

traffic impact assessment;

St Ives Indoor Sports Complex

For Ku-Ring-Gai Council

10 June 2021

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1. Introduction

1.1 Project Summary

ptc. has been engaged by JDH architects on behalf of Ku-ring-gai Council to prepare a Traffic Impact Assessment (TIA) for the proposed St Ives Indoor Sports Complex development at 91 Yarrabung Road St Ives. This assessment accompanies a Development Application (DA). The proposed site lies within the Ku-ring-gai Council Local Government Area (LGA) and has been assessed under that Council's Controls.

This report sets out the methodology and findings of the study to assess the traffic, parking and the road network related considerations associated with the proposal.

The location of the subject site is outlined in Figure 1.

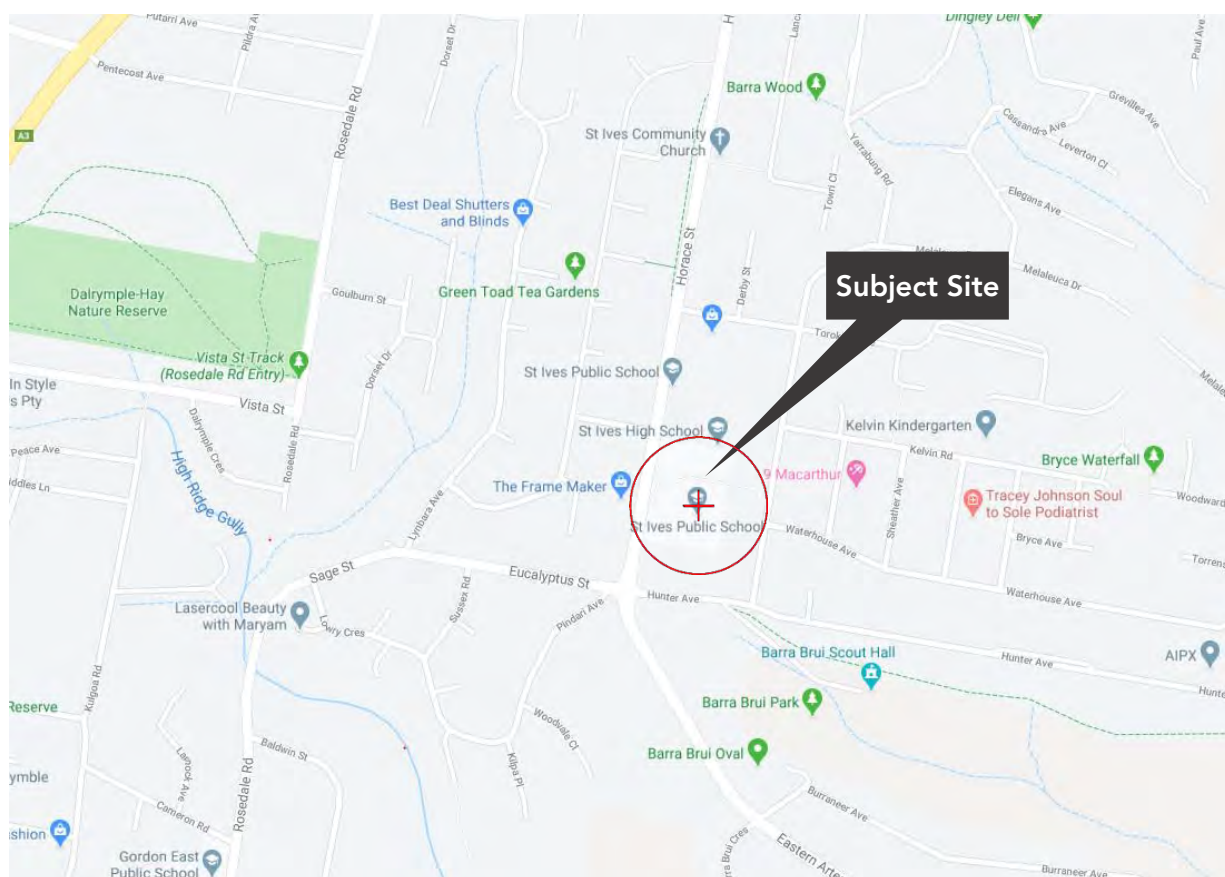


Figure 1 – Site Location (Source: Google Maps)

1.2 Purpose of the Report

The report presents the following considerations relating to the traffic and parking assessment of the development:

- Section 1 Introduction of the project;
- Section 2 Background information, including a description on the development site and the proposal;
- Section 3 A description of the road network serving the development site, the existing transportation options and active transport facilities;
- Section 4 Assessment of the proposed parking provision in the context of the relevant planning control requirements;
- Section 5 Determination of the traffic activity associated with the development proposal, and the adequacy of the surrounding road network;
- Section 6 Assessment of the proposed parking, access and circulation arrangements, in relation to compliance with relevant standards; and
- Section 7 Conclusion

1.3 Response to pre-DA Comments

A peer review of the draft Traffic Impact Assessment dated 5th August 2020 was undertaken as part of the pre-DA process and comments regarding parking and traffic were issued. Below is a list of these comments and recommendations and our response to them.

Traffic Comments

1. In the absence of any published traffic generation criteria for particular uses (e.g. basketball courts), the RMS Guidelines suggest that surveys should be undertaken at comparable existing facility. This was not undertaken so the adopted number of players (including reserves), officials and spectators is purely speculative and appears to be minimal particularly given the quantum of spectator seating to be provided.

ptc. response

The Guide to Traffic Generating Facilities in Section 3.8 – Land Use Traffic Generation – Recreational and tourist facilities states the following:

“Recreational and tourist facilities are site and type specific in their operation and traffic generation, often with seasonal variations in usage. Ideally, analysis of proposed developments should be based on surveys of similar developments. If this is not possible a first principles analysis is required.”

It is noted that COVID-19 made undertaking traffic surveys impracticable at the time of writing the draft report, hence a first principles analysis has been undertaken.

A basketball team consists of 5 players and up to 7 on the bench / substitutes. It is noted that the proposed courts will serve the local community rather than competitive teams, hence 10 players per team is considered reasonable in this case.

Spectators are assumed to be friends and family who wish to accompany the players, rather than random fans wanting to watch a competitive game.

It is also noted that the parking and traffic calculation does not take into account an increased car occupancy, although it is likely that a number of players / spectators will arrive in one car.

The proposal also provides 12 motorbike and 33 bicycle spaces, thus increasing the overall parking supply to 151 across various transport modes.

2. The two multipurpose rooms are specified to have a capacity of 100 persons and yet it is assessed that the parking demand will only be 15 cars and the traffic generation for the 30 min. peak is only 13 vt. Very unusually the assessed 1 hour generation is halved whereas yoga/gym classes have very concentrated arrival/ departure patterns which are not spread over 60 minutes.

ptc. response

The number, size and capacity of the multipurpose rooms have been decreased to 1 room, 143.6m² and 50 patrons, respectively, and the parking and traffic generation has been amended accordingly. The parking generation has been based on the Ku-ring-gai DCP rate, with 1 space per 17m² gross floor area.

The traffic generation calculation is based on the Guide to Traffic Generating Developments, with 9 trips per 100m² GFA.

Both of the above rates are based on the GFA rather than the number of patrons that can be accommodated for BCA calculation purposes.

The 1 hour generation has been halved for the assessment as a means to replicate / simulate the likely rush of arrivals / departures. Therefore, the assessment is considered to be more conservative than if the same volume of traffic was spread over a one-hour period.

There is option to stagger the basketball / yoga commencement times to spread the traffic. However, this is not seen as required at this stage.

3. The assessed traffic generation of the basketball courts is totally reliant on an extremely regimented and staggered start/finish and arrival/departure pattern and the assessed number of persons involved. While this may be feasible it does not take account of the concurrent potential mass arrival and departure for the up to 100 persons attending the activities in the multipurpose rooms.

ptc. response

The courts and the room will be operationally managed through a booking system, meaning that the arrival / departure periods are predictable. Should some players arrive earlier / depart later, this would lead to spreading of the traffic.

As discussed above, the yoga room has been reduced in size and in the maximum BCA capacity. In any case, the parking and traffic generation has been calculated based on the DCP and the Guide, meaning that the proposed traffic generation and parking demand are considered adequate. Patrons attending the multipurpose room have been included in the SIDRA and parking analysis.

4. It is assessed that some 15% of attendees will be set down and picked up, however there is nowhere designated on the site for this activity to occur. The combination of these set-down/pick-up cars waiting in the aisles, cars arriving and circulating looking for and not being able to find available spaces together with congestion caused by cars manoeuvring into/out of spaces near the access driveway raises the potential for unsatisfactory traffic outcome.

ptc. response

A pick-up and drop-off area has been designated along Horace Street, refer to Section 4.4 for detail and Attachment 3 and Attachment 5 for signage and design drawings.

5. The nature of the separate angled ingress and egress driveways resembles an RMS inspired arrangement to prevent right turn movements IN and OUT. The result is a somewhat acute turn for right turn ingress and a very wide driveway width for pedestrians and cyclists to cross.

ptc. response

The design of the driveway has been influenced by the existing level changes and the surrounding

trees.

It is acknowledged that the angle is unusual; however, the following is noted:

- a. The driveway has been designed to allow left-in / left-out turns only to minimise impact on through traffic along Horace Street. This is justified by the close proximity to the roundabout just south of the proposed driveway, so that patrons wishing to travel northbound can undertake a safe U-turn.*
- b. The entry / exit are divided by an island, which provides between 1.3m-1.8m width. The island is proposed to accommodate a pedestrian holding area.*

Design assessment

1. There are no widths shown on the parking bays, however they appear to be 2500 wide and these as well as the aisles comply with the AS2890.1 criteria for a "Sports Facility".
ptc. response
The width has been added in the design review drawing in Attachment 5. The bay dimensions are also shown in the legend.
All but one bay are 2.5m wide; one accessible bay is 2.4m wide.
2. The ambulance bay should be moved forward to provide for the stretcher as per the NSW Ambulance Guidelines.
ptc. response
The ambulance bay has been relocated outside the basement car park.
3. There are no grades shown on the access ramp so this cannot be assessed. Grades are to be shown on plans submitted with the development application.
ptc. response
Refer to architectural drawings for RLs.
4. There should be wheel stops on the angle bays adjacent to the tandem bays.
ptc. response
Wheel stops have been provided for all but the front tandem parking spaces.
5. The swept path diagram shows very little clearance between cars turning between the driveway and the 1st aisle. The kerb on the corner of the inwards side should be trimmed back to provide for an increased radius turn.
ptc. response
The swept paths have been provided in accordance with the AS 2890., where a minimum clearance of 300mm between two passing vehicles is permitted.
6. There is no safe pedestrian crossing or corridor connecting to the lobby.
ptc. response
It is not clear where a pedestrian crossing is being suggested, as the entrance / exit from the lobby leads into an aisle and the positioning of a pedestrian crossing there would not be practicable. In any case, it is not required to provide zebra crossings within a car park.
6. The ingress driveway should be at 90° to the kerb and the island separating the ingress and egress driveway needs to have a "cut out" for pedestrians walking along the footway. The arrangement for the egress and prohibition of the right turn egress is a TfNSW sanctioned arrangement.
ptc. response
The design of the driveway has been influenced by the existing level changes and the surrounding

trees.

It is acknowledged that the angle is unusual, however, the following is noted:

- a. *The driveway has been designed to allow left-in / left-out turns only to minimise impact on through traffic along Horace Street*
 - b. *The entry / exit are divided by an island, which provides between 1.3m-1.8m width. The island will accommodate a pedestrian holding area.*
7. The 3 parking spaces accessed off the access driveway should be designated as staff to minimise the access movements for the bays in conflict with the carpark access movements.
- ptc. response**
This recommendation has been adopted.
8. It would appear that there is insufficient head room for the ambulance as per the NSW Ambulance Guidelines.
- ptc. response**
The ambulance bay has been relocated outside the basement car park.
9. Tandem parking bays for staff is an acceptable arrangement.
- ptc. response**
Noted

Recommendation

1. Provide NO PARKING signage on the eastern side of Horace Street south of the proposed driveway to provide for set-down/pick-up activity. This would require approval of the Ku-ring-gai Traffic Committee.
- ptc. response**
This recommendation has been adopted, refer to updated signage drawings in Attachment 3.
2. Provide a parking space occupancy advice system to discourage drivers entering the carpark when it is full.
- ptc. response**
A parking space occupancy advice system is not a requirement and it is not seen as providing a great value in the given case for the following reasons:
- o The car park is fairly small, with only 106 parking spaces
 - o The car park has only one one-way aisle, making navigating within the car park and finding a parking space easy
 - o It is considered that the car park has an adequate number of parking spaces. It is therefore not anticipated that patrons would be required to park outside the venue or needing to go around the block for a parking space to be vacated – this would only increase traffic.
3. Utilise the existing carpark adjacent to the SIHS Hall.
- ptc. response**
The car park adjacent to the proposed basketball complex belongs to the adjacent school. The use of the adjacent car park may be negotiated at a later stage; However, it is not proposed to make the hall's parking demand reliant on the school's parking provision.

4. Trim back the kerb at the driveway/aisle connection.

ptc. response

The design of the entry point has been designed according to the AS 2890.1 and sufficient manoeuvring space has been provided, as shown in the design review drawings in Attachment 5.

5. Provide a pedestrian crossing connection to the lobby in the basement.

ptc. response

It is not clear where a pedestrian crossing is being suggested, as the entrance / exit from the lobby leads into an aisle and the positioning of a pedestrian crossing there would not be practicable. In any case, it is not required to provide zebra crossings within a car park.

6. Relocate the ambulance bay to be outside the basement.

ptc. response

The ambulance bay has been relocated outside the basement car park.

2. Background Information

2.1 Site Location

The proposed site is located at 91 Yarrabung Road, St Ives and is identified as Lot 1 in Deposited Plan (DP) 122431, Lot 1 in DP 122432, Lot 1 in DP 376563, Lot 4 in DP 1209 and Lot 5 in DP1209. The site is located approximately 22 kilometres north of Sydney CBD. More specifically, it is located within the St Ives Public School and St Ives High School premises. The site has frontage to Horace Street to the west. The aerial view of the subject site is shown in Figure 2.



Figure 2 – Aerial View of the Subject Site (Source: Near Map)

2.2 Surrounding Land Use

The proposed site is currently under SP2 (Infrastructure) zone, where the surrounds are predominantly R2 (Low Density Residential). There are large E1 (National Parks & Natural Reserves) and E2 (Environmental Living Zones) within the vicinity of the site. This is presented in Figure 3.

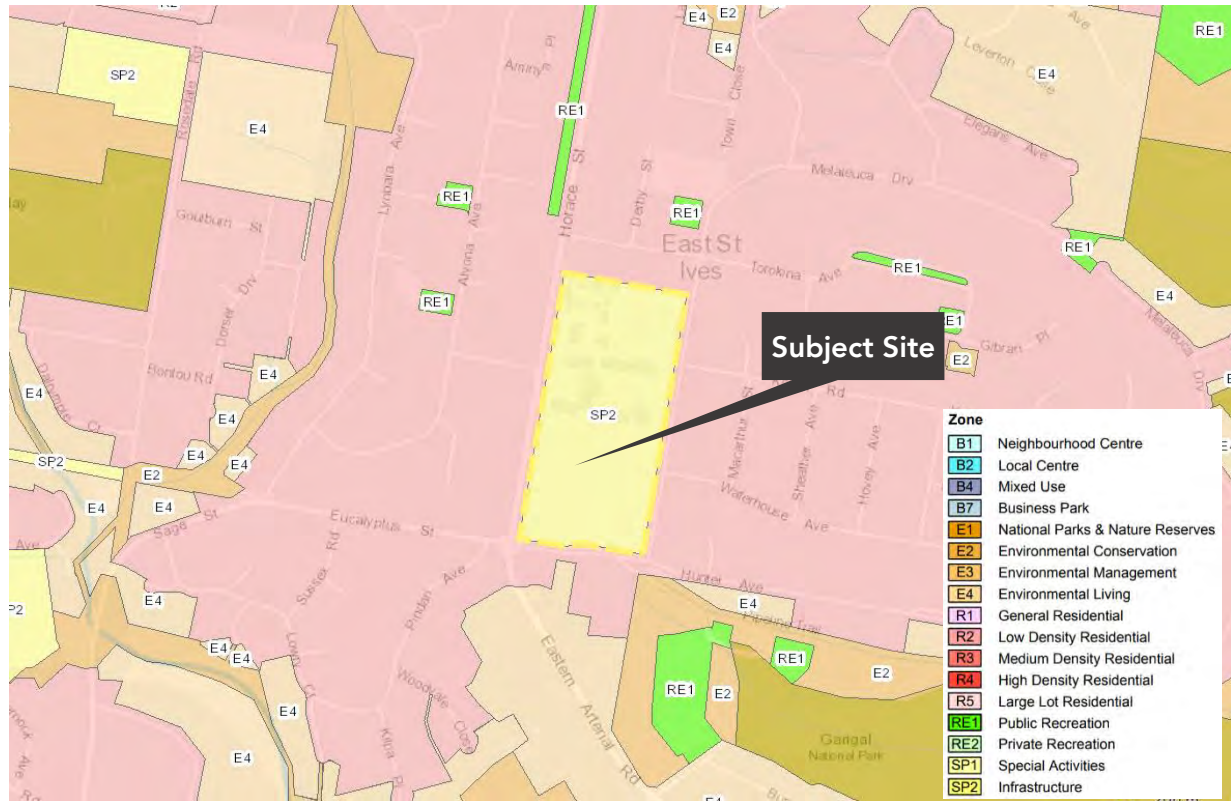


Figure 3 – Local Land Use Map (Source: Nsw Planning Viewer)

2.3 Development Proposal

The development site lies within the property of St Ives Public / High School, and currently is a vacant land. The development proposal for the sports complex includes the following:

- 2×Basketball Court with a total area of 1,480.5m².
- 1×Multipurpose Room with a total area of 143.6m² with a capacity for approximately 50 people.
- Café, lounge and foyer area; and
- 106 Car Parking Spaces, 12 motorbike spaces and 33 bicycle spaces.

It is proposed that the sports complex be used by the school during school hours and by community thereafter.

The proposed site layout plan for the Sports Complex is illustrated in Figure 4. The detailed architectural plans of the development site are provided in **Attachment 1**.

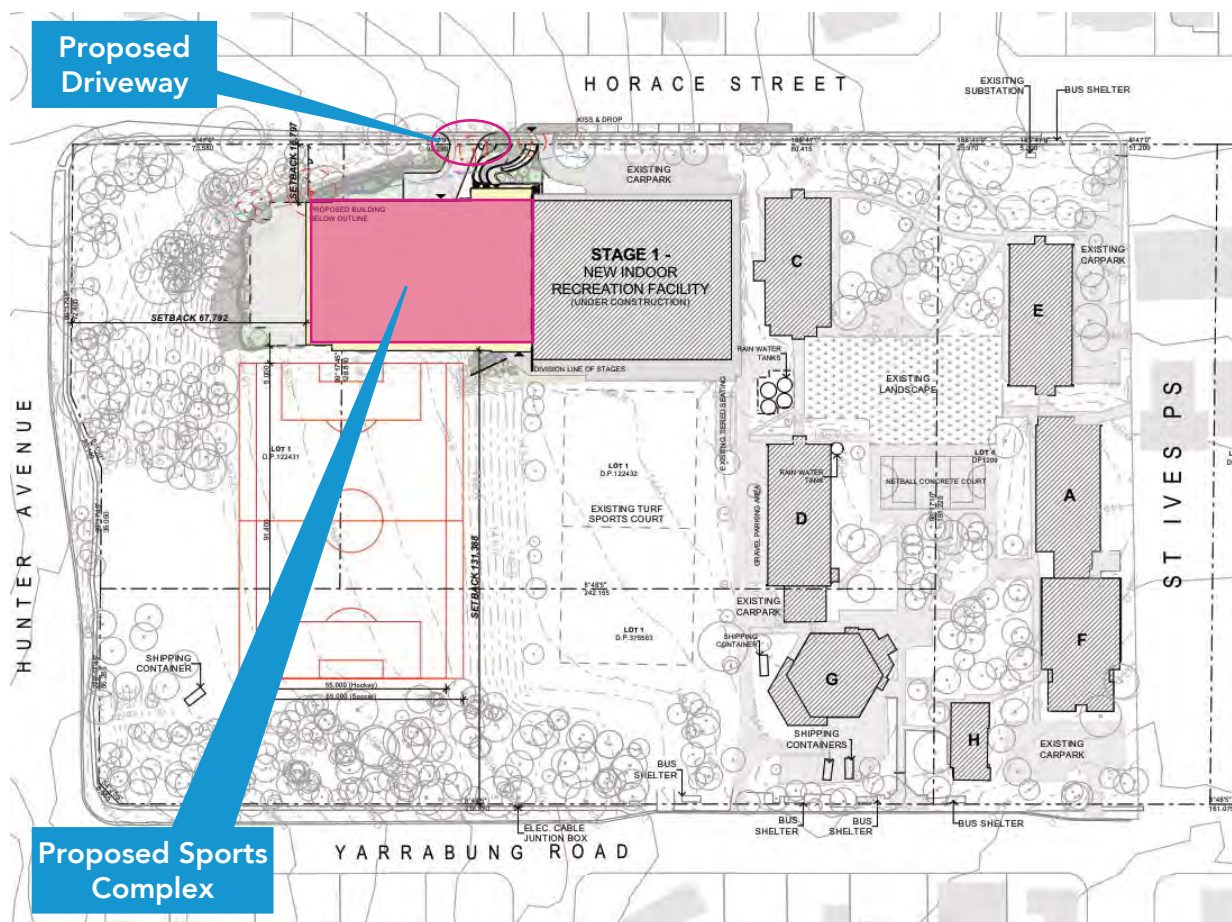


Figure 4 – Site Layout (Source: JDH Architects)

3. Existing Transport Facilities

3.1 Road Hierarchy

The subject site is located in the suburb of St Ives and is primarily serviced by a Regional Road i.e., Horace Street.

A summary of the State, Regional and Council managed local roads serving the site is presented in Figure 5 and the following tables.

