14 January 2022

ptc.

Matthew Metlege
School Infrastructure NSW
Level 8
259 George Street
Sydney
NSW, 2000

Dear Matthew

1. New Primary School in Mulgoa Rise – 1-23 Forestwood Drive – Glenmore Park

ptc. has been engaged by Richard Crookes Construction on behalf of School Infrastructure NSW (SINSW) to address comments received following the submission of the State Significant Development Application (SSDA) and subsequent additional request for information for the proposed development of a new primary school located at 1-23 Forestwood Drive in Glenmore Park.

This letter has been prepared in response to the following documents:

- Letter dated 3 December 2021 from Penrith City Council (Council),
- Letter dated 8 December 2021 from Transport for NSW (TfNSW),
- Letter dated 18 December 2021 from the Department for Planning, Industry & Environment.

The individual items are addressed below, noting that re responses reference the Transport and Traffic Assessment dated 20 August 2021 and the response letter dated 11th November 2021 addressing previous comments.

2. Council Comments

2.1 Pedestrian Crossing - Design

Council Comment

It is noted that, in response to Council's comments from 1 October 2021, the proposal has been amended respond to varies matters.

The primary points of disagreement remaining include:

- *The proposal for pedestrian crossings to be at-grade rather than raised "wombat" style crossings,*

Response

As per advice received from the project's civil engineer, blisters or raised crossings are not feasible due to potential flooding issues, please refer to the flooding assessment. The proposed solution is shown in Figure 1, with yellow lines representing fencing instead of kerb buildouts. The project is open to alternatives, such as bollards or other devices if these are seen as a better outcome. Refer to Section 3.1 for further comments and analysis.

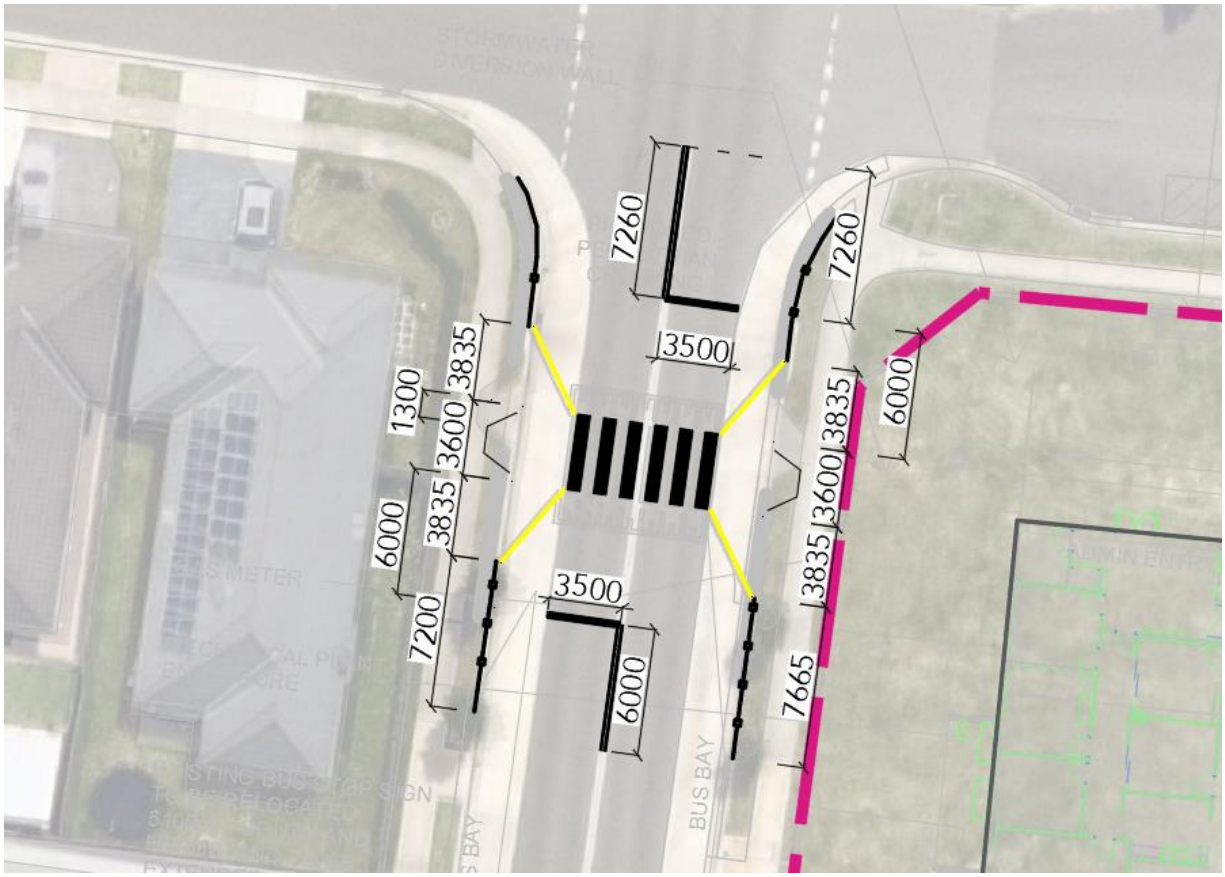


Figure 1 – Proposed Zebra Crossing Design

2.2 Dedicated School Bus Service

Council Comment

- *The proposal not to use a dedicated school bus service, but rather to use an existing bus route which causes children to have to cross the road, and*

Response

Discussions regarding bus provisions have been held with TfNSW as part of the SSDA and in the TWG meetings. The project is proposing to further discuss with TfNSW the possibility of a dedicated school bus service, noting that this would be TfNSW's responsibility.

2.3 Positioning of Bus Infrastructure

Council Comment

- *The positioning of bus infrastructure.*

Response

Refer to Section 3.1.

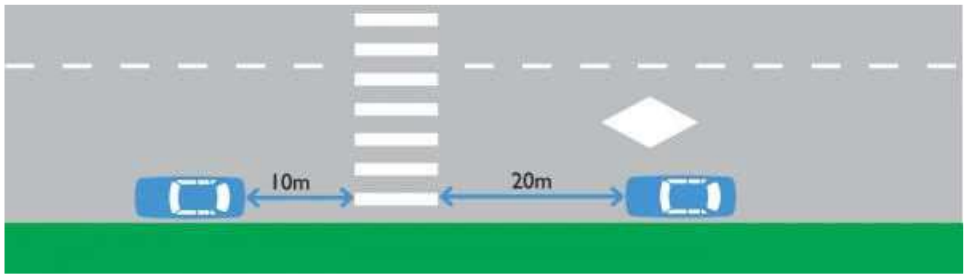
3. Transport for New South Wales

3.1 Zebra Crossing – Sight Lines and Design

TfNSW Comment (5 October 2021)

5.2.4.1 & Attachment 2 (Pedestrian Crossings) – Bus Bays need to be located sufficiently away from the crossing to ensure sight lines are not obstructed in line with Australian Standards (this also needs to consider how many buses may simultaneously be present, especially at bus stop B);

5.1 - The amount of parking spaces shown in Figure 41 will need to be revised as the below minimum buffer is required at zebra crossings;



6.4.1 – How was location of crossings determined? Sufficient sight distance needs to be achieved for each crossing;

The kerb would need to expand out ~3m up to the edge of the through lane, where the cars are for sight distance compliance;

Attachment 3 – a fence is not considered an appropriate alternative to kerb build outs and is not supported by Australian Standards. Figure 82 shows fencing in what appears to be car park location and the TfNSW spec fencing is located on the footpath.

Response (11 November 2021)

Refer to Sections 2.2 and 2.8 in the traffic response letter dated 11 November 2021.

TfNSW Comment (8 December 2021)

a) *the provided plan on figure 6 does not show an outline of a bus in bus zone and it is not indicative of whether the sight line encroaches the orange area (bus zone) e.g. is the green line actually overlapping the orange shape? CSD is measured from behind the kerb and not at the face of the crossing/kerb as shown in Figure 3.7 of AGRD Part 4A. It is requested that a more detailed/indicative plan is provided. It is also noted that the proposed design (as per figure 6) is not supported. Any sort of blister island device is also not a kerb extension, but rather a 'splinter island', and so the 'No Stopping' distance and CSD should be measured from the kerb ramp as the zebra crossing would need to extend from kerb to kerb, not where the blister ends;*

    i. *However, if the revised design as per attachment 1 is what is proposed, this treatment could be considered a form of kerb extension – see further comments under 3.6;*

Response

The RMS Supplement to AGTM Part 10 stipulates the following in regard to the travel length of pedestrian (zebra) crossings:

> *"NSW practice does not permit pedestrian (zebra) crossings on roads with 2 or more marked travel lanes in the same direction. This also applies to roads with 2 unmarked travel lanes in the same direction, i.e. where vehicles can pass other vehicles travelling in the same direction.*

Darug Avenue is 12m wide with a total of 4 lanes including 1 traffic lane and 1 kerbside parking lane on each side. In response to the above, the proposed zebra crossing on Darug Avenue has been designed to span across only the 2 traffic lanes rather than 4 lanes between the kerbs.

Examples of pedestrian crossings spanning across the traffic lanes only, with buildouts or kerbs narrowing down the carriageway are shown below. It is noted that both crossings are located at schools and act as "Children's Crossings" as well.

Figure 2 – An example of pedestrian zebra crossing near Hornsby South Public School

Figure 3 – An example of pedestrian zebra crossing near St Anthony's College

Further, the RMS supplement notes:

> *Note: A pedestrian (zebra) crossing can be provided by the provision of line marking or kerb extensions that restrict the road to one travel lane each way or where a full time parking lane exists."*

In order to address the above, the project proposes to narrow down the carriageway of Darug Avenue. Due to flooding issues, kerb buildouts are not feasible, refer to the civil flooding reports. A reduction in the width of the road in the form of just line marking could be provided, but this is not seen as an optimal solution for this given location, considering that the crossing will be used by young school children. This is because the width between the centre line and the kerb would physically enable two vehicles to drive in the same direction.

