

Transport Impact Assessment

New Estella Road Public School, Wagga Wagga
Estella Road, Estella (Wagga Wagga)

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1 Introduction

1.1 Overview

Ason Group has been engaged by Hansen Yuncken on behalf of the NSW Department of Education (DoE) to prepare a Transport Impact Assessment (TIA) in regard to State Significant Development Application 9494 (the SSDA) for the proposed New Estella Road Public School, Wagga Wagga (the School), located in Estella Road, Estella (the Site). The SSDA provides for:

- The construction of new classroom buildings and associated facilities and infrastructure
- Outdoor playgrounds and learning spaces
- A school population of 480 students from Kindergarten to Year 6
- 16 full-time equivalent teaching staff and 8 additional admin staff

1.2 Transport Impact Assessment Tasks

This TIA provides an assessment of the relevant access, traffic and parking characteristics of the School, and the potential impacts of the School on the local road, parking and active transport environment. This has included a detailed assessment of:

- Existing local road network operations and on-street parking conditions;
- Public and active transport services and infrastructure, and available sustainable transport strategies to reduce the future (vehicular) trip generation of the School;
- The peak period trip generation and distribution of the School, and the potential impact of those trips on the local road network;
- Drop-off / pick-up (DOPU) infrastructure;
- Parking requirements and provision; and
- The design of access driveways; parking aisles and spaces; and servicing areas.

This scope of work specifically references the Secretary's Environmental Assessment Requirements (SEARs) prepared by the [then] Department of Planning and Environment (DPE) dated 6 August 2018 relating to the SSDA. In this regard, **Table 1** provides a summary of the SEARs; a summary response to each; and a reference to the section of this TIA which provides a more detailed response to each assessment request.

Table 1: Secretary's Environmental Assessment Requirements

SEARS	Summary Response	TIA Location
Include a transport and accessibility impact assessment, which details, but is not limited to the following:		
accurate details of the current daily and peak hour vehicles, existing and future public transport networks and pedestrian and cycle movement provided on the road network located adjacent to the proposed development	Details in regard to each of these existing, future Site and broader transport characteristics of the School catchment are provided in this TIA.	Section 3.1 Section 5.4 Section 6.1
details of estimated total daily and peak hour trips generated by the proposal based on surveys of the existing and similar schools within the local area based on surveys of the existing and similar schools within the local area	The daily and peak hour trip generation of the School references RMS surveys of schools across Metropolitan Sydney, as well as recent Ason Group school assessments. It is estimated that the School will generate some 303 vehicle trips per hour (vph) in the AM School peak and 250vph in the PM School peak.	Section 5.4
the adequacy of existing public transport or any future public transport infrastructure within the vicinity of the site, pedestrian and bicycle networks and associated infrastructure to meet the likely future demand of the proposed development	Estella Road has been designated as a bus route corridor and as such has been / will be designed in accordance with the appropriate bus standards, including the provision of minimum 3.5m travel lanes and indented bus bays in the vicinity of the Site.	Section 4
measures to integrate the development with the existing/future public transport network	Estella Road has been designated as a bus route corridor and as such has been / will be designed in accordance with the appropriate bus standards, including the provision of minimum 3.5m travel lanes and indented bus bays in the vicinity of the Site.	Section 4.2 Section 5.2.3
the impact of trips generated by the development on nearby intersections, with consideration of the cumulative impacts from other approved developments in the vicinity, and the need/associated funding for, and details of, upgrades or road improvement works, if required (Traffic modelling is to be undertaken using SIDRA network modelling for current and future years)	SIDRA modelling has been undertaken of nearby intersections which confirms that the existing intersections operate satisfactorily. Previously planning for the locality identified the need for upgrades to the Boorooma Street / Estella Road intersection and that finding is confirmed by this study whereby that intersection will exceed capacity by 2030. As such, it is therefore recommended for upgrades (to a roundabout) in the future, even without the School.	Section 6.1
the identification of infrastructure required to ameliorate any impacts on traffic efficiency and road safety impacts associated with the proposed development, including details on improvements required to affected intersections, additional school bus routes along bus capable roads (i.e. minimum 3.5 m wide travel lanes), additional bus stops or bus bays	The key intersections continue to operate at good levels of service to 2030, well within capacity, with minimal delays and a LOS A for all movements. Council has identified the need to provide a roundabout at the intersection of Estella Road / Boorooma Street due to background growth.	Section 4.2
details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location specific sustainable travel plan (Green Travel Plan and specific Workplace travel plan) and the provision of facilities to increase the non-car mode share for travel to and from the site	Along with the public and active transport available to the Site, Sustainable Travel Planning strategies have been prepared as part of the GTP accompanying this TIA.	Section 6.1 Appendix A