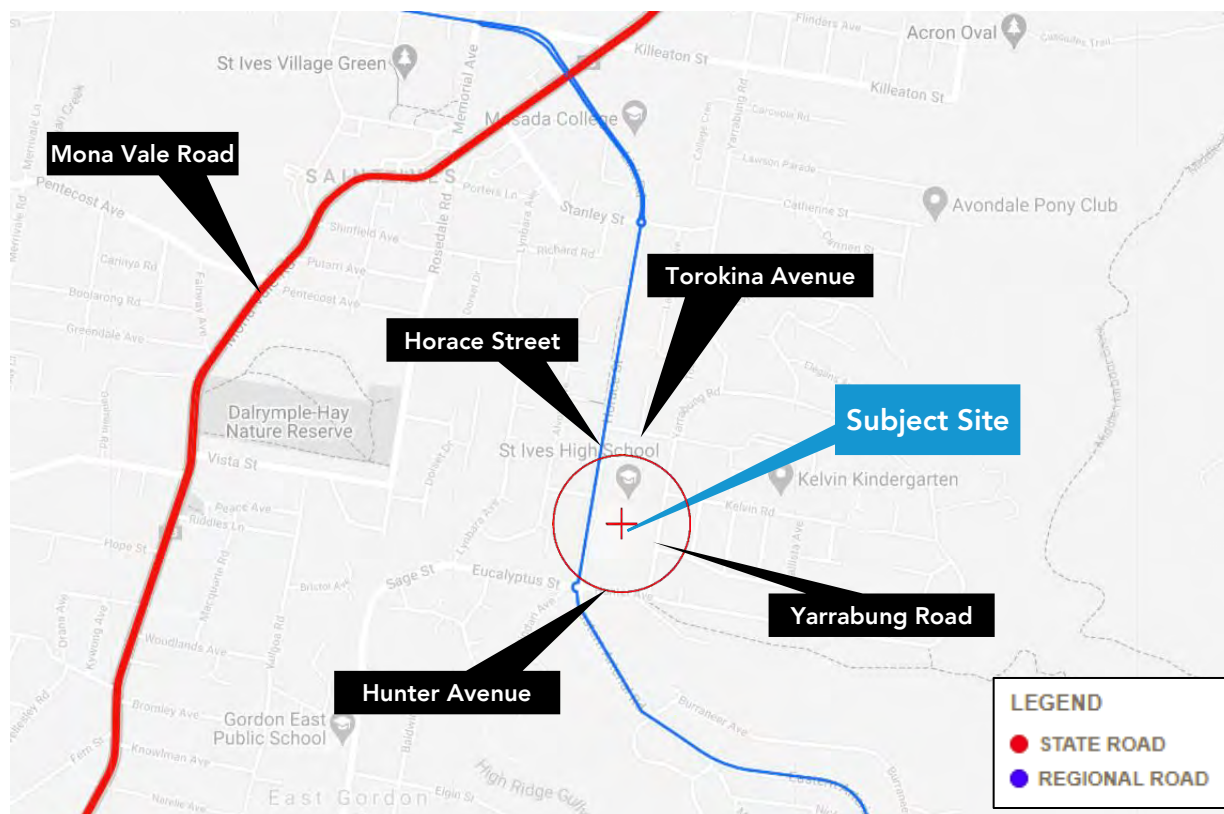


Figure 5 – Surrounding Road Network (Source: RMS Road Hierarchy)

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

- | | |
|-----------------------|--|
| State Roads | - Freeways and Primary Arterials (RMS managed) |
| Regional Roads | - Secondary or Sub Arterials (Council managed, partly funded by the State) |
| Local Roads | - Collector and Local Access Roads (Council managed) |

Table 1 – Horace Street

Horace Street	
Road Classification	Regional Road
Alignment	North-South
Number of Lanes	2 lanes in each direction.
Carriageway Type	Undivided
Carriageway Width	Approximately 12.5m near the vicinity of the site
Speed Limit	60km/h
School Zone	Yes
Parking Controls	Kerbside lanes in the vicinity are subjected to unrestricted parking outside of Bus Zone and No Stopping
Forms Site Frontage	Yes

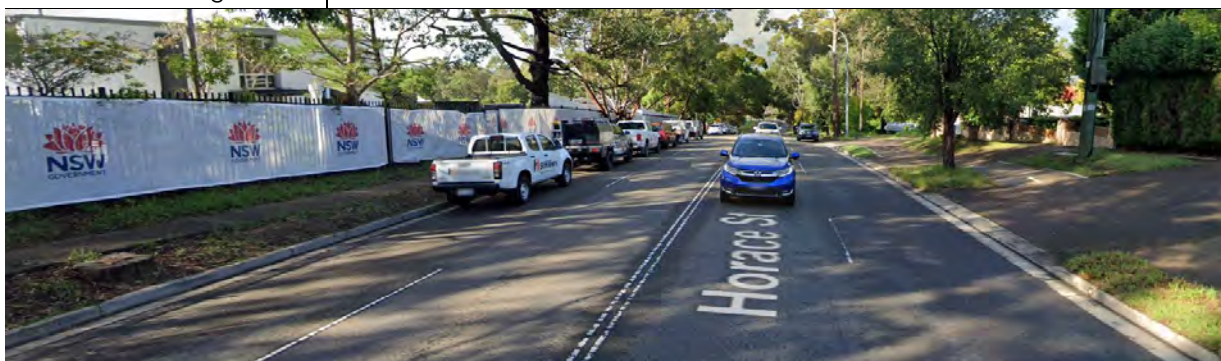


Figure 6 – Horace Road – Southbound towards Eucalyptus Street and Hunter Avenue

Table 2 – Yarrabung Road

Yarrabung Road	
Road Classification	Local Road
Alignment	North-South
Number of Lanes	1 lane in each direction.
Carriageway Type	Undivided
Carriageway Width	Varies 9 – 12.5m near the vicinity of the site
Speed Limit	50km/h
School Zone	Yes
Parking Controls	Unrestricted parking provided at almost all sections outside of Bus Zone and No Stopping
Forms Site Frontage	No



Figure 7 – Horace Road – Nothbound towards Waterhouse Avenue

Table 3 – Hunter Avenue

Hunter Avenue	
Road Classification	Local Road
Alignment	East-West
Number of Lanes	Varies, typically 1 lane in each direction. Road widens to 2 lanes westbound at the intersection with Horace Street
Carriageway Type	Undivided
Carriageway Width	Varies, typically 8.5m in sections with 1 lane in each direction. Approximately 11m near the intersection with Horace Street
Speed Limit	50km/h
School Zone	Yes
Parking Controls	Unrestricted Parking on the southern lane near the vicinity of the site
Forms Site Frontage	No



Figure 8 – Hunter Avenue – Westbound towards Horace Street

Table 4 – Torokina Avenue

Torokina Avenue	
Road Classification	Local Road
Alignment	East - West
Number of Lanes	1 lane in each direction.
Carriageway Type	Undivided
Carriageway Width	Approximately 7m near the vicinity of the site
Speed Limit	50km/h
School Zone	Yes
Parking Controls	The lanes are either subjected to 'No parking during 8:30am – 9:30am and 2:30pm-3:30pm School days' or 'unrestricted parking'
Forms Site Frontage	No



Figure 9 – Torokina Avenue – Westbound towards Horace Street

Table 5 – Amesbury Avenue

Amesbury Avenue	
Road Classification	Local Road
Alignment	East - West
Number of Lanes	1 lane in each direction.
Carriageway Type	Undivided
Carriageway Width	Approximately 8m
Speed Limit	50km/h
School Zone	Yes
Parking Controls	No parking on the southern side and unrestricted parking on the northern side
Forms Site Frontage	No



Figure 10 – Amesbury Avenue – Eastbound towards Horace Street

3.2 Public Transport

The locality of the site has been assessed in the context of available forms of public transport that may be utilised by prospective players and spectators. When defining accessibility, the NSW Planning Guidelines for Walking & Cycling (2004) suggests that 400m-800m is a comfortable walking distance to access public transport and local amenities.

Figure 11 illustrates 400m and 800m catchments from the proposed Sports Complex site, together with the public transport options and network, which are available in the vicinity of the site. Details of public transport options available are outlined in the following sections.

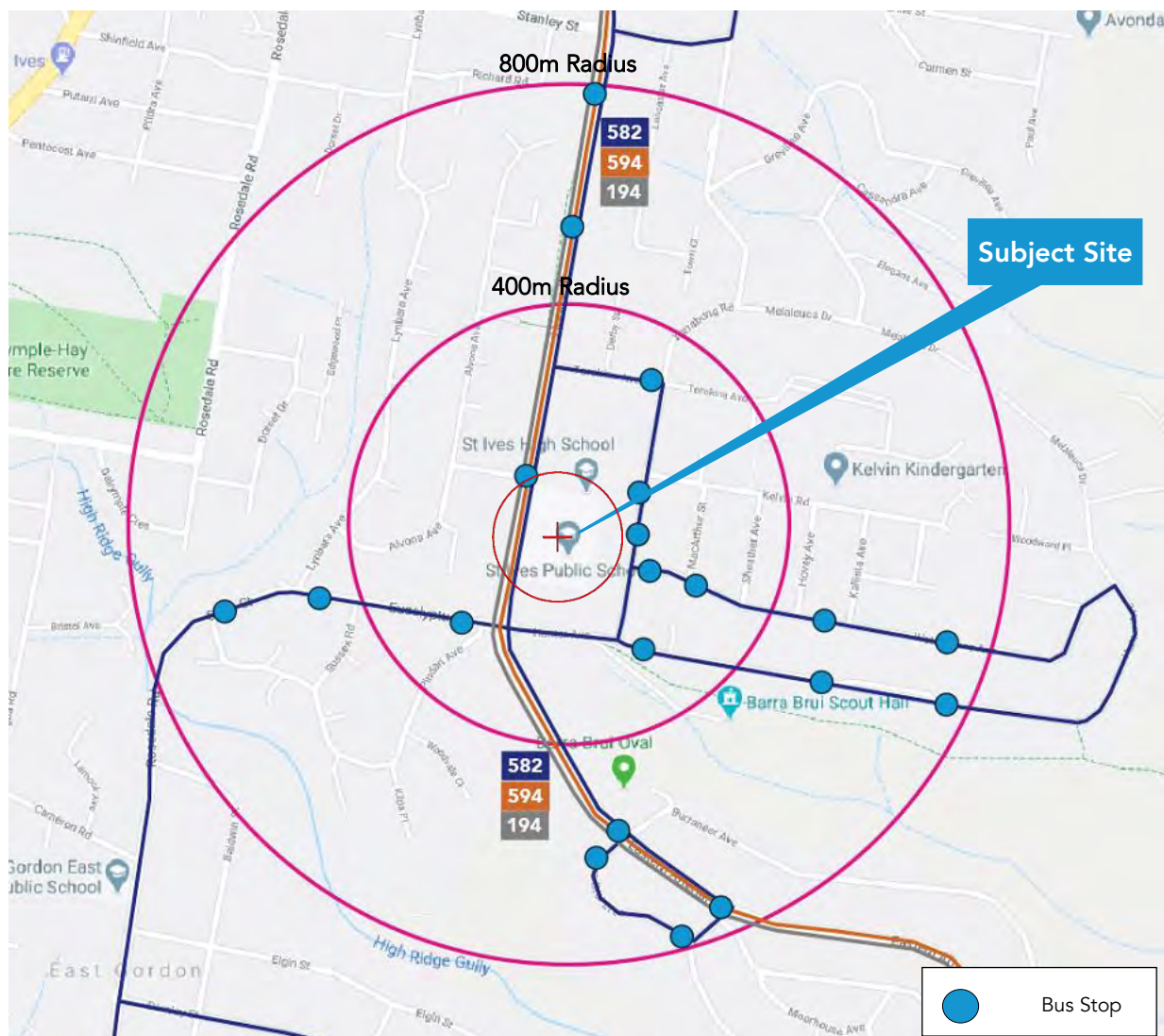


Figure 11 – 400m and 800m radius of the subject site

3.2.1 Bus Services

As shown in Figure 11, there are a few bus services within the 800m catchment. The closest existing bus stops are located along Horace Street in less than 200m walking distance from the subject site. These stops are serviced by 194, 582, and 594 buses.

The bus services, including coverage, approximate operation times and frequency, are summarised in the table below.

Table 6 – Bus Service Summary (Source: Transport NSW)

Bus Route	Coverage	Approximate operation time frame and frequency
194	City QVB to St Ives	Mon-Fri: 15-60 minutes intervals, between 5:45am and 10:05pm Sat-Sun: 30-60 minutes intervals, between 7:00am and 6:50pm
582	Gordon to St Ives Shopping Centre	Mon-Fri: 13-60 minutes intervals, between 6:05am and 9:36pm Sat-Sun: 60 minutes intervals, between 8:14am and 5:33pm
594	City Clarence St to North Turramurra	Mon-Fri: - North Turramurra to City QVB – 2 services at 26 minutes intervals, between 6:54am and 8:30am Mon-Fri: - City QVB to North Turramurra – 2 services at 40 minutes intervals, between 5:20pm and 6:56pm Sat-Sun: No services

The frequency of bus services to the development is considered average, with services every 13 minutes to four times a day throughout the day on weekdays, and therefore is a modest mode share option for players and spectators.

3.3 Active Transport

The locality has been reviewed for features that would attract active transport trips (walking and cycling), with reference to the NSW Guidelines for Walking and Cycling (2004).

3.3.1 Walking

Walking is a viable transport option for distances under one kilometre (approximately 15-20 min) and is often quicker for short trips door to door. Walking is also the most space efficient mode of transport for short trips and presents the highest benefits. Co-benefits where walking replaces a motorised trip include improve health for the individual, reduced congestion on road network and reduced noise emission and pollution.

The pedestrian network in the locality has been assessed to provide a reasonably high level of amenities within the vicinity of the site. The surrounding roads provide footpaths on either both or at least one side of the carriageway and generally have pram ramps at intersections. A signalised mid-block crossing is provided along Horace Street approximately 200m away from the site. A zebra crossing is provided along Yarrabung Road. Overall, the amenities within one kilometre of the site are reasonably suitable for walking.

3.3.2 Cycling

The surrounding locality within the vicinity of the site has some bicycle friendly routes, dedicated on-road bicycle route and dedicated off-road bicycle route. The local bicycle network is shown in Figure 12.

The dedicated bicycle lane on Horace Street extends across Mona Vale Road providing connection to Turramurra and other suburbs.

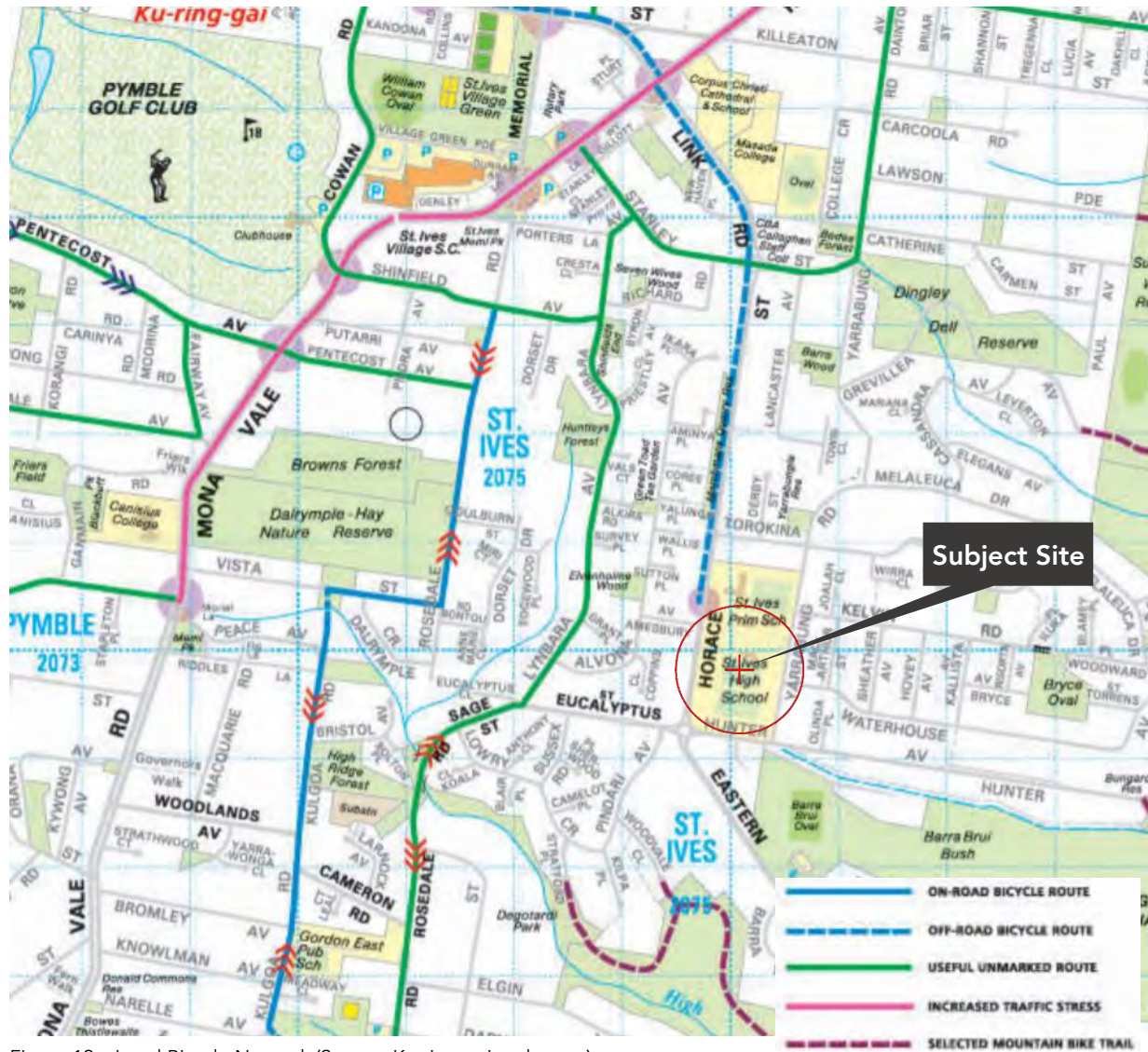


Figure 12 – Local Bicycle Network (Source: Ku-ring-gai cycle map)

4. Car Parking Assessment

4.1 Planning Policy

The site is identified under Ku-ring-gai Council's *Ku-ring-gai Local Environmental Plan (LEP) 2015 and Ku-ring-gai Development Control Plan 2016* compliments LEP 2015. In establishing the parking provision requirements, reference is made to the parking provision rates stipulated in the following planning documents:

- Ku-Ring-Gai Development Control Plan 2015 (DCP)
- Planning Guidelines for Walking and Cycling (NSW Government 2004)

4.2 Car Parking

As outlined in Section 2.3, the proposed sports complex will have the following attributes:

- 2×Basketball Court with a total area of 1,480.5m².
- 1×Multipurpose Room with a total area of 143.6m² with a capacity for approximately 50 people;
- Café, lounge and foyer area; and
- 106 Car Parking Spaces, 12 motorbike spaces and 33 bicycle spaces.

The details of the car parking requirements are discussed in the following sections.

4.2.1 Car Parking for the Basketball Courts

The DCP does not stipulate any car parking rates for basketball courts and therefore the parking calculation has been undertaken based on the first principles assessment.

The development proposal involves the construction of 2 basketball courts; however, the adjacent school sports complex with additional 2 basketball courts will also be made available for community sports. Therefore, in order to account for the cumulative use of both buildings, the first principles parking assessment has been undertaken for all 4 basketball courts.

It is assumed that the 4 full-size courts may be used simultaneously during the week and on weekends. The patronage will consist of players, officials (referees / hall management / staff) and spectators. It is also assumed that every court will involve 20 players (10 players on each side), with an assumed number of officials equal to 10% of the players and the number of spectators equal to 25% of players. The calculations for the projected number of patrons are presented in Table 7.

Table 7 – Calculation for the number of patrons

User	Assumptions	Number of Patrons
Players	20 Players x 4 Courts	80 Players
Officials (Referees / Hall Management / Staff)	10% of Players (80)	8 Officials
Spectators	25% of Players (80)	20 Spectators
TOTAL		108 Patrons

Further assumption is made that out of the 108 patrons, 85% will drive, whilst the remaining 15% will either be picked-up and dropped-off, car pool or will use other modes of transport (bus, cycling, walking). The car parking requirement for the basketball courts can be calculated based on the above assumptions, which is illustrated in Table 8.

Table 8 – Car Parking Requirement and Provision for the Basketball Court

Use	No. of Patrons	First Principles Assessment	Minimum Parking Requirement
Basketball Court	108	0.85 parking spaces per patron	92 (91.8) ¹
TOTAL			92

As shown in Table 8, the basketball courts have the potential to generate a requirement to provide of 92 parking spaces based on the first principles assessment.

In order to avoid a parking overlap, it is proposed that the games are separated by a short break. This will allow patrons from the preceding game to vacate car spaces while patrons from the succeeding game occupy them within the same period of time. It is also assumed that the car parking utilisation during different games will remain the same. Therefore, the proposed car spaces will be able to meet the parking demands. The proposed sports session schedule is graphically represented in Figure 13.

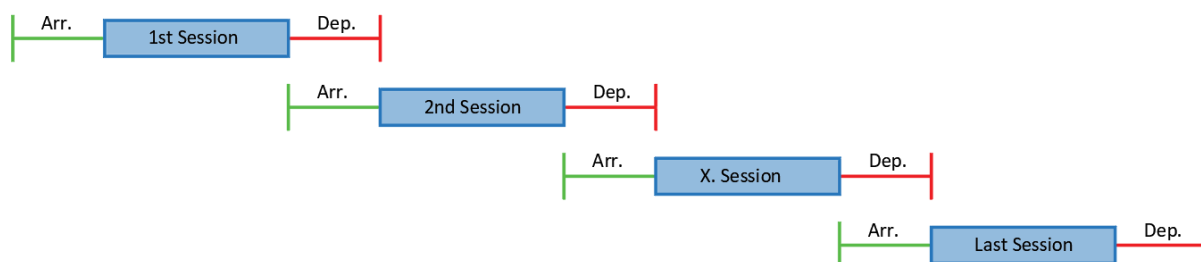


Figure 13 – Proposed Sports Session Schedule

4.2.2 Car Parking for the Multipurpose Room

In order to calculate parking requirement for the multipurpose room, the DCP car parking rates for gymnasiums have been used, which are stipulated in part 22R.1 of the DCP. The car parking requirement is illustrated in Table 9.

Table 9 – Car Parking Requirement and Provision for Multipurpose Room

Use	No. / Area	DCP Parking Rate (min)	Minimum Parking Requirement ²
Multipurpose Room (Yoga / Gymnasium)	143.6m ²	1 space per 17m ² GFA	9
TOTAL			9

¹ The parking numbers rounded to the nearest whole number

² The parking numbers rounded up to the nearest whole number according to the DCP

As shown in Table 9, based on the DCP the site requires a total of 9 car parking spaces for multipurpose room.

4.2.3 Car Parking for Café, Lounge and Foyer Area

It is proposed that the café, lounge and foyer areas will be primarily used by the patrons of the basketball courts and the multipurpose room. Therefore, these areas will not generate additional parking demand and therefore do not require any additional car parking spaces.

4.2.4 Car Parking Provision and Discussion

As discussed in Section 4.2.1, Section 4.2.2 and Section 4.2.3, the proposed Sports Complex development requires a total of 101 car parking spaces. This assumes the worst case that all facilities are at full capacity at the same time. The proposal is to provide a total of 106 car parking spaces, including 2 tandem car spaces for staff. Based on the first principles assessment, the provision exceeds the minimum parking requirement by 5 spaces and therefore it is expected that the parking demand will be met.

4.3 Accessible Car Parking

The accessible car parking provision requirement is provided in Part 22.5 of the DCP. The accessible car parking rates for the recreational facilities have been adopted for the proposed Sports Complex development. The requirements and provisions are as follows:

Table 10 – Accessible Car Parking Requirement and Provision

Use	No. of car spaces	Parking Rate (min)	Parking Provision Requirement (min)	Proposed Parking Provision
Recreational Facilities - Sports Complex	106	2-3% of the total parking spaces ³	3-4 ⁴	3
TOTAL			3-4	3

The proposed car park accommodates a total of 106 car spaces, which results in a minimum requirement for 3-4 accessible car parking spaces. The development proposes to provide 3 accessible car spaces which is in accordance with the planning controls.

4.4 Pick-up and Drop-off

As discussed in Section 4.2.1, it is assumed that 15% of patrons for the basketball courts will be picked-up and dropped-off, car pool or use other modes of transport (bus, cycling, walking).

With an assumption that 5%-10% of patrons (6-11 patrons) will be picked up and dropped off, a calculation of the parking requirement has been undertaken using Poisson distribution. The following parameters have been assumed:

- 30 minute time frame for pick-up and drop-off

³ Accessible car parking requirement for other land used according to Part 22.5 of the DCP

⁴ The parking numbers rounded up to the nearest whole number according to the DCP

- A conservative car occupancy of 1 patron per car
- Allowance for pick-up and drop-off overlap results in 12-22 vehicles during the 30 minute time frame
- An average of 180 seconds dwell time for the pick-up / drop-off activity

Based on the above, the development would require to provide up to 5 pick-up and drop-off spaces. With this provision, the probability of a queue is 3.7%.

The development proposes to allocate 5 spaces for pick-up and drop-off along Horace Street, thereby meeting the potential demand.

It is proposed to provide 6.1m long pick-up and drop-off spaces.

Signage required is presented in **Attachment 3**.

4.5 Motorcycle Parking

The DCP does not stipulate any motorcycle parking rates, however, the development proposes to provide 12 motorbike spaces in the car park.

4.6 Bicycle Parking

The DCP does not stipulate any bicycle parking rates, hence, reference is made to *NSW Planning Guidelines for Walking & Cycling 2004* which outlines the following bicycle parking requirement for bicycle parking space for gyms, indoor sport/recreation. It is estimated that the Sports Complex will have approximately 12 staff at a time. The bicycle parking requirement and provision is summarised below:

Table 11 – Bicycle Parking Requirement

Use	User Group	No. of staff.	Bicycle Parking Provision Rate	Bicycle Parking Requirement	Bicycle Parking Provided
Gyms, Indoor Sport / Recreation	Staff	12	1 staff space for 3-5% staff (long-term use)	1 space	33
	Visitor		1 visitor space for 5-10% staff (short-term use)	1 space	
TOTAL				2 spaces	33

The development proposes to provide 33 bicycle spaces for staff and visitors, thereby providing significantly more spaces than required. This is as a means to promote active transport.

The *NSW Planning Guidelines for Walking & Cycling 2004* also outlines the bicycle parking facilities to be provided in accordance with Australian Standards, which means providing class 2 bicycle lockers for staff/employees and Class 3 bicycle rails for visitors. However, from Table 11 it can be seen that the development requires only 2 bicycle spaces according to the planning controls, and therefore, a combined provision of staff and visitor parking spaces in the form of rails is considered acceptable.

The *NSW Planning Guidelines for Walking & Cycling 2004* also stipulates the requirement of personal lockers, showers and change rooms for staff bicycle parking facilities. The lockers, showers and change rooms requirements are summarised in Table 12, Table 13 and Table 14 respectively.

Table 12 – Lockers for Staff Requirement and Provision

Number of Staff	Lockers Provision Rate	Lockers Requirement
12	1 locker for 3 bicycle racks	1

Table 13 – Showers / Change Cubicle Requirement and Provision

Number of Staff	Shower Provision Rate	Showers Requirement
12	- 1 shower for 0 up to 12 staff - 2 (1 male and 1 female) showers for 13 up to 49 staff - 4 (2 male and 2 female) showers for 50 up to 149 staff	1

Table 14 – Change Rooms Requirement and Provision

Number of Staff	Change Rooms Provision Rate	Change Rooms Requirement
12	- 1 change cubicle for 0 up to 12 staff - 2 (1 male and 1 female) change cubicles for 13 up to 49 staff - 2 (1 male and 1 female) change cubicles for 50 up to 149 staff	1

Based on the *NSW Planning Guidelines for Walking & Cycling 2004*, the development requires 1 locker, 1 shower and 1 change room. The proposal is a sports complex, meaning that it will have lockers, showers and changing rooms for staff, players and multipurpose room visitors.