In light of this, it is proposed to provide a physical barrier along the narrowing of the carriageway. Fencing has been proposed, though the project would be happy to discuss alternative ways to provide a physical barrier without impacting on flooding. If fencing or other physical barriers are not supported by the authorities, line marking could be implemented in accordance with the RMS supplement.

In regard to the CSD line measurements, figure 3.7 of AGRD Part 4A is presented below. Given that the proposed zebra crossing starts at the beginning of the traffic lane, it is considered the CSD has been measured from the correct point.

Figure 3.7: Sight distance at pedestrian crossings

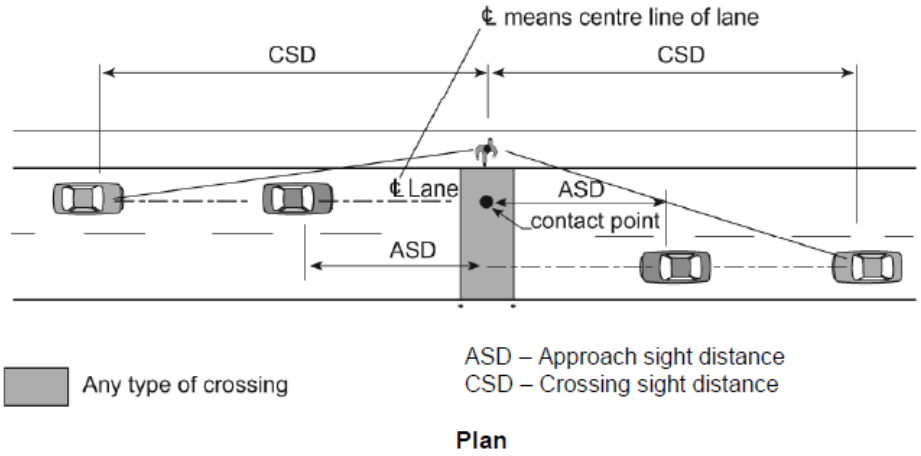


Figure 4 – Sight Distance at Pedestrian Crossings (Source: AGRD Part 4A)

The sight distance figure has been amended as per TfNSW comment and is shown below, with the bus parked in the bus bay and a vehicle approaching the zebra crossing. The figure shows that the sight line is outside of the bus parked in the bus bay.

It is noted that the bus zone will be mostly unoccupied, with buses expected to stop at this bus stop no more than 2-3 time within one hour.

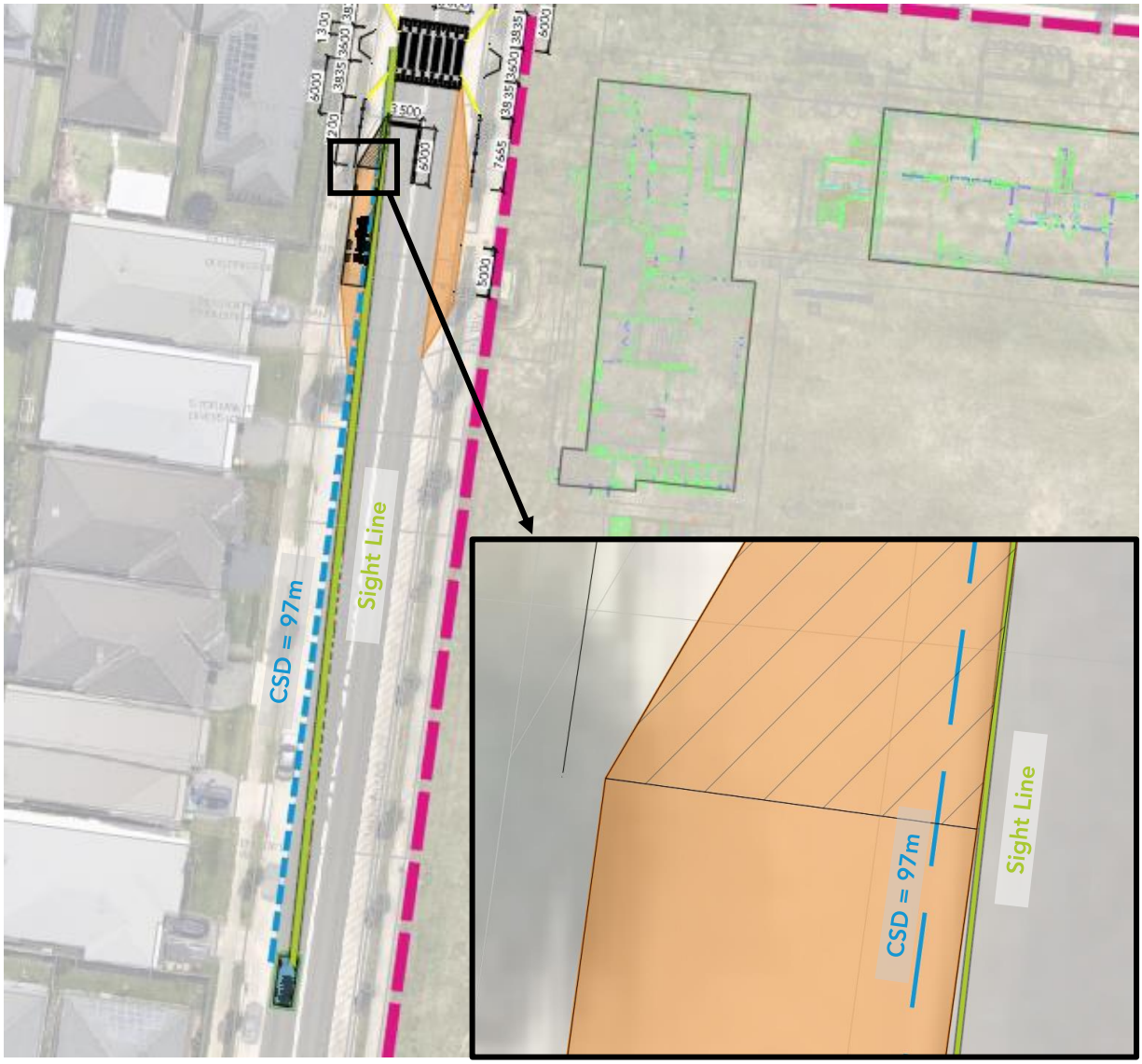


Figure 5 – Proposed zebra crossing design

In any case, it is noted that apart from the design of the kerb buildout, all crossings and parking restrictions have been set out in accordance with the relevant standards, i.e. the:

- AS 1742.10 – 2009 – Manual of uniform traffic control devices Part 10: Pedestrian control and protection
- TDT 2002/12b – Stopping and parking restrictions at intersections and crossings
- TDT 2011/01a – Pedestrian refuges (Supplement for narrowing or widening of roads at Pedestrian Refuges)
- Roads and Maritime Supplement to Austroads Guide to Traffic Management Part 10

The subject intersection does not have any vertical or horizontal curves which would impede on sight, thus it is unclear as to why the standard no stopping distances are not being accepted by the authorities.

It is understood that a physical kerb buildout would be preferred, but this cannot be accepted by the project from a perspective of potential legal implications. The project is open to discussing alternative ways to narrow down the carriageway without impacting on flooding. If no agreement can be reached then no zebra crossing can be provided, which is not seen as a feasible solution for the proposed school.

3.2 Bus Bay Length

TfNSW Comment (5 October 2021)

In addition, the bus bay is to have sufficient length (consider draw-in length, draw out length, and maximum number of services expected at any one time) to ensure that buses can be fully contained within bus bay;

Response (11 November 2021)

The existing bus stops on Darug Avenue are currently being serviced by only one bus (794 bus service). The frequency of the bus service at both bus stops is 27-73 minutes during the school peak hours. As the existing bus frequency is very low, the existing bus stops are able to accommodate additional bus services if the timetables are managed by departure / arrival times.

According to TfNSW *Guidelines for the Planning of Bus Layover Parking,* a standard bus requires a minimum of 12.5m long parking length and additional 11.5m draw-in and 6.0m draw-out length, refer to the table below.

Minimum Bus Draw In and Draw Out Lengths

Type of bus	Length (metres)	Min. draw-in length (metres)	Min. draw-out length (metres)	Length for one bus (metres)
Standard (inc double decker)	12.5	11.5	6.0	30.0
Long Rigid	14.5	14.0	6.5	35.0
Articulated	18.0	14.0	8.0	40.0

Figure 6 – Bus Zone Dimensions Requirements

The proposed zebra crossing and the proposed relocated eastern bus bay have been located such that both bus bays at Darug Avenue will be compliant with the TfNSW requirement, thus will meet the minimum requirement for parking, draw-in and draw-out lengths, as shown in Figure 7.

