Traffic Engineering Report

Ballina Indoor Sport Centre

Cherry St, Ballina NSW

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Revision Record

No.	Author	Reviewed/Approved	Description	Date
1.	R. van der Merwe		Preliminary Report	20/10/17
2.	G. Harris	RV. Jones	Submission Report	07/11/17
3.	G. Harris	G. Harris	Revised Submission Report	17/11/17
4.	G. Harris	G. Harris	Revised Submission Report	27/11/17
5.	B. Baker	RV. Jones	Revised Submission Report	24/01/18
6.	I. Blackburn	I. Blackburn	Revised Submission Report	22/03/18

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1 Introduction

1.1 Background

TTM Consulting has been engaged by Ballina Shire Council to prepare a traffic engineering report investigating a proposed indoor sports centre (BISC) on the Ballina High School site.

1.2 Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Parking supply required to cater for development demand;
- Parking layout to provide efficient and safe internal manoeuvring;
- Identification of likely traffic volumes and traffic distribution from the future development;
- Identification of likely traffic impact of development on the public road network;
- Access configuration to provide efficient and safe manoeuvring between the site and the public road network;
- Internal road layout to provide efficient and safe internal manoeuvring for service vehicles;
- Suitability of access and internal facilities to provide for pedestrian and cyclist operation;
- Access to suitable level of public transport; and
- Internal road hierarchy to cater for lot access, vehicle design speeds and road user amenity requirements.

To assess the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- Ballina Shire Council Development Control Plan; and
- Australian Standard 2890.

1.3 Site Location

The site is located at Ballina High School, Cherry Street, Ballina, NSW, as shown in Figure 1.1. The property description is Lot 477 on Parcel No 5789, Lot 478 on Parcel No 5790 and Lot 392 on Parcel No 6500. The site has road frontages to Cherry Street, Swift Street, Martin Street, and Bentinck Street.

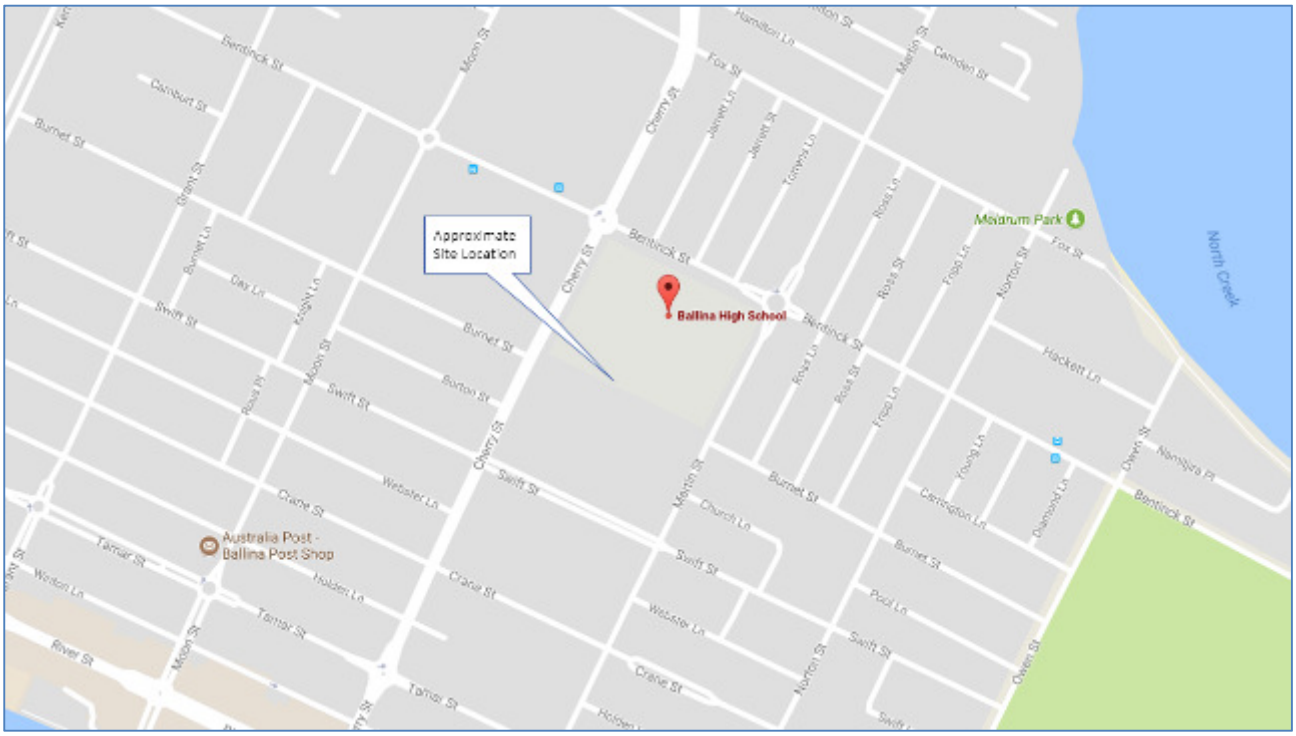


Figure 1.1: Site Location

Figure 1.2: Site Area

1.4 Development Profile

The proposed land use for this development is summarised as a 2,636m^2 GFA indoor sports centre as follows:

- 1,940m^2 for court/playing areas.
- 268m^2 foyer/circulation.
- 428m^2 change rooms/amenities/meeting rooms/storage.

2 Existing Transport Infrastructure

2.1 The Road Network

Most roads in the immediate vicinity of the site are administered by Ballina Shire Council, the exceptions being Cherry Street to the north of the site and Bentinck Street. The hierarchy and characteristics of roads in the immediate vicinity of the site are shown below in Table 2.1.

Table 2.1: Local Road Hierarchy

Road	Speed Limit	Lanes	Classification	Road Authority
Cherry Street	50kph	2 (undivided, plus parking)	Local Road	BSC
Bentinck Street	50kph	2 (undivided, plus parking)	Sub-arterial	RMS
Swift Street	50kph	2 (undivided, plus parking)	Local Road	BSC
Martin Street	50kph	2 (undivided, plus parking)	Local Road	BSC

Cherry Street has a 22.5m wide roadway at the site frontage with a 32.5m road reserve. The intersection of Cherry Street and Bentinck Street is a roundabout controlled intersection.

2.2 Road Planning

Ballina High School is located immediately south of the subject site. This has recently been demolished and is currently being constructed as a new facility which will have capacity for 1,000 students and 93 staff. This development was assessed under an Environmental Impact Assessment process with key traffic and parking outcomes as follows:

- The local road network would operate below capacity, with the school, with no mitigation measures required.
- The school is conditioned to provide a minimum of 47 on site parking spaces for staff (Condition B11b and D15).
- The school includes a drop off facility for 10 cars.
- Pick up and drop off transactions will use on-street parking available on the local road network. The Martin Street and Cherry Street frontages of the school and sport fields currently have parking capacity for up to 87 cars. The school is conditioned to seal and line mark a further 29 spaces on Martin Street (Condition D16) for a total supply of 114 on-street parking spaces. Further on-street parking spaces are available on Swift Street and Bentick Street.
- The school is conditioned to implement a Green Travel Plan (Condition D12) and Parking Management Strategy (Condition D13).

Based on discussions with the project team and Council, it is understood that the 47 staff parking spaces for the school will be provided in a shared facility with parking for the BISC.

Council/RMS have not specified any works near the site which will impact upon or be impacted by the proposed development on its interactive mapping.

A standard condition of approval will be the construction/repair and reinstatement of pedestrian footpaths across the frontage of the site subsequent to construction activity on the site.

2.3 Public Transport and Pedestrian Facilities

Further public and active transport information is in Section 9 of this report.

Buses

Four bus stops are located within approximately 400m of the site, with regular services to surrounding areas.

Pedestrians

Formal pedestrian footpaths are located on both sides of Cherry Street. The nearest formal pedestrian crossing of Cherry Street is located at the intersection with Burnet Street.

Cyclists

Dedicated off-street cycle lanes are located within the vicinity of the site.

3 Car Parking Arrangements

3.1 Parking Supply Requirement

To determine parking requirements, it is anticipated that Council would categorise the proposed development as a Recreation Facility (indoor) – Other Activities. For this use, BDCP2012, Chapter 2, Section 3.19 identifies that parking should be supplied on merit.

As parking for the BISC and adjacent school will be provided in a shared facility, TTM have identified key parking scenarios as follows:

- Peak parking demands during school operating hours (i.e. 8:30am to 4pm).
- Peak parking demands outside school operating hours (i.e. evenings and weekends).
- Regional/state events.

3.1.1 During School Operating Hours

The car park will be a combined facility for school staff and BISC use during school hours. As such, during school operating hours, the car park will need to provide 47 spaces for school staff in addition to parking for BISC activities which are separate to school activities. TTM have been advised that demands for the BISC during school hours would be minimal and primarily restricted to use of meeting room facilities.

The BISC includes 2 meeting rooms, one being 73m^2 and the other is 50m^2. It is anticipated that the meeting rooms would be unlikely to accommodate more than 1 person per 2m^2. Meeting Room 1 would therefore accommodate up to 36 persons and Meeting Room 2 would accommodate up to 25 persons. As such, both meeting rooms could cater for a maximum 61 persons.