4.7 Service Bay Provision

The DCP does not stipulate the requirement of service bays for a Sports Centre, and the development does not provide any. Waste collection is proposed to be conducted on street. It is assumed that the waste collection is typically conducted outside of peak periods (i.e., early in the morning) and occurs once or twice a week, thus the impact this will have on the servicing of the site is anticipated to be minor.

4.8 Ambulance Bay

An ambulance bay is proposed to be located along Horace Street. The bay would be located at the pedestrian access to the complex thus providing direct entry to the building.

The bay is 11m long, allowing for a 7m long ambulance and 4m for a stretcher.

Signage required is presented in **Attachment 3**.

5. Traffic Impact Assessment

5.1 Existing Traffic Volumes

5.1.1 Traffic Surveys

In order to determine the existing traffic conditions within the road network serving the proposed development, traffic surveys of the following key intersections within the vicinity of the site have been considered:

- Link Road / Horace Street / Stanley Street 4 arm roundabout intersection
- Horace Street / Eastern Arterial Road / Eucalyptus Street 4 arm roundabout intersection

The key intersections considered for this assessment for the existing and development traffic conditions are shown in Figure 14.

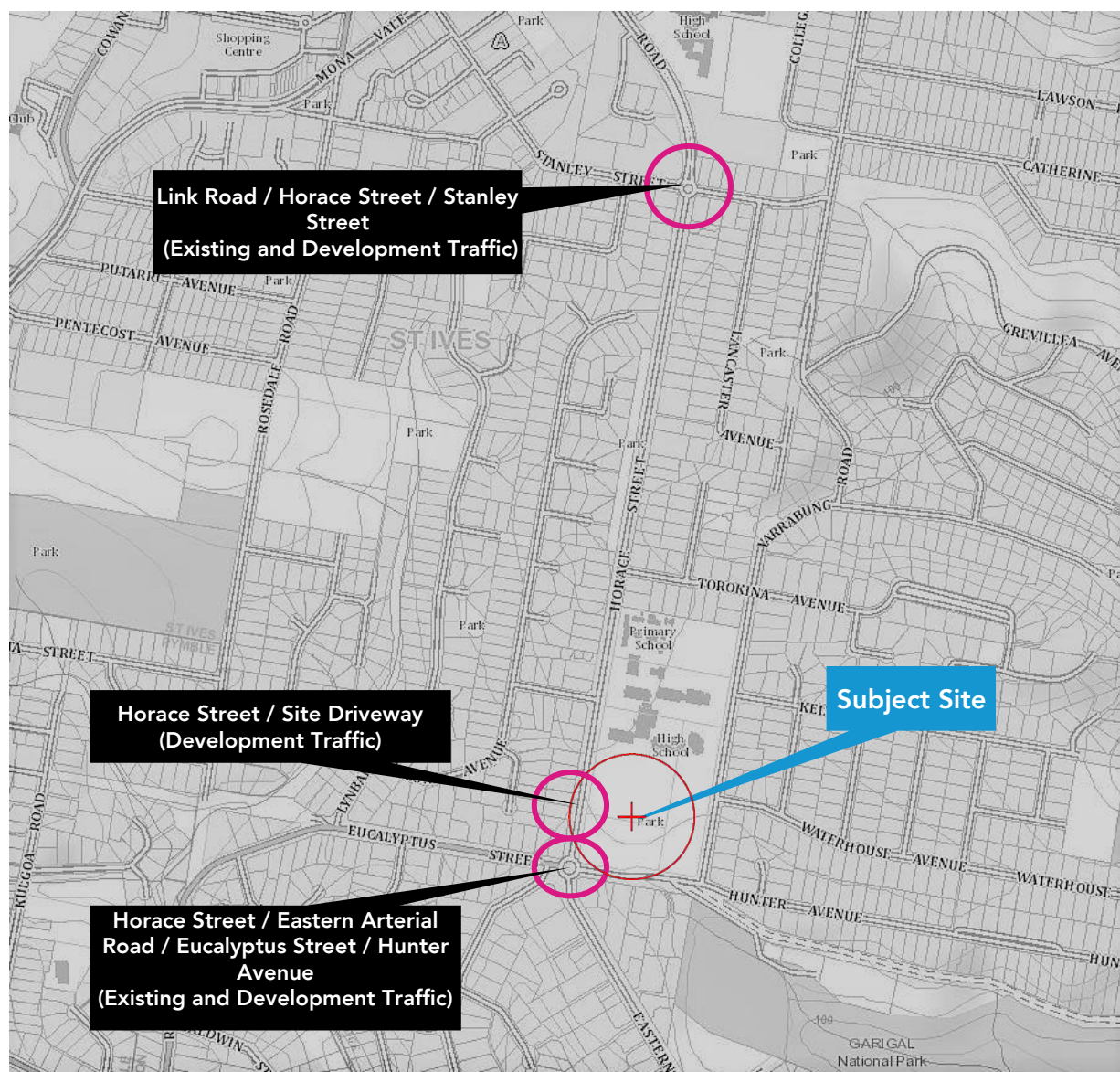


Figure 14 – Key Intersections

Considering the current COVID-19 situation, traffic surveys undertaken at the moment would most likely not represent typical road conditions. Therefore, upon discussion with Ku-ring-gai Council, **ptc.** was provided with traffic surveys undertaken in a pre-COVID time (see **Attachment 2**).

As per the DCP requirements, traffic volumes for weekday PM peak and Saturday Mid-day peak have been considered for the assessment. This time is relevant because weekday PM and Saturday Mid-day is the peak time for community use. It is noted that the building will be utilised by the school during weekdays up until 3pm, which will not result in additional traffic generation. The Sports Complex will be made available for community use after 3pm on weekdays and on weekends.

Traffic count surveys on Link Road / Horace Street / Stanley Street intersection were undertaken on 22nd May 2018 (Tuesday) between 3:00pm to 5:00pm and 19th May 2018 between 11:00am to 1:00pm for weekday and Saturday respectively. Similarly, traffic count surveys for Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue intersection were undertaken on 17th October 2019 (Thursday) between 4:00pm to 6:00pm and 19th October 2019 between 11:00am to 2:00pm for weekday and Saturday respectively.

To analyse the future traffic impacts on Horace Street, the Sports Complex driveway with Horace Street has been modelled as a 3 arm give way intersection. However, this intersection has been considered only for the future development traffic, as the assessment of the driveway is not relevant to the existing condition.

The analysis and the results of the surveys are described in the following sections.

5.1.2 Existing Peak Hour Volumes

The specific peak hours within the peak periods at the Link Road / Horace Street / Stanley Street roundabout have not been provided. The peak hours for the Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue roundabout have been determined based on the traffic volumes during the evening commuter and Saturday Mid-day periods.

Table 15 – Peak Hour Traffic Volumes

Road Intersection	Weekday PM Peak Period	Saturday Mid-day Peak Period
Link Road / Horace Street / Stanley Street	Information not provided. For the purpose of this assessment the peak times are assumed to be as below.	
Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue	5:00pm – 6:00pm	11:45am – 12:45pm

Figure 15 and Figure 16 illustrate the existing traffic volumes during the weekday evening peak hour and Saturday peak hour respectively.



Figure 15 – Traffic Volumes during Evening Peak Hour (1 Hour Period) – Existing Situation

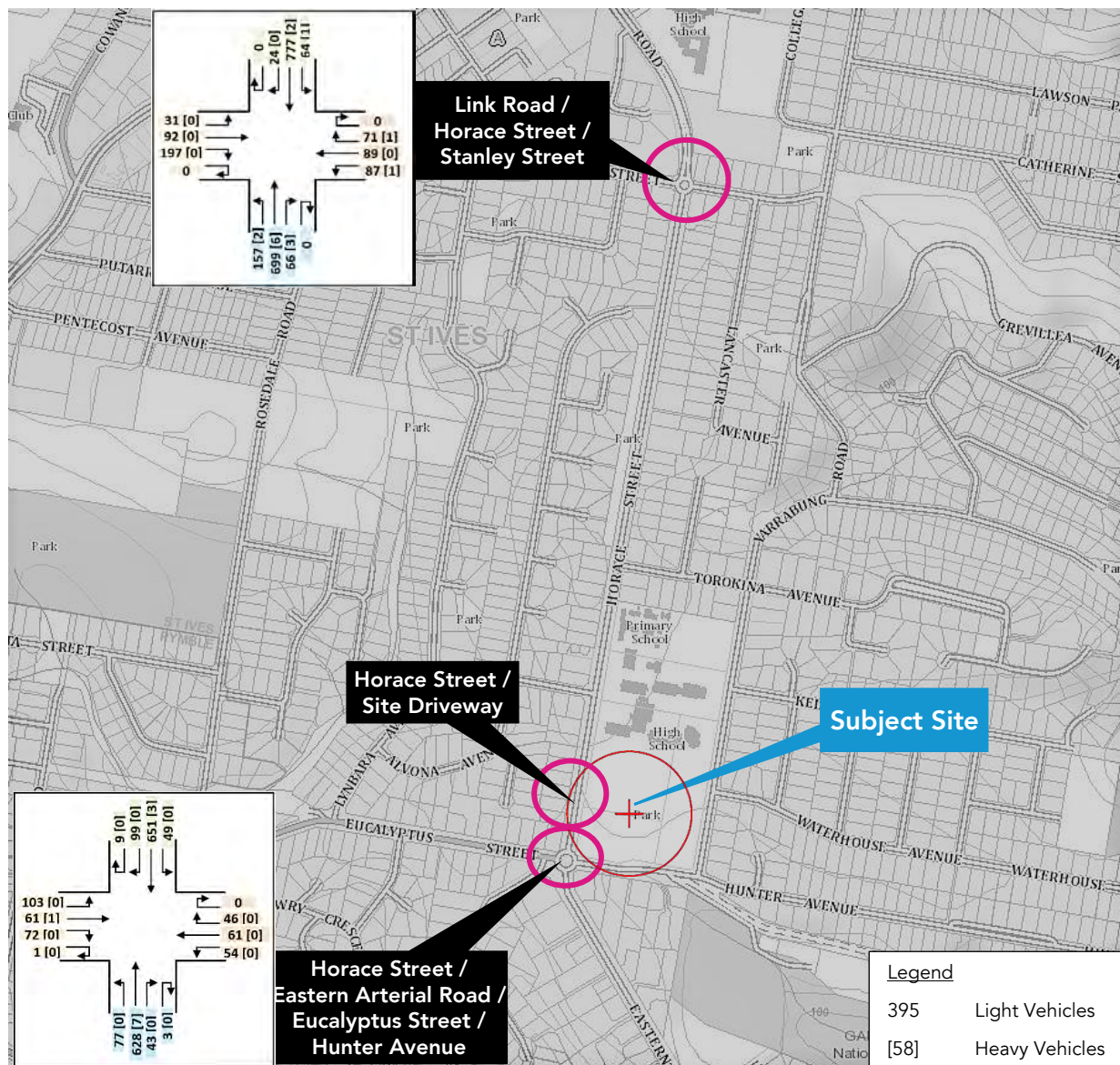


Figure 16 – Traffic Volumes during Saturday Peak Hour (1 Hour Period) – Existing Situation

5.2 Traffic Generation

The potential traffic generation associated with the proposed development has been estimated with reference to the following:

- RMS Guide to Traffic Generating Developments 2002 (RMS Guide);
- RMS Technical Direction 2013/04 (TDT);
- First Principles Assessment.

5.2.1 Existing Traffic Generation

Currently the development site is a vacant land and hence does not generate any traffic.

5.2.2 Development Traffic Generation

The development traffic generation rate for the Sports Complex has been calculated for weekday PM peak hour and Saturday Mid-day peak hour. As mentioned in Section 5.1, this time is considered due to the significance of usage related to the Sports Complex. The traffic generation rate has been calculated as described in the following sections.

5.2.2.1. Traffic Generation for Basketball Courts

The RMS Guide and TDT do not provide traffic generation rates for basketball courts, and therefore the potential traffic generation rate for the basketball courts has been calculated based on the first principles assessment. The same trip generation approach is adopted for weekday PM peak and Saturday Mid-day peak.

The following considerations have been made:

- The patronage will consist of players, officials and spectators;
- The duration of each game is approximately 1 hour;
- It is assumed that outbound vehicles require up to 30 minutes post game to leave the venue and inbound vehicles require up to 30 minutes prior to the start of games;
- Based on the above, the commencing game is proposed to be scheduled 30 minutes after the previous game concludes. This is to minimise the requirement to provide an overlap for parking spaces;
- It is anticipated that the development traffic activity will include both vehicles travelling into and out of the site for parking but also for pick up and drop off.

A schematic graphical representation of the assumed development trip generation approach is shown in Figure 17.

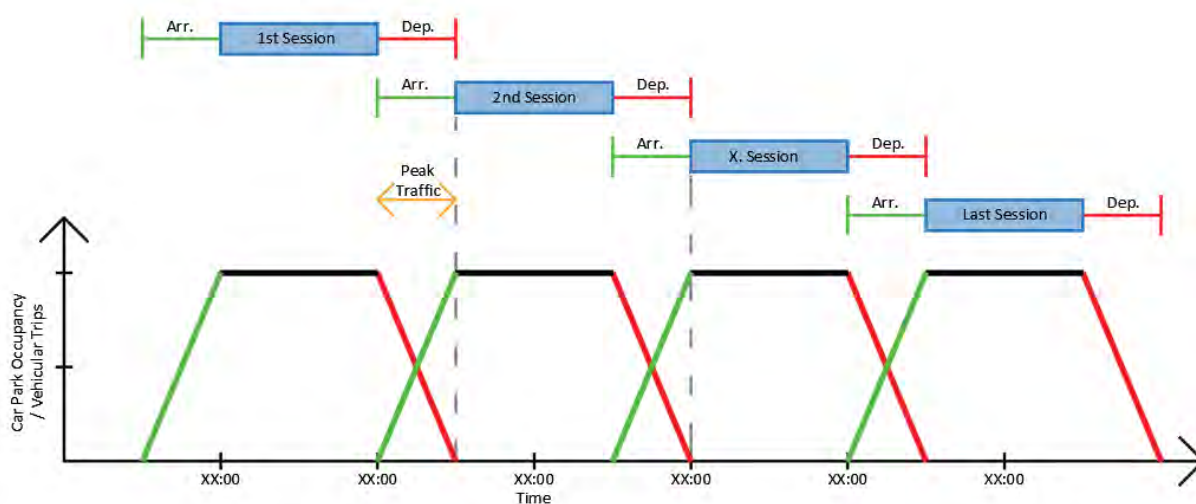


Figure 17 – Inbound & Outbound Vehicular Trips (Inbound in green, games in blue, outbound in red)

As discussed in Section 4.2.1 and shown in Table 7, a total of 108 patrons are anticipated to be present during a game, and it is assumed that out of the 108 patrons, 10%, i.e., 11 patrons will stay after the match

while the remaining 97 patrons will leave. Out of the 97 patrons who will leave the venue, it is assumed that 85% will drive, 10% will be dropped off / picked up (two-way trip) and remaining 5% will use other travel modes. These assumptions result in the following number of trips:

- Trips for concluding game:

- 85% driving: $0.85 \times 97 = 83$ trips (outbound)
- 10% picked up: $0.10 \times 97 = 10$ trips (one-way)

Therefore, two-way trip = 20 trips (10 inbound, 10 outbound)

Hence, the total number of trips for a concluding game is 103 trips (10 inbound, 93 outbound). These trips are assumed to occur within ½ hour.

- Trips for commencing game:

- 85% driving: $0.85 \times 97 = 83$ trips (inbound)
- 10% picked up: $0.10 \times 97 = 10$ trips (one-way)

Therefore, two-way trip = 20 trips (10 inbound, 10 outbound)

Hence, the total number of trips for a commencing game is 103 trips (93 inbound, 10 outbound). These trips are assumed to occur within ½ hour.

Total traffic generation for the basketball courts within a period of ½ hour is 206 trips (103 inbound, 103 outbound).

Therefore, the total traffic generation during the Weekday PM and Saturday Mid-day ½ hour peak period.

- Weekday PM peak: 206 trips (103 inbound, 103 outbound)
- Saturday Mid-day peak: 206 trips (103 inbound, 103 outbound)

5.2.2.2. Traffic Generation for Multipurpose Room

The exact utilisation of the multipurpose room has not yet been decided; however, most likely it will host activities such as yoga or other sporting classes. Hence, traffic generation rates from the RMS Guide for gymnasiums has been adopted to estimate the potential traffic generation. The RMS rate has been summarised below:

- Multipurpose Rooms⁵: 9 trips per 100m² GFA in the PM peak

The RMS Guide states that the peak traffic generation for gymnasiums generally occurs between 6:00pm and 7:00pm, however for a conservative assessment, same rates have been used for the network peak. It is also noted that the RMS Guide does not provide traffic generation rates for Saturday peak period; however, for conservative reasons the trips for PM peak have been used for Saturdays.

⁵ The traffic generation rates for gymnasiums at metropolitan sub regional areas has been adopted, considering that the multipurpose rooms will be used for similar purpose

Applying the above rates to the 143.6m² for multipurpose room results in the following number of trips for the weekday PM and Saturday Mid-day peak periods:

- Weekday PM peak: 13 trips (7 inbound, 6 outbound)
- Saturday Mid-day peak: 13 trips (7 inbound, 6 outbound)

It is noted that the above trips are for 1 hour period, whereas the traffic generated by basketball courts is assumed to occur within a ½ hour period. For a conservative assessment, all trips generated by the multipurpose room have been adopted within the ½ hour calculation.

The following trips have been applied for Weekday PM and Saturday Mid-day ½ hour peak period:

- Weekday PM peak: 13 trips (7 inbound, 6 outbound)
- Saturday Mid-day peak: 13 trips (7 inbound, 6 outbound)

5.2.2.3. Traffic Generation for Café, Lounge and Foyer Area

It is understood that the café, lounge and foyer area will be mostly used by patrons of the basketball courts and the multipurpose room. Therefore, it is not anticipated that the café, lounge and foyer area will generate any additional traffic.

5.2.2.4. Total Development Traffic

The total trips for the proposed development are as follows:

Table 16 – Total Development Traffic

	Weekday PM Peak (1/2 hour period)	Saturday Mid-day Peak (1/2 hour period)
Total Proposed Trips	219 (110 inbound, 109 outbound)	219 (110 inbound, 109 outbound)

It is noted that the above number of trips is seen to represent the worst case scenario, where the basketball turnaround coincides with the turnaround of the multipurpose room users. This is highly unlikely, however to provide a robust assessment we have adopted these numbers into our SIDRA analysis.

5.3 Proposed Driveway Arrangement and Parking Signage Changes

The driveway for the Sports Complex is proposed to be located approximately 110 metres north from the Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue intersection. The driveway is proposed to be designed to allow right turns into the site from Horace Street, but to restrict the exit to 'Left Out Only' movements in order to minimise the impact on the through traffic. This is considered acceptable given the proximity of the site to a roundabout, as vehicles wishing to exit the site towards the north will be able to exit the site towards the south and then undertake a U-turn at Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue roundabout intersection.

Horace Street has 2 lanes in each direction, with the outermost lanes allowing for unrestricted parking. Buildings on the western side of the road have driveways and appear to provide sufficient on-site parking, as only few vehicles have been observed to park on the street during a site visit and on aerial imagery. The eastern side of Horace Street belongs to the school, hence there is no parking generating effect on the

street. Despite the low parking demand on the section of Horace Street north of the roundabout, parking and therefore signage changes have been proposed. This is so as to minimise the potential impact of vehicles queuing along Horace Street to turn right into the site while a vehicle may be parked on the western side of Horace Street. The details of the proposed signage changes are as follows:

- 'No Stopping' sign on the kerbside lanes (on both sides) of Horace Street from the driveway down to Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue intersection i.e., on the southern side of the proposed driveway;
- 'No Stopping – emergency vehicle excepted' sign adjacent to the proposed driveway up to the new indoor recreational facility driveway on the northern side;
- 'No Stopping' sign on Horace Street on the opposite side of the proposed development site up to an approximate distance of 45 metres north from the centre of the proposed driveway location (based on Austroads Guide to Road Design Part 4A for Urban Basic Right-turn Treatment on Un-divided Roads);
- 'Left Only' sign on Horace Street opposite to the proposed driveway;
- A median island to discourage the right turn movement and a 'No Right Turn' sign on the centre of the proposed driveway.

The above changes would result in a reduction of on-street parking by 13 on the eastern side and 18 spaces on the western side. Additional 5 spaces on the western side would be converted to pick-up and drop-off spaces.

The detailed Signage Plan is presented in **Attachment 3**.

5.4 Development Traffic Distribution

The analysis of the future traffic distribution for weekday PM peak and Saturday Mid-day peak has taken into consideration the potential ingress / egress routes to the proposed development while taking into consideration of the proposed "Left Out Only" arrangement as described in Section 5.3. The same assumption has been made for weekday and Saturday.

The assumptions made on the potential routes that patrons will use to travel to and from the site are as follows:

- Inbound Trip Distribution
 - Based on the locality of the subject site it is assumed that 50% of patrons will travel from the north by using Link Road / Horace Street / Stanley Street intersection and 50% will travel from the south by using Eastern Arterial Road / Horace Street / Eucalyptus Street / Hunter Avenue intersection;
 - Out of the 50% vehicles travelling southbound using Link Road / Horace Street / Stanley Street intersection, it is assumed that 50% travel from the north of intersection via Link Road, 30% travel from the west via Stanley Street West and 20% travel from the east via Stanley Street East;
 - Out of the 50% vehicles travelling northbound using Eastern Arterial Road / Horace Street / Eucalyptus Street / Hunter Avenue intersection, it is assumed that 50% travel from the south of intersection via Eastern Arterial Road and 50% travel from the west via Eucalyptus Street. No vehicle movements are expected from the east of the intersection as this is a small residential area, from where the site can be easily accessed by walking or cycling.

- Outbound Trip Distribution

- Outbound vehicle movements from the site are assumed to be the same as the inbound movements, where the outbound vehicles are expected to travel towards the same direction they came from. However, as the “Left out Only” arrangement is proposed at the site driveway, vehicles wishing to travel north after exiting the site would utilise the Eastern Arterial Road / Horace Street / Eucalyptus Street / Hunter Avenue roundabout to undertake a U-turn.

As discussed in Section 5.2.2, the same traffic volumes are generated during weekday PM peak hour and Saturday peak hour, and the same assumption on trip distribution is made for the inbound and outbound trips. Therefore, the future trips for both peak hours are estimated to be the same. The future trips for the weekday PM peak hour and Saturday Mid-day peak hour is presented in Figure 18.

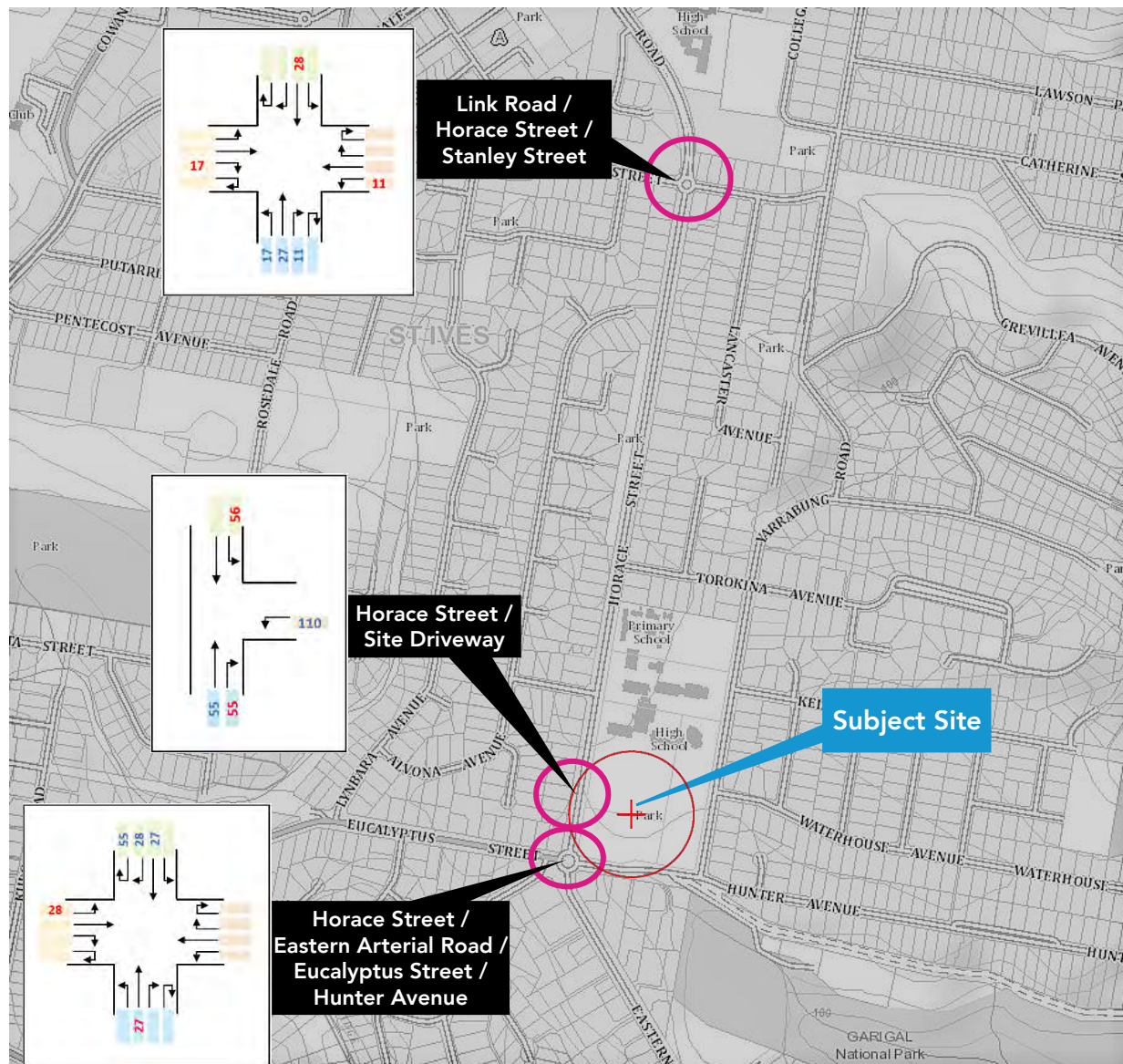


Figure 18 – Development Traffic Volumes during PM Peak Hour and Saturday Peak Hour (1/2 Hour Period)

5.5 SIDRA Analysis

A volume analysis was performed using the SIDRA Intersection 8 software, a micro-analytical tool for individual intersection and whole-network modelling. The models are based on the collected traffic survey data. SIDRA provides a number of performance indicators outlined below:

- Degree of Saturation – The total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation. (e.g. 0.8=80% saturation)
- Average Delay – The average delay encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.
- 95% Queue Lengths (Q95) – is defined to be the queue length in metres that has only a 5-percent probability of being exceeded during the analysis time period. It transforms the average delay into measurable distance units.
- Level of Service (LoS) – This is a categorization of average delay, intended for simple reference. It is a good indicator of overall performance for individual intersections. The RMS adopts the following bands:

Table 17 – Intersection Performance - Levels of Service

Level of Service	Average Delay (secs/vehicle)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Extra capacity required	Extreme delay, major treatment required

5.5.1 Existing and Future Network Operation

The key intersections have been modelled for ½ hour peak period. The existing peak hour traffic volumes as shown in Section 5.1.2 have been modified to represent a ½ hour period, which is significant to the sports complex traffic generation.