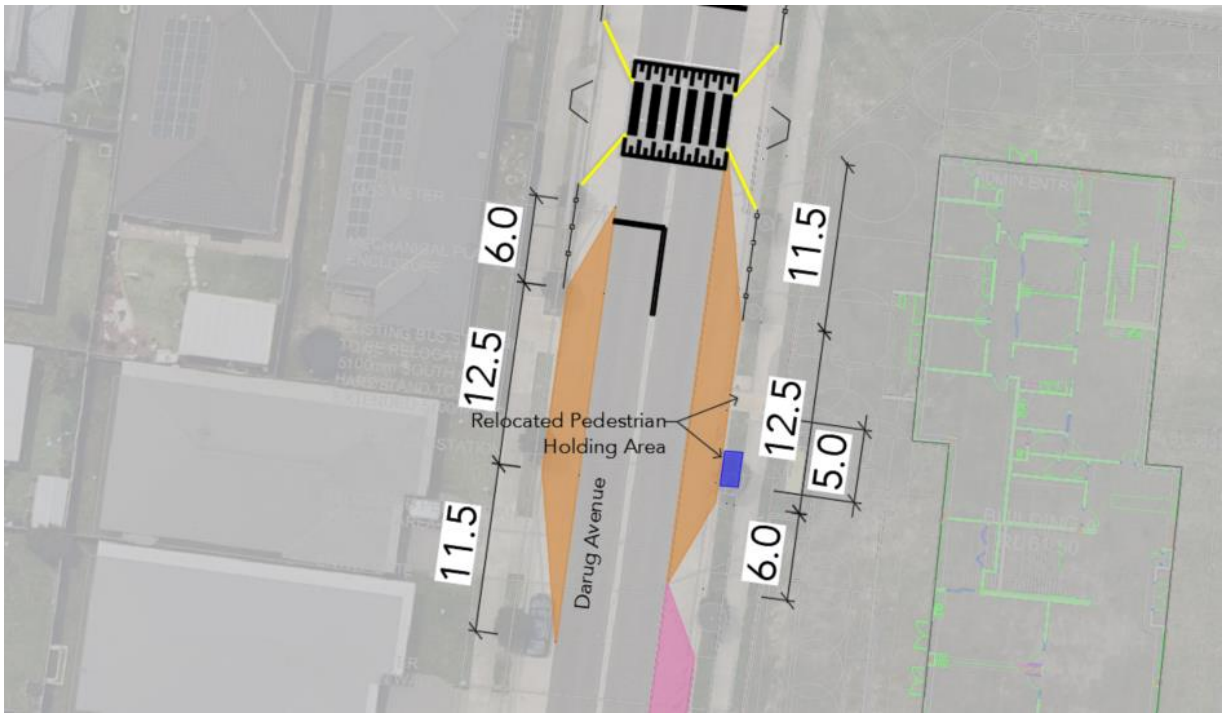


Figure 7 – Bus Bays at Darug Avenue

TfNSW Comment (8 December 2021)

there is no mention of peak school bus volumes and the number of buses (relating to school activities) that may be present simultaneously

bus bay length should be designed to accommodate the expected peak volume of buses (i.e. several school buses arriving or requiring to wait at the same time).

Response

The existing bus timetables are shown in Table 1. Considering the potential school bell times at 8:50am in the morning and 2:50pm in the afternoon, the AM and PM peak hours are likely to be between 8:00am-9:00am and 2:30pm-3:30pm respectively. As shown in Table 1, the existing bus route travels northbound once and southbound twice during the AM peak hour, and northbound once and southbound once during the PM peak hour.

Table 1 - Bus Service Summary (Source: Transport NSW)

Bus Route	Coverage	Bus Stop	Morning Peak	Bus Stop	Afternoon Peak
794	Penrith to Glenmore Park via The Northern Road	A	7:57, 8:35, 9:27	A	14:34, 15:47, 16:17
	Glenmore Park to Penrith via The Northern Road	B	7:51, 8:18, 8:54, 9:42	B	13:46, 15:07, 16:10

As part of the TTA discussions, it has been proposed that the public bus route 799 be amended to carter for the School students and for the parent onward journey, in addition to the 794 bus.

The recommended bus timetables are presented in Table 2. The proposal is to provide increased frequency to the existing bus services with the bus servicing both northbound and southbound twice during the school AM and PM peak hours. The proposed bus time tables relate to changes of the existing buses, rather than additional dedicated school buses.

The recommended bus timetable in Table 2 is indicative only, and this timetable is not additional to the bus timetable in Table 1. **ptc.'s** recommendation is to change the arrival and departure time of the existing bus service and increase the frequency of the existing bus services during the peak hours to service the School. Thus, no simultaneous bus timetables are recommended.

Bus routes and timetables have been discussed as part of the Transport Working Group meeting with the Lead Service Planner, Bus, Ferry & Light Rail Planning, Integrated Public Transport Planning John Broady.

ptc.'s Transport and Traffic Assessment report (TTA) dated 20/08/2021 shows a mode share calculation of 10% for students travelling by bus (moderate / target scenario). This means that only 41 primary school students (out of 414 students) are expected to travel by bus. These students can be accommodated in one bus, meaning that no additional bus services apart from the recommendations shown in Table 2 are required at this stage. If additional bus services are required in the future, the arrival and departure times of different bus services can be managed by staggering the timetables.

It is noted that the number of buses servicing the Darug Avenue bus stops is very low. As such, if additional bus services or increased frequency are required, the bus timetables can be managed by staggering. Therefore, increasing the bus bay length is not seen as required.

Table 2 - Recommended Bus Services

Coverage	Bus Stop	Morning Peak	Bus Stop	Afternoon Peak
Glenmore Park to / from: Penrith South Penrith Kingswood St Marys	A	**OSHC Services** 7:35-7:40 – arrival bus for students residing east of the school, 7:50-8:00 – departure time for parents who wish to accompany their child to school **School Services** 8:35-8:40 – arrival bus for students residing east of the school, 8:50-9:00 – departure time for parents who wish to accompany their child to school	A	**School Services** 2:50-3:00 – arrival bus for parents, 3:05 – departure bus for students residing northwest of the school **OSHC Services** 3:50-4:00 – arrival bus for parents, 4:05 – departure bus for students residing northwest of the school 4:50-5:00 – arrival bus for parents, 5:05 – departure bus for students residing northwest of the school 5:50-6:00 – arrival bus for parents, 6:05 – departure bus for students residing northwest of the school
	B	**OSHC Services** 7:35-7:40 – arrival bus for students residing northwest of the school, 7:50-8:00 – departure time for parents who wish to accompany their child to school **School Services** 8:35-8:40 – arrival bus for students residing northwest of the school, 8:50-9:00 – departure time for parents who wish to accompany their child to school	B	**School Services** 2:50-3:00 – arrival bus for parents, 3:05 – departure bus for students residing east of the school **OSHC Services** 3:50-4:00 – arrival bus for parents, 4:05 – departure bus for students residing northwest of the school 4:50-5:00 – arrival bus for parents, 5:05 – departure bus for students residing northwest of the school 5:50-6:00 – arrival bus for parents, 6:05 – departure bus for students residing northwest of the school

3.3 U-turns

TfNSW Comment (5 October 2021)

5.2.5 – What measures are proposed to prevent parents from undertaking u-turn manoeuvres? It is noted that the SUH pick-up/drop-off is located on the westbound side of Deerubin Drive and that any parents requiring access to the SUH unit coming from the south would generally just turn right at Deerubin Drive as opposed to driving around the block. This movement may also be more prevalent during wet weather if parents wish to drop their children off closest to a building facility;

Response (11 November 2021)

If issues with parents undertaking U-turns are observed in the future, lane divider pavement flaps could be implemented along the centre line of Deerubbin Drive. The requirement for these measures could be reviewed as part of the STP updates.

As the SUH parking requires larger parking bays and pram ramps, it is more likely that the pick-up and drop-off will be undertaken on the correct side of the road. Vehicles requiring to park at the SUH unit and approaching from the south will be advised to turn right at Glenmore Ridge Drive, then turn right into Glenholme Drive and park on the SUH pick-up/drop-off.

The proposed design has been set out for the majority of days based on averages, which is a standard approach. Designing for rainy days would result in over-engineered designs.

TfNSW Comment (8 December 2021)

Lane divider flaps would generally not be recommended as a measure in this instance, whereas a median may be more appropriate.

Response

If issues with parents undertaking U-turns are observed in the future, lane divider pavement flaps or other devices could be implemented along the centre line of Deerubbin Drive. The requirement for these measures could be reviewed as part of the STP updates.

3.4 Zebra Crossing – Design

TfNSW Comment (5 October 2021)

6.4.1 & Attachment 2 (Pedestrian Crossings) – The Crossings need to be designed in accordance with relevant standards, guidelines and supplements. Fencing is not an approved device as part of a zebra crossing. It should be noted that fencing at crossings can obscure visibility of pedestrians (in particular children shorter in height than the fencing). Therefore this design will not be supported by TfNSW;

Response (11 November 2021)

As per information provided to the authorities and discussions held as part of the TWG meetings, there is a flooding issue within the surrounding roads which prevents implementing any raised infrastructure within the carriageways (refer to documents prepared by Woolacotts: the Overland Flow Flooding Summary dated 27 July 2021 and the Flood Impact Assessment dated 22 October 2021).

A discussion on various at grade pedestrian crossing designs, including the implementation of middle islands, was submitted as part of the SSDA, refer to Attachment 3 of the TTA.

A revised at grade zebra crossing design is shown in the below figure and in Attachment 1, with the yellow lines representing fencing (or any other structure i.e. bollards that would be deemed acceptable) to imitate the kerb buildouts. This is so that the impact on the water flow within the carriageway is minimised.