SEARS	Summary Response	TIA Location
the proposed walking and cycling access arrangements and connections to public transport services	The Proposal provides a good level of public and active transport services and infrastructure in the vicinity of the School connecting to the broader network, including bus stops, shared paths and pedestrian crossings.	Section 4 Section 5.3
the proposed access arrangements, including car and bus pick off facilities, and measures to mitigate any associated traffic impacts and impacts on public transport, pedestrian and bicycle networks, including pedestrian crossings and refuges and speed control devices and zones	A drop-off and pick-up zone (DOPUZ) will be provided on Estella Road to meet the peak student DOPUZ demand and be clearly signposted to provide short term stay provisions during School peak periods. A future pedestrian crossing could also be provided immediately adjacent to the School if the warrants are met in the future. An indented bus bay is also proposed immediately adjacent to the School to allow safe and efficient student access to bus services.	Section 5.2
proposed bicycle parking provision, including end of trip facilities, in secure, convenient, accessible areas close to main entries incorporating lighting and passive surveillance	Bicycle racks and parking spaces are to be provided on-site for students and staff respectively. End of journey facilities, including showers and lockers, will also be provided for staff.	Section 5.6.3
proposed number of on-site car parking spaces for teaching staff and visitors and corresponding compliance with existing parking codes and justification for the level of car parking provided on-site	A total of 22 car parking spaces will be provided on-site, which provides a surplus and therefore, full compliance with the CGCP DCP.	Section 5.6
an assessment of the cumulative on-street parking impacts of cars and bus pick-up/drop-off, staff parking and any other parking demands associated with the development.	An assessment of the cumulative potential impacts of the School on the local traffic, public and active transport network is provided in this TIA.	Section 6.1
an assessment of road and pedestrian safety to / from the school and adjacent to the proposed development and the details of required road safety measures and personal safety in line with CPTED	A detailed assessment of vehicle and pedestrian access is provided in this TIA, while more details in regard to CPTED are provided elsewhere in the Environmental Impact Assessment which this TIA accompanies.	Section 7.4
emergency vehicle access, service vehicle access, delivery and loading arrangements and estimated service vehicle movements (including vehicle type and the likely arrival and departure times)	Emergency and service vehicle access will be provided via the staff car park and designed to provide compliance with the relevant Australian Standards (AS2890) and emergency vehicle access guidelines. Service vehicle movements will be scheduled to occur outside of School peak periods.	Section 5.6 Appendix B
- the preparation of a preliminary Construction Traffic and Pedestrian Management Plan to demonstrate the proposed management of the impact in relation to construction traffic addressing the following: - o assessment of cumulative impacts associated with other construction activities (if any)	A Preliminary Construction Traffic & Pedestrian Management Plan (CTPMP) has been prepared as part of this TIA based on all available information in regard to future construction requirements. The CTPMP will be updated further to consultation with the key consent authorities as more details become available in regard to the construction program and would necessarily require compliance with Council and RMS guidelines.	Section 7.3 Appendix B
o assessment of cumulative impacts associated with other construction activities (if any)		
o an assessment of road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity		

SEARS	Summary Response	TIA Location
o details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process		
o details of anticipated peak hour and daily construction vehicle movements to and from the site		
o details of on-site car parking and access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle		
o details of temporary cycling and pedestrian access during construction		

1.3 Planning Controls

The Site lies within the Wagga Wagga Council (Council) Local Government Area (LGA) and as such, key references in preparing this TIA include:

- Wagga Wagga Local Environmental Plan 2010 (LEP);
- Wagga Wagga Development Control Plan 2010 (DCP);
- Wagga Wagga Local Infrastructure Contributions Plan 2019-2034 (LICP)
- Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040 (WWITS);
- Report for Wagga Wagga Planning Studies, Traffic Management - Estella West 2008 (TMEW 2008);

1.4 Traffic and Transport Guidelines and Standards

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

- Guide to Traffic Generating Developments 2002, Roads and Maritime Services (RMS Guide);
- Guide to Traffic Generating Developments – Updated Traffic Surveys 2013, RMS (RMS Guide Update);
- Roads and Maritime Services Trip Generation Surveys Schools Analysis Report, GTA Consultants (RMS Schools Report);
- Australian Standard 2890.1: Parking Facilities – Off-Street Car Parking (AS 2890.1);
- Australian Standard 2890.2: Parking Facilities – Off-Street Commercial Vehicle Facilities (AS 2890.2);
- Australian Standard 2890.3: Parking Facilities – Bicycle Parking (AS 2890.3);
- Australian Standard 2890.6: Parking Facilities – Off-Street Parking for People with a Disability (AS 2890.6);
- Department of Education Educational Facilities Standards & Guidelines (EFSG);
- Design Guide for Schools, NSW Government Architects (DGS);
- Department of Planning & Environment Environmental Impact Statement Guidelines, Department of Planning & Environment;
- Transport for NSW Guide to Transport Impact Assessment;
- Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development;
- Planning Guidelines for Walking and Cycling 2004, NSW State Government; and
- Austroads, Cycling Aspects of Austroads Guides, 2040
- City of Wagga Wagga, Wagga Integrated Transport Strategy and Implementation Plan 2040

1.5 Background Reports

Given the significant primarily residential growth anticipated in the vicinity of the Site, and indeed previous investigations of the Site itself, Ason Group has also specifically referenced the following reports in preparing this TIA:

- Wagga Wagga Integrated Transport Strategy and Implementation Plan 2040 (WWITSIP)
- Boorooma East Traffic Management (BETM)
- Estella West Traffic Management (EWTM)

1.6 Consultation

In preparing this report, the project team has had the opportunity to discuss key local and sub-regional transport issues with officers of Council, Roads and Maritime Services (RMS) and Transport for NSW (TfNSW). Ason Group acknowledges the insights in regard