The existing traffic has been modelled in accordance to the existing layout on Link Road / Horace Street / Stanley Street intersection and Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue intersection. The future development for Horace Street / Site driveway intersection and Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue intersection has been modelled with the proposed layout changes along Horace Street as mentioned in Section 5.3.

A summary of the existing traffic conditions detailing the LoS, Average Delay, DoS and Q95 of the existing and future development situation is shown in Table 18.

A full SIDRA calculation is presented in **Attachment 4**.

Table 18 – Summary of Existing Traffic Conditions

Intersection	Time	Period	Average LoS ⁶	Average Delay (s) ⁷	Highest DoS (v/s)	Highest Q95 (m)
Link Road / Horace Street / Stanley Street	Weekday PM Peak	Existing	A	8.9	0.642	42.6
		Future Development	A	10.8	0.729	60.0
	Saturday Mid-day Peak	Existing	A	9.8	0.776	72.6
		Future Development	A	12.8	0.866	109.0
Horace Street / Sports Complex Driveway	Weekday PM Peak	Future Development	A	14.4	0.437	25.1
	Saturday Mid-day Peak	Future Development	B	17.5	0.454	22.0
Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue	Weekday PM Peak	Existing	A	7.4	0.765	61.8
		Future Development	A	7.7	0.570	31.6
	Saturday Mid-day Peak	Existing	A	6.1	0.512	24.8
		Future Development	A	6.7	0.609	35.3

5.5.1.1. Link Road / Horace Street / Stanley Street Intersection

The Link Road / Horace Street / Stanley Street Intersection operates with a LoS for the PM and Saturday peak ½ hour period. The proposed development increases all parameters only marginally, with a minimum of 13% spare capacity during the peak hours.

5.5.1.2. Horace Street / Sports Complex Driveway Intersection

A future scenario with the layout as mentioned in Section 5.3 has been adopted to model the Sports Complex Driveway with the Horace Street. The development traffic for the right turn movement from Horace Street results in a LoS A and B for PM peak and Saturday peak ½ hour period respectively.

5.5.1.3. Horace Street / Eastern Arterial Road / Eucalyptus Street / Hunter Avenue Intersection

The overall LoS at this intersection is A for the PM and Saturday peak ½ hour period. The layout changes as mentioned in Section 5.3 are adopted to model the future traffic, which minimises the queue for turning movements into the driveway. Therefore, the future development with the proposed layout changes results in no significant change to the operation of this intersection.

5.5.1.4. Summary

Based on the modelling it is anticipated that the proposed development will not have any detrimental impact on the performance of the intersections.

⁶ For roundabout intersections, the average performance indicators have been reported. It is noted that for priority-controlled intersections, the minor road usually experiences the highest delay whereas the major road experiences zero delay. In light of this, the average performance indicators may not be a suitable method of assessing the performance of an intersection. Therefore, the performance indicators for the worst movement have been reported for priority-controlled intersections.

⁷ For roundabout intersections, the average performance indicators have been reported. It is noted that for priority-controlled intersections, the minor road usually experiences the highest delay whereas the major road experiences zero delay. In light of this, the average performance indicators may not be a suitable method of assessing the performance of an intersection. Therefore, the performance indicators for the worst movement have been reported for priority-controlled intersections.

6. Access and Car Park Assessment

The following section presents an assessment of the proposed development with reference to the requirements of AS2890.1:2004 (Off-street car parking), AS2890.3:2015 (Bicycle Parking) and AS2890.6:2009 (Off-street parking for people with disabilities). This section is to be read in conjunction with the architectural plans provided by JDH Architects (see **Attachment 1**) and the car park assessment undertaken by ptc. (see **Attachment 5**).

The proposed car park is to be predominantly used as a sports facility, and therefore, the car park is assessed in accordance to AS 2890.1 for typical User Class 2.

6.1 Vehicular Access & Circulation

6.1.1 Access and Exit Driveway

The proposal is to construct a new driveway with access from Horace Street. Horace Street is an arterial road with a maximum speed limit of 60km/hr outside of school peak hours. The details of the proposed assess driveway are as follows:

- In accordance to Section 3 of AS 2890.1, the construction of 109 User Class 2 (Sports facility) car spaces will require a Category 3 driveway with a minimum width of 10m-12m with a 1m-3m separator. The proposal is to provide a 15.9 m wide driveway with a 2.45m wide separator, and therefore the proposed provision is in accordance with the requirement of AS 2890.1.
- It is proposed that the exit movements from the new driveway will be restricted to “Left out Only” as a means to minimise impact of exiting vehicles on the through movement along Horace Street. Further, it is proposed that the median island of the driveway is shaped so as to direct vehicles towards the left.
- It is anticipated that the largest vehicle requiring access to the proposed car park is to be a B99 vehicle. Therefore, a swept path analysis has been undertaken to show that the proposed driveway and car park is able to accommodate the one-way circulation of the B99 vehicle. The swept path analysis is presented in **Attachment 4**.

6.1.2 Circulation

The proposed car park provides minimum 5.8m traffic aisle widths throughout the car park to allow vehicles to manoeuvre into the parking spaces. The proposed aisle width adheres to the requirements stipulated in AS 2890.1 for a typical Class 2 facility. Swept path assessment has been undertaken using a B99 vehicle along the one-way aisle and a B99 and a B85 passing each other with appropriate clearance at the two-way aisle. The swept path analysis is presented in **Attachment 4**.

The vehicular access, circulation, aisle width and car space dimensions comply with AS 2890.1 & 2890.6. Two-way circulation will be provided inside the car park, pick-up & drop-off and vehicular access points, thus no potential queuing on public roads.

6.1.3 Ramp Design

The access driveway into the at grade carpark to be designed in accordance with AS2890.1, where:

- Maximum grades do not exceed 1:20 (5%) for the first 6m from the property line.

6.2 Sight Distance

The sight distance requirements are outlined in Section 3.2 of AS2890.1 and are prescribed on the basis of the posted speed limit or 85th percentile vehicle speeds along the frontage road.

Horace Street has a speed limit of 60km/h which requires a desirable visibility distance of 83 metres and a minimum stopping sight distance of 65 metres. The proposed driveway along Northumberland Street is located on a straight/flat section of the road where sufficient sight distance is provided.

The proposed driveway also provides the minimum sight lines for pedestrian safety, as stipulated in AS2890.1. Triangular pedestrian sight splays (2.0m x 2.5m) have been provided in accordance with the Australian Standards.

6.3 Car Park Arrangement

6.3.1 Typical Requirements

The car parking arrangements have been assessed against the requirements of AS2890.1:2004, with reference to Class 2 (sports facility) parking. The development is to provide the following dimensions for the parking spaces:

Class 2 (sports facility) parking:

- Car Spaces: 2.5m x 5.4m
- Aisle Width: 5.8m (minimum)

additional 300mm needs to be provided where one side of the aisle is bounded by high obstruction (i.e. wall or column)

All parking spaces have been individually assessed and found to be compliant with the minimum requirements of AS2890.1. All spaces meet the clearance requirements (door opening, entry flanges, column locations) of the parking space envelope requirements provided in Figure 5.2 of AS2890.1.

6.3.2 Tandem Parking Spaces

The tandem car spaces have been assessed according to the AS2890.1:2004, with reference to Class 1A (employee) parking for staff. The development is to provide the following dimensions for the parking spaces:

Class 1A (employee) parking:

- Car Spaces: 2.4m x 5.4m
- Aisle Width: 5.8m (minimum)

additional 300mm needs to be provided where one side of the aisle is bounded by high obstruction (i.e. wall or column)

All tandem parking spaces have been individually assessed and found to be compliant with the minimum requirements of AS2890.1. All spaces meet the clearance requirements (door opening, entry flanges, and column locations) of the parking space envelope requirements provided in Figure 5.2 of AS2890.1.

6.3.3 Accessible Parking

All accessible parking spaces have been individually assessed against the requirements of AS2890.6. Accessible parking spaces are to be designed based on the following dimensions:

- Accessible Space: 2.4m x 5.4m
- Adjacent Shared Bay: 2.4m x 5.4m (with bollard)

All shared bays and accessible spaces shall be installed in accordance with AS2890.6, including the installation of bollards and relevant pavement markings. A minimum height clearance of 2.5m is to be maintained above all accessible and shared bays.

6.3.4 Headroom Clearance

Headroom clearances must be provided in accordance with the minimum requirements of AS2890.1 and AS2890.2. These requirements are stipulated below:

- Minimum 2.2m above all general spaces;
- Minimum 2.5m above all accessible spaces and adjacent shared bays; and
- Minimum 2.2m above all bicycle spaces.

6.3.5 Motorcycle Parking

All motorcycle parking spaces have been assessed against the requirements of AS2890.1. All motorcycle spaces are to provide the following dimensions:

- Length: 2.5m
- Width: 1.2m

All proposed motorcycle spaces meet the above requirements.

6.3.6 Bicycle Parking

Approved bicycle parking devices (BPD's) shall be installed as per the following requirements of AS2890.3:2015:

- Horizontal parking: 1800mm x 500mm
- Vertical parking: 1200mm x 500mm
- Access aisle: 1500mm

7. Conclusion

ptc. has been engaged by JDH architects on behalf of Ku-ring-gai Council to prepare a Traffic Impact Assessment (TIA) for the proposed Sports Complex development at 91 Yarrabung Road St Ives. This assessment accompanies a Development Application (DA). The proposed site lies within the Ku-ring-gai Council Local Government Area (LGA) and has been assessed under that Council's Controls.

This report has been prepared to assess the proposed Sports Complex development in terms of parking provisions and traffic impacts on the surrounding road network.

The following findings have been identified through the assessment:

- The proposed Sports Complex development will comprise two basketball courts, a multipurpose room, café, lounge and a foyer area. The community use will spread over the proposed building and the newly constructed school's sports complex located adjacent to the proposed development. Traffic and parking calculations take this into consideration;
- In terms of public transport, the site is accessible by buses providing transport links to the greater Sydney area. Pedestrian amenities are reasonably well developed considering the infrastructure zone and residential character of the area, with footpaths largely on both sides of the road and pram ramps at the majority of intersections. A cycle path runs along Horace Street, thereby providing a reasonable level of active transport accessibility;
- In the context of parking, the assessment has been undertaken based on first principles for the basketball courts and on the requirements of the DCP for the multipurpose room. In order to minimise the possibility of parking demand overlap, it is proposed that a gap between two game sessions is implemented. This will allow patrons from a concluding game to exit the car park while patrons enter before a commencing game. The proposal is to provide 106 car spaces, which takes into account players, officials and other staff and spectators. The development proposes to provide 12 motorbike spaces and 33 bicycle spaces within the car park.
- With reference to traffic survey data and first principal analysis, a review of the potential traffic generation of the site has revealed that the development may generate 221 trips during the weekday evening peak hour and Saturday peak hour. The results from SIDRA modelling indicate that the future traffic can be accommodated within the existing road network. As such, it is anticipated that the proposed development will not have any detrimental impact to the existing road network.
- The driveway is proposed to be designed to allow right turns into the site from Horace Street, but to restrict the exit to 'Left Out Only' movements in order to minimise the impact on the through traffic. Parking and therefore signage changes have been proposed so as to minimise the potential impact of vehicles queuing along Horace Street to turn right into the site while a vehicle may be parked on the western side of Horace Street. The signage changes have been proposed based on Austroads Guide to Road Design Part 4A for Urban Basic Right-turn Treatment on Un-divided Roads.
- An ambulance bay and pick-up and drop-off spaces are proposed to be located along the eastern kerb of Horace Street. Parking and signage changes have been proposed to accommodate this.
- A design review of the car parking facility has been undertaken with reference to AS 2890.1:2004, AS 2890.3:2015 and AS 2890.6:2009 and found the proposal to be in compliance and meeting the intent of the relevant standards.

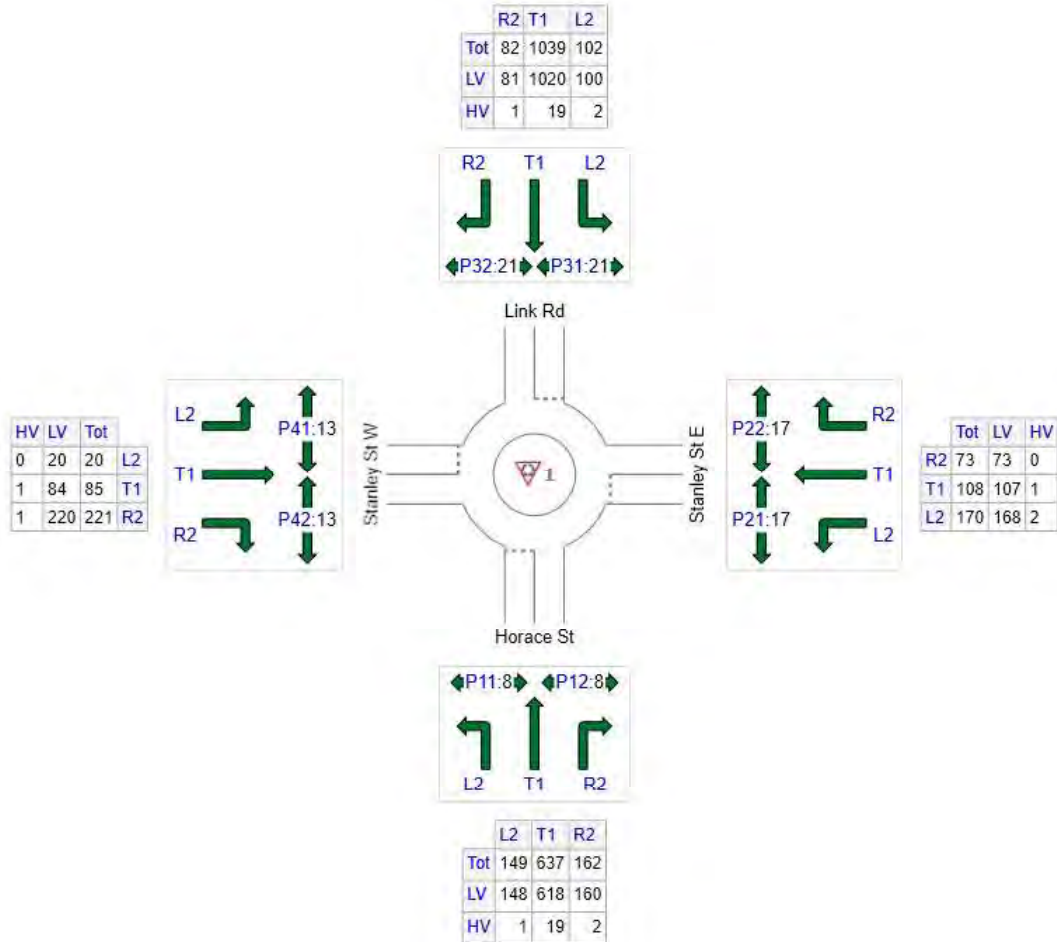
In light of the above, the proposed development is endorsed in the context of parking and traffic.

Attachment 1 Architectural Plans

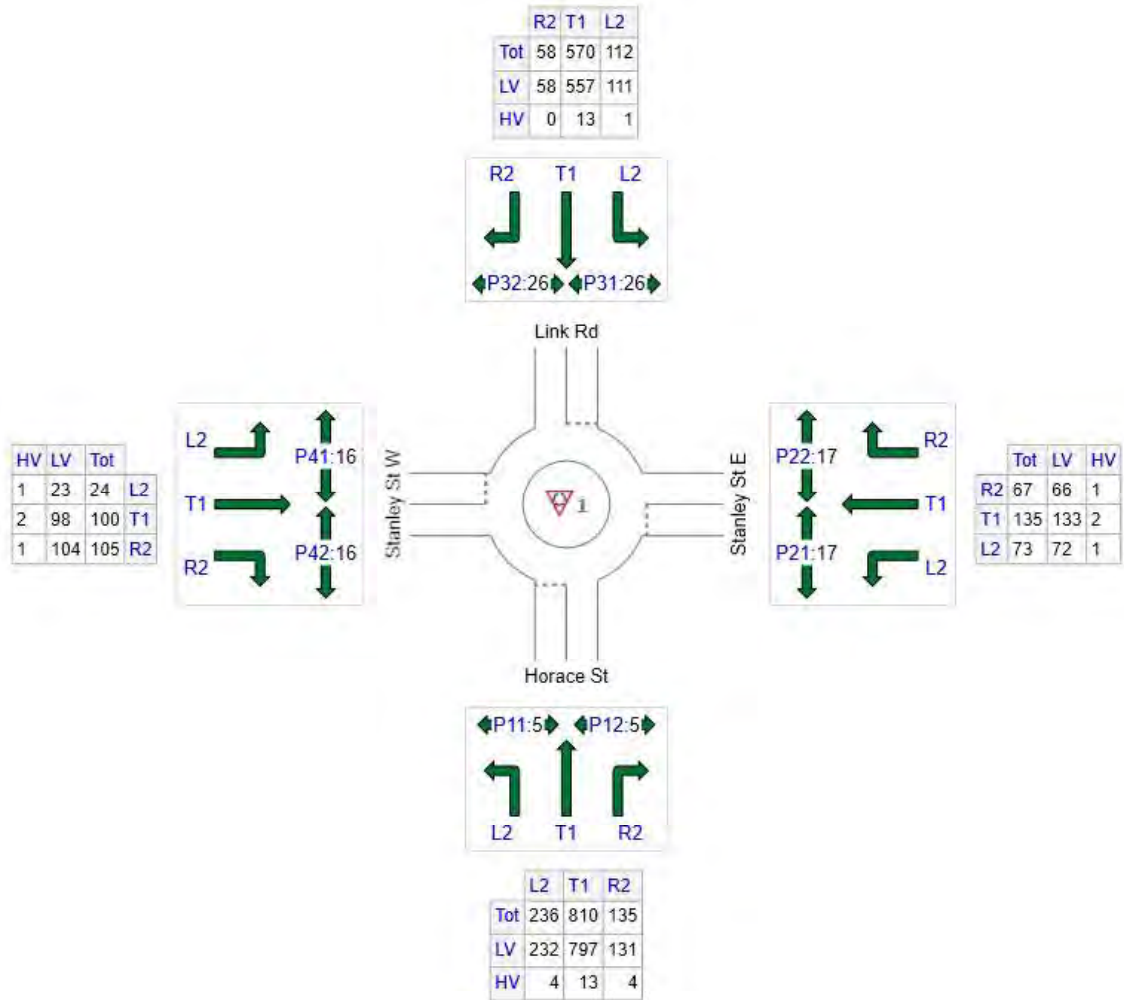
Attachment 2 Traffic Surveys

8 Appendix

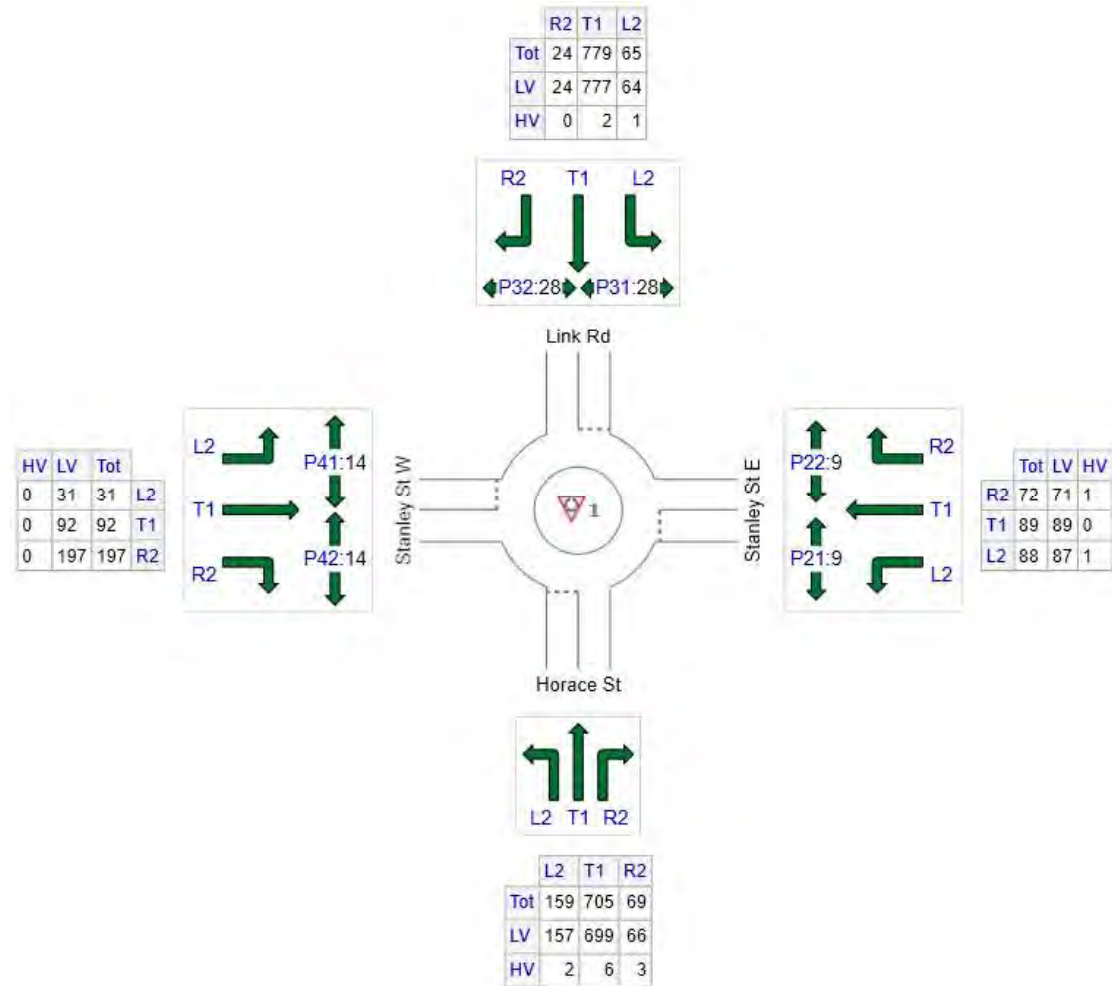
WEEKDAY AM PEAK HOUR VEHICLE AND PEDESTRIAN VOLUMES



WEEKDAY PM PEAK HOUR VEHICLE AND PEDESTRIAN VOLUMES



SATURDAY MIDDAY PEAK HOUR VEHICLE AND PEDESTRIAN VOLUMES



[illegible]

[illegible]

[illegible]

Attachment 3 Signage Plans

Note: The dimensions are in meters.