It is anticipated that such meetings would be community based and possibly cater for either groups or people with who would not be able to transport themselves to the meeting and would rely on others. In these scenarios vehicle occupancy is anticipated to be no less than 2 persons per vehicle. As such, the parking demand for BISC would be up to 30 cars. This parking demand would also cater for up to 45 persons with a vehicle occupancy of 1.5 persons per car.

As such, the combined school staff/BISC car park would require 77 parking spaces of which 47 are allocated for school staff during school operating hours.

3.1.2 Outside School Operating Hours

The peak BISC use will occur during evenings and weekends. Activities during these times would primarily relate to games of:

- Basketball – 5 players on court per team, plus bench of 6-8 persons per team including coach, plus 3 officials per game.
- Volleyball – 6 players on court per team, plus bench of 3-4 persons plus 1 official per game.

- Netball – 7 players on court per team, plus bench of 1-2 persons plus 1 official per game.
- Hockey – 6 players on court per team, plus bench of 1-2 persons plus 1 official per game.

Based on the information above, the key patronage would occur during games of basketball. With up to 13 people per team plus 3 officials, each game would have up to 29 persons. The two courts would therefore have patronage of up to 58 people.

TTM anticipate vehicle occupancy would average 2 persons per vehicle, due to the team nature of games. As such, when two games are played simultaneously, there would parking demands for 29 cars.

It is acknowledged that games could be played on each court with limited break time between each game. Should this occur parking demands could be up to 58 cars with back to back games on each court, outside of school hours.

3.1.3 Events

The BISC will host regional and potentially state events for various sports. Depending on the nature of the game, catchment of players and spectators, parking demands could vary from very low (i.e. coach parking with limited private vehicle use) to reasonably high (if there are many spectators). TTM suggest that a parking management plan is developed to manage parking during events.

3.1.4 Parking Recommendation

Based on the above assessment, peak parking demands would occur during school hours with full utilisation of the meeting rooms. It is therefore recommended that the communal parking area include a total of 77 parking spaces with a minimum 30 spaces for the BISC in addition to the 47 required for the school (allocated for school staff during school operating hours and available to the BISC outside these hours). A parking management plan should be developed for larger events.

3.2 People with Disability (PWD)

The Building Code of Australia (BCA) outlines the requirements for parking for people with a disability (PWD). The BCA specifies the PWD requirements of a use based on the development building type. For this building type parking should be provided at a rate of 1 PWD bay per 50 standard spaces. It is unlikely that PWD parking requirements would exceed 2 PWD spaces.

3.3 Parking Provision

The proposed development incorporates a total of 77 car parking spaces, including 2 PWD spaces. This is in accordance with the parking supply recommendation discussed in Section 3.1.4. Therefore, it is expected that the proposed parking provision is sufficient to cater for the proposed development.

3.4 Car Park Layout

Table 3.1 identifies the AS2890.1 parking area requirements and compliance against these provisions. The development will need to ensure that all parking areas are designed to this standard.

Table 3.1: Parking Design Requirements

Design Aspect	Minimum AS2890.1 Standard	Provision	Compliance
Standard parking space length:	5.4m	5.4m	Compliant
Parking space width: – Staff – Visitor (Class 2) – PWD Bay	 2.4m 2.5m 2.4m + 2.4m shared area	 2.6m 2.6m 2.4m + 2.4m shared area	 Compliant Compliant Compliant
Parking aisle width (Class 1A and 3)	5.8m	6.2m	Compliant
Parking envelope clearance - Column intrusion	0.25m into bay within 0.3m & 0.2m into bay within 1.2m of front of bay	No intrusions	Compliant
Maximum Gradient: – PWD parking – Parking bay – Parking aisle	 1:40 (2.5%) 1:20 (5.0%) 1:16 (6.25%)	 2.5% 2.5% 2.5%	 Compliant Compliant Compliant
Height Clearance – General Min. – Over PWD bay	 2.2m 2.5m	 Uncovered 2.5m	 Compliant Compliant

The proposed plans include 14 dedicated staff spaces and a wide turnaround area at the end of the blind aisle as required. It is recommended that appropriate signage/line-marking is incorporated into the design of the carpark to clearly indicate the staff car parking spaces. As shown in Figure 3.1, the end of aisle treatment encroaches onto the adjacent pedestrian footpath. Therefore, it is recommended that the pedestrian footpath be realigned as depicted.

Figure 3.1: Carpark Layout

The proposed carpark layout complies with the requirements outlined in AS2890.1 and is suitable to cater for the proposed development.

4 Existing Traffic Volumes

4.1 Peak Hour

TTM Data conducted an intersection movement survey at the Cherry Street / Bentinck Street intersection, from 3:00 to 7:00 pm on Thursday the 12th of October 2017. The peak hour was found to be between 15:15 to 16:15 PM. The results of the survey are shown below in Figure 4.1.

The survey results indicate that the PM peak hour traffic volumes on Cherry Street adjacent to the subject site is 669vph. Truck (i.e. non-car) content on Cherry Street was approximately 2.7%.

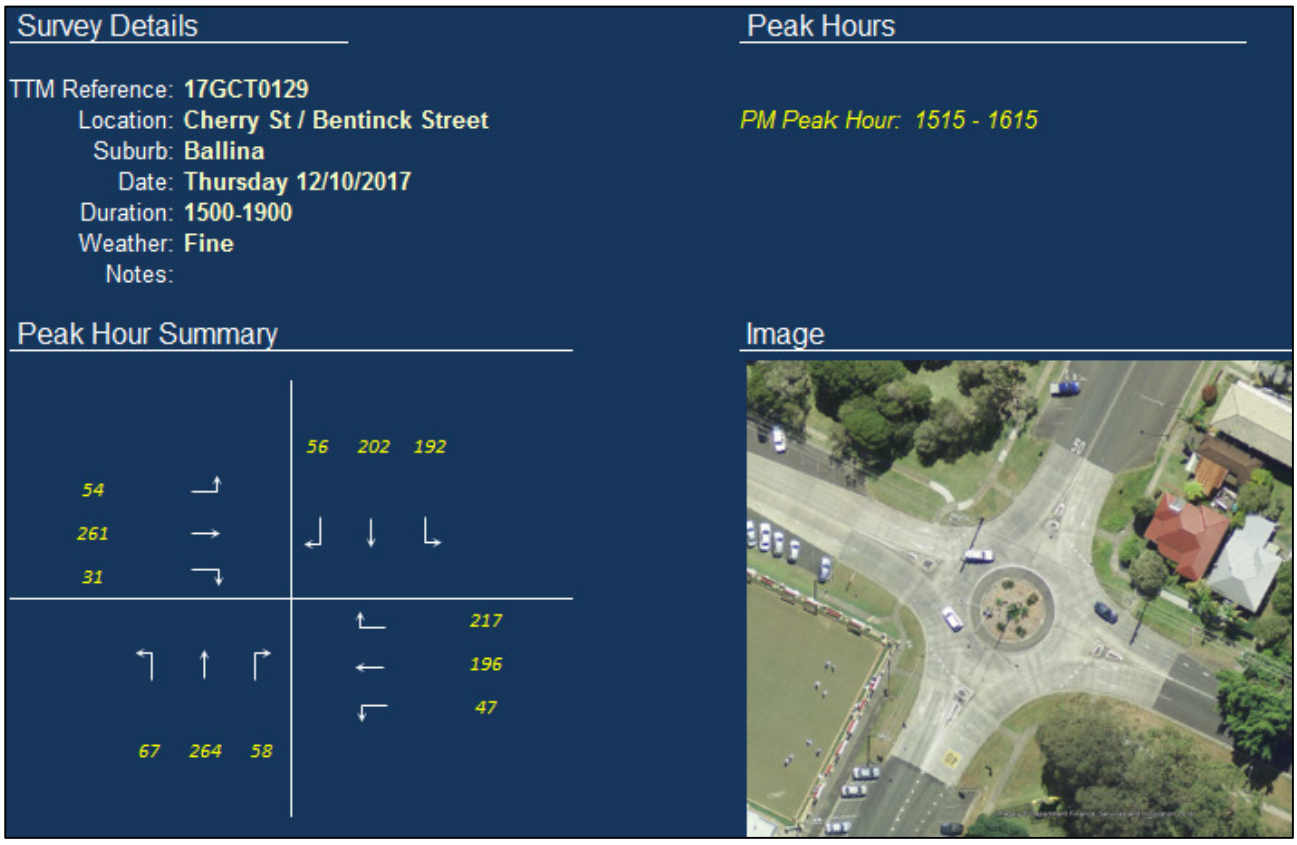


Figure 4.1: Existing (Surveyed) Peak Hour Traffic Volumes 2017

4.2 Daily Traffic

From the above peak hour data TTM has estimated the daily traffic volume as the average peak hour volume on the route, multiplied by 10. As such, the two-way daily traffic volumes on Cherry Street is taken as 6,790 vehicles per day.