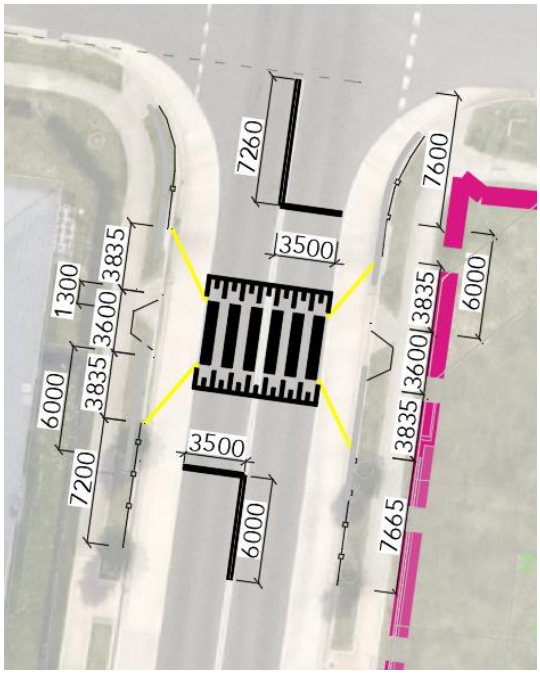


Figure 8 – Proposed Zebra Crossing Design

TfNSW Comment (8 December 2021)

a. *Figure 1 (and all other figures containing the crossing) should be updated to reflect the design in Attachment 1;*

b. *Can it be confirmed whether Attachment 1 is the amended crossing design? There is conflicting information and plans contained within the letter that suggests any raised infrastructure causes flooding issues, yet Attachment 1 appears to suggest a 'blister island';*

c. *Attachment 1 –*

   i. *At-grade zebra crossings do not require piano key pavement marking (these are used for raised crossings);*

   ii. *Fencing indicated by the 'yellow line' is not an approved device and should not be installed in such a manner. Proposed RMS type 1 Pedestrian fencing on kerb can be extended further to meet at crossing point;*

   iii. *Is it proposed to have a kerb ramp where there is a grate across the gutter? This is not clear, please clarify.*

Response

Refer to Section 2.1 and 3.1 regarding zebra crossing design.

The change in pavement and line marking were proposed to imitate a raised crossing / shared zone, thus to raise driver's awareness of an increased pedestrian activity. This is because the development cannot provide a raised zebra crossing due to flooding issues. However, the piano keys can be removed.

The project is open to discussion and alternative options for the zebra crossing design, given the flooding issues.

3.5 Speed Counts

TfNSW Comment (5 October 2021)

6.4.2.2 – It is expected that speed counts are undertaken to indicate that the 85th percentile speed does not exceed 60km/h;

Response (11 November 2021)

Speed surveys undertaken today would not represent the future travel behaviour, thus an assessment of the 85th percentile speed would not provide an accurate representation of the road character for when the school is operational. Further, it is noted that the mixed-use development is yet to be constructed and the amount of traffic is likely to increase in the near future. This will result in a reduction in travel speeds.

It has been agreed during the TWG meeting held on the 3rd November 2021 that no speed count surveys need to be undertaken at this point.

TfNSW Comment (8 December 2021)

Congestion/increased traffic is not an appropriate 'traffic calming' justification. A lower average speed may be prevalent in some instances, but there are periods of the day where traffic will be operating at free flow capacity. It is recommended that speed counts are undertaken post construction.

Response

It has been agreed during the TWG meeting held on the 3rd November 2021 that no speed count surveys need to be undertaken at this point, as these would not provide an accurate representation of the road character for when the school is operational.

Speed counts can be undertaken post-construction of the School.

3.6 Children's Crossing

TfNSW Comment (5 October 2021)

6.4.2.3 – All proposed crossings will need to be submitted to Local Traffic Committee for recommendation to Council for approval. TfNSW requests clarification as to whether children's crossings are being considered;

Response (11 November 2021)

All three crossings are proposed to be designed as children's crossings. The plans will be submitted in due course to the Local Traffic Committee for approval.

TfNSW Comment (8 December 2021)

a. *It is considered that the proposed children crossing location does not provide sufficient sight distance for vehicles travelling south (turning from Deerubbin Drive). Despite having sufficient space to provide the stop line 6 metres from the crossing, and having 7.26 metres of storage, this does not account for the approach sight distance required for drivers turning from Deerubbin Drive to observe the stop line and other associated cues of the children's crossing (see AGRD Part 4a – section 3.3). Provision of ASD ensures that even if there is no pedestrian actually on the crossing, the driver should be aware of the crossing by seeing the associated pavement markings and other cues, and therefore be alerted to take the appropriate action if a pedestrian steps onto the crossing. Provision of ASD should be used for crossings where the pedestrian has the priority;*

i. *Note that ASD should be calculated from where the turning manoeuvre is complete, and not from the holding line of the minor leg at the intersection.*

b. *Noting the response provided for 2.10, the provided design was not accepted by Council and TfNSW during the Transport Working Group meeting help on the 3rd November 2021. The design was never provided to Transport for review and comment prior to the TWG, and it was stated that Transport would require the design plans to be submitted for formal review and comments;*

c. *Whilst there is no specific guideline/standard that prescribes a minimum offset of a zebra crossing (or children's crossing) from an intersection, based on the principles of ASD provision for pedestrian crossings and taking into account comments provided above, it is considered appropriate that the children's crossing should be located further from the intersection to allow for a design that satisfies the relevant standards and design principles for safe crossing facilities;*

d. *If there is concern that locating the crossing further from the intersection may lead to pedestrians crossing away from the provided facility due to desire lines, other measures can be considered to minimise that occurrence i.e. planting, fencing etc. Otherwise, reconsideration should be given as to whether a children's crossing is required at this location (as opposed to providing just a zebra crossing);*

Response

It is unclear why the ASD considerations would apply to children's crossings only and not to general zebra crossings. In any case, the analysis is presented below.

Section 3.2.1 Approach Sight Distance in the Guide to Road Design Part 4A: Unsignalised and Signalised Intersections notes the following:

Provision of ASD for cars

ASD is:

- *the minimum level of sight distance which must be available on the minor road approaches to all intersections to ensure that drivers are aware of the presence of an intersection*
- *also desirable on the major road approaches so that drivers can see the pavement and markings within the intersection and should be achieved where practicable. However, the provision of ASD on the major road may have implications (e.g. cost; impact on adjacent land and features) in which case SSD is the minimum sight distance that should be achieved on the major road approaches to the intersection and within the intersection.*

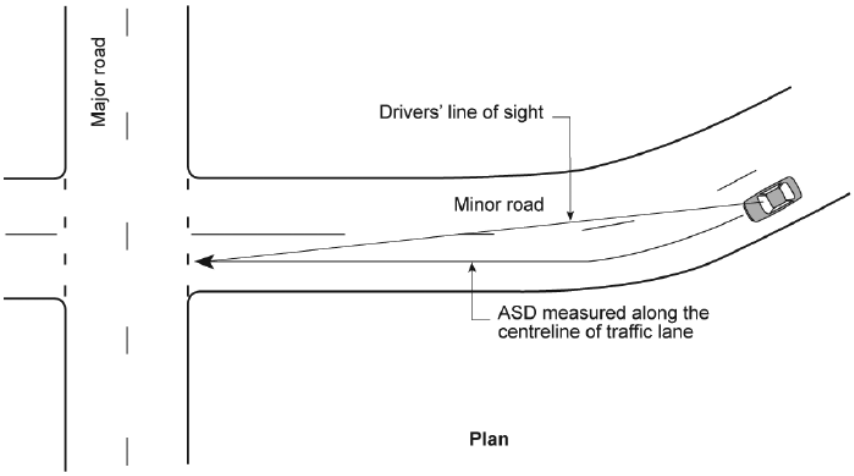


Figure 9 – Figure 3.1 Application of approach sight distance (ASD) (Source: Guide to Road Design)

Deerubbin Drive is the minor road approaching the major road – Darug Avenue. Given that the section of Deerubbin Drive is straight, it is considered that the ASD is met for this intersection in the sense of the definition provided above. Refer to Figure 10 for the ASD at the subject intersection.

Figure 10 – Approach sight line at the Deerubbin Drive / Darug Avenue intersection

The guideline does not appear to stipulate that the ASD applies to facilities, i.e. zebra crossings, located around the corner of the minor road approach, noting that vehicles are legally required to slow down and be prepared to stop at the "Give Way" line to assess the adequacy of further travel movement. Once at the intersection, vehicles would have an unobstructed sight line onto the zebra crossing, approaching pedestrians and the stop line, as shown in Figure 11.

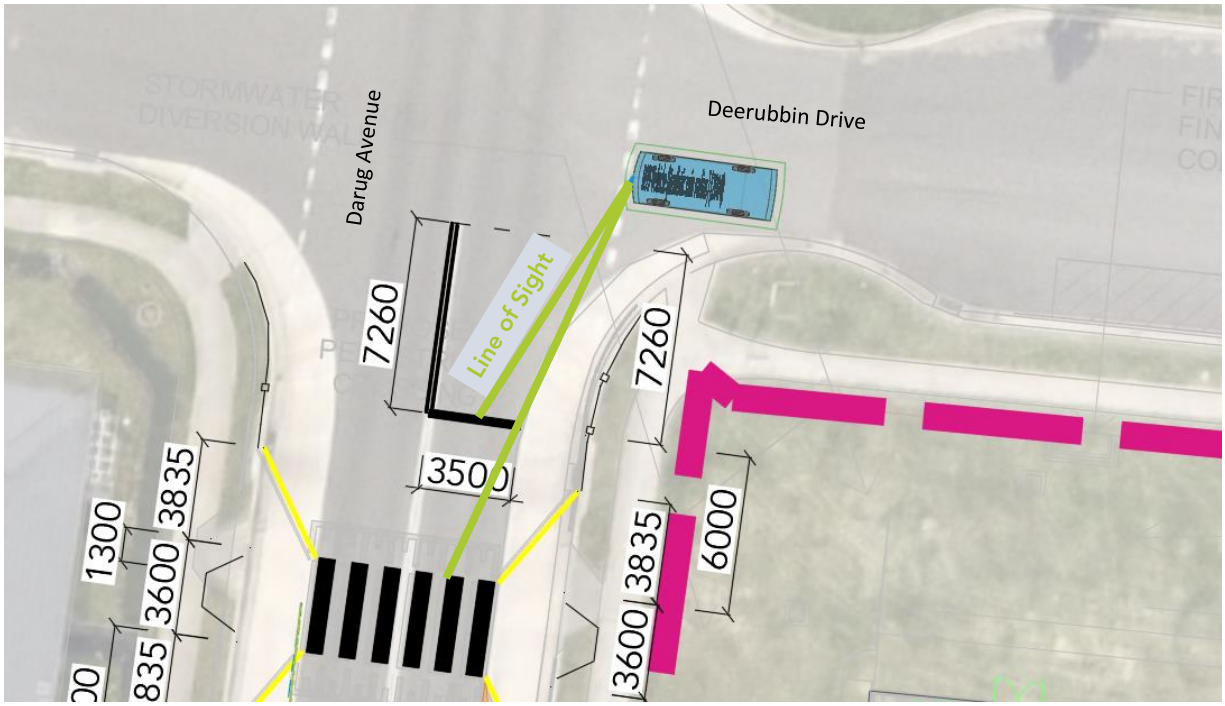


Figure 11 – Unobstructed sight lines to the Darug Avenue zebra crossing and the stop line