p

t

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rev	date	comment / description	drawn	reviewed
4	10.06.21	For Information	KB	SW
3	29.04.21	For Information	KB	SW
2	30.07.20	For Review	PS	KB
1	03.07.20	For Review	PS	KB

project

St Ives Indoor Sports Complex

drawing title

Proposed Signage Plans

client	Ku-ring-gai Council
drawing #	ptc-001
project #	2854
scale	1 : 500

rev 4

Attachment 4 SIDRA Results

MOVEMENT SUMMARY

 **Site: 101 [1a. Link Rd / Horace St / Stanley St - Existing PM Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Horace St (S)												
1	L2	260	1.5	0.584	6.4	LOS A	4.7	33.7	0.65	0.66	0.66	48.6
2	T1	890	1.6	0.584	6.6	LOS A	4.7	33.7	0.65	0.68	0.67	52.9
3	R2	148	2.7	0.584	10.6	LOS A	4.7	33.7	0.66	0.70	0.68	49.1
3u	U	2	0.0	0.584	12.4	LOS A	4.7	33.7	0.66	0.70	0.68	53.2
Approach		1300	1.7	0.584	7.0	LOS A	4.7	33.7	0.65	0.68	0.67	51.6
East: Stanley St (E)												
4	L2	82	2.4	0.589	13.9	LOS A	4.9	34.7	0.91	1.07	1.20	43.9
5	T1	148	1.4	0.589	13.9	LOS A	4.9	34.7	0.91	1.07	1.20	42.2
6	R2	74	2.7	0.589	17.9	LOS B	4.9	34.7	0.91	1.07	1.20	44.5
6u	U	2	0.0	0.589	19.4	LOS B	4.9	34.7	0.91	1.07	1.20	42.7
Approach		306	2.0	0.589	14.9	LOS B	4.9	34.7	0.91	1.07	1.20	43.2
North: Link Rd (N)												
7	L2	124	1.6	0.196	7.7	LOS A	0.9	6.4	0.54	0.71	0.54	48.6
8	T1	626	2.2	0.642	8.0	LOS A	6.0	42.6	0.73	0.79	0.83	52.5
9	R2	64	0.0	0.642	11.9	LOS A	6.0	42.6	0.73	0.79	0.83	49.1
9u	U	2	0.0	0.642	13.7	LOS A	6.0	42.6	0.73	0.79	0.83	53.1
Approach		816	2.0	0.642	8.3	LOS A	6.0	42.6	0.70	0.77	0.78	51.6
West: Stanley St (W)												
10	L2	28	7.1	0.533	11.6	LOS A	3.0	21.7	0.81	0.99	1.03	44.7
11	T1	110	1.8	0.533	11.3	LOS A	3.0	21.7	0.81	0.99	1.03	43.1
12	R2	116	1.7	0.533	15.0	LOS B	3.0	21.7	0.81	0.99	1.03	45.5
12u	U	2	0.0	0.533	16.6	LOS B	3.0	21.7	0.81	0.99	1.03	43.7
Approach		256	2.3	0.533	13.0	LOS A	3.0	21.7	0.81	0.99	1.03	44.3
All Vehicles		2678	1.9	0.642	8.9	LOS A	6.0	42.6	0.71	0.78	0.80	49.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 103 [3a. Horace St / Eastern Arterial Rd /Eucalyptus St / Hunter Ave - Existing PM Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Eastern Arterial Road (S)												
1	L2	106	1.9	0.201	6.0	LOS A	0.9	6.4	0.40	0.58	0.40	49.7
2	T1	962	0.2	0.765	6.6	LOS A	8.8	61.8	0.67	0.63	0.70	49.7
3	R2	94	2.1	0.765	10.8	LOS A	8.8	61.8	0.68	0.63	0.71	49.5
3u	U	2	0.0	0.765	12.7	LOS A	8.8	61.8	0.68	0.63	0.71	53.7
Approach		1164	0.5	0.765	6.9	LOS A	8.8	61.8	0.64	0.63	0.67	49.7
East: Hunter Avenue (E)												
4	L2	42	4.8	0.061	6.4	LOS A	0.3	1.8	0.57	0.68	0.57	48.7
5	T1	56	0.0	0.085	5.3	LOS A	0.4	2.7	0.57	0.65	0.57	46.4
6	R2	18	0.0	0.085	9.4	LOS A	0.4	2.7	0.57	0.65	0.57	28.3
6u	U	2	0.0	0.085	11.1	LOS A	0.4	2.7	0.57	0.65	0.57	47.2
Approach		118	1.7	0.085	6.4	LOS A	0.4	2.7	0.57	0.66	0.57	44.3
North: Horace Street (N)												
7	L2	26	0.0	0.219	6.3	LOS A	1.1	7.6	0.48	0.60	0.48	44.4
8	T1	540	0.4	0.437	5.9	LOS A	2.8	20.0	0.52	0.61	0.52	50.3
9	R2	114	0.0	0.437	9.9	LOS A	2.8	20.0	0.53	0.62	0.53	45.2
9u	U	6	0.0	0.437	11.9	LOS A	2.8	20.0	0.53	0.62	0.53	23.8
Approach		686	0.3	0.437	6.7	LOS A	2.8	20.0	0.52	0.61	0.52	49.0
West: Eucalyptus Street (W)												
10	L2	222	0.0	0.371	9.7	LOS A	2.4	17.1	0.87	0.94	0.90	41.1
11	T1	116	0.0	0.364	10.4	LOS A	2.2	15.9	0.85	0.95	0.91	43.8
12	R2	66	3.0	0.364	14.6	LOS B	2.2	15.9	0.85	0.95	0.91	46.3
12u	U	2	0.0	0.364	16.2	LOS B	2.2	15.9	0.85	0.95	0.91	44.5
Approach		406	0.5	0.371	10.7	LOS A	2.4	17.1	0.86	0.94	0.90	43.1
All Vehicles		2374	0.5	0.765	7.4	LOS A	8.8	61.8	0.64	0.68	0.66	47.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 101 [1b. Link Rd / Horace St / Stanley St - Existing Saturday Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Horace St (S)												
1	L2	174	1.1	0.431	5.6	LOS A	3.0	21.2	0.49	0.57	0.49	49.1
2	T1	776	0.8	0.431	5.6	LOS A	3.0	21.2	0.50	0.58	0.50	53.7
3	R2	76	5.3	0.431	9.6	LOS A	2.9	20.9	0.50	0.59	0.50	49.8
3u	U	2	0.0	0.431	11.4	LOS A	2.9	20.9	0.50	0.59	0.50	54.0
Approach		1028	1.2	0.431	5.9	LOS A	3.0	21.2	0.49	0.58	0.49	52.5
East: Stanley St (E)												
4	L2	98	2.0	0.640	17.7	LOS B	5.1	36.0	0.93	1.13	1.35	41.9
5	T1	98	0.0	0.640	17.6	LOS B	5.1	36.0	0.93	1.13	1.35	40.4
6	R2	80	2.5	0.640	21.7	LOS B	5.1	36.0	0.93	1.13	1.35	42.4
6u	U	2	0.0	0.640	23.2	LOS B	5.1	36.0	0.93	1.13	1.35	40.8
Approach		278	1.4	0.640	18.9	LOS B	5.1	36.0	0.93	1.13	1.35	41.5
North: Link Rd (N)												
7	L2	72	2.8	0.209	7.9	LOS A	1.0	7.1	0.57	0.71	0.57	48.5
8	T1	856	0.2	0.776	10.2	LOS A	10.4	72.6	0.87	0.91	1.09	51.5
9	R2	26	0.0	0.776	14.3	LOS A	10.4	72.6	0.89	0.93	1.13	48.0
9u	U	2	0.0	0.776	16.2	LOS B	10.4	72.6	0.89	0.93	1.13	51.8
Approach		956	0.4	0.776	10.2	LOS A	10.4	72.6	0.84	0.90	1.05	51.1
West: Stanley St (W)												
10	L2	34	0.0	0.611	11.0	LOS A	3.9	27.2	0.79	1.02	1.08	44.7
11	T1	102	0.0	0.611	11.0	LOS A	3.9	27.2	0.79	1.02	1.08	42.9
12	R2	216	0.0	0.611	14.8	LOS B	3.9	27.2	0.79	1.02	1.08	45.4
12u	U	2	0.0	0.611	16.5	LOS B	3.9	27.2	0.79	1.02	1.08	43.5
Approach		354	0.0	0.611	13.4	LOS A	3.9	27.2	0.79	1.02	1.08	44.6
All Vehicles		2616	0.8	0.776	9.8	LOS A	10.4	72.6	0.71	0.81	0.87	49.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).


HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 103 [3b. Horace St / Eastern Arterial Rd /Eucalyptus St / Hunter Ave - Existing Saturday Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Eastern Arterial Road (S)												
1	L2	82	0.0	0.134	5.9	LOS A	0.6	4.0	0.38	0.57	0.38	49.8
2	T1	638	0.6	0.512	5.4	LOS A	3.5	24.8	0.46	0.55	0.46	51.0
3	R2	44	0.0	0.512	9.6	LOS A	3.5	24.8	0.46	0.55	0.46	50.4
3u	U	2	0.0	0.512	11.5	LOS A	3.5	24.8	0.46	0.55	0.46	54.7
Approach		766	0.5	0.512	5.7	LOS A	3.5	24.8	0.45	0.55	0.45	50.8
East: Hunter Avenue (E)												
4	L2	52	0.0	0.081	7.1	LOS A	0.3	2.4	0.62	0.74	0.62	48.4
5	T1	52	3.8	0.125	6.0	LOS A	0.6	4.2	0.62	0.75	0.62	45.7
6	R2	50	0.0	0.125	10.0	LOS A	0.6	4.2	0.62	0.75	0.62	28.0
6u	U	2	0.0	0.125	11.8	LOS A	0.6	4.2	0.62	0.75	0.62	46.5
Approach		156	1.3	0.125	7.7	LOS A	0.6	4.2	0.62	0.75	0.62	40.6
North: Horace Street (N)												
7	L2	40	0.0	0.246	5.5	LOS A	1.3	8.8	0.37	0.52	0.37	44.9
8	T1	752	0.8	0.492	5.3	LOS A	3.4	24.2	0.41	0.54	0.41	51.1
9	R2	84	0.0	0.492	9.4	LOS A	3.4	24.2	0.43	0.54	0.43	46.0
9u	U	6	0.0	0.492	11.3	LOS A	3.4	24.2	0.43	0.54	0.43	24.3
Approach		882	0.7	0.492	5.7	LOS A	3.4	24.2	0.41	0.54	0.41	50.1
West: Eucalyptus Street (W)												
10	L2	108	0.0	0.141	6.7	LOS A	0.7	5.0	0.64	0.73	0.64	43.5
11	T1	60	0.0	0.135	6.1	LOS A	0.7	4.9	0.64	0.73	0.64	45.7
12	R2	52	0.0	0.135	10.2	LOS A	0.7	4.9	0.64	0.73	0.64	48.5
12u	U	2	0.0	0.135	11.9	LOS A	0.7	4.9	0.64	0.73	0.64	46.5
Approach		222	0.0	0.141	7.4	LOS A	0.7	5.0	0.64	0.73	0.64	45.6
All Vehicles		2026	0.6	0.512	6.1	LOS A	3.5	24.8	0.47	0.58	0.47	48.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 101 [1a. Link Rd / Horace St / Stanley St - Development PM Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Horace St (S)												
1	L2	294	1.4	0.634	6.8	LOS A	5.9	41.6	0.70	0.70	0.73	48.5
2	T1	944	1.5	0.634	7.0	LOS A	5.9	41.6	0.70	0.72	0.75	52.7
3	R2	170	2.4	0.634	11.1	LOS A	5.8	41.5	0.71	0.74	0.76	48.9
3u	U	2	0.0	0.634	12.9	LOS A	5.8	41.5	0.71	0.74	0.76	52.9
Approach		1410	1.6	0.634	7.5	LOS A	5.9	41.6	0.70	0.72	0.74	51.3
East: Stanley St (E)												
4	L2	104	1.9	0.729	21.6	LOS B	7.5	53.1	1.00	1.24	1.57	40.2
5	T1	148	1.4	0.729	21.6	LOS B	7.5	53.1	1.00	1.24	1.57	38.8
6	R2	74	2.7	0.729	25.6	LOS B	7.5	53.1	1.00	1.24	1.57	40.7
6u	U	2	0.0	0.729	27.1	LOS B	7.5	53.1	1.00	1.24	1.57	39.2
Approach		328	1.8	0.729	22.6	LOS B	7.5	53.1	1.00	1.24	1.57	39.7
North: Link Rd (N)												
7	L2	124	1.6	0.206	8.1	LOS A	1.0	6.8	0.58	0.74	0.58	48.3
8	T1	682	2.1	0.727	10.0	LOS A	8.4	60.0	0.84	0.91	1.06	51.4
9	R2	64	0.0	0.727	13.9	LOS A	8.4	60.0	0.84	0.91	1.06	48.1
9u	U	2	0.0	0.727	15.7	LOS B	8.4	60.0	0.84	0.91	1.06	51.9
Approach		872	1.8	0.727	10.1	LOS A	8.4	60.0	0.80	0.89	0.99	50.7
West: Stanley St (W)												
10	L2	28	7.1	0.647	14.2	LOS A	4.2	29.7	0.86	1.07	1.22	43.2
11	T1	110	1.8	0.647	13.9	LOS A	4.2	29.7	0.86	1.07	1.22	41.7
12	R2	150	1.3	0.647	17.6	LOS B	4.2	29.7	0.86	1.07	1.22	44.0
12u	U	2	0.0	0.647	19.3	LOS B	4.2	29.7	0.86	1.07	1.22	42.2
Approach		290	2.1	0.647	15.9	LOS B	4.2	29.7	0.86	1.07	1.22	43.0
All Vehicles		2900	1.7	0.729	10.8	LOS A	8.4	60.0	0.78	0.86	0.96	48.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 102 [2a. Horace Street / Sports Complex Driveway - Development PM Peak]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Horace Street (S)												
2	T1	1318	0.2	0.437	1.6	LOS A	3.6	25.1	0.18	0.06	0.26	56.6
3	R2	112	0.0	0.437	14.4	LOS A	3.6	25.1	0.51	0.17	0.74	48.6
Approach		1430	0.1	0.437	2.6	NA	3.6	25.1	0.21	0.07	0.30	55.9
East: BBall Courts Driveway												
4	L2	222	0.0	0.167	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	50.0
Approach		222	0.0	0.167	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	50.0
North: Horace Street (N)												
7	L2	114	0.0	0.061	5.6	LOS A	0.0	0.0	0.00	0.54	0.00	53.6
8	T1	686	0.3	0.352	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		800	0.3	0.352	0.8	NA	0.0	0.0	0.00	0.08	0.00	58.4
All Vehicles		2452	0.2	0.437	2.3	NA	3.6	25.1	0.12	0.11	0.17	56.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 103 [3a. Horace St / Eastern Arterial Rd /Eucalyptus St / Hunter Ave - Development PM Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Eastern Arterial Road (S)												
1	L2	106	1.9	0.570	6.9	LOS A	4.5	31.6	0.66	0.71	0.70	48.6
2	T1	1016	0.2	0.570	7.0	LOS A	4.5	31.6	0.67	0.72	0.71	49.7
3	R2	94	2.1	0.570	11.4	LOS A	4.5	31.5	0.67	0.74	0.72	49.4
3u	U	2	0.0	0.570	13.3	LOS A	4.5	31.5	0.67	0.74	0.72	53.5
Approach		1218	0.5	0.570	7.4	LOS A	4.5	31.6	0.67	0.72	0.71	49.5
East: Hunter Avenue (E)												
4	L2	42	4.8	0.071	7.4	LOS A	0.3	2.3	0.65	0.75	0.65	48.1
5	T1	56	0.0	0.097	6.0	LOS A	0.5	3.3	0.65	0.72	0.65	46.1
6	R2	18	0.0	0.097	10.1	LOS A	0.5	3.3	0.65	0.72	0.65	28.1
6u	U	2	0.0	0.097	11.9	LOS A	0.5	3.3	0.65	0.72	0.65	46.9
Approach		118	1.7	0.097	7.2	LOS A	0.5	3.3	0.65	0.73	0.65	43.9
North: Horace Street (N)												
7	L2	26	0.0	0.284	6.4	LOS A	1.5	10.4	0.50	0.62	0.50	44.3
8	T1	594	0.3	0.568	6.2	LOS A	4.2	29.8	0.57	0.65	0.57	49.6
9	R2	170	0.0	0.568	10.2	LOS A	4.2	29.8	0.60	0.67	0.60	44.3
9u	U	116	0.0	0.568	12.1	LOS A	4.2	29.8	0.60	0.67	0.60	23.4
Approach		906	0.2	0.568	7.7	LOS A	4.2	29.8	0.58	0.65	0.58	45.5
West: Eucalyptus Street (W)												
10	L2	278	0.0	0.409	7.8	LOS A	2.3	16.1	0.79	0.92	0.88	42.5
11	T1	116	0.0	0.346	8.2	LOS A	1.7	12.0	0.76	0.90	0.82	45.0
12	R2	66	3.0	0.346	12.4	LOS A	1.7	12.0	0.76	0.90	0.82	47.6
12u	U	2	0.0	0.346	14.0	LOS A	1.7	12.0	0.76	0.90	0.82	45.7
Approach		462	0.4	0.409	8.6	LOS A	2.3	16.1	0.78	0.91	0.85	44.2
All Vehicles		2704	0.4	0.570	7.7	LOS A	4.5	31.6	0.66	0.73	0.69	46.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 101 [1b. Link Rd / Horace St / Stanley St - Development Saturday Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Horace St (S)												
1	L2	208	1.0	0.477	5.6	LOS A	3.5	25.0	0.52	0.57	0.52	49.0
2	T1	830	0.7	0.477	5.7	LOS A	3.5	25.0	0.53	0.59	0.53	53.5
3	R2	98	4.1	0.477	9.6	LOS A	3.5	24.5	0.53	0.60	0.53	49.6
3u	U	2	0.0	0.477	11.4	LOS A	3.5	24.5	0.53	0.60	0.53	53.8
Approach		1138	1.1	0.477	6.0	LOS A	3.5	25.0	0.53	0.58	0.53	52.3
East: Stanley St (E)												
4	L2	120	1.7	0.788	28.5	LOS C	7.8	55.2	0.99	1.31	1.80	37.4
5	T1	98	0.0	0.788	28.5	LOS B	7.8	55.2	0.99	1.31	1.80	36.1
6	R2	80	2.5	0.788	32.5	LOS C	7.8	55.2	0.99	1.31	1.80	37.8
6u	U	2	0.0	0.788	34.0	LOS C	7.8	55.2	0.99	1.31	1.80	36.5
Approach		300	1.3	0.788	29.6	LOS C	7.8	55.2	0.99	1.31	1.80	37.0
North: Link Rd (N)												
7	L2	72	2.8	0.233	8.4	LOS A	1.1	8.1	0.61	0.75	0.61	48.2
8	T1	912	0.2	0.866	14.4	LOS A	15.5	109.0	0.97	1.11	1.47	48.6
9	R2	26	0.0	0.866	18.8	LOS B	15.5	109.0	1.00	1.14	1.53	45.4
9u	U	2	0.0	0.866	20.7	LOS B	15.5	109.0	1.00	1.14	1.53	48.8
Approach		1012	0.4	0.866	14.1	LOS A	15.5	109.0	0.95	1.09	1.41	48.5
West: Stanley St (W)												
10	L2	34	0.0	0.708	13.5	LOS A	5.1	35.9	0.85	1.10	1.29	43.4
11	T1	102	0.0	0.708	13.5	LOS A	5.1	35.9	0.85	1.10	1.29	41.7
12	R2	250	0.0	0.708	17.3	LOS B	5.1	35.9	0.85	1.10	1.29	44.0
12u	U	2	0.0	0.708	19.0	LOS B	5.1	35.9	0.85	1.10	1.29	42.2
Approach		388	0.0	0.708	16.0	LOS B	5.1	35.9	0.85	1.10	1.29	43.3
All Vehicles		2838	0.7	0.866	12.8	LOS A	15.5	109.0	0.77	0.91	1.08	47.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 102 [2b. Horace Street / Sports Complex Driveway - Development Saturday Peak]

New Site

Site Category: (None)

Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Horace Street (S)												
2	T1	912	0.4	0.376	2.0	LOS A	3.1	22.0	0.16	0.08	0.21	56.1
3	R2	112	0.0	0.376	17.5	LOS B	3.1	22.0	0.79	0.38	1.07	42.5
Approach		1024	0.4	0.376	3.7	NA	3.1	22.0	0.23	0.11	0.30	54.2
East: BBall Courts Driveway												
4	L2	222	0.0	0.167	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	50.0
Approach		222	0.0	0.167	5.5	LOS A	0.0	0.0	0.00	0.54	0.00	50.0
North: Horace Street (N)												
7	L2	114	0.0	0.061	5.6	LOS A	0.0	0.0	0.00	0.54	0.00	53.6
8	T1	882	0.7	0.454	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		996	0.6	0.454	0.7	NA	0.0	0.0	0.00	0.06	0.00	58.7
All Vehicles		2242	0.4	0.454	2.6	NA	3.1	22.0	0.10	0.13	0.14	55.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 **Site: 103 [3b. Horace St / Eastern Arteria Rd /Eucalyptus St / Hunter Ave - Development Saturday Peak]**

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Eastern Arterial Road (S)												
1	L2	82	0.0	0.384	6.1	LOS A	2.3	16.0	0.54	0.62	0.54	49.1
2	T1	692	0.6	0.384	6.2	LOS A	2.3	16.0	0.55	0.63	0.55	50.5
3	R2	44	0.0	0.384	10.4	LOS A	2.2	15.7	0.55	0.64	0.55	50.0
3u	U	2	0.0	0.384	12.4	LOS A	2.2	15.7	0.55	0.64	0.55	54.2
Approach		820	0.5	0.384	6.4	LOS A	2.3	16.0	0.55	0.63	0.55	50.3
East: Hunter Avenue (E)												
4	L2	52	0.0	0.095	8.3	LOS A	0.4	3.0	0.69	0.81	0.69	47.6
5	T1	52	3.8	0.145	7.0	LOS A	0.7	5.1	0.70	0.82	0.70	45.3
6	R2	50	0.0	0.145	11.0	LOS A	0.7	5.1	0.70	0.82	0.70	27.7
6u	U	2	0.0	0.145	12.7	LOS A	0.7	5.1	0.70	0.82	0.70	46.1
Approach		156	1.3	0.145	8.8	LOS A	0.7	5.1	0.70	0.82	0.70	40.2
North: Horace Street (N)												
7	L2	40	0.0	0.305	5.6	LOS A	1.6	11.5	0.39	0.53	0.39	44.8
8	T1	806	0.7	0.609	5.5	LOS A	5.0	35.3	0.46	0.57	0.46	50.3
9	R2	140	0.0	0.609	9.5	LOS A	5.0	35.3	0.50	0.59	0.50	45.1
9u	U	116	0.0	0.609	11.5	LOS A	5.0	35.3	0.50	0.59	0.50	23.9
Approach		1102	0.5	0.609	6.6	LOS A	5.0	35.3	0.47	0.57	0.47	47.0
West: Eucalyptus Street (W)												
10	L2	164	0.0	0.196	6.0	LOS A	0.9	6.3	0.63	0.77	0.63	44.1
11	T1	60	0.0	0.164	6.3	LOS A	0.7	4.9	0.63	0.79	0.63	45.7
12	R2	52	0.0	0.164	10.3	LOS A	0.7	4.9	0.63	0.79	0.63	48.5
12u	U	2	0.0	0.164	12.1	LOS A	0.7	4.9	0.63	0.79	0.63	46.5
Approach		278	0.0	0.196	6.9	LOS A	0.9	6.3	0.63	0.78	0.63	45.6
All Vehicles		2356	0.5	0.609	6.7	LOS A	5.0	35.3	0.53	0.63	0.53	47.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Attachment 5 Design Review

TYPICAL

Please note the following compliance requirements:

Height Clearance: **2.2m** (min) throughout all areas of the car park accessible to vehicles and bicycles.
2.5m above accessible and shared bays
X wherever access is required for a refuse vehicle (and safety clearance envelope)

Sight Splays: Visibility splays in the form of a **2.5m x 2m** right-angled triangle to be provided (AS2890.1). Ensure design avoids visual obstructions in sight splay (i.e. dense landscaping, tall fencing/walls etc.)

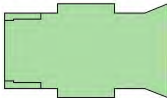
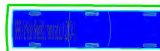
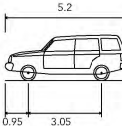
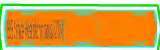
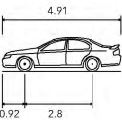
Parking Spaces: The parking envelopes shown, must be kept clear of all physical obstructions, including height clearance reductions. Ensure that grades within the parking module do not exceed 1:20 (1:40 for accessible bays).

Accessible Spaces: To be designed in accordance with AS2890.6. i.e. standard parking space with adjacent shared bay (2.4m x 5.4m), to be installed as per AS2890.6 requirements (bollard and markings).