4.3 School Traffic

During the surveyed times, the school was not operational but was under construction with upgrades. Therefore, the school traffic was based on the 2015 APP traffic assessment, based on other schools

surveyed, RMS and ITE. Therefore, the proposed upgraded school which will host up to 1000 students, traffic generation is shown below:

Table 4.1: Proposed School Traffic

Description	Units	Weekday	PM	PM In	PM Out
School	Pupil	1	0.2	52%	48%
Proposed School	**1000**	**1000**	**200**	**104**	**96**

The school traffic produced in Table 4.1 was then added to the base traffic volumes but were not subject to traffic growth as the school will host a maximum of 1,000 students. No construction traffic was removed from the surveyed volumes and therefore the volumes used is considered conservative.

5 Estimated Future Transport Demands

5.1 Development Scenarios

For assessing the future traffic demands TTM has adopted an annual growth rate of 1.5%, consistent with the Ardill Payne Traffic Impact Study of the Proposed New High School for Ballina Cnr Cherry & Swift Streets, Ballina.

TTM has identified three assessment periods for the road network as follows:

Opening Year (2018) Traffic Scenario

This analysis incorporates a 1.5% per annum increase in the background traffic volume for a period of 1 year from the most recent survey. For the base case scenario, the existing road network has been analysed.

2028 Traffic Scenario

This analysis incorporates a 1.5% per annum increase in the background traffic volume for a period of (10 years past opening year).

5.2 Estimated Development Traffic Generation

The Roads and Maritime Services 'Guide to Traffic Generating Developments' recommends using specific generation rates, for planning purposes, for different development types. Application of these rates to the proposed development, results in the following estimate of development site traffic generation:

PM Peak Hour

- PM peak hour traffic generation = 2 vph / 100m² GFA = 53 vph (in + out)

Daily

- Daily traffic generation = 20 vpd / 100m² GFA = 528 vpd (in + out)

5.3 Estimated Development Traffic Distribution

The distribution of development generation traffic is based on the following:

- 49% of development traffic is inbound in the PM Peak, with the remaining 51% outbound
- The remaining traffic movements are based on corresponding movements in the survey data.

The estimated distribution of development generated traffic is shown in Figure 5.1.

Figure 5.1: Estimated Distribution of Development Generated Traffic

The estimated development traffic is highlighted in Table 5.1 below.

Table 5.1: Vehicle Trip Generation Rates

Description	Units	Weekday	PM	PM In	PM Out
Indoor Recreation	100 sqm	20	2	49%	51%
Development	**2,636 sqm**	**528**	**53**	**26**	**27**

5.4 Opening Day (2018) Base Traffic Demands

Figure 5.2 shows the opening day (2018) base traffic demands, based on an application of an annual growth rate of 1.5% for a period of 1 years (i.e. 1 years past the date of the traffic surveys) to the 2017 traffic survey volumes.

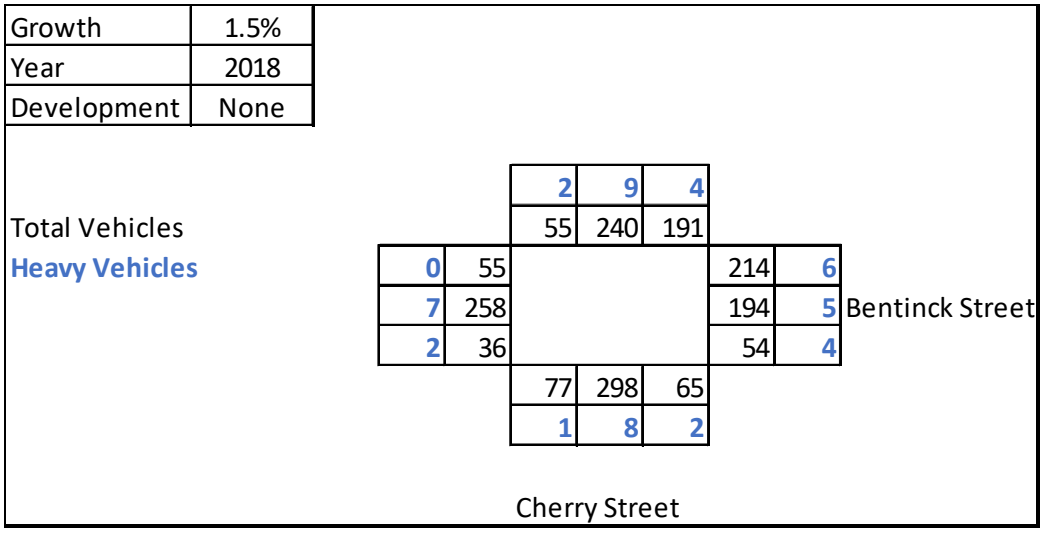


Figure 5.2: Estimated 2018 Peak Hour Traffic, Without Development (1.5% p.a. Growth)

5.5 Opening Day (2018) Project Traffic Demands

The opening day project case scenario is obtained by the addition of development traffic generation shown in Table 5.1 to the base traffic volumes shown in Figure 5.2. These expected traffic movements are shown in Figure 5.3.

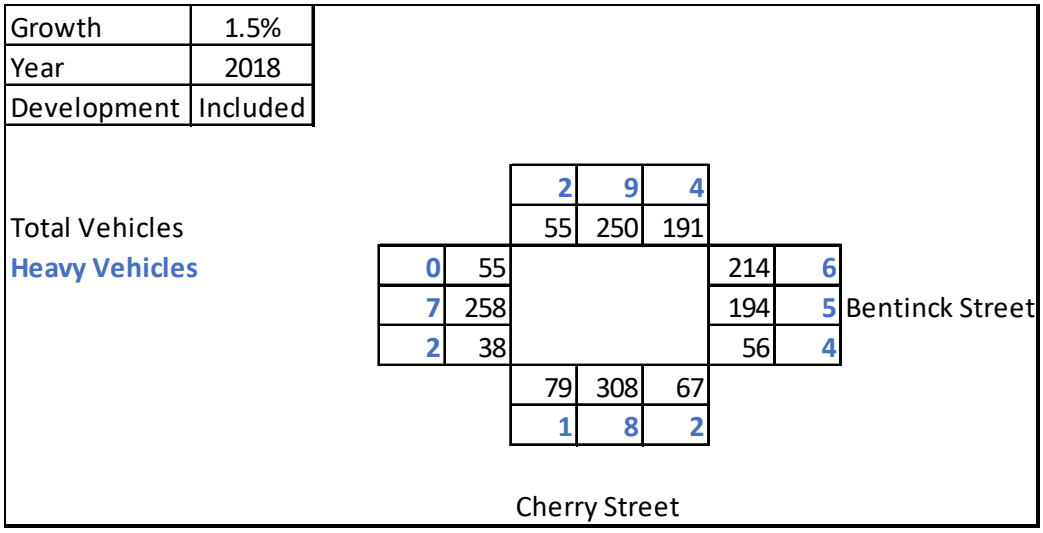


Figure 5.3: Estimated 2018 Peak Hour Traffic, With Development

5.6 Future (2028) Base Traffic Demands

Figure 5.4 shows the future (2028) base traffic demands, based on an application of an annual growth rate of 1.5% for a period of 11 years (i.e. 10 years past an assumed 2018 completion date of the project) to the 2017 traffic volumes.

Growth	1.5%
Year	2028
Development	None

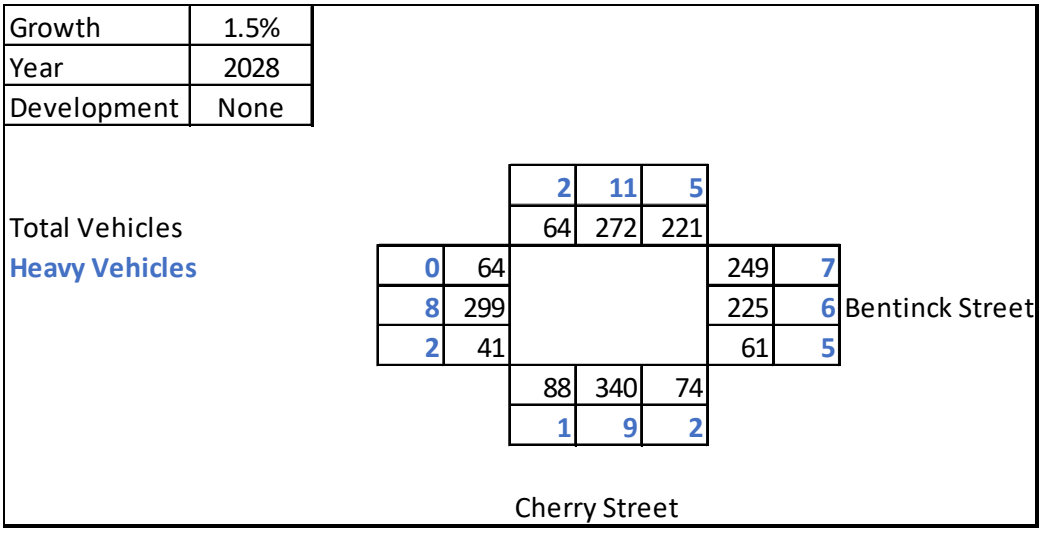


Figure 5.4: Estimated 2028 Peak Hour Traffic, Without Development (1.5% P.A. Growth)

5.7 Future (2028) Project Traffic Demands

The future project case scenario is obtained by the addition of development traffic generation shown in Table 5.1 to the base traffic volumes shown in Figure 5.4. These expected traffic movements are shown in Figure 5.5.