In reference to Figure 3.7 from the Guide to Road Design, it appears that the illustrated pedestrian facility is a mid-block crossing, rather than a crossing at an intersection. Given that Darug Avenue has a straight alignment, the ASDs in the north and southbound directions are considered to be met.

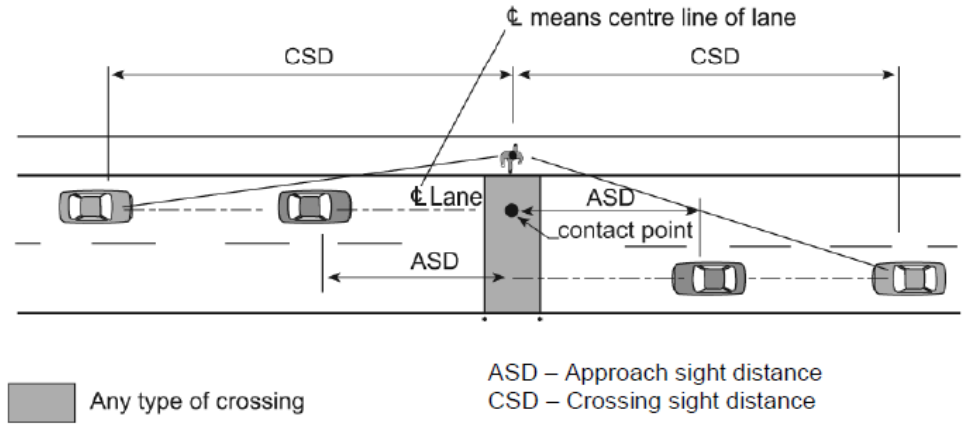


Figure 12 – Figure 3.7: Sight distance at pedestrian crossings (Source: Guide to Road Design)

Based on all the above, we believe that the ASD requirements of the intersection and zebra crossing are met. Nevertheless, to address the comments we undertook a calculation of the ASD length.

The radius of the road centreline of the turning movement from Deerubbin Drive south into Darug Avenue is 8m. The following equation (based on Formula 5, Austroads Guide to Road Design: Part 3 – Geometric design) was used to calculate the speed that vehicles could potentially be driving at if they did not stop at the "Give Way" line:

$$V = \sqrt{(127(e+f)R)}$$

Where; V = Vehicle speed (km/h)

e = superelevation (0.025)

f = side friction factor (0.3)

R = radius (m) (8)

From this formula, it has been calculated that the negotiable speed of the approach radius is 18.2 kph, noting that this is seen as a conservative result given that drivers need to be prepared to stop at the "Give Way" line.

Then, using Equation 1 (Guide to Road Design Part 4A: Unsignalised and Signalised Intersections) the Approach Sight Distance (ASD) was calculated.

$$ASD = (R_T \times V) / 3.6 + V^2 / (254 \times (d + 0.01 \times a))$$

Where: R_T = reaction time (sec) (1.5)

V = operating (85^{th} percentile) speed (km/h) (18.2)

d = coefficient of deceleration (0.36)

a = longitudinal grade (-0.5)

From this formula, it has been calculated that a the ASD for the zebra crossing upon approach from the eastern arm of the Deerubbin Drive / Darug Avenue intersection would be 11.3m. This is shown in Figure 13.

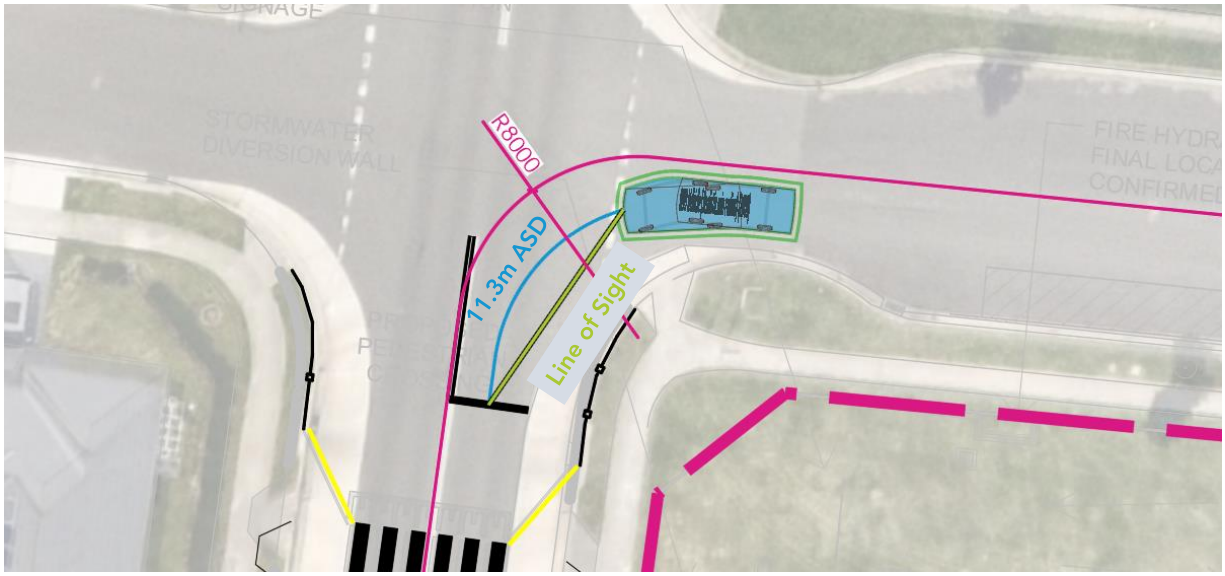


Figure 13 – 11.2m long ASD

Based on the calculations, the proposed zebra and children's crossing is considered to meet the ASD line requirements.

The project could remove the "Children's crossing" design and provide a normal crossing instead, if this is seen as the best outcome for young school children. However, it is considered that the ASD requirements are not a valid reason for this decision, but if so, it is not clear as to why the ASD considerations would apply to children's crossings only and not to general crossings.

It is not recommended to relocate the zebra crossing further south, as the location of the zebra crossings has been determined based on pedestrian desire lines.

Please refer to Section 2.1 and Section 3.1 regarding the zebra crossing design.

Overall, it is proposed to retain the proposed location of the children's crossing. However, a "Children's crossing ahead" sign could be installed along Deerubbin Drive and south of the western bus stop on Darug Avenue to inform the road users of the crossing in advance.

3.7 Speed and Traffic Volumes

TfNSW Comment (8 December 2021)

e. It should also be noted that children's crossings cannot be provided on roads where the 85th percentile speed exceeds 60km/h one hour before or after school hours, and is generally intended for local and lightly trafficked roads.

Response

The road has a posted speed limit of 50km/h and will be subject to a 40 km/h school zone. As agreed in the TWG meeting and discussed in Section 3.5, speed surveys undertaken at this time would not provide an accurate representation of the road character for when the school is operational. However, it is noted that the surrounding roads within the vicinity of the School are local roads with intersections located at short distances (80-150m), meaning that excessive speeds are not seen as a likely issue.

Further, the above-mentioned speed requirement is relevant to any type of crossing - normal zebra crossing, raised crossing or a children's crossing. If 85th percentile speeds of over 60km/h are observed, no zebra or children's crossing can be provided, which is not an option for this development.

In regard to traffic volumes, item 6.4.4 in the Roads and Maritime Supplement to Austroads Guide to Traffic Management Part 10 stipulates the following:

> *RMS practice for children's crossings:*
> *The crossing is located on local and lightly trafficked roads where in a one hour duration immediately before and after school hours the traffic flow exceeds 50 vehicles per hour in each direction and during the same hour 20 or more children cross the road within 20 m of the proposed crossing location.*

Darug Avenue is a local road located within a residential area. As shown in the SIDRA result excerpts in Figure 14 and Figure 15, there will be 126 and 49 trips in the morning and 85 and 78 trips in the afternoon in each direction of Darug Avenue respectively. This means that the suggested threshold of 50 vehicles is considered to be met. With the proposed public and active mode share it is expected than more than 20 students will be crossing the Darug Avenue crossing.

In light of the above, it is considered that the proposed children's crossing location at Darug Avenue meets the intent of the requirement of being situated along a light trafficked road. The 85th percentile speeds are not envisaged to exceed 60 km/h given the residential character of the area, noting that this speed requirement relates to any type of crossing. Therefore, it is proposed to implement this crossing in the form of a children's crossing to increase the perceived safety of young road users.