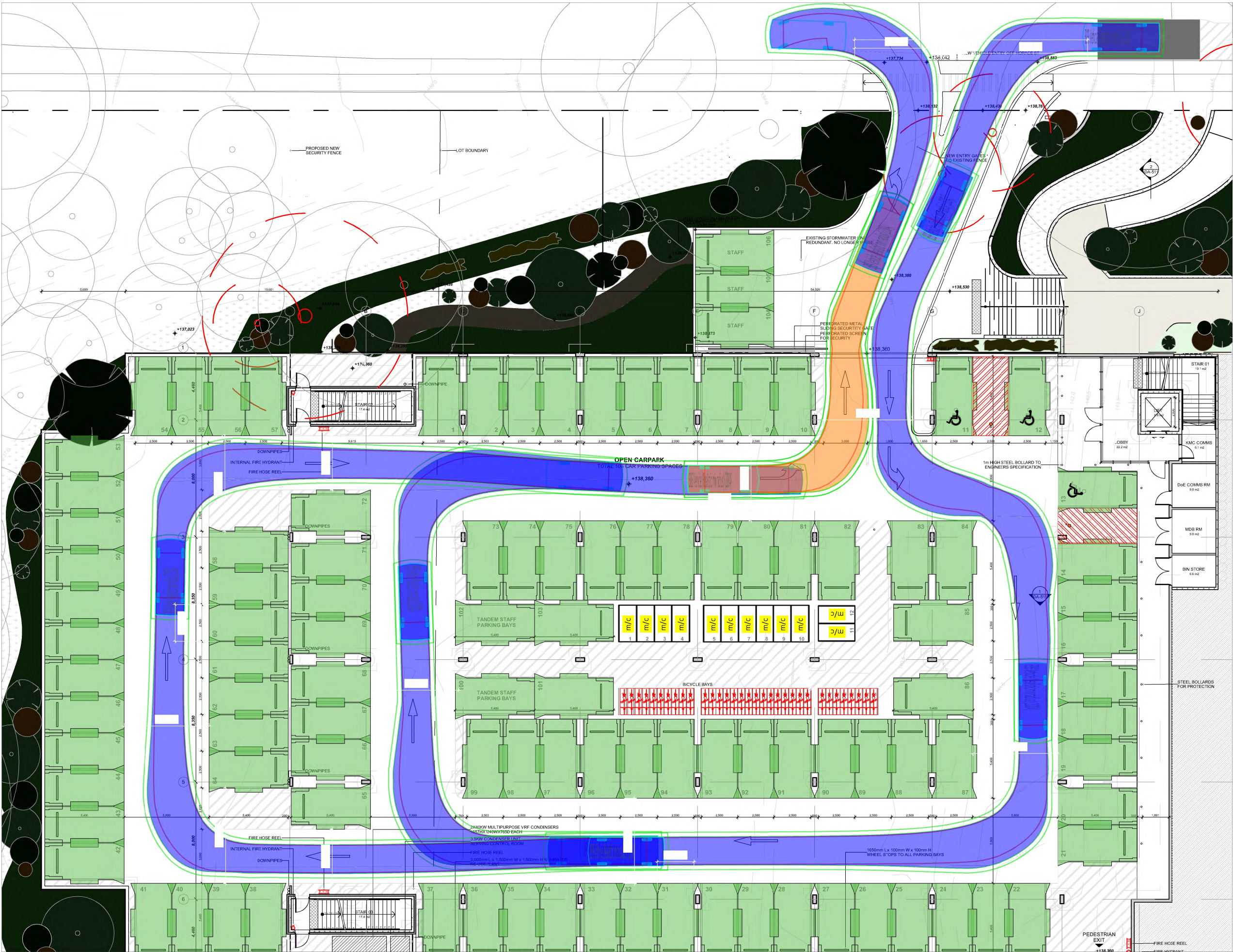
Motorcycle Parking: Motorcycle bays to be designed as a 2.5m x 1.2m envelope (AS2890.1).

Bicycle Parking: Bicycle spaces are to allow for a envelope of 500mm by 1800mm, with an aisle width of 2000mm for locker storage, or 1500mm for racks.

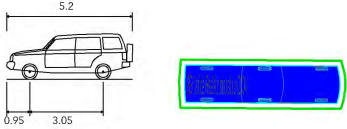
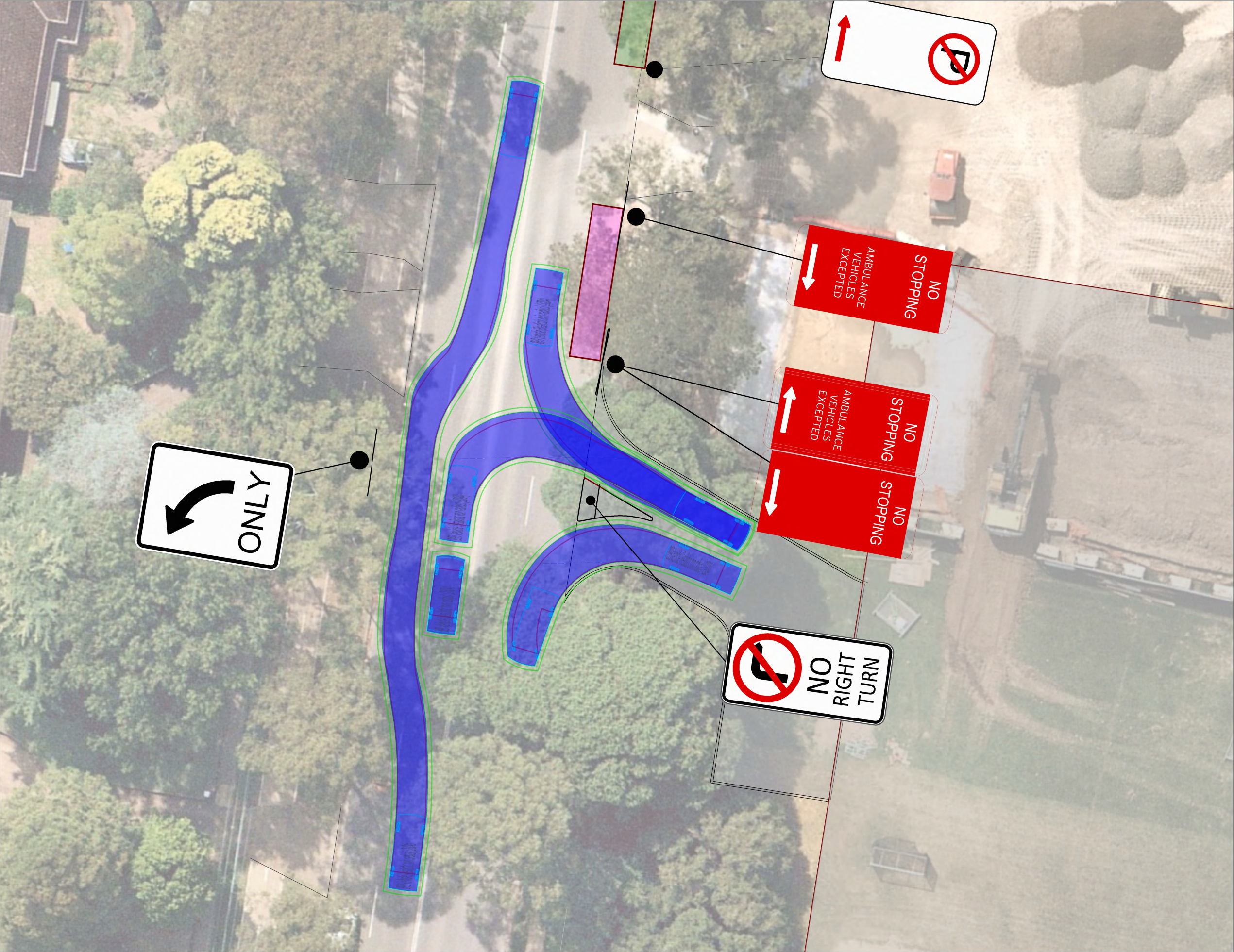
Control Measures: Please note recommended control measures, including line markings, signage, bollards, convex mirrors, lights etc.



2.5m x 5.4m Parking Envelope



rev	date	comment / description	drawn	reviewed
7	10.06.21	For Information	KB	SW
6	29.04.21	For Information	KB	SW
5	12.04.21	For Review	KB	SW
4	03.08.20	For Review	PS	KB
3	30.07.20	For Review	PS	KB
2	08.07.20	For Review	PS	KB
1	26.06.20	For Review	PS	KB



B99 Veh cle (Realistic min radius) (2004)
Overall Length 5.200m
Overall Width 1.940m
Overall Body Height 1.878m
Min Body Ground Clearance 0.272m
Track Width 1.840m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 6.250m

- 5 x 6.1m long pick-up and drop-off spaces
- 11m long ambulance bay

Note: The dimensions are in meters.

17 November 2021



Ku-ring-gai Council
Christoph Jaensch
JDH Architects
181 Oxford Street
Darlinghurst
NSW 2010

Dear Christoph

1. 1175 St Ives Indoor Sports Complex – Response to Submissions

ptc. has been engaged by JDH Architects on behalf of Ku-ring-gai Council to address comments received following the submission of the Development Application (DA) for the proposed development of a sports complex located at 60-70 Horace Street, St Ives.

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

- Letter Dated 28 September 2021 from Ku-ring-gai Council (Council), and
- Letter Dated 3 August 2021 from Transport for NSW (TfNSW).

The individual items are addressed below.

2. Council Comments

Council Comment

Concerns are raised over various insufficient details and anomalies which appear within the ptc traffic report and require review.

Horace Street is a classified regional road. This road during normal peak commute times (outside of COVID lockdowns) carries considerable numbers of fast moving traffic, with no signalised slowing of traffic and minimal pedestrian crossing points.

Response

The sports complex is not proposed to be available for public use during the weekday morning peak hour.

The Horace Street / Eucalyptus Street roundabout is located just 100m south of the proposed driveway to the sports centre, meaning that vehicles will already be slowing down prior to approaching the intersection.

It is noted that other residential and school driveways are located along this road section.

An additional driveway may lead to slowing down the traffic, though it is noted that the majority of games are expected to occur outside of peak hours.

A signalised pedestrian crossing is located 200m north of the proposed development.

Council Comment

Submissions have raised

- 1. issues to do with pedestrian safety (minimal crossings) and*
- 2. the heavy reliance on onsite parking.*

Response

1. A signalised pedestrian crossing is located 200m north of the proposed development. This is considered an adequate pedestrian facility provision, given that the proposed development would cater mainly for adults (as opposed to the adjacent school).
2. The quantity of parking has been set out based on a first principal assessment, which has taken the following into consideration:
 - a. Number of players, referees, staff and spectators,
 - b. The limited public transport availability in the surroundings,
 - c. The proposed provision of bicycle spaces and an End of Trip Facility to encourage alternative transport modes,
 - d. The provision of a pick-up and drop-off area,
 - e. Staggering of games to spread traffic and parking demand.

Considering all the above, the quantity of parking spaces has been established while assuming that a proportion of users would utilise public and active transport and the pick-up and drop-off area to get to and from the facility.

Council Comment

One submission questioned

- 1. how many staff spaces will be accommodated within the car park,*
- 2. how the event staggering will work in practice,*
- 3. how drop off and pick-ups will occur in the rain (where proposed outside),*
- 4. safety around the kiss and drop area provided on Horace Street,*
- 5. concerns relating to the interaction between pedestrians and drivers at this point and*
- 6. how the car park will be secured to prevent commuter parking.*
- 7. It was also suggested that a sign be provided to indicate when the car park is full to avoid queuing in Horace Street.*

Response

1. 7 spaces have been allocated to staff, as noted within the Traffic Impact Assessment submitted as part of the DA (refer to drawing number ptc-001 and the architectural drawing number DA-102)
2. The online booking system will not allow patrons to book a court back-to-back, i.e. the 30-minute gaps between the games will be blocked out. As an example, the courts will be bookable for 1-hour blocks at 3:30pm, 5:00pm, 6:30pm, etc., as opposed to 1-hour blocks at 3:30pm, 4:30pm, 5:30pm etc.
3. The pick-up and drop-off are located about 40m away from the main entry. Patrons / visitors dropped off will enter the building through the provided footpath – on both rainy and sunny days (refer to Figure 1).
4. Vehicles parking within the pick-up and drop-off area will do so in accordance with the general parking rules. It is acknowledged that the pick-up and drop-off results in a higher turnaround, but it is noted

that such arrangement is not uncommon (school pick-up and drop-off occurs in the same way) and the majority of games are expected to occur outside of peak hours.

5. Pedestrians will exit the building and use the footpath leading up to the pick-up and drop-off spaces; The vehicles will stop within the pick-up and drop-off spaces. No conflicts are expected during this occurrence (refer to Figure 1). Appropriate parking signage ("No Parking") has been proposed as part of the original DA submission.
This arrangement is similar to a pick-up and drop-off operation at a school pick-up and drop-off.
6. The area surrounding the proposed development is mostly residential, with little industry or shops that would generate commuter parkers. Further, the car park will be secured by a gate outside of school and the complex's operating hours.
The car park will be used by staff from the adjacent school during school hours. The school will ensure that staff vacate the car park after school finish, so that all parking spaces are available for community use.
7. It is considered that a "car park full" sign would deter patrons from entering the car park. Without such note, patrons would enter the car park and, if required, recirculate until a vacant space is found.

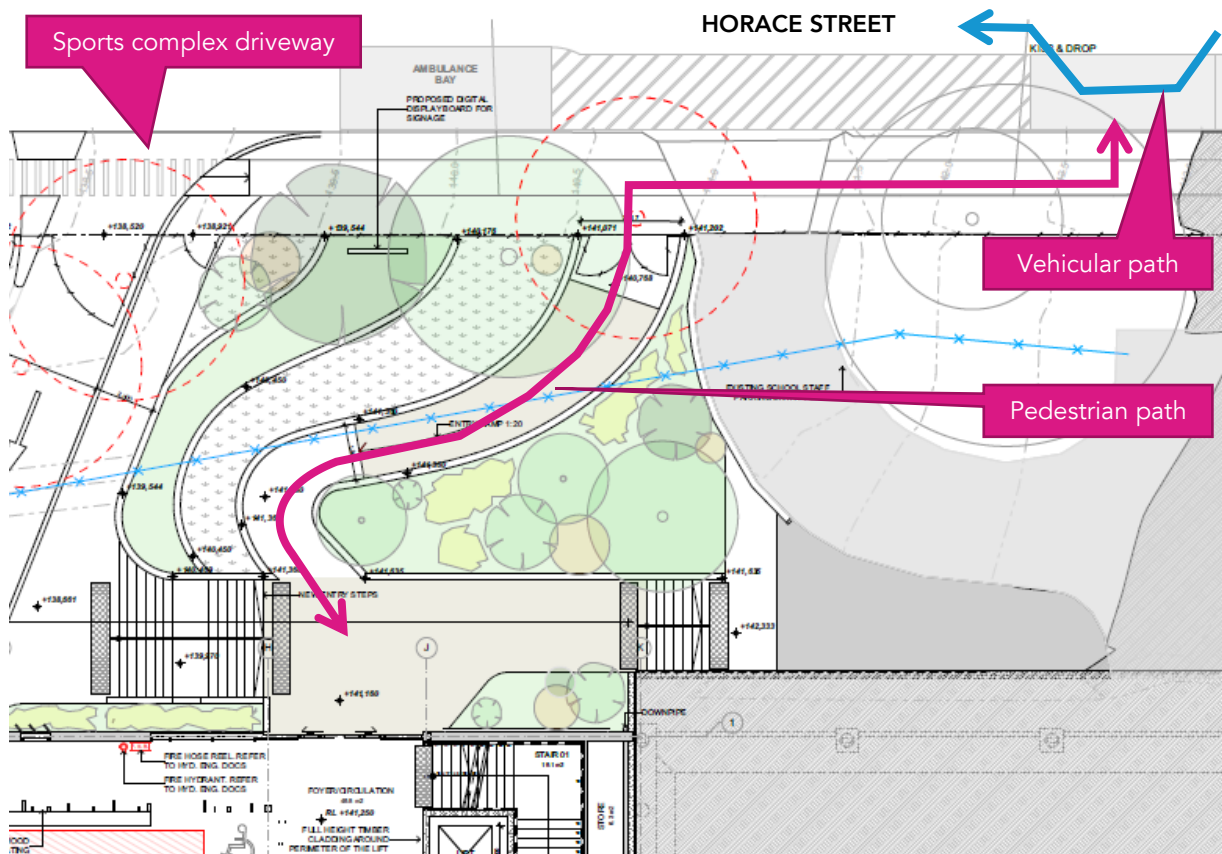


Figure 1 - Use of pick-up and drop-off

Council Comment

There is no definitive design provided for the proposed median island in Horace Street and particular issues are:

- *How does the median allow right turn ingress but preclude right turn egress?*
- *Will the median be wide enough to provide refuge for pedestrians crossing and if it is, then will this require widening of the Horace Street roadway to accommodate it?*
- *It would appear that there will be some potential in the future due to safety consideration (e.g. limited sight distance due to the crest just to the north) to extend the median to prevent the right turn ingress.*

Response

The proposal does not involve a provision of a median island along Horace Street.

The proposed median is to be provided along the access driveway and has been designed with the following considerations:

- The median divides the inbound and outbound movements, which results in a reduction in conflicts.
- The median has been designed such that it deters right turn egress movements. A swept path assessment demonstrating the possible ingress and egress manoeuvres are shown in Figure 2. The left only movement will be reinforced by the "Left Only" and "No Right Turn" signage. This is to ensure vehicles egress from the proposed car park in an efficient and safe manner without disrupting the through traffic.
- The median provides for a pedestrian refuge which is 1.2m in width and length. This is to ensure that pedestrians are able to safely cross the proposed access driveway and minimise potential conflict between pedestrians and vehicles.
- The driveway has been designed and will be constructed in accordance with the relevant Australian Standards.

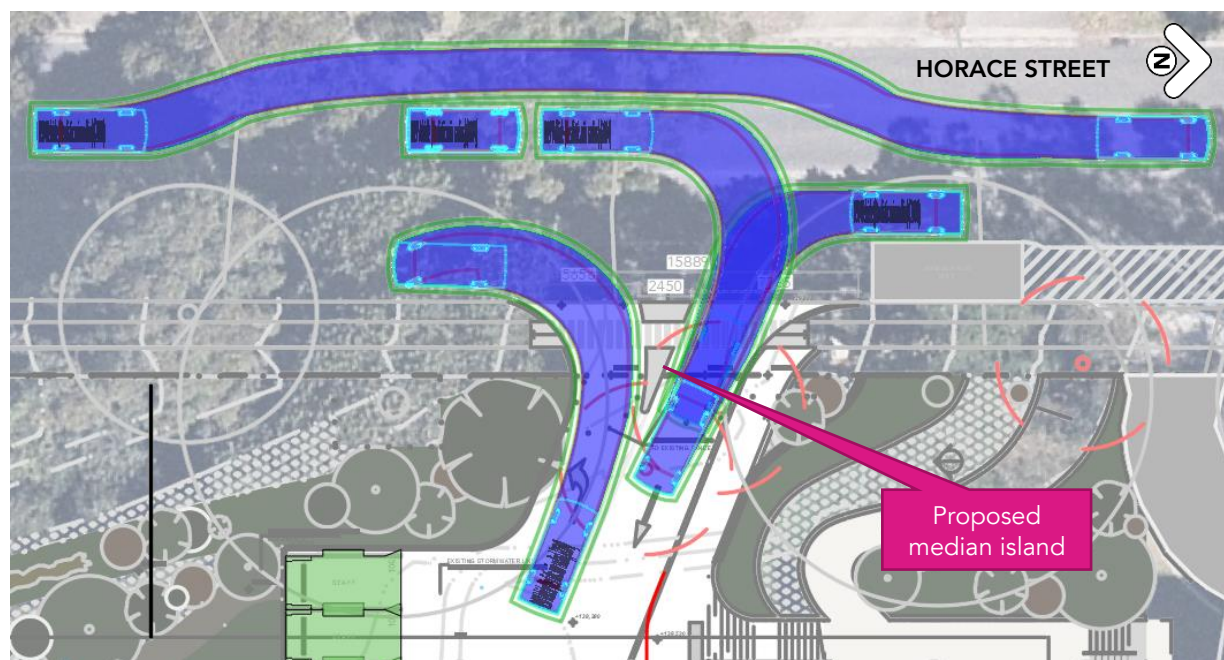


Figure 2 - Swept Path Assessment

Council Comment

*Contingent provision should be made for this potential eventuality as alluded to in the TfNSW response, there are significant errors in attachment 3 Signage Plan in the **ptc.** report in the context of “encouraging” the use of the basement car park, there is also the potential that it will reach capacity at peak usage times and it would be unfortunate if this exacerbated the impact of access movements.*

While there would be a significant cost for a fully installed “space available” system, it could be judicious to at least install the necessary conduits in conjunction with the construction works.

Response

The signage plan has been amended as per the phone consultation with TfNSW on 1st November 2021. Please refer to response to TfNSW comment regarding signage for a detailed response on the amendments made.

In regard to a parking system, the following is noted:

- Car parks of the proposed capacity are typically not provided with parking systems.
- Users of the proposed car park are envisaged to be patrons and visitors to the sports complex, with games / activities mostly lasting one hour. Therefore, a high turnover of vehicles is expected within the car park, particularly between the games.
- The proposed car park has been designed to provide a simple yet effective circulation, with traffic aisles circulating in a one-way manner. This is to ensure that vehicles are able to access, circulate and exit the car park in a safe and efficient manner, with minimal disruptions. Should the car park be full at the time of entry of a vehicle, the simple one-way arrangement enables easy recirculation.
- It is considered that a “car park full” sign would deter patrons from entering the car park. Without such note, patrons would enter the car park and, if required, recirculate until a vacant space is found.

Council Comment

*There is a significant crest just to the north of the site. The **ptc.** report (p.34) says that "Northumberland Street is a straight and flat section of the road where sufficient sight distance is available." This street is not found in the locality of the development.*

Response

The street name "Northumberland Street" has been incorrectly used in place of Horace Street; The incorrect name of the street was a typo.

The assessment of sight distance has been undertaken for the frontage road as per Section 3.2.4 of AS2890.1. The proposal involves the provision of an access driveway along Horace Street which has a posted speed limit of 60km/h.

AS2890.1 stipulates that an access driveway with a frontage road speed of 60km/h is to be provided with a desirable visibility distance of 83 metres and a minimum stopping distance of 65 metres. The proposed driveway along Horace Street is located on a straight section of the road. It is noted that there is a crest towards the north of the proposed driveway.

A desktop analysis indicates that the crest is located directly in front of property 47 Horace Street. The sight distance assessment has been undertaken (refer to Figure 3) as per Figure 3.2 of AS2890.1, which indicates that the crest of the hill lies outside the minimum stopping distance of 65 metres. Therefore, the proposed location of the access driveway along Horace Street complies with the requirements of AS2890.1.



Figure 3 - Sight Distance Requirement

Council Comment

The ptc. report makes much of the proposed provision of 33 bicycle parking spaces with EOT facilities and the existence of an off-road shared path along Horace Street. This runs along the western side of the road although there is the ability to cross at the pedestrian signals near the Primary School.

A shared path could be provided on the eastern side between the signals and the site.

Response

The provision of the bicycle parking spaces and an End of Trip Facility has been made to encourage the use of alternative modes of transport, particularly given the poor public transport network in the vicinity of the site. The proposed complex will predominantly be utilised by adults who are able to cycle on the road.

Eucalyptus Street is line marked as an on-street cycling route as shown in Figure 4, which is considered to be sufficient to accommodate cyclists travelling to and from the proposed development.

As stated in the TIA and the comment, there is a shared path on the western side of Horace Street; The provision of shared paths on both sides of a road is not common in Sydney. Nevertheless, any upgrades to the cycling network as part of Council's yearly infrastructure improvements would benefit the broader community and would be welcomed by the proposed development.