Growth	1.5%
Year	2028
Development	Included

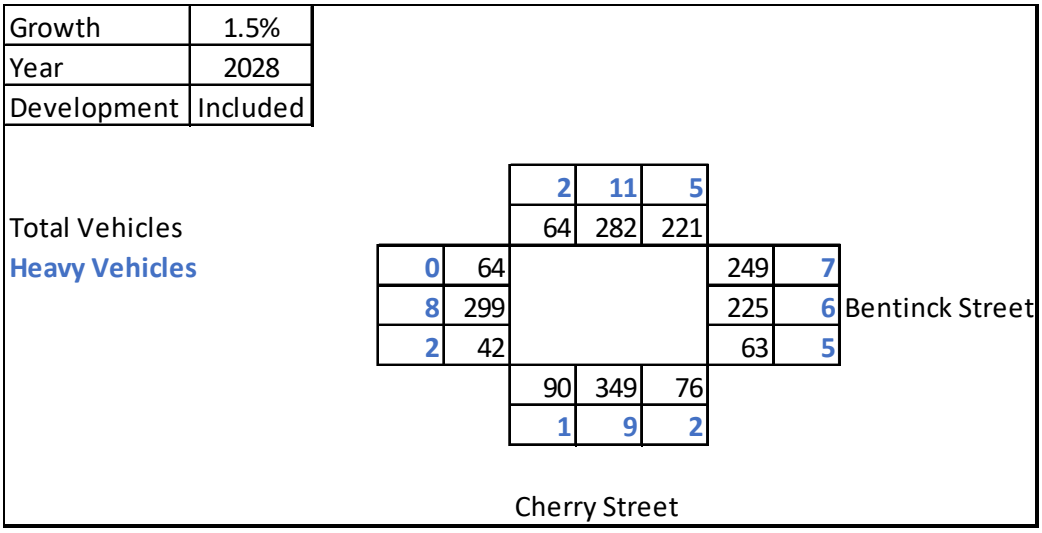


Figure 5.5: Estimated 2028 Peak Hour Traffic, With Development

6 Road Network Performance

6.1 Analysis of Cherry Street / Bentinck Street Intersection

TTM has assessed the performance of these intersections utilising Sidra analysis software (version 7). TTM has assessed all the development scenarios up to 2028. Based on the outcomes of the project analysis for 2028, TTM has identified no upgrades are required for the intersection to function with development traffic included.

6.1.1 Analysis Results

The Sidra layout identified for this intersection is shown in Figure 6.1.

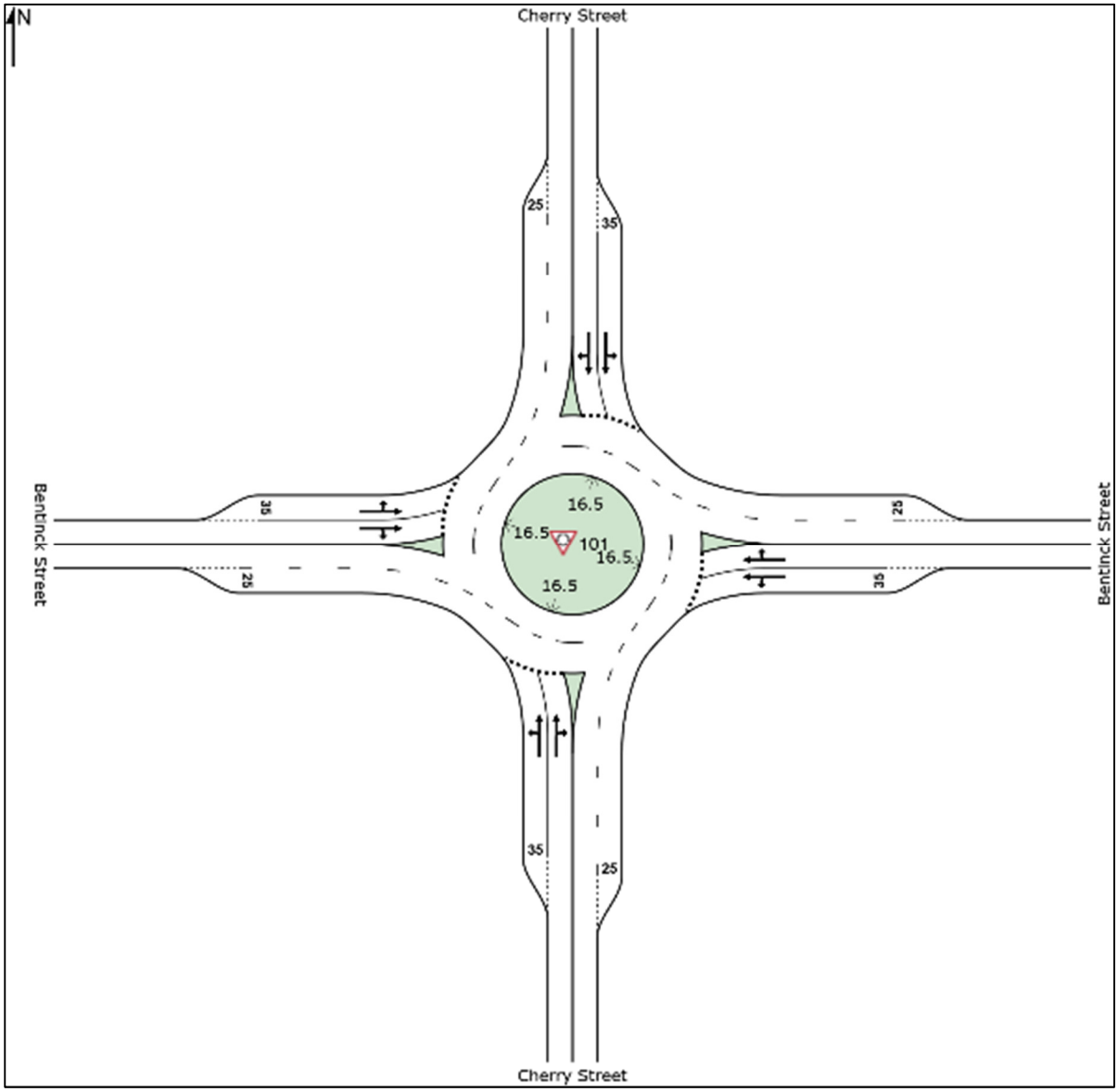


Figure 6.1: Cherry Street and Bentinck Street Intersection Layout

Table 6.1 gives a summary of the outputs for the various traffic cases applied to the intersection. The detailed outputs for this analysis are provided in Appendix B.

Table 6.1: Summary of Sidra Outputs (Cherry Street and Bentinck Street Intersection)

Case	Degree of Saturation	Average Delay	Level of Service	95th Percentile Critical Queue (m)			
				South	East	North	West
2018 Base Case	41.3%	6.6	A	17.6	18.4	13.5	16.5
2018 Development Case	42.5%	6.6	A	18.5	18.8	14.1	17.0
2028 Base Case	50.2%	7.5	A	25.8	25.5	17.7	25.2
2028 Development Case	51.7%	7.6	A	27.4	26.4	18.4	26.1

As shown in Table 6.1, the existing intersection is sufficient to cater for the proposed traffic increases.

6.2 Analysis Conclusions

The above analysis cases identify that there is significant capacity in the existing road network with no improvements to the existing intersection needed. Therefore, no ameliorative or upgrade works are required.

7 Site Access Arrangements

7.1 Turn Facilities

Austroads Guide to Road Design (Part 4A) has been utilised to address the warrants for turn treatments.

Vehicle movements at the site entry is based on the following:

- 2028 PM Base through movements (passing the site) shown in Figure 5.4 as follows:
  - Northbound: 502vph.
  - Southbound: 372vph.
- 2028 AM base volumes estimated as the reverse of the PM volumes:
  - Northbound: 372vph.
  - Southbound: 502vph.
- AM entry movements based on each school staff parking spaces (47) generating one entry movement in the peak hour (47vph) based on the distribution in Figure 5.1 as follows:
  - Right turn into site (from south): 19vph.
  - Left turn into site (from north): 28vph.
- PM entry movements based on development traffic generation in Table 5.1 (53vph) and distributed as shown in Figure 5.1 as follows:
  - Right turn into site (from south): 21vph.
  - Left turn into site (from north): 32vph.

These volumes are plotted in Figure 7.1, which is a reproduction of Figure 4.9(b) of the Austroads Guidelines. This figure is used for determining the warrants of turn treatments for roads less than 100km/h design speed.