MOVEMENT SUMMARY

Site: 103 [3e. Darug Ave / Deerubbin Drive - Future Base + Dev AM (Site Folder: E. Future Base + Dev AM Peak Hour)]

Network: N101 [E. Future Base + Dev AM Peak Hour (Network Folder: Future Base + Development Scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Darug Avenue (South)														
1	L2	1	0.0	1	0.0	0.069	4.7	LOS A	0.2	1.5	0.08	0.17	0.08	47.4
2	T1	87	6.0	87	6.0	0.069	0.1	LOS A	0.2	1.5	0.08	0.17	0.08	42.7
3	R2	38	0.0	38	0.0	0.069	4.7	LOS A	0.2	1.5	0.08	0.17	0.08	46.8
Approach		126	4.2	126	4.2	0.069	1.5	NA	0.2	1.5	0.08	0.17	0.08	45.4
East: Deerubbin Drive (East)														
4	L2	44	0.0	44	0.0	0.145	4.7	LOS A	0.5	3.8	0.18	0.55	0.18	43.7
5	T1	3	0.0	3	0.0	0.145	4.0	LOS A	0.5	3.8	0.18	0.55	0.18	46.3
6	R2	106	0.0	106	0.0	0.145	5.6	LOS A	0.5	3.8	0.18	0.55	0.18	43.7
Approach		154	0.0	154	0.0	0.145	5.3	LOS A	0.5	3.8	0.18	0.55	0.18	43.8
North: Darug Avenue (North)														
7	L2	4	0.0	4	0.0	0.026	4.6	LOS A	0.0	0.1	0.01	0.06	0.01	48.7
8	T1	44	4.8	44	4.8	0.026	0.0	LOS A	0.0	0.1	0.01	0.06	0.01	47.5
9	R2	1	0.0	1	0.0	0.026	4.8	LOS A	0.0	0.1	0.01	0.06	0.01	48.0
Approach		49	4.3	49	4.3	0.026	0.5	NA	0.0	0.1	0.01	0.06	0.01	47.9
West: Deerubbin Drive (West)														

Figure 14 – Excerpt from SIDRA results for the Darug Avenue / Deerubbin Drive intersection during the AM peak

MOVEMENT SUMMARY

Site: 103 [3f. Darug Ave / Deerubbin Drive - Future Base + Dev PM (Site Folder: F. Future Base + Dev PM Peak Hour)]

Network: N101 [F. Future Base + Dev PM Peak Hour (Network Folder: Future Base + Development Scenario)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Darug Avenue (South)														
1	L2	1	0.0	1	0.0	0.046	4.8	LOS A	0.1	0.9	0.10	0.15	0.10	47.5
2	T1	61	3.4	61	3.4	0.046	0.1	LOS A	0.1	0.9	0.10	0.15	0.10	43.0
3	R2	23	0.0	23	0.0	0.046	4.8	LOS A	0.1	0.9	0.10	0.15	0.10	46.9
Approach		85	2.5	85	2.5	0.046	1.4	NA	0.1	0.9	0.10	0.15	0.10	45.4
East: Deerubbin Drive (East)														
4	L2	20	0.0	20	0.0	0.116	4.8	LOS A	0.4	2.9	0.24	0.55	0.24	43.6
5	T1	1	0.0	1	0.0	0.116	3.9	LOS A	0.4	2.9	0.24	0.55	0.24	46.2
6	R2	97	0.0	97	0.0	0.116	5.4	LOS A	0.4	2.9	0.24	0.55	0.24	43.6
Approach		118	0.0	118	0.0	0.116	5.3	LOS A	0.4	2.9	0.24	0.55	0.24	43.6
North: Darug Avenue (North)														
7	L2	2	0.0	2	0.0	0.039	4.7	LOS A	0.0	0.1	0.01	0.03	0.01	48.9
8	T1	72	1.5	72	1.5	0.039	0.0	LOS A	0.0	0.1	0.01	0.03	0.01	48.6
9	R2	2	0.0	2	0.0	0.039	4.7	LOS A	0.0	0.1	0.01	0.03	0.01	48.3
Approach		76	1.4	76	1.4	0.039	0.3	NA	0.0	0.1	0.01	0.03	0.01	48.6
West: Deerubbin Drive (West)														

Figure 15 – Excerpt from SIDRA results for the Darug Avenue / Deerubbin Drive intersection during PM peak

3.8 HRV Swept Path

TfNSW Comment (5 October 2021)

Figure 56 & Attachment 2 (Pedestrian Crossings) – The swept path is considered unacceptable (particularly due to the proximity to the pedestrian crossing), the plans indicate that a HRV encroaches over the centreline into the opposing traffic lane on both Darug Avenue and Forestwood Drive. This would result in a B99 vehicle travelling along Forestwood Drive to be forced to occupy the very left of the carriageway which is unrealistic if the vehicle is wishing to travel straight or turn right (and arrives before the HRV);

Response (11 November 2021)

The proposed zebra crossing at Darug Avenue has been relocated further south and is located at 13.3m south of Darug Avenue / Deerubbin Drive intersection. The HRV turn movement swept path has been re-run and it can be accommodated without crossing the opposite lane, as shown in Figure 16.

The proposed zebra crossing location at Forestwood Drive has been relocated further east at 20.7m from the Darug Avenue / Forestwood Drive intersection. The proposed new location allows for adequate turn movement as shown in Figure 17.

In any case, it is noted that local roads seldomly allow for an HRV movement without crossing into the opposite lane. Further, the turn movements discussed above are not likely to occur during the pick-up and drop-off time, as no bus routes run along these routes and waste collection will occur outside of pick-up and drop-off times.

This has been agreed during the TWG meeting held on the 3rd November 2021.

