiencies in the modelling methodology (refer to Section 4), it is moved that the future modelling undertaken is not suitable in providing a clear, realistic picture of the future traffic conditions. Furthermore, there is a reliance on the travel demand management strategies to shift traffic away from private car usage. However, the low net trip generation hinges upon the estimated 10% mode shift, which is not a conservative approach to traffic concerns.
Traffic and Parking – increased pedestrian safety risks.	The proposal seeks to re-orientate the High School Main Entrance away from the residential areas of Queen's Park. The High School Pedestrian Entrance will be at Gate 3 on Baronga Avenue and the Vehicular Entrance will be at Gate 4 on York Road, south. In addition, the proposal will relocate the existing on-street drop-off/pick-up facilities on York Road (south) so that they take place entirely within the site in the south car park. This new drop-off/ pick-up area is proposed to be allocated for secondary students via a loop rood system, similar to the existing drop-off/pick-up area already provided for the primary school. This loop road will enable queuing to occur within the site to minimise on street queueing.	Detailed queueing analysis should be undertaken for all DOPU operations. Furthermore, analysis should be undertaken for Ultimate stage traffic.
Traffic and Parking – students and staff parking in residential streets.	Measures will be introduced through implementation of the Green Travel Plan to discourage travel to the school via vehicle. These measures predominately focus on encouraging alternative forms of transport including bicycle, public transport, and walking. This is coupled with the provision of improved bicycle parking and end of trip facilities.	The 'discouraging' effect has been proposed via a restriction of on-site parking. However, this may not necessarily result in a decrease in car usage, but may exacerbate the issue being raised by shifting the parking demand onto on-street sources. The on-street parking impacts have not been evaluated clearly as a part of this proposal.