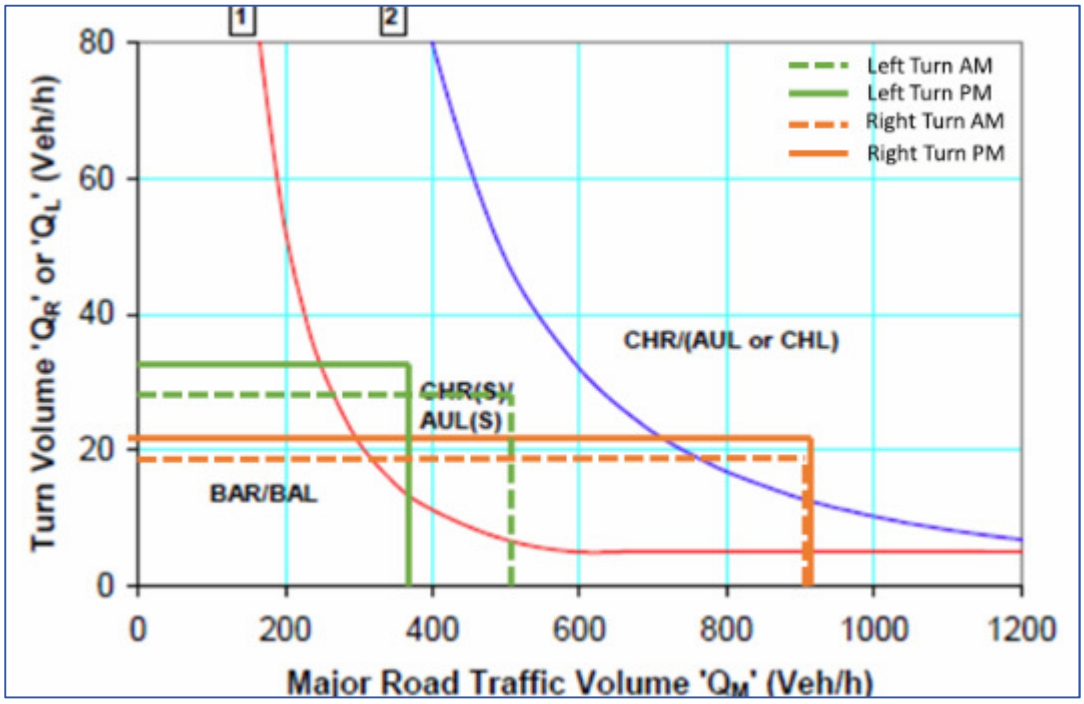


Figure 7.1: Assessment of Turn Treatment Warrants (2028 Peak Periods)

This identified that for a 50km/h posted speed limit (60km/h design speed) the turn treatments required are a AUL(s) turn lane and a CHR turn lane.

Whilst turn treatments are theoretically required, Cherry Street is a low speed urban road with angle parking where turn facilities are not appropriate. In fact, providing turn lanes for the site entry would lead to higher vehicle speeds passing the site. Furthermore, in providing turn lanes, on-street parking would need to be removed on each side of Cherry Street. This will leave significant areas of carriageway unusable which is a poor use of public space.

TTM recommend turn facilities are not provided as:

- Cherry Street is a low speed urban road.
- Turn lanes are not provided at any intersections/accesses in the local area – except at roundabouts. The site access will not incorporate roundabouts. As such, not providing turn lanes is consistent with the local area.
- Alternative treatments for access are available which are more consistent with the existing road network.
- Provision of formal turn lanes would require the removal of angle parking on the western side of Cherry Street for the length of this treatment.

Cherry Street is comprised of angle parking and 2 through lanes within a 22.5m carriageway width. There is approximately 6m of unmarked lane between angle parking and the centre line. TTM suggest an edge line is painted on northbound and southbound through lanes as shown in Figure 7.2.

Figure 7.2: Recommended Line Marking

These edge lines assist in defining the through lane and shift through vehicles toward the road centre-line and away from angle parking spaces and movements. As such, the edge lines will benefit all vehicles on Cherry Street whether parking, driving along this road section or turning.

The remaining 3m (between the through lane and angle parking) in each direction would provide an area for vehicles to manoeuvre into angle parking bays, clear of through vehicles. Additionally, this area would be

used by northbound drivers travelling along Cherry Street to pass any vehicles turning right into the site. Lastly, this area would be used by vehicles turning left into the site to turn clear of southbound through vehicles on Cherry Street.

It is noted that this arrangement is provided on the northern side of Bentick Street between Cherry Lane and Jarrett Street, and as such this arrangement is consistent with existing parking and traffic operations.

Given the benefits of providing edge lines (only) for all road users and the negative impacts of providing dedicated turn lanes (loss of angle parking), providing edge lines on Cherry Street along the site frontage is the preferred way to manage turn movements into the site.

7.2 Access Design

TTM have undertaken a swept path analysis of trucks and 14.5m long rigid bus as shown in Appendix C. This analysis shows that the accesses are adequately designed to facilitate the largest vehicles expected to access the site. The two proposed access driveways are described as:

- A 6.5m Entry crossover.
- A 7.0m Exist crossover.

7.3 Access Locations

The site exit is appropriately located as it is approximately 32m from the Burnet Street intersection and there will be clear visibility between the access and this intersection. This distance is also suitable for a vehicle exiting the site and turning into Burnet Street to straighten on Cherry Street and turn from an appropriate alignment.

The site entry is also located a suitable distance (60m) from the Bentinck Street roundabout as it will be clear of queuing on the southern approach to this intersection.

8 Service Vehicle Arrangements

To assess the required number of service bays for the development, TTM has referred to the Ballina Shire Council requirements for service vehicles. Other service vehicle provisions are generally in accordance with AS2890.2.

8.1 Council Requirements

The proposed development is defined as an indoor recreational facility, totalling approximately 2,636m^2. Specific service vehicle capacity requirements are not specified by Council. As such, the service vehicle requirements have been estimated by TTM based on practical operational requirements of the site as per Section 8.2.

8.2 Estimated Service Vehicle Traffic Movements

It is estimated that the site will most likely only require servicing by an SRV and refuse collection vehicles (RCV); and occasional access by a HRV.

Typically, it is appropriate to identify the service vehicle requirements and then supply the maximum requirement to provide for the full development. This can be achieved through the provision of a managed bay and through the demand share available through the various peak service vehicle requirements.

Refuse collection would generally occur outside of site opening hours. As such, a dedicated loading facility for RCV's is not warranted. Similarly, it is expected that HRV servicing to the site would be on rare occasion, therefore, a dedicated service bay would not be required.

TTM have undertaken a swept path analysis, to demonstrate that a HRV can access and egress the site in a forward gear. This is shown in Appendix C.

9 Active Transport

9.1 Public Transport

Access to public transport from the site is considered adequate, due to the presence of four bus stops within 400m of the site, and its connectivity to surrounding suburbs. TTM has produced a graphical diagram outlining the key public transport provisions available for the site. This is shown in Figure 9.1 below.

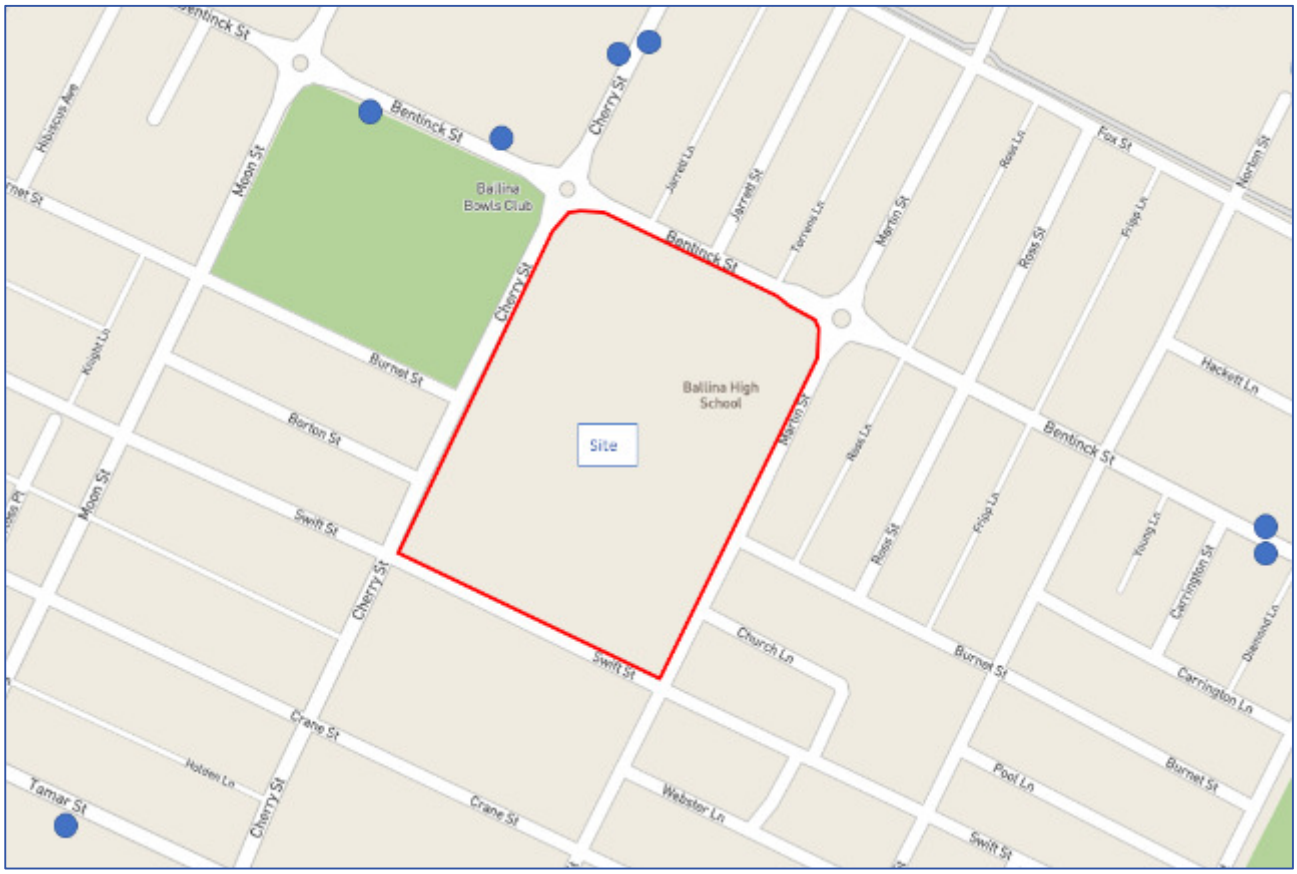


Figure 9.1: TransportNSW Bus Stops Within the Vicinity (29/09/2017)