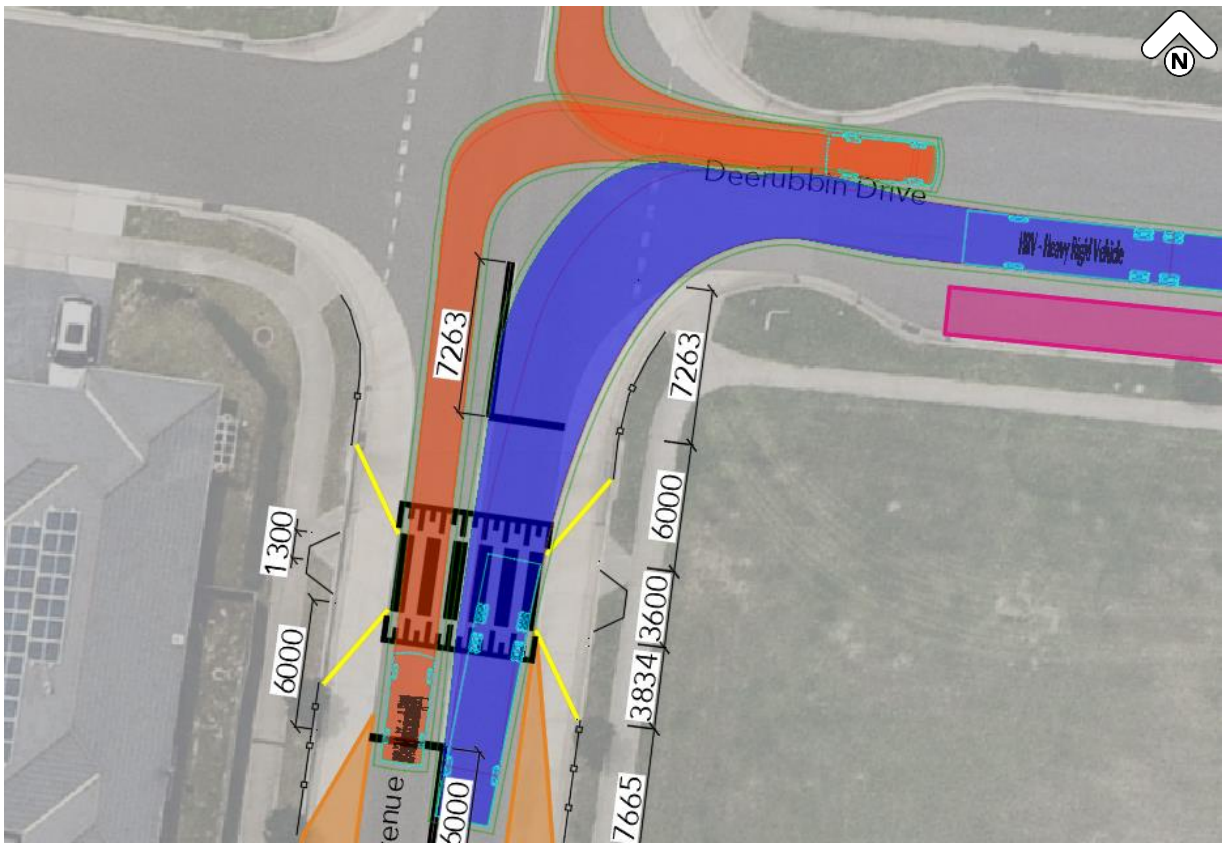


Figure 16 – HRV Swept Path at proposed Zebra Crossing at Forestwood Drive

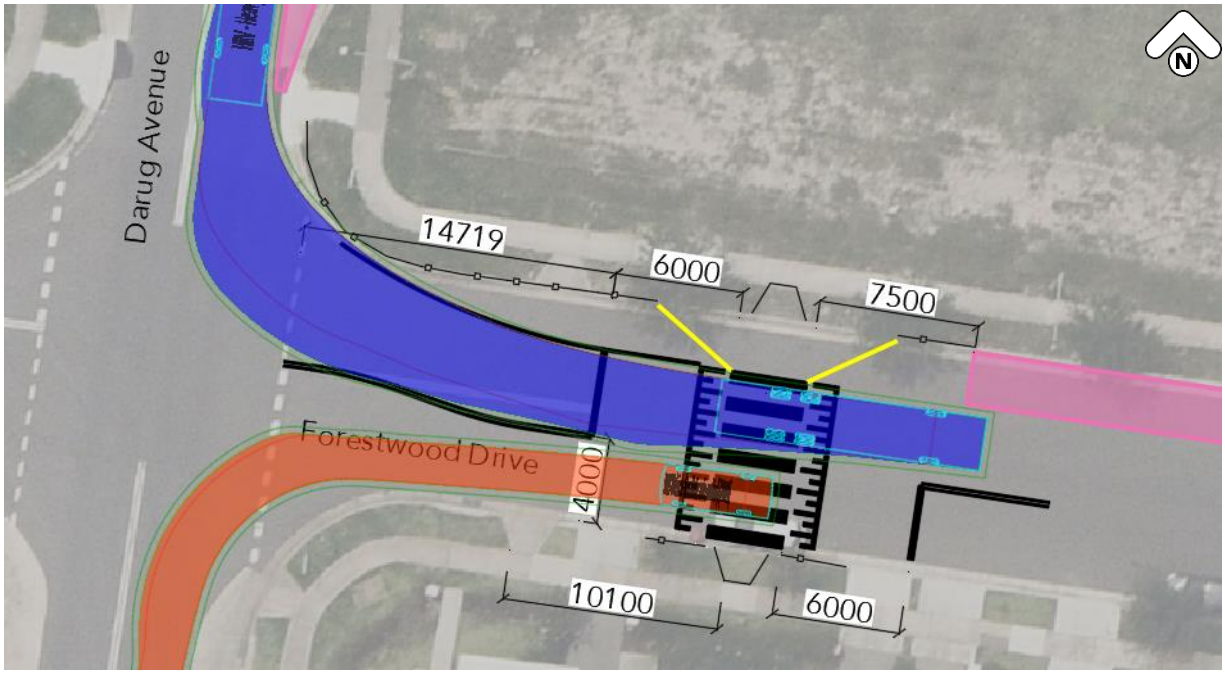


Figure 17 – HRV Swept Path at proposed Zebra Crossing at Forestwood Drive

TfNSW Comment (8 December 2021)

3.10 – Consideration should be given to providing barrier line on approach to intersection on Deerubbin Dr and straightening out dividing line on Forestwood Drive.

Response

Currently there is no barrier line on Deerubbin Drive and the project is not proposing to amend any of the travel movements of the truck. Currently, the truck needs to negotiate the left turn manoeuvre with cars potentially parked along Darug Avenue. By providing 'No Stopping' signs on Darug Avenue (at the intersection with Deerubbin Drive) as a part of zebra crossing, the project is reducing the existing possibility of conflict between potentially parked cars on the eastern side of Darug Avenue and the truck turning left into Darug Avenue. Therefore, it is not seen as required to amend the existing situation.

In regard to the proposed barrier line on Forestwood Drive, the BB line has been curved to retain the alignment through the intersection in the east-west direction. However, this could be amended if the misalignment through the intersection is not seen as an issue.

3.9 Zebra Crossing – Sight Lines

TfNSW Comment (5 October 2021)

6.5.4 – The sight line assessments need to be quantified. Has TDT2002/12C been referred to? Has crossing sight distance (Austroads) been assessed? Not only should motorist's view of pedestrians be considered, but also the pedestrian's view of oncoming vehicles;

Response (11 November 2021)

Refer to Sections 2.2 and 2.8 in the traffic response letter dated 11 November 2021.

TfNSW Comment (8 December 2021)

a. *Assumption of V=50km/h for the 85th percentile school zone does not account for the fact that crossing is still operational outside of school hours. Based on this assumption, V should be readjusted to a higher value to reflect the permanent speed limit of 50km/h;*

b. *Proposed 'kerb extension' design is not supported;*

c. *Figure 6 – Note 4 of figure 7 in TDT 2002/12c contains a further note that stipulates that the provision of note 4 does not apply when 'splinter islands' are used, as it would still allow the crossing to commence at the kerb line. As per the provided design, this would not be considered a kerb extension, and so No Stopping distance is to be revised (which would impact bus stop location);*

d. *Children's crossing sign would be obscured by stationary bus;*

e. *Also, see comments for 3.1.*

Response

a. The road has a posted speed limit of 50km/h and as agreed in the TWG meeting and discussed in Section 3.5, speed surveys will not be undertaken at this time, as these would not provide an accurate representation of the road character for when the school is operational. However, it is noted that the surrounding roads within the vicinity of the School are local roads with intersections located at short distances (80-150m), meaning that excessive speeds are not seen as a likely issue.
Should issues with excessive speed arise in the future, speed calming devices can be considered.
In any way, it is noted that the

b. Refer to Section 3.1 and Section 3.4.

c. Refer to Section 3.1 and Section 3.4.

d. A children's crossing pre-warning sign can be positioned before the bus stop.

e. Refer to Section 3.1 and Section 3.4.

3.10 Zebra Crossing – Design / Surface

TfNSW Comment (5 October 2021)

Attachment 3 – Figure 81 shows a surface change at a raised intersection (which does not have pedestrian priority). Is there justification as to why a surface treatment is being considered as an isolated treatment at crossings? Surface treatments are generally used as a threshold treatment or to highlight the presence of something. Zebra pavement markings already indicates the pedestrian priority at crossings, addition surface treatments may detract from the zebra pavement marking;

Response (11 November 2021)

The change in pavement was proposed to imitate a raised crossing / shared zone to raise driver's awareness of an increased pedestrian activity. This is because the development cannot provide a raised zebra crossing due to flooding issues.

A discussion on the zebra crossing design is provided in Section 2.2.

TfNSW Comment (8 December 2021)

As stated previously, the design as provided in Figure 10 is not supported. It is unclear whether this is the design or the design provided in Attachment 1. As per comments provided in 3.6, piano keys are not to be provided for at-grade crossings, they are intended for raised crossings. Change in pavement colour is also not supported for at-grade crossings. They should not be trying to imitate a raised crossing or shared zone if they are not one as this may confuse drivers, and lead to non-compliance for these types of treatments (raised crossing/shared zones).

Response

Refer to Section 2.1 and 3.1 regarding zebra crossing design.

The change in pavement and line marking were proposed to imitate a raised crossing / shared zone, thus to raise driver's awareness of an increased pedestrian activity. This is because the development cannot provide a raised zebra crossing due to flooding issues. However, the piano keys can be removed.

The project is open to discussion and alternative options for the zebra crossing design, given flooding issues.

3.11 Buses for School Events

TfNSW Comment (5 October 2021)

4.3 – How many large buses are anticipated for school events? It is unclear if the buses can be accommodated for in the proposed bus zones without impacting the safe operation of the crossing.

Response (11 November 2021)

There is a bus stop on the eastern site of Darug Avenue, and an approximately 80m long 15-minute parking zone is proposed on the school frontage along Darug Avenue adjacent to the bus stop. Either the existing bus stop or the 15-minute parking zone can easily accommodate buses required for school events.

TfNSW Comment

15 minute parking should not necessarily be relied upon for bus use if it is anticipated that more than 1 bus would be used for events - additionally the buses would also be restricted to parking/waiting for 15 mins;

Response

The buses arriving for the events would be managed by the School staff. These buses would generally arrive at the scheduled times and would only park until the students' board or alight the bus. Thus, it is unlikely that these buses would need to park on Darug Avenue for mor than 15 minutes.

Further, it is noted that the 15-minute parking is proposed to be imposed during school pick-up and drop-off times only.

3.12 School Travel Plan

TfNSW Comment

TfNSW has reviewed the EIS document which includes the School Travel Plan Travel Plan and provides the below recommendation for this development application.

Recommendation

Subject to The Department's approval and the following requirement being included in the development consent:

A School Travel Plan (STP) detailing travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location-specific sustainable travel and the provision of facilities to increase the non-car mode share for travel to and from the site is to be submitted to TfNSW for review and approval prior to the issue of a Construction Certificate. The STP should as a minimum include a Travel Access Guide (TAG) which includes maps and times of all modes of transport, bikes, bus, train, walking and car-pooling options; details of end of trip facilities; details of mode share; and a parking management strategy.

Response

A first version of the School Transport Plan (STP) has already been submitted as a part of the SSDA. The commencement of the School is planned on early 2023. During the time period, changes might occur to the surrounding infrastructure and the bus routes. Therefore, any Travel Access Guide (TAG) prepared now may not be accurate when the school commences.

Therefore, an updated STP and TAG will be submitted once the principal has been appointed and prior to an Occupational Certificate.

3.13 School Zone

TfNSW Comment

Comment

A significant number of vehicles and pedestrians will access the site at the start and end of the school day. School Zones must be installed along all roads with a direct access point (either pedestrian or vehicular) from the school. School Zones must not to be provided along roads adjacent to the school without a direct access point.

TfNSW is responsible for speed management along all public roads within the state of New South Wales. That is, TfNSW is the only authorised organisation that can approve speed zoning changes and authorise installation of speed zoning traffic control devices on the road network within New South Wales.

Recommendation

Subject to The Department's approval and the following requirement being included in the development consent:

Road Safety precautions and parking zones should be incorporated into the neighbouring local road network:

- *40km/hr School Zones are to be installed in Darug Avenue, Forestwood and Deerubbin drives in accordance with the following conditions.*
- *Council should ensure that any parking, drop-off / pick-up zones and bus zones incorporated are in accordance with TfNSW standards.*

The Developer must obtain written authorisation from TfNSW to install the School Zone signs and associated pavement markings and/or remove/relocate any existing Speed Limit signs.