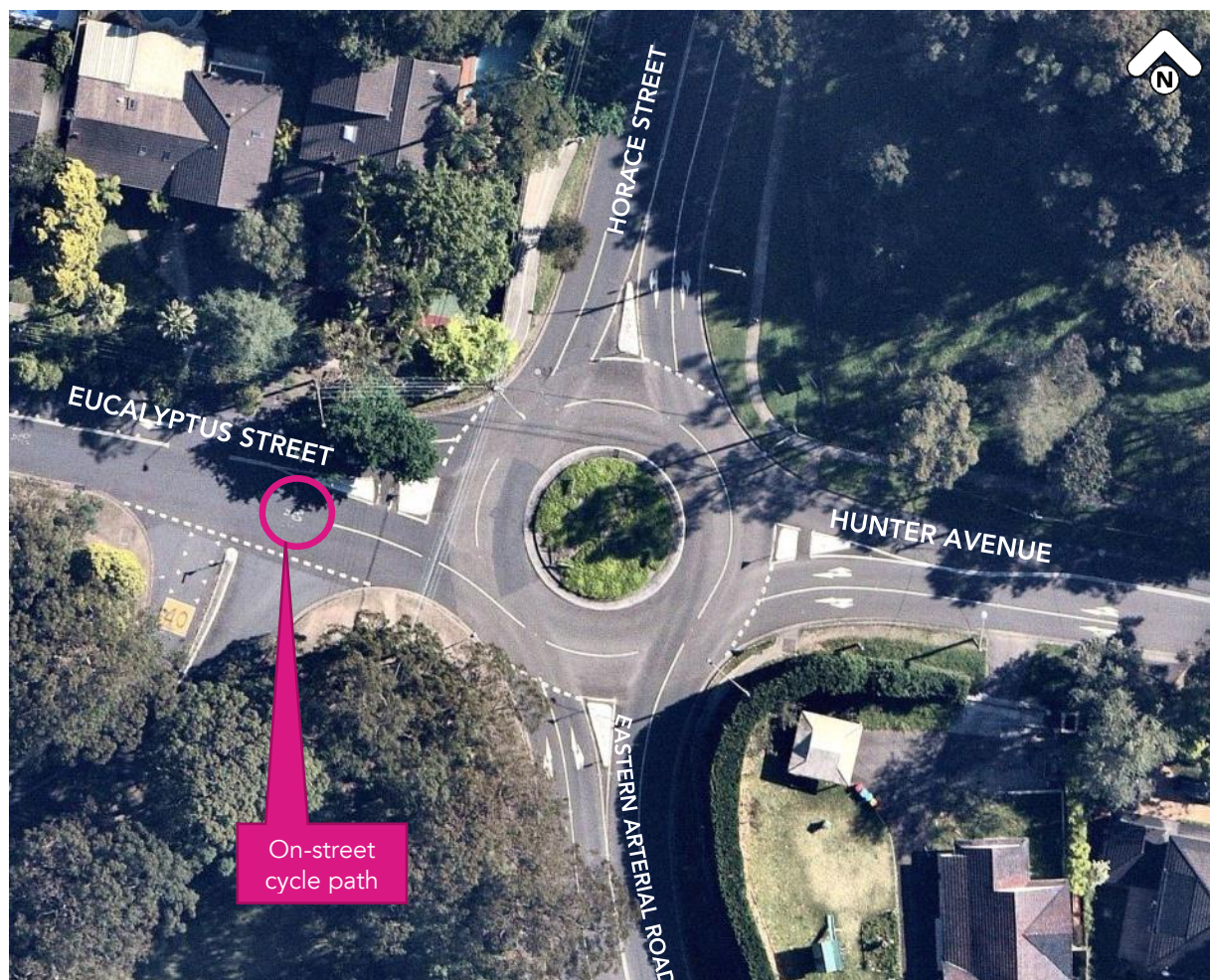


Figure 4 - On-road Cycling Route Line Marking (Source: Nearmap)

Council Comment

It is stated that visitors will be encouraged to park within the basement car park however, there is no indication of how this will be encouraged. The best form of encouragement would be to ensure that the parking spaces are used efficiently and effectively.

The Plan does not contain anything which indicates how non-bona fide and overstay parking would be dealt with.

Response

Measures

The following measures will be implemented to encourage the use of the proposed car park for patrons and visitors:

- The sports complex website will promote the use of the proposed car park, with relevant information provided. The mere provision of a convenient on-site car park is seen as encouragement to park there.
- The patrons and visitors will be provided with parking information upon booking confirmation for the use of the proposed sports complex. This will encourage the use of the proposed car park.
- The area surrounding the proposed development is mostly residential, with little industry or shops that would generate commuter parkers. Further, the car park will be secured by a gate outside of school and the complex's operating hours.
The car park will be used by staff from the adjacent school during school hours. The school will ensure that staff vacate the car park after school finish, so that all parking spaces are available for community use.

Car Park Use

As previously discussed, users of the proposed car park are envisaged to be patrons and visitors to the sports complex, with games / activities mostly lasting one hour. Therefore, a high turnover of vehicles is expected within the car park, particularly between the games.

The proposed car park has been designed to provide a simple yet effective circulation, with traffic aisles circulating in a one-way manner. This is to ensure that vehicles are able to access, circulate and exit the car park in a safe and efficient manner, with minimal disruptions. Should the car park be full at the time of entry of a vehicle, the simple on-way arrangement enables easy recirculation.

It is considered that a "car park full" sign would deter patrons from entering the car park. Without such note, patrons would enter the car park and, if required, recirculate until a vacant space is found.

On-Street Parking

It is considered that patrons would unlikely chose to park within the surrounding residential streets in preference to on site parking due to the distance between parking spaces and the entry to the complex.

A desktop analysis has been undertaken to assess the potential on-street parking spaces that the patrons would be able to use in the vicinity of the site, refer to Figure 5. The analysis indicates that patrons would be required to walk a minimum 100 metres from the closest available on-street parking space along the southern side of Hunter Avenue, noting that the only access to the proposed site is off Horace Street.

Patrons that would park their vehicles along the residential streets towards the east of the site would need to walk around the site to enter the complex, which seems inconvenient (path illustrated with blue dotted line in Figure 5).

In light of the above, it is anticipated that the provision of a dedicated car park for patrons within the subject site will be a form of encouragement.

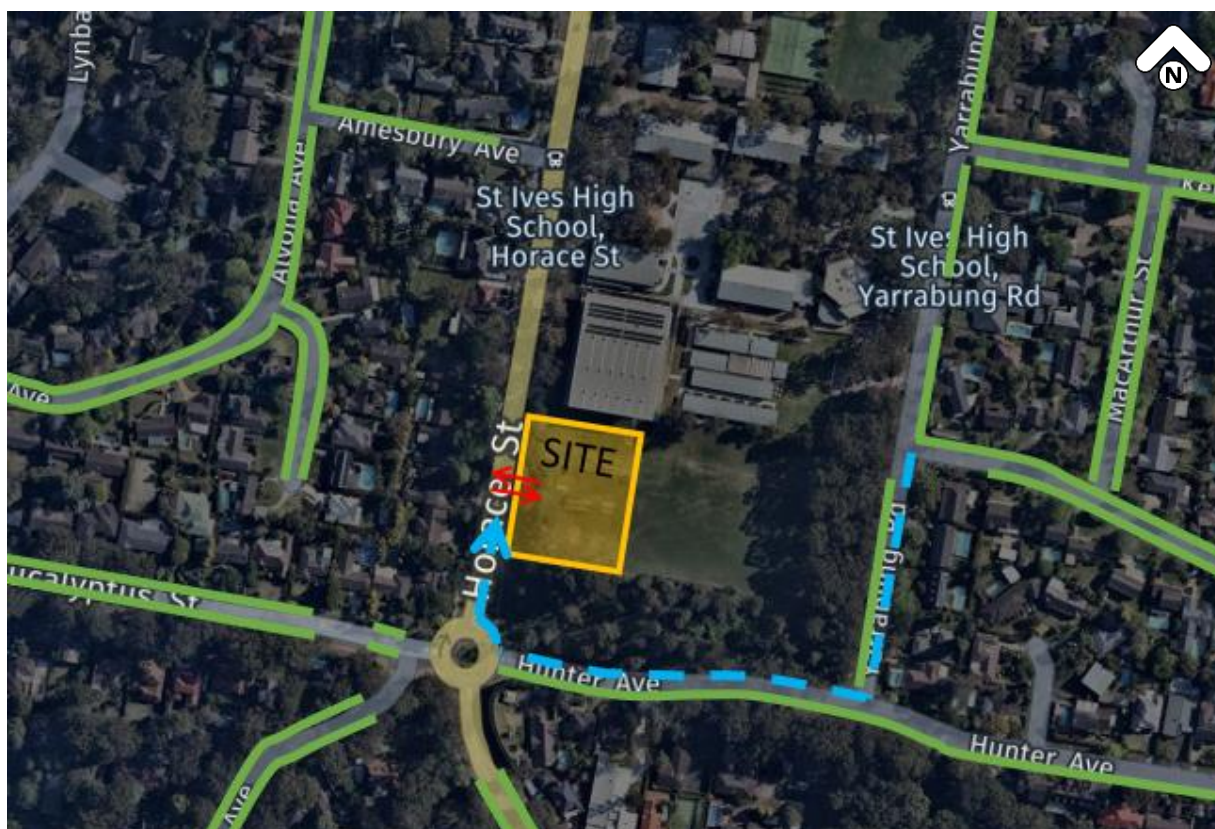


Figure 5 - On-street Parking Availabilities (Source: Nearmap)

Council Comment

It is said that games will be scheduled to have a 30 minute programmed time gap. This could mean games at the 2 courts starting and finishing at the same time and potentially at the same time as activities in the multipurpose room. It would be preferable for the start and finish times of each court to be staggered.

These items should be further addressed within amended Plan of Management and Traffic Report documents.

Response

It is noted that a first principle assessment for the likely parking requirement for the proposed development was undertaken in the original traffic report prepared by **ptc.** dated 10 June 2021.

The parking assessment includes the 2 proposed courts and 2 additional basketball courts situated in the adjacent school sports complex which is anticipated to be made available for community sports. The assessment indicates that 92 car parking spaces will be sufficient to accommodate the patrons, staff and visitors associated with all 4 courts operating concurrently. The proposed multipurpose room has been allocated additional 9 car parking spaces.

The parking and traffic assessment assumes that all 4 courts and the multipurpose room are used at the same time, with a 30-minute gap between the basketball games. The facility has been designed to be able to accommodate the parking demand and traffic generation related to the complex under the above operational assumptions.

It is proposed to commence the operation and review the efficiency after a few months.

Council Comment

Further discussion on how the hall events and sporting events may be managed in respect of the side by side driveways and entry and existing aspects.

Response

The driveway adjacent to the proposed sports complex's driveway leads out of the adjacent school car park (see the screenshot below). The school car park will not be operational outside of school hours, and the sports complex will be available to the community outside of school hours only. The school driveway is managed by a gate, so misuse of the car park is not likely to occur.

In light of the above, the two driveways will not be operational at the same time.

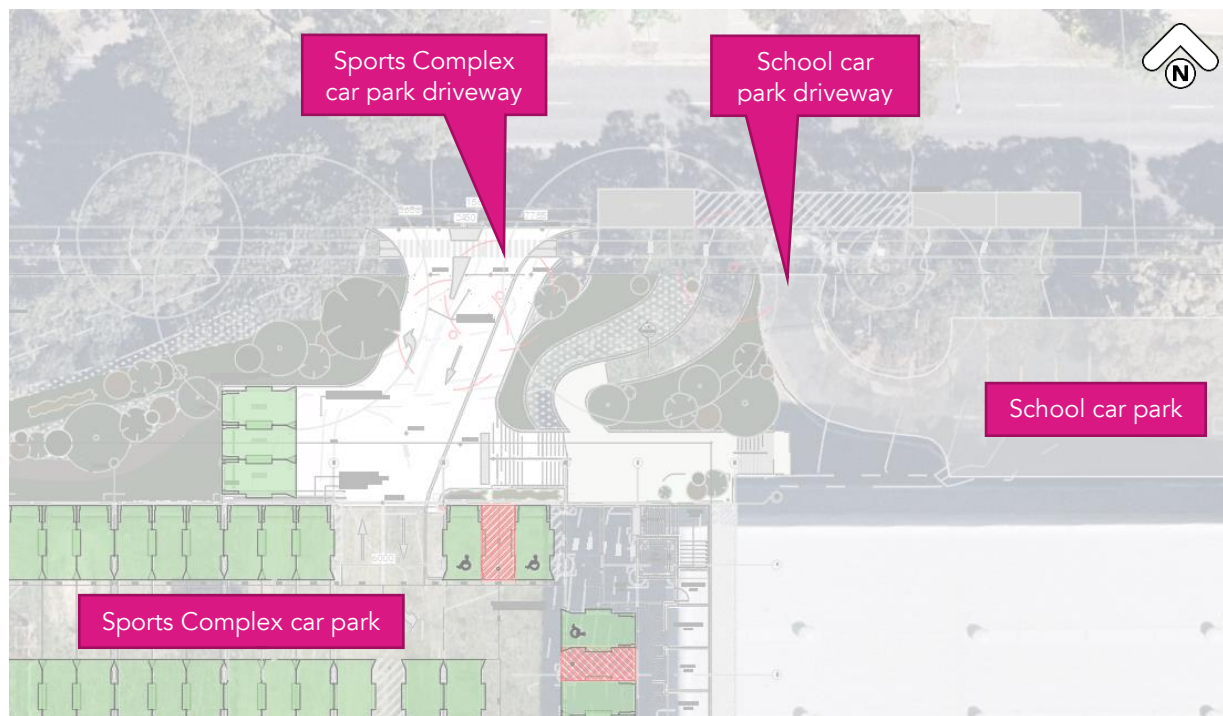


Figure 6 – Driveway locations

Council Comment

Deliveries – the Operational Plan of Management identifies that deliveries are to occur in the basement but no clearly designated loading/unloading area is identified on the plans. The café is likely to have regular deliveries for milk, coffee, bread, soft drinks etc and it would be expected and likely that the lift would be used to transport food and other items up to the café.

Response

The deliveries will occur during community use operation hours in vehicles no larger than a B99 (a van, for example), for which the car park has been designed. The deliveries will be small in nature and last short periods of time, thus it is envisaged that this would have a negligible effect on the complex's overall parking and traffic performance.

Refer to the architectural response for more detail.

3. Transport for NSW Comments

TfNSW Comment

The proposed stormwater system and vehicular access on the classified regional road should be designed and constructed to the satisfaction of Council.

Response

Noted. The detailed design of the proposed stormwater system and vehicular access on the classified regional road is to be provided by the Civil Engineers.

TfNSW Comment

It is suggested that the locations of the "Left Turn Only" sign and the "No Right Turn" sign shown in Attachment 3 of the Traffic Impact Assessment report (TIA).

There are a number of incorrect signs shown on the signage and linemarking plan in Attachment 3 of the TIA.

The signage and linemarking plan should be updated to meet TfNSW requirements and be in accordance with AUSTROADs and other Australian Codes of Practice.

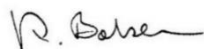
Response

The signage plan has been amended (see Attachment 1) as per the phone consultation undertaken with TfNSW on 1st November 2021. The amendments include the following:

- The proposed No Stopping signs on either side of Horace Street adjacent to the roundabout have been amended to double arrows from the single arrow signs.
- Additional No Stopping double arrow signs have been provided on either side of Horace Street to reinforce the proposed parking restrictions.
- The "Left Turn Only" sign has been relocated and is proposed to be installed on the median island located on the proposed access driveway. The "No Right Turn" sign has also been relocated and is proposed to be installed on Horace Street directly opposite the proposed access driveway.

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

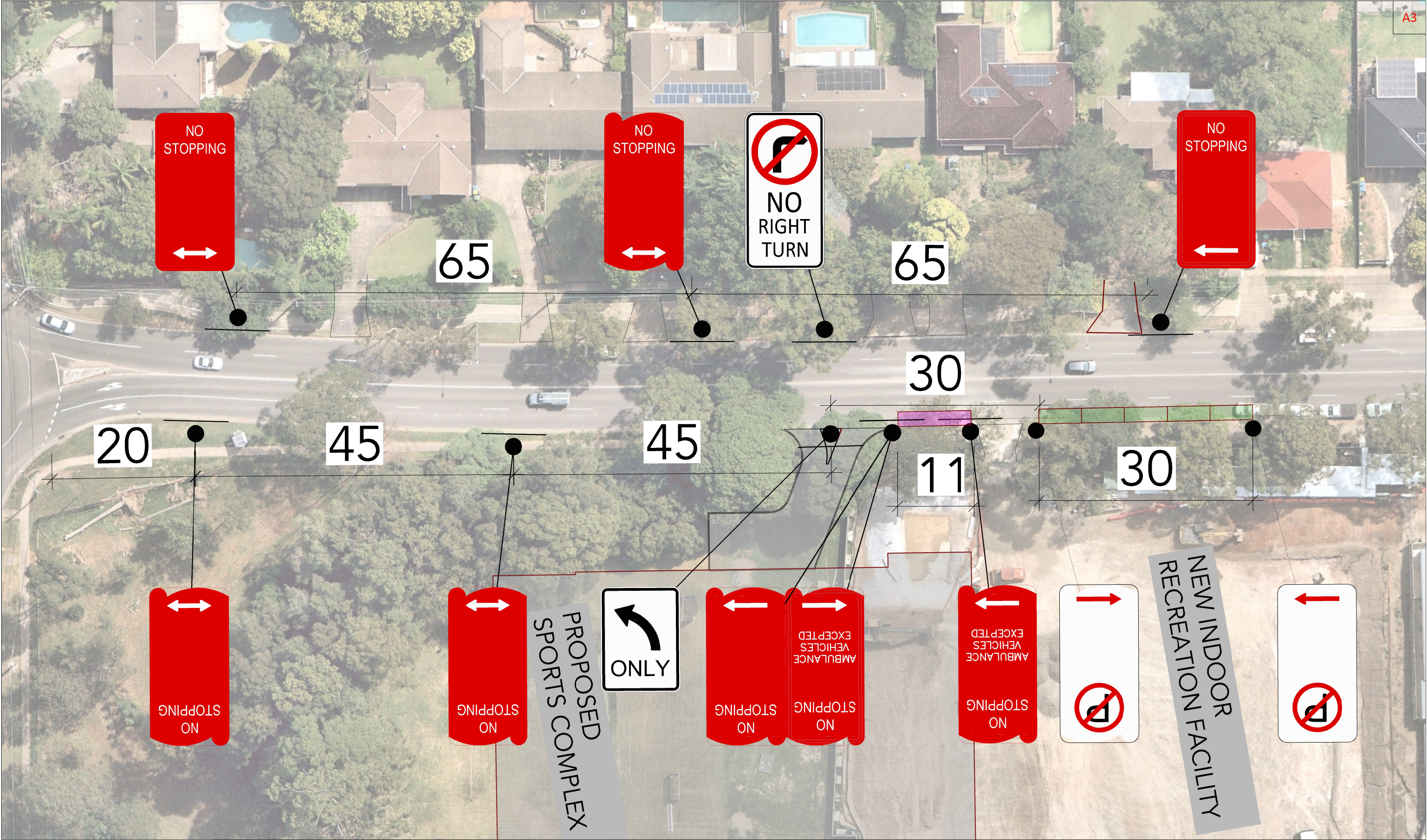
Kind regards,



Kasia Balsam
Team Leader

Document Control: Prepared by JJ on 17 November 2021. Reviewed by KB on 17 November 2021.


Attachment 1 Signage Plan



comments

- 5 x 6.1m long pick-up and drop-off spaces
- 11m long ambulance bay

Note: The dimensions are in meters.

<div>ptc.</div> <div>Suite 502, 1 James Place North Sydney NSW 2060</div> <div>t +61 2 8920 0800</div> <div>ptccconsultants.co</div>	rev	date	comment / description	drawn	reviewed		project St Ives Indoor Sports Complex	drawing title Proposed Signage Plans	client	Ku-ring-gai Council	
									drawing #	ptc-001	
	5	03.11.21	For Information	JJ	SW				project #	2854	
	4	10.06.21	For Information	KB	SW				scale	rev 5	
	3	29.04.21	For Information	KB	SW						
	2	30.07.20	For Review	PS	KB						
	1	03.07.20	For Review	PS	KB						

16 February 2022

Ku-ring-gai Council
Christoph Jaensch
JDH Architects
181 Oxford Street
Darlinghurst
NSW 2010

Dear Christoph

1. 1175 St Ives Indoor Sports Complex – Additional Response to Submission

ptc. has been engaged by JDH Architects on behalf of Ku-ring-gai Council to address additional comments received following the submission of the Development Application (DA) for the proposed development of a sports complex located at 60-70 Horace Street, St Ives.

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

- Letter Dated 9 February 2022 from Ku-ring-gai Council (Council)

The individual comments are addressed below.

2. Council Comments

2.1 Comment 1

Council Comment

Further dimensional detail is required in relation to the proposed median island and the treatment of traffic lanes to satisfy road design criteria. ptc specifies that the proposed median island will be 1200mm long and wide. Firstly, the island needs to be longer than this to satisfy road design criteria. Secondly, this section of Horace Street has a 12800mm wide roadway which has 4 marked lanes. Sufficient detail has not been provided detailing how the lanes can be maintained as prescribed above when 1200mm is allocated to the median island.

Response

The proposal **does not** involve the provision of a median island **along Horace Street**.

It is proposed to retain the existing 4-lane arrangement of Horace Street, and no median or width reduction of the 12800mm wide carriageway is being proposed. The 4 lanes are proposed to retain their existing use, i.e. 2 through lanes and 2 shoulders / parking lanes (refer to Figure 1).

The proposed median island is to be provided upon entry to the site, along the crossover to separate the inbound and outbound traffic into the site, as shown in Figure 1, Figure 2 and Figure 3. The 1.2m long and wide cut-out within the island acts as a holding area for pedestrians walking along the footpath. This is to ensure that pedestrians are able to safely cross the proposed access driveway and minimise potential conflict between pedestrians and vehicles.

The driveway has been designed and will be constructed in accordance with the relevant Australian Standards.

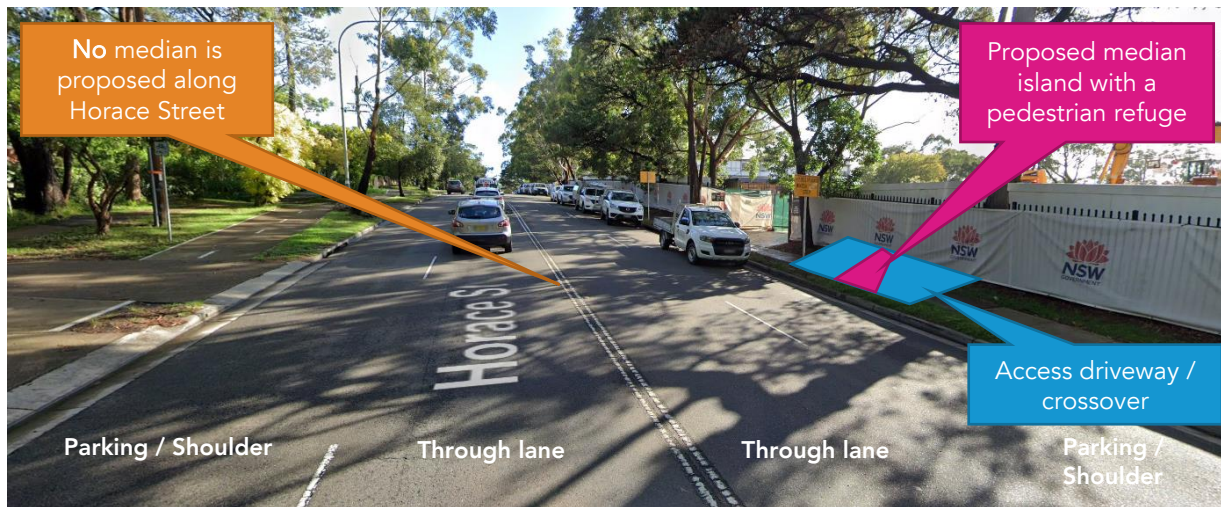


Figure 1 - Sketch of the Proposed Median Island Along the Driveway (not Horace Street)

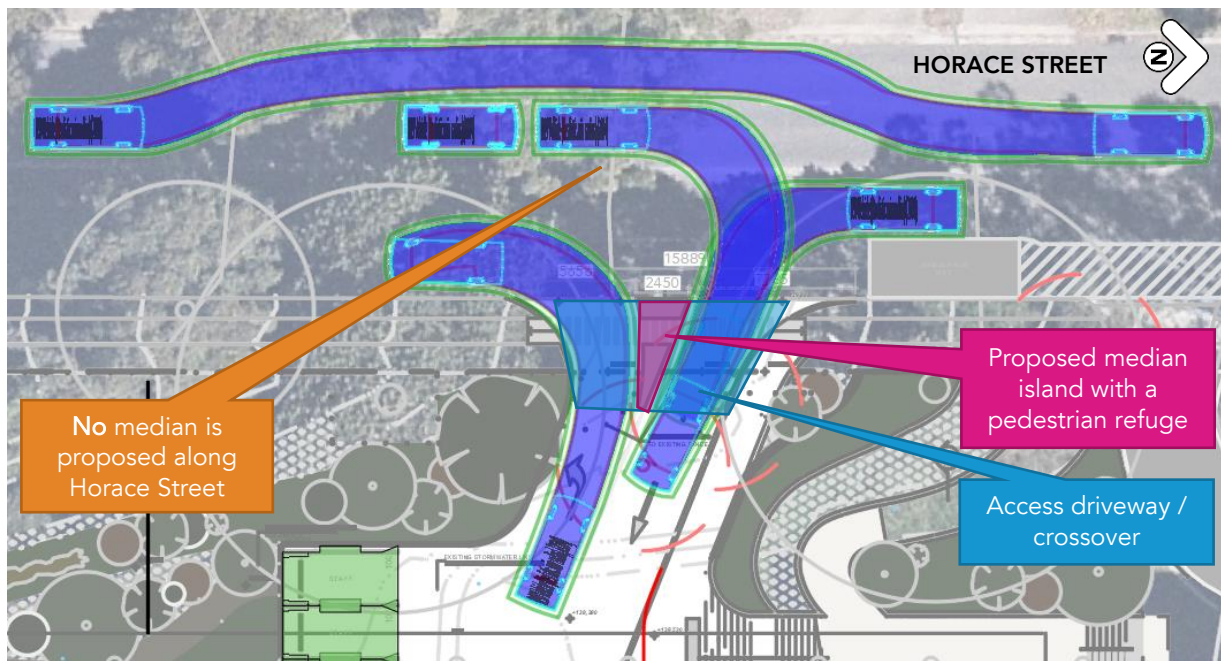


Figure 2 - Swept Path Assessment

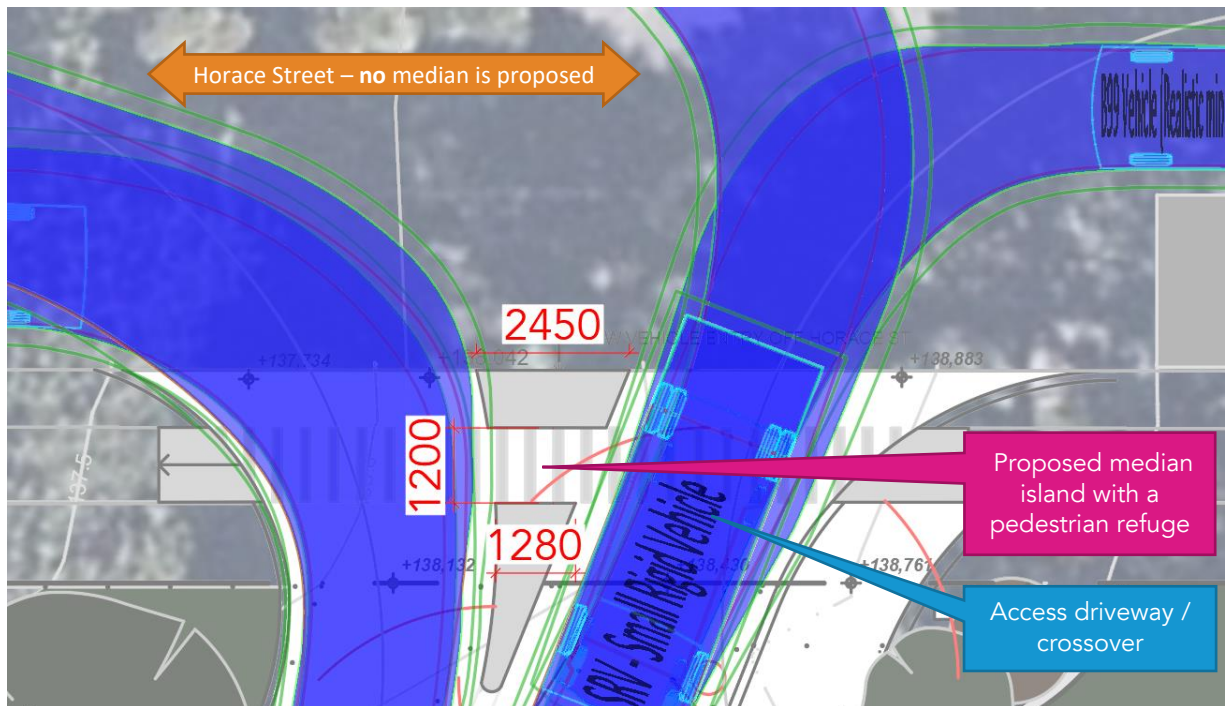


Figure 3 - Proposed Median Island at the Sports Complex Access Driveway

2.2 Comment 2

Council Comment

Further comment is required in relation to parking demand given the capacity of the spectator seating and the use of the 2 x multipurpose rooms (specified to have a capacity of 100 persons).