As can be seen in this diagram, the site is positioned less than 400m walking distance to numerous local bus stops servicing bus routes around the area with buses running approximately every 30 minutes as below:

Route:

- 640: Ballina to Byron Bay
- 641: Ballina to Byron Bay
- 664: Ballina to Cumbalum
- 665: Ballina to Prospect Estate via Angels Beach
- 668: Ballina to West Ballina

- 661: Ballina to Lismore
- 669: Ballina to East Ballina

Whilst TTM consider the high-availability of public transportation provisions near the site will satisfy the site's requirements for such facilities, provision for a bus zone has been made on the Cherry Street frontage adjacent to the foyer. Swept path analysis in Appendix C shows a 14.5m long rigid bus accessing the bus zone. The bus zone is in a position such that it provides clear minimum sight distance as required for pedestrians at the crossing in front of the bus, as well as for vehicles exiting the car park at the rear of the bus zone.

9.2 Pedestrian Access

Pedestrian access to the site is considered adequate with several pedestrian access points available along the site frontage, including access immediately adjacent to the facility.

9.3 Cyclist Requirements

The site has access to cycling facilities, with dedicated off-street cycle lanes located adjacent the site.

Figure 9.2: Ballina Cycle Routes Near the Site

Cycling Aspects of Austroads Guides parking requirements for this type of development are identified in Table 9.1.

Table 9.1: Parking Supply Requirement

Land Use	Class	Requirement	Extent	Requirement
Indoor Recreational Facility	1 or 2	1 per 4 employees	0	0
	3	1 per 200m^2 GFA	2,636m^2	13.2
Total				**14 Class 3**

The minimum required parking spaces as required under the Cycling Aspects of Austroads Guides for the proposed development is 14 class 3 spaces which are provided within the development plans.

10 Developer Contributions

10.1 State Controlled Roads

TTM has identified that the State Controlled Road Network near the site is expected to operate to a satisfactory standard in the 2028 design case, with the proposed development traffic included. As such, no contributions to the State Road Network are considered necessary.

10.2 Council Roads

TTM has proposed upgrades to Cherry Street as defined in Section 7 of this report. These upgrades comprise edge line marking of northbound and southbound through lanes between Burnet Street and Bentick Street.

11 Summary and Conclusions

11.1 Development Summary

TTM have undertaken a traffic and parking assessment of the proposed Ballina Indoor Sports Centre from Cherry Street in Ballina. This facility will have a GFA of 2,636m^2 incorporating courts for various sports and associated facilities.

11.2 Car Parking Arrangements

TTM suggest the parking area provide a minimum 30 parking spaces for the BISC in addition to the 47 spaces required for school staff during school operating hours (and available to BISC outside these hours), for a total of 77 car parking spaces. The proposal incorporates 77 car parking spaces, which is in accordance with the estimated demand.

The car park layout is compliant with AS2890 standards.

11.3 Impact on Surrounding Road Network

Assessment of the proposed development indicates that the development will not have a significant impact on the future road network. To manage turns to and from the subject site and improve amenity for drivers using the angle parking, TTM suggest edge lines are provided on Cherry Street at the site frontage.

11.4 Access Arrangements

The accesses provide sufficient separation to adjacent intersections and are considered appropriate. The access crossovers are adequately designed to accommodate the largest vehicle expected to service the site.

11.5 Service Vehicle Arrangements

TTM's swept path analysis demonstrates that the proposed access and parking layout is suitable to accommodate a HRV accessing and egressing the site in a forward gear.

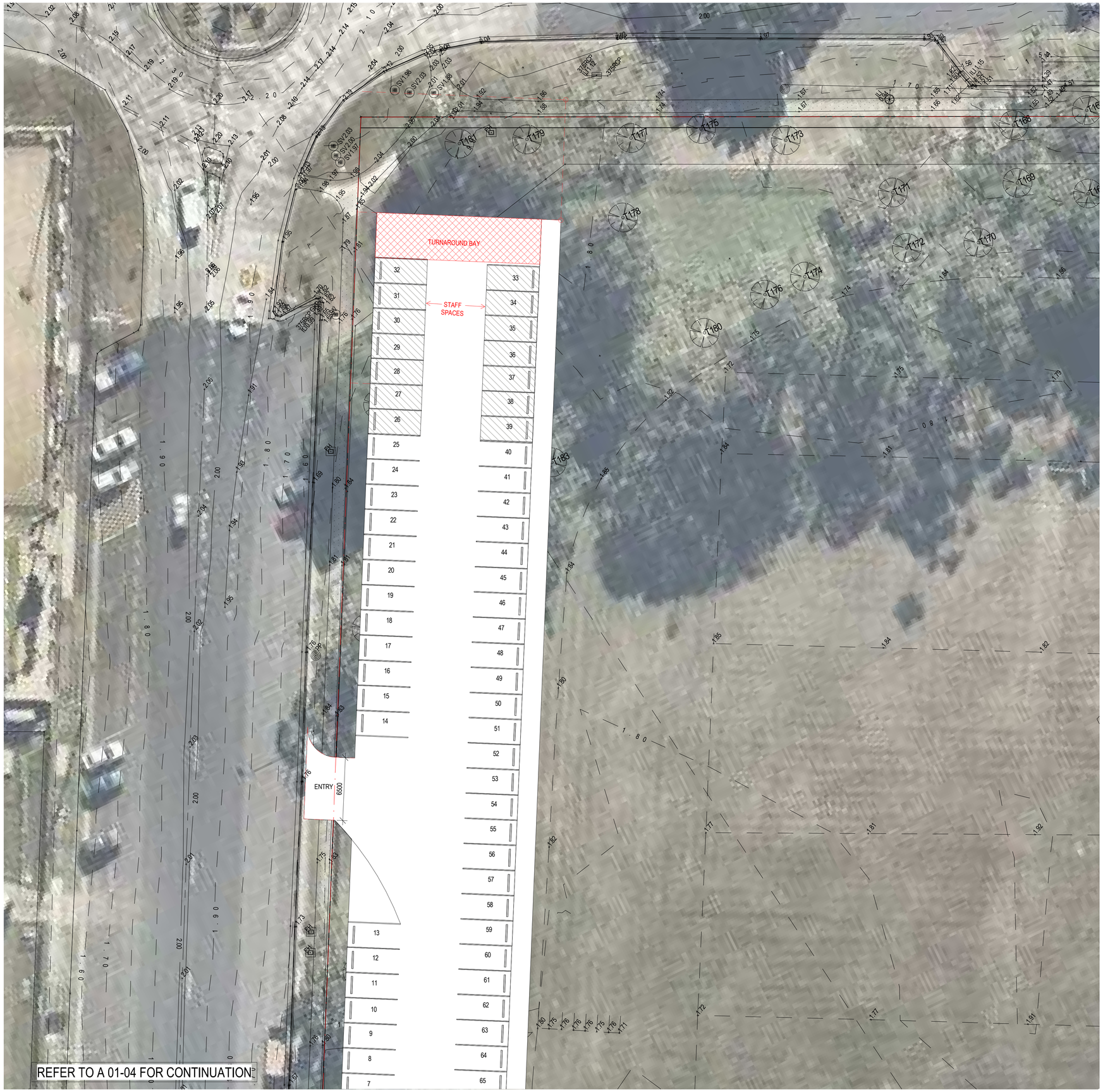
11.6 Active Transport Facilities

The current public transport infrastructure and proposed site provisions for pedestrian facilities is considered adequate for the development. The BISC should provide a minimum of 14 bicycle spaces.

11.7 Conclusion

Based on the assessment contained within this report, TTM see no traffic engineering reason the relevant approvals should not be granted.

Appendix A Proposed Site Plan



13/03/2018 11:04:38 AM

DIMENSIONS
Use figured dimensions only. DO NOT SCALE. Check all dimensions on site prior to fabrication or setout.