To obtain authorisation, the Developer must submit the following for review and approval by TfNSW, at least eight (8) weeks prior to student occupation of the site:

a. A copy of Council's development Conditions of Consent

b. The proposed school commencement/opening date

c. Two (2) sets of detailed design plans showing the following:

i. School property boundaries

ii. All adjacent road carriageways to the school property

iii. All proposed school access points to the public road network and any conditions imposed/proposed on their use

iv. All existing and proposed pedestrian crossing facilities on the adjacent road network

v. All existing and proposed traffic control devices and pavement markings on the adjacent road network (including School Zone signs and pavement markings).

vi. All existing and proposed street furniture and street trees.

School Zone signs and pavement marking patches must be installed in accordance with TfNSW approval/authorisation, guidelines and specifications.

All School Zone signs and pavement markings must be installed prior to student occupation of the site.

The Developer must maintain records of all dates in relation to installing, altering, removing traffic control devices related to speed.

Following installation of all School Zone signs and pavement markings the Developer must arrange an inspection with TfNSW for formal handover of the assets to TfNSW. The installation date information must

also be provided to TfNSW at the same time. Note: Until the assets are formally handed-over and accepted by TfNSW, TfNSW takes no responsibility for the School Zones/assets.

Response

An Indicative School Zone Plan has been submitted as part of the SSDA and consecutive additional request for information.

Formal application for School Zone will be submitted after the Council's Consent on due course.

4. Department of Planning, Industry and Environment

4.1 Comparison with Other Schools

DPIE Comment

Requests from the Department, Council and TfNSW to provide comparisons of the mode share performance at local schools with similar characteristics to demonstrate that mode share targets can be achieved was not adequately addressed in the RtS. The RtS outlines new processes SINSW has implemented for school developments to investigate measures to increase active and public transport usage and the percentage of students in the 400m, 800m and 1,200m catchments but does not provide a comparison of travel modes at other local schools (including Glenmore Park Public School and Surveyors Creek Public School).

A detailed comparison of the mode usage at local primary schools must be provided to demonstrate that the proposed mode breakdown outlined in the School Transport Plan may be achieved.

Response

The schools surrounding the New School in Mulgoa Rise are Regentville Public School, Glenmore Park Public School, Surveyors Creek Public School and Mulgoa Public School. This is shown in the following figure.

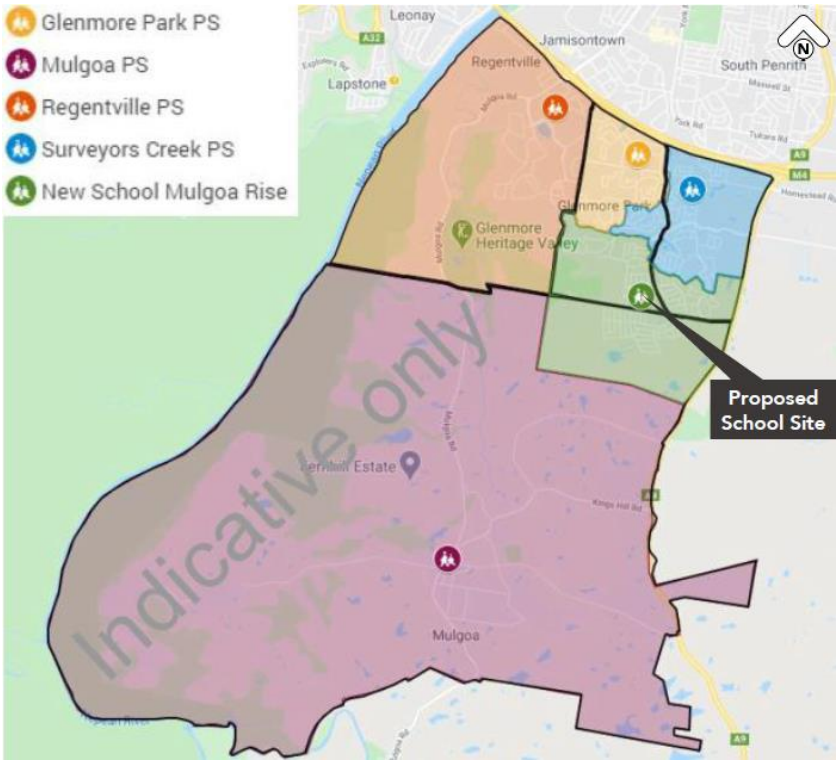


Figure 18 – Nearby Schools (Source: NSW Department of Education)

Mode share data for the surrounding schools is not available. The earliest time to undertake mode share surveys would be mid-February, which would significantly delay the assessment of the determination of the SSDA, and as a result the construction program. Even if undertaken, the survey results are likely to not represent the actual travel behaviour that would be expected under normal circumstances due to the COVID impact.

In order to provide a comparison of the drop-off and pick-up availability, an assessment has been undertaken of the quantity of drop-off and pick-up spaces along the frontage roads at the surrounding schools. These are presented in Figure 19, Figure 20, Figure 21 and Figure 22.

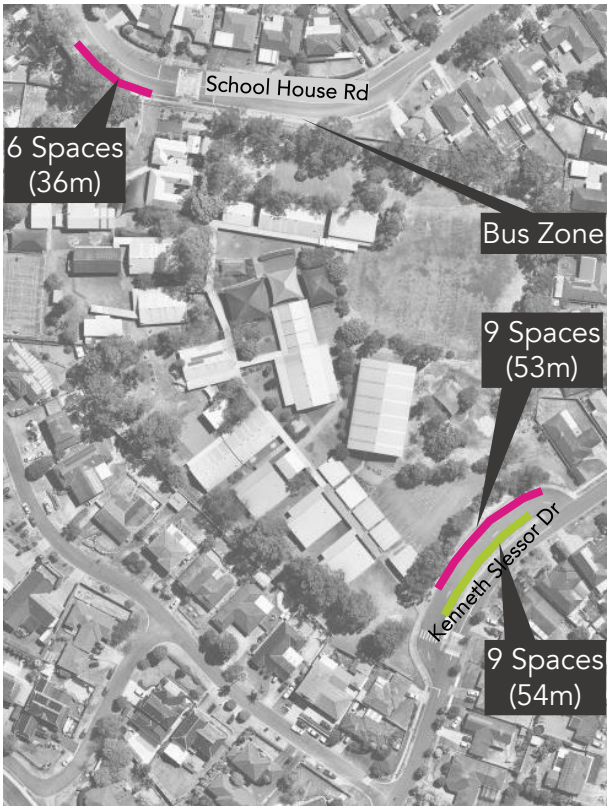


Figure 19 - Regentville Public School – 654 Students

Figure 20 - Glenmore Park Public School – 660 Students

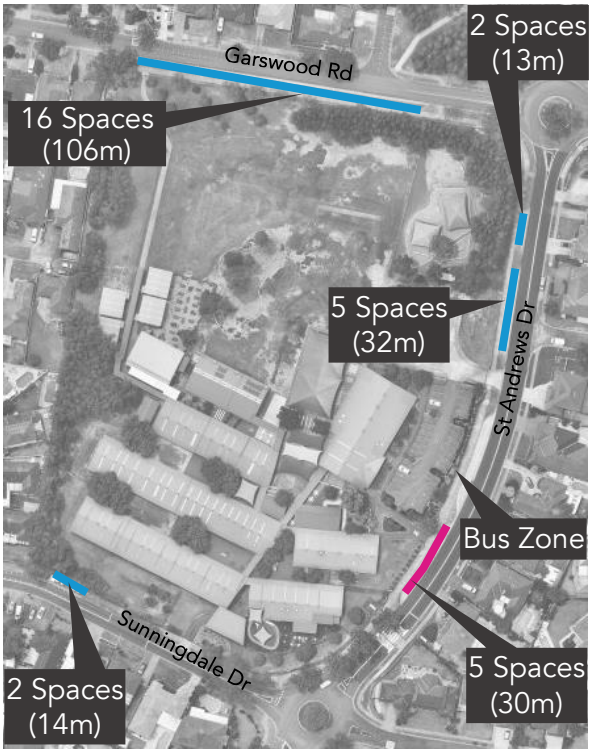


Figure 21 - Surveyors Creek Public School – 552 Students

Figure 22 - Mulgoa Public School – 89 Students

The new School in Mulgoa Rise proposes to provide 24 "drop-off and pick-up spaces", 20 "15 min parking spaces" and 8 "assisted drop-off and pick-up spaces" adjacent to the school property.

The comparison and summary of the parking provision of the surrounding schools is presented in Table 3.

Table 3 – Summary of the parking provisions of the surrounding schools

Schools	Number of Students	Drop-off and Pick-up Spaces	15 min Parking Spaces	Assisted Drop-off and Pick-up Spaces	Unrestricted Parking Spaces	Drop-off and Pick-up Spaces Ratio per 100 Students
Proposed new school in Mulgoa Rise	414	24	20	8	-	**5.8**
Regentville PS	654	15	-	-	9	**2.3**
Glenmore Park PS	660	16	-	-	-	**2.4**
Surveyors Creek PS	552	5	25	-	-	**0.9**
Mulgoa PS	89	-	-	-	5	**-**

It is evident from the table that the proposed new school in Mulgoa Rise proposes to provide more drop-off and pick-up spaces per 100 students compared to the other surrounding schools. Therefore, the potential of queuing is likely to be reduced, which is as we understand the reason why Council requested to compare the travel mode shares of other schools.

We trust that this letter assists in the assessment of the application. For any further enquiries, please contact our office on (02) 8920 0800.

Kind regards,

Kasia Balsam
Team Leader

Document Control: Prepared by *PS* on *11 January 2022*. Reviewed by *KB* on *12 January 2022*.