Response

Only one (1) multi-purpose room is proposed with a capacity for approximately 50 people, refer to architectural and planning reports, as well as Section 2.3 of the **ptc.** Traffic Impact Assessment, Revision 2 (TIA) dated 10th June 2021.

Council Comment

It is assessed that the parking demand will only be 15 cars and the traffic generation for the 30 min. peak is only 13 vt.

Response

The parking generation has been based on the Ku-ring-gai DCP, with a parking rate of 1 space per 17m² gross floor area. The multipurpose room has an area of 143.6m², which results in 9 car spaces (not 15 car spaces).

The traffic generation calculation is based on the Guide to Traffic Generating Developments. The multipurpose room will most likely host activities such as yoga or other sporting classes, hence a rate for a gymnasiums was used, with 9 trips per 100m² GFA during the evening peak hour (1 hour peak period). With an area of 143.6m², the multipurpose room is expected to generate 13 vehicle trips **in one hour** (see Section 5.2.2.2 of **ptc.** TIA dated 10th June 2021).

Council Comment

Unusually the assessed 1 hour generation is halved whereas yoga/gym classes have very concentrated arrival/departure patterns which are not spread over 60 minutes.

Response

It is not the traffic generation which has been halved, but rather the peak period within SIDRA. As shown in Figure 4, it has been assumed that all sports activities will last 1 hour, with peak traffic occurring between the games for a 30-minute window. The reduced peak period within SIDRA has been adopted as a means to replicate / simulate the likely rush of arrivals / departures.

As stated above, the multipurpose room is expected to generate 13 vehicle trips within one hour. For a conservative assessment, all of these trips have been adopted within the ½ hour calculation in SIDRA, i.e. 13 vehicle trips within 30 minutes (not one hour).

Therefore, the assessment is considered to be more conservative than if the same volume of traffic was spread over a one-hour period.

In any case, it is noted that the SIDRA results show that the two closest intersections are expected to run at a Level of Service A with spare capacity in the post development scenario.

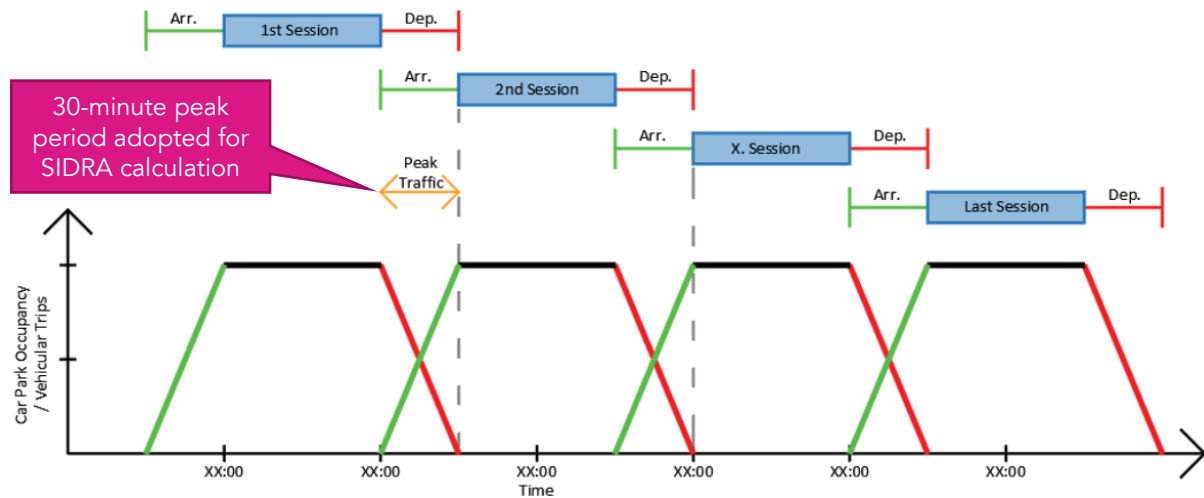


Figure 4 - Inbound and Outbound Vehicular Trips for Basketball Games (Inbound in green, basketball games in blue, outbound in red)

Council Comment

Also, how the staggered booking system will be applied for this potential mass arrival of 100 people in relation to parking.

Response

As stated above, the proposed multipurpose room will accommodate up to 50 people (not 100). The parking generation of 9 spaces has been determined based on the DCP, and the traffic generation rate calculated based on the Guide to Traffic Generating Developments is expected to be 13 vehicle trips. These results have been adopted in the parking and traffic calculations for the overall development.

As shown in Figure 4, a gap between the sports activities has been implemented, which is for the purpose of reducing car parking demand of the overall development.

The courts and the room will be operationally managed through a booking system to ensure that the gap between the activities is adhered to.

There is an option to stagger the basketball / yoga commencement times; however, this is not seen as required at this stage.

2.3 Comment 3

Council Comment

Additional information is required as to an appropriate assessment of the sight distance circumstance in accordance with Austroad's design criteria. Consideration may need to be given to the actual 85th percentile speed of southbound vehicles (particularly at night) and the adequacy of the street lighting. Remedial recommendations may be considered in relation to this aspect (eg. Signage) to ensure safety in relation to the crest to the north of the site given the access point and traffic movements.

Response

The assessment of sight distance has been undertaken for the frontage road as per Section 3.2.4 of AS2890.1. The proposal involves the provision of an access driveway along Horace Street which has a posted speed limit of 60km/h.

AS2890.1 stipulates that an access driveway with a frontage road speed of 60km/h is to be provided with a desirable visibility distance of 83 metres and a minimum stopping distance of 65 metres. The proposed driveway along Horace Street is located on a straight section of the road. It is noted that there is a crest towards the north of the proposed driveway.

A desktop analysis indicates that the crest is located directly in front of property 47 Horace Street. The sight distance assessment has been undertaken (refer to Figure 5 - Sight Distance Requirement) as per Figure 3.2 of AS2890.1, which indicates that the crest of the hill lies outside the minimum stopping distance of 65 metres. Therefore, the proposed location of the access driveway along Horace Street complies with the requirements of AS2890.1.



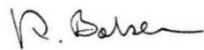
Figure 5 - Sight Distance Requirement

In regard to the sight distance based on the 85th percentile speed, the following is noted:

- Speed surveys would need to be undertaken to determine the 85th percentile speed, which was not possible to occur within the period of time given to the project to respond to this RtS.
- There are other driveways located between the Horace Street / Eucalyptus Street roundabout and the crest; residential on the western and the school driveway on the eastern side. Whilst it is acknowledged that the existing residential and school driveways have lower traffic volumes compared to the proposed sports complex, the risk around potential conflicts is comparable, with no amendments undertaken to date by other parties.
- Concerns are raised about visibility at night. It is noted that southbound vehicles are travelling from the crest downhill and as such, vehicles leaving the proposed sports complex will be able to see the headlights of southbound vehicles and vice versa. Therefore, visibility of potential conflicts may not be as great as outlined.
- If required, speed surveys can be undertaken at a later stage. Should survey results show that the 85th percentile speed is higher than the posted speed limit, further investigation can be undertaken. Potential solution would be the implementation of a 'Caution Driveway' sign at the crest to warn southbound drivers of an upcoming driveway.

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 *16 February 2022*. Reviewed by *KB* on *16 February 2022*.

16 February 2022

Ku-ring-gai Council
Christoph Jaensch
JDH Architects
181 Oxford Street
Darlinghurst
NSW 2010

Dear Christoph

1. 1175 St Ives Indoor Sports Complex – Additional Response to Submission

ptc. has been engaged by JDH Architects on behalf of Ku-ring-gai Council to address additional comments received following the submission of the Development Application (DA) for the proposed development of a sports complex located at 60-70 Horace Street, St Ives.

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

- Letter Dated 9 February 2022 from Ku-ring-gai Council (Council)

The individual comments are addressed below.

2. Council Comments

2.1 Comment 1

Council Comment

Further dimensional detail is required in relation to the proposed median island and the treatment of traffic lanes to satisfy road design criteria. ptc specifies that the proposed median island will be 1200mm long and wide. Firstly, the island needs to be longer than this to satisfy road design criteria. Secondly, this section of Horace Street has a 12800mm wide roadway which has 4 marked lanes. Sufficient detail has not been provided detailing how the lanes can be maintained as prescribed above when 1200mm is allocated to the median island.

Response

The proposal **does not** involve the provision of a median island **along Horace Street**.

It is proposed to retain the existing 4-lane arrangement of Horace Street, and no median or width reduction of the 12800mm wide carriageway is being proposed. The 4 lanes are proposed to retain their existing use, i.e. 2 through lanes and 2 shoulders / parking lanes (refer to Figure 1).

The proposed median island is to be provided upon entry to the site, along the crossover to separate the inbound and outbound traffic into the site, as shown in Figure 1, Figure 2 and Figure 3. The 1.2m long and wide cut-out within the island acts as a holding area for pedestrians walking along the footpath. This is to ensure that pedestrians are able to safely cross the proposed access driveway and minimise potential conflict between pedestrians and vehicles.

The driveway has been designed and will be constructed in accordance with the relevant Australian Standards.

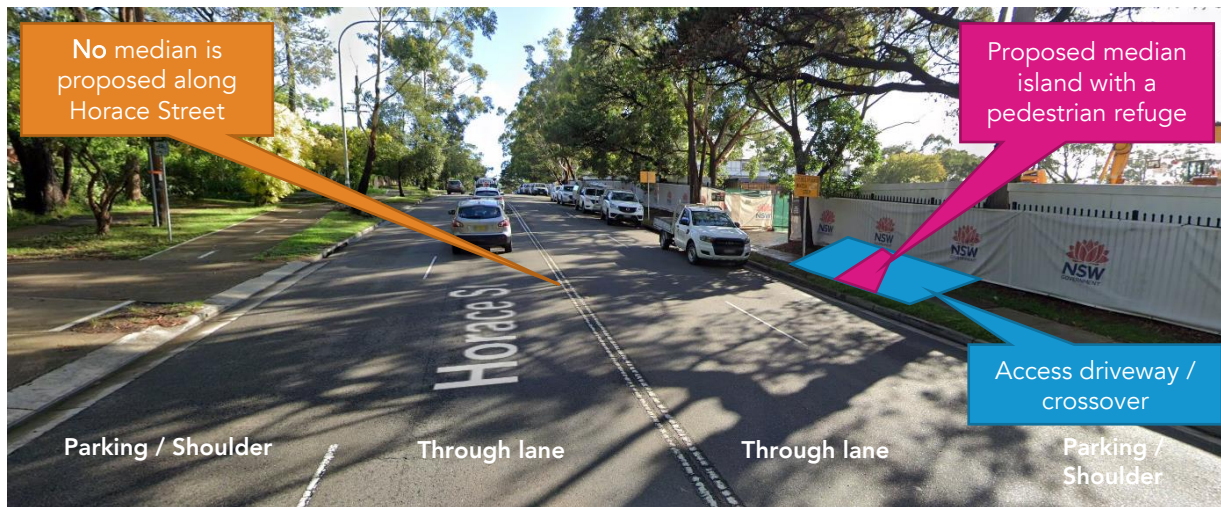


Figure 1 - Sketch of the Proposed Median Island Along the Driveway (not Horace Street)

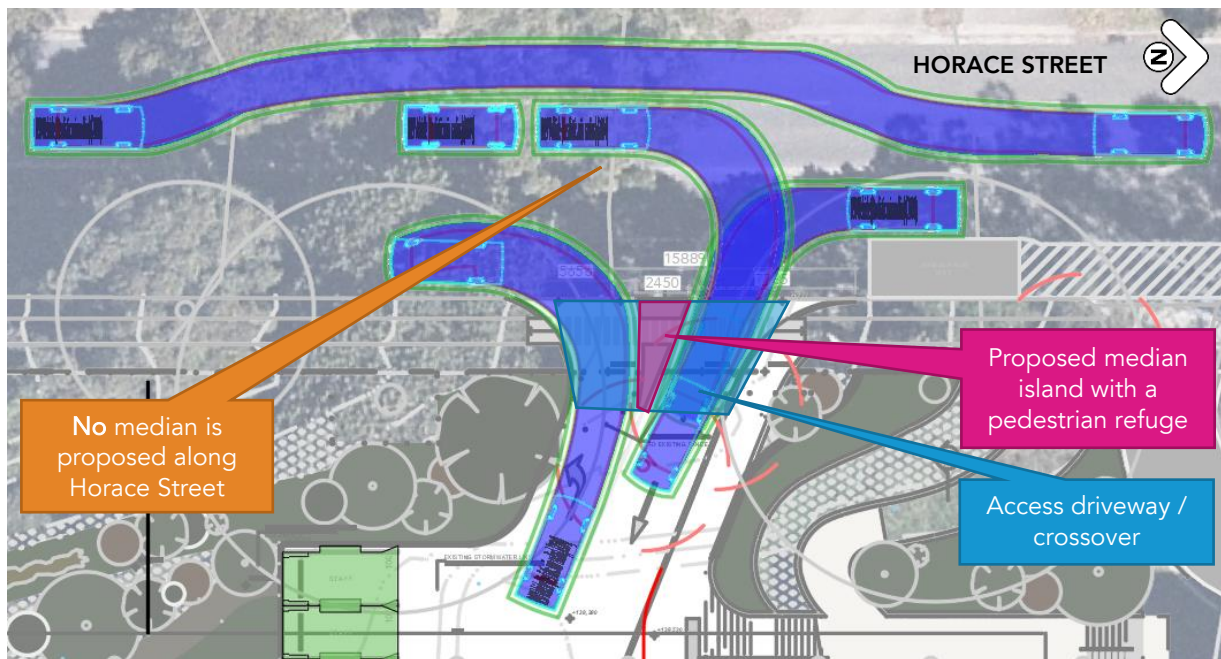


Figure 2 - Swept Path Assessment

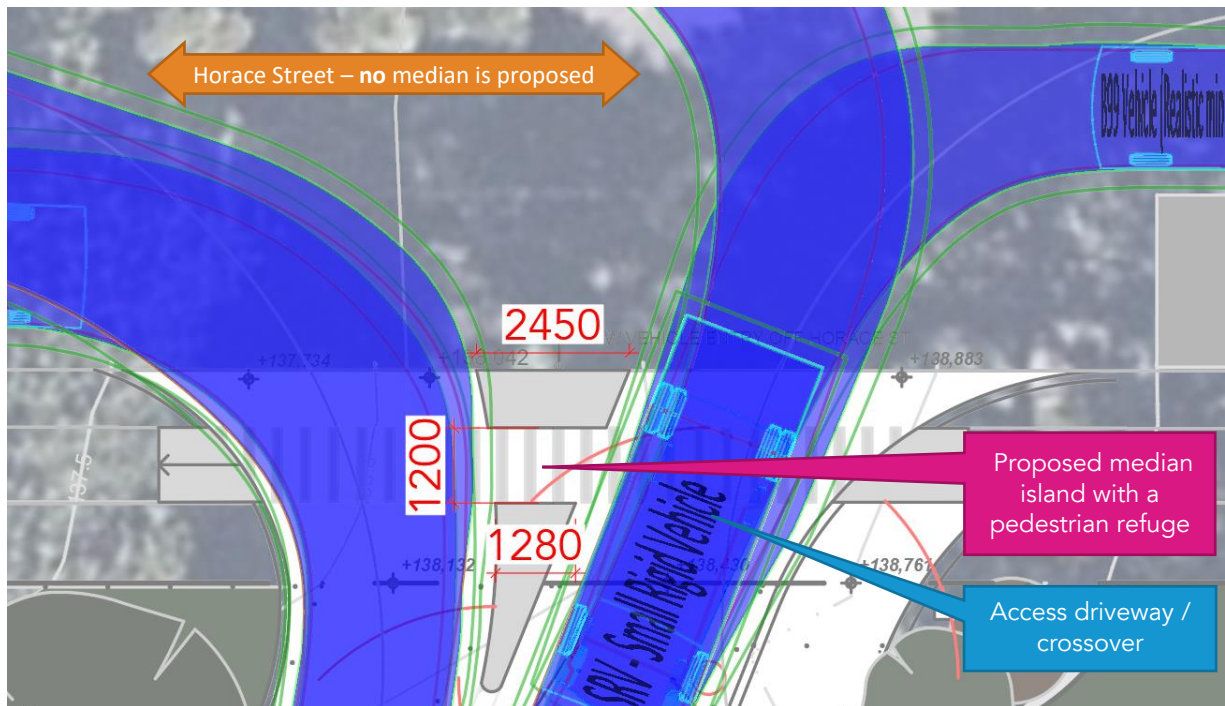


Figure 3 - Proposed Median Island at the Sports Complex Access Driveway

2.2 Comment 2

Council Comment

Further comment is required in relation to parking demand given the capacity of the spectator seating and the use of the 2 x multipurpose rooms (specified to have a capacity of 100 persons).

Response

Only one (1) multi-purpose room is proposed with a capacity for approximately 50 people, refer to architectural and planning reports, as well as Section 2.3 of the **ptc.** Traffic Impact Assessment, Revision 2 (TIA) dated 10th June 2021.

Council Comment

It is assessed that the parking demand will only be 15 cars and the traffic generation for the 30 min. peak is only 13 vt.

Response

The parking generation has been based on the Ku-ring-gai DCP, with a parking rate of 1 space per 17m² gross floor area. The multipurpose room has an area of 143.6m², which results in 9 car spaces (not 15 car spaces).

The traffic generation calculation is based on the Guide to Traffic Generating Developments. The multipurpose room will most likely host activities such as yoga or other sporting classes, hence a rate for a gymnasiums was used, with 9 trips per 100m² GFA during the evening peak hour (1 hour peak period). With an area of 143.6m², the multipurpose room is expected to generate 13 vehicle trips **in one hour** (see Section 5.2.2.2 of **ptc.** TIA dated 10th June 2021).

Council Comment

Unusually the assessed 1 hour generation is halved whereas yoga/gym classes have very concentrated arrival/departure patterns which are not spread over 60 minutes.

Response

It is not the traffic generation which has been halved, but rather the peak period within SIDRA. As shown in Figure 4, it has been assumed that all sports activities will last 1 hour, with peak traffic occurring between the games for a 30-minute window. The reduced peak period within SIDRA has been adopted as a means to replicate / simulate the likely rush of arrivals / departures.

As stated above, the multipurpose room is expected to generate 13 vehicle trips within one hour. For a conservative assessment, all of these trips have been adopted within the ½ hour calculation in SIDRA, i.e. 13 vehicle trips within 30 minutes (not one hour).

Therefore, the assessment is considered to be more conservative than if the same volume of traffic was spread over a one-hour period.

In any case, it is noted that the SIDRA results show that the two closest intersections are expected to run at a Level of Service A with spare capacity in the post development scenario.

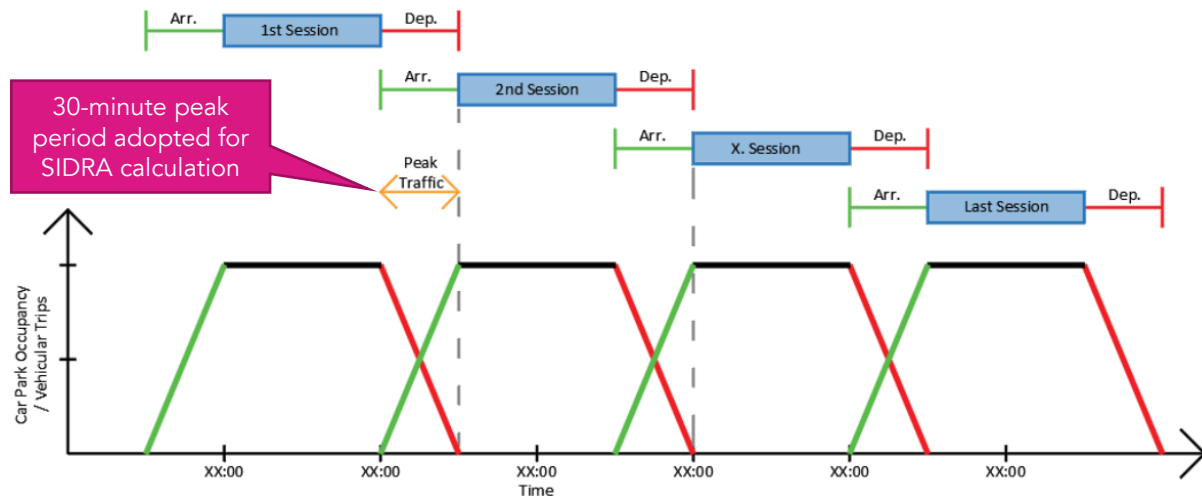


Figure 4 - Inbound and Outbound Vehicular Trips for Basketball Games (Inbound in green, basketball games in blue, outbound in red)

Council Comment

Also, how the staggered booking system will be applied for this potential mass arrival of 100 people in relation to parking.

Response

As stated above, the proposed multipurpose room will accommodate up to 50 people (not 100). The parking generation of 9 spaces has been determined based on the DCP, and the traffic generation rate calculated based on the Guide to Traffic Generating Developments is expected to be 13 vehicle trips. These results have been adopted in the parking and traffic calculations for the overall development.

As shown in Figure 4, a gap between the sports activities has been implemented, which is for the purpose of reducing car parking demand of the overall development.

The courts and the room will be operationally managed through a booking system to ensure that the gap between the activities is adhered to.

There is an option to stagger the basketball / yoga commencement times; however, this is not seen as required at this stage.

2.3 Comment 3

Council Comment

Additional information is required as to an appropriate assessment of the sight distance circumstance in accordance with Austroad's design criteria. Consideration may need to be given to the actual 85th percentile speed of southbound vehicles (particularly at night) and the adequacy of the street lighting. Remedial recommendations may be considered in relation to this aspect (eg. Signage) to ensure safety in relation to the crest to the north of the site given the access point and traffic movements.

Response

The assessment of sight distance has been undertaken for the frontage road as per Section 3.2.4 of AS2890.1. The proposal involves the provision of an access driveway along Horace Street which has a posted speed limit of 60km/h.

AS2890.1 stipulates that an access driveway with a frontage road speed of 60km/h is to be provided with a desirable visibility distance of 83 metres and a minimum stopping distance of 65 metres. The proposed driveway along Horace Street is located on a straight section of the road. It is noted that there is a crest towards the north of the proposed driveway.

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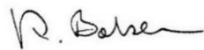
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