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SCALE 1:200

for approval

drawing authors

sheet setup date	11/27/17
dwg authors	Author
project leader	O. THESSMAN

authorised for issue by project leader

signature date

amendments

date	issue	description	checked by auth	proj ldr
11.12.17	1	DA ISSUE	MS	OT
19.01.18	2	UPDATED DA ISSUE	MS	OT
13.03.18	3	CHANGES TO CARPARK	MS	OT

78 TOTAL CARPARK SPACES REQUIRED

47 SPACES REQUIRED BY THE HIGH SCHOOL CONSENT
31 SPACES REQUIRED BY BISC (14 SPACES FOR STAFF)

GENERAL NOTES

- ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE GENERAL NOTES, ***DWG. A 00-02***
- USE FIGURED DIMENSIONS ONLY. DO NOT SCALE FROM DRAWINGS. CHECK ALL DIMENSIONS ON SITE BEFORE SETOUT OR FABRICATION.
- THE CONTRACTOR MUST VERIFY AND CHECK ALL SITE CONDITIONS INCLUDING CEILING HEIGHTS AND DIMENSIONS BEFORE COMMENCING WORK ON SITE.

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project details
BALLINA INDOOR SPORTS CENTRE
40 CHERRY STREET BALLINA NSW

sheet title
SITE PLAN - SHEET 1

issue date	scale @ A1	stage
13.03.18	As indicated	SD
job no.	dwg no.	revision
8385	A 01-03	3

original sheet size A1 [594 x 841mm]

13/03/2018 11:04:36 AM

DIMENSIONS
Use figured dimensions only. DO NOT SCALE. Check all dimensions on site prior to fabrication or setout.

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SCALE 1:500

GENERAL NOTES

- ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE GENERAL NOTES, ***DWG. A 00-02***
- USE FIGURED DIMENSIONS ONLY. DO NOT SCALE FROM DRAWINGS. CHECK ALL DIMENSIONS ON SITE BEFORE SETOUT OR FABRICATION.
- THE CONTRACTOR MUST VERIFY AND CHECK ALL SITE CONDITIONS INCLUDING CEILING HEIGHTS AND DIMENSIONS BEFORE COMMENCING WORK ON SITE.

for approval

drawing authors

sheet setup date	09.11.17
dwg authors	M. SEVILLA
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authorised for issue by project leader

signature date

amendments

date	issue	description	checked by auth	proj ldr
10.11.17	1	DRAFT PRELIMINARY ISSUE	MS	OT
15.11.17	2	REVISED DRAFT PRELIM ISSUE	MS	OT
24.11.17	3	DA ISSUE	MS	OT
11.12.17	4	DA ISSUE	MS	OT
19.01.18	5	UPDATED DA ISSUE	MS	OT
13.03.18	6	CHANGES TO CARPARK	MS	OT

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project details
BALLINA INDOOR SPORTS CENTRE
40 CHERRY STREET BALLINA NSW

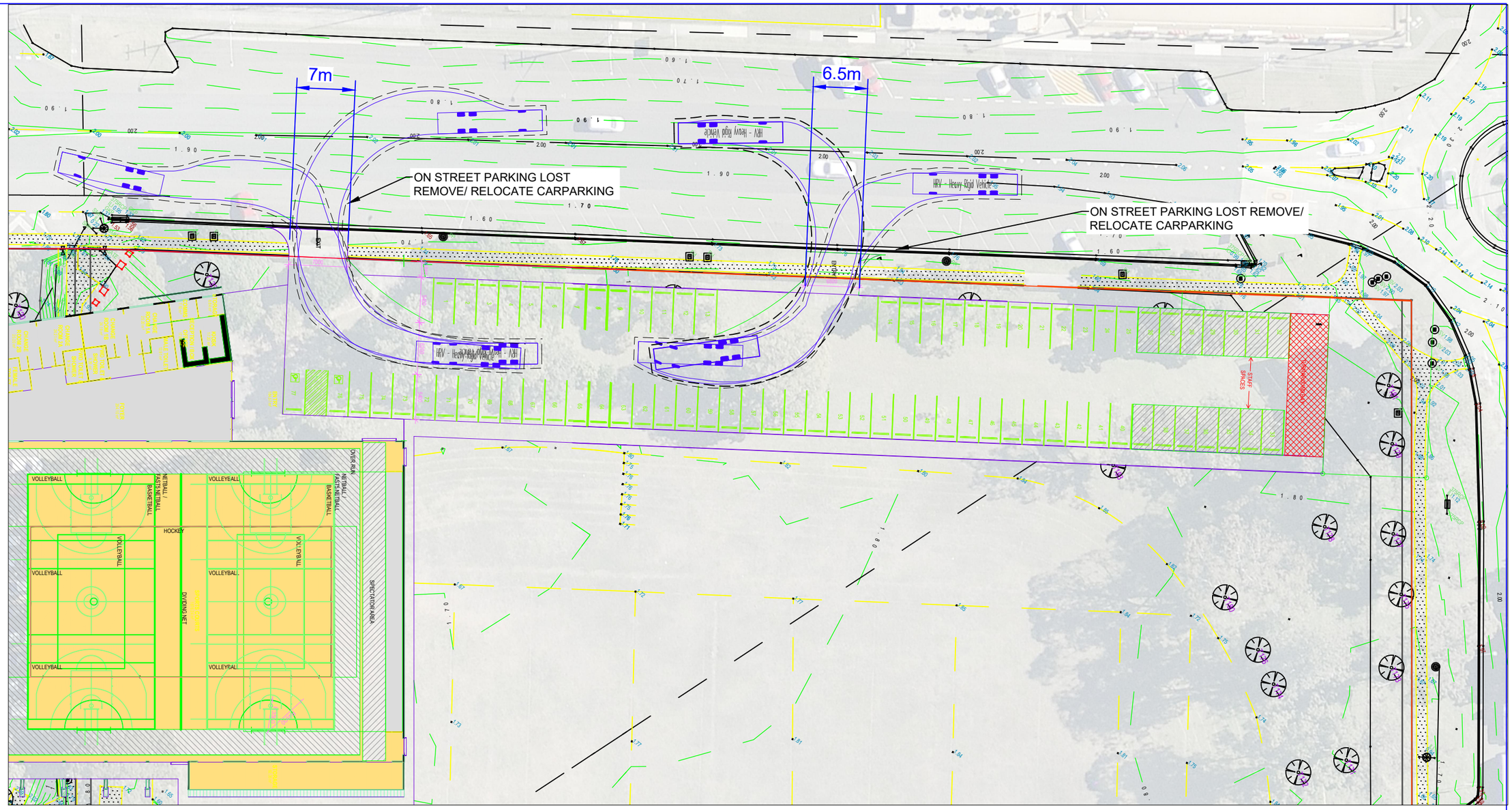
sheet title
SITE PLAN OVERALL

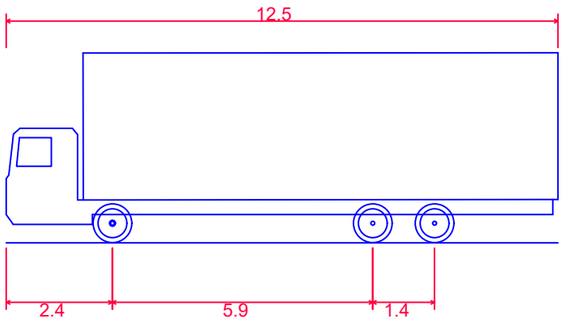
issue date	scale @ A1	stage
13.03.18	As indicated	SD
job no.	dwg no.	revision
8385	A 01-02	6

original sheet size A1 [594 x 841mm]

Appendix B Sidra Intersection Analysis (electronic)

Appendix C Swept Path Analysis





HRV - Heavy Rigid Vehicle

Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.417m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

BUS SWEPT PATH

SCALE 1:500

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
B	22-03-18	NEW ACCESS	KP	IB	IB
A	21-03-18	ORIGINAL ISSUE	KP	IB	IB

SCALE 0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE

NORTH

CLIENT pdt. architects

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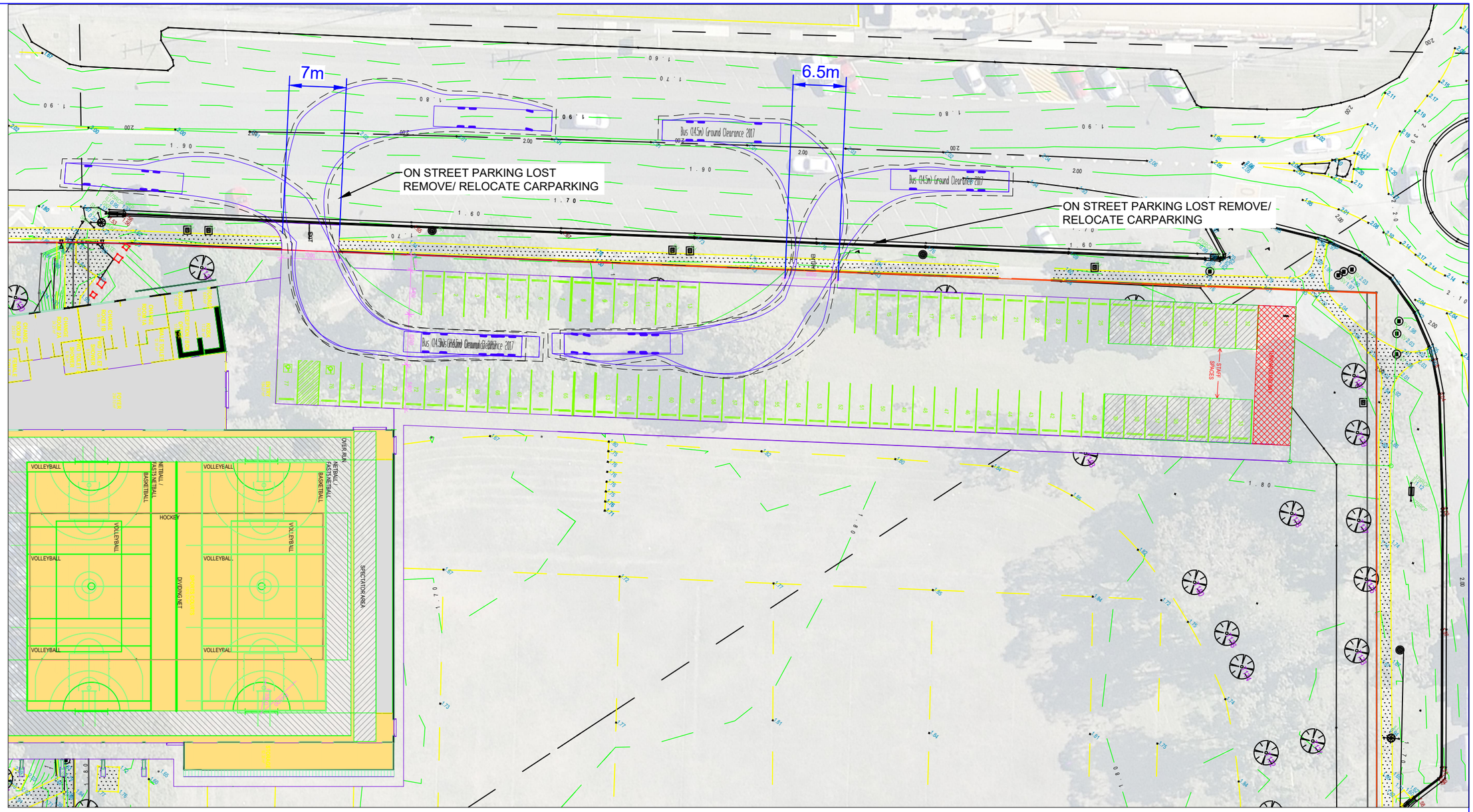
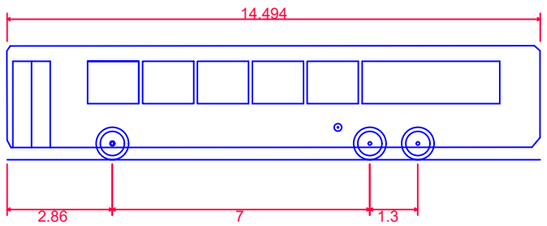
PROJECT **BALLINA INDOOR SPORT CENTER**

DRAWING TITLE **SWEPT PATH MOVEMENTS**
HRV DESIGN VEHICLE

PROJECT NUMBER	ORIGINAL SIZE
17GCT0129	A3
DRAWING NUMBER	REVISION
17GCT0129-02	B
DATE	SHEET
22 MAR 2018	1 OF 1





Single Unit Truck/Bus (14.5m)

Overall Length	14.494m
Overall Width	2.500m
Overall Body Height	3.102m
Min Body Ground Clearance	0.337m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.135m

BUS SWEPT PATH

SCALE 1:500

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	22-03-18	NEW ACCESS	KP	IB	IB
A	21-03-18	ORIGINAL ISSUE	KP	IB	IB

SCALE 0 5 10 15 20 25m

SCALE 1:500 AT ORIGINAL SIZE

NORTH

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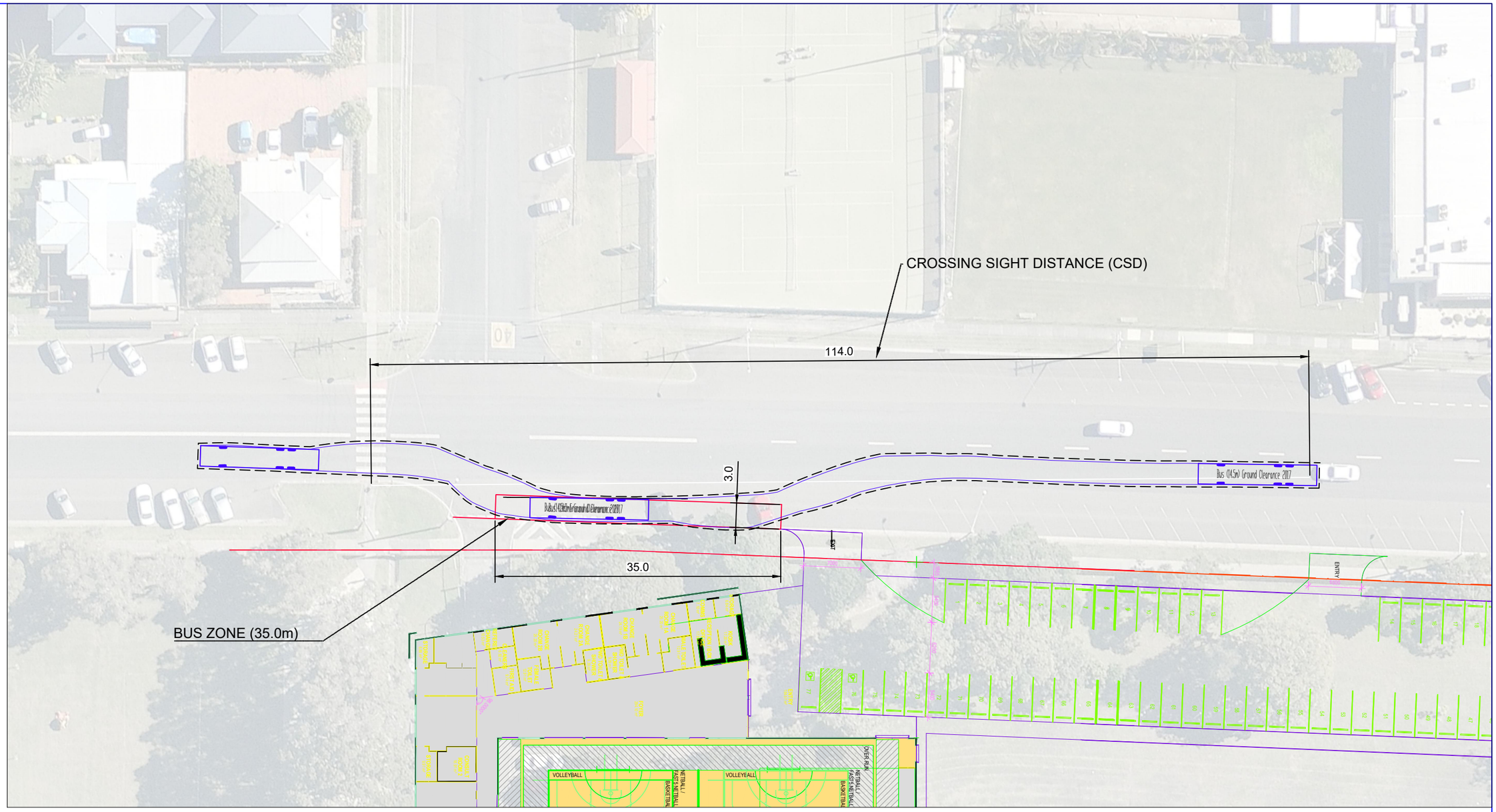
PROJECT **BALLINA INDOOR SPORT CENTER**

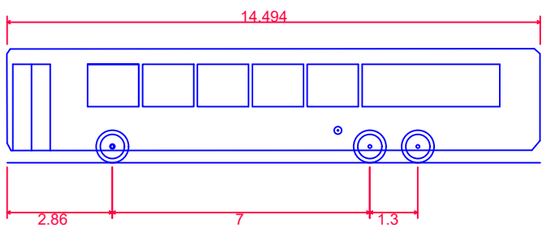
DRAWING TITLE **SWEPT PATH MOVEMENTS**
14.5m BUS DESIGN VEHICLE

PROJECT NUMBER	ORIGINAL SIZE
17GCT0129	A3
DRAWING NUMBER	REVISION
17GCT0129-03	B
DATE	SHEET
22 MAR 2018	1 OF 1



BUS SWEPT PATH

SCALE 1:500



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Overall Body Height	3.102m
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REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
B	22-03-18	NEW ACCESS	KP	IB	IB
A	21-03-18	ORIGINAL ISSUE	KP	IB	IB

SCALE 0 5 10 15 20 25m

SCALE 1:500 AT ORIGINAL SIZE

NORTH

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PROJECT **BALLINA INDOOR SPORT CENTER**

DRAWING TITLE **SWEPT PATH MOVEMENTS - BUS ZONE**
14.5m BUS DESIGN VEHICLE

PROJECT NUMBER	ORIGINAL SIZE
17GCT0129	A3
DRAWING NUMBER	REVISION
17GCT0129-04	B
DATE	SHEET
22 MAR 2018	1 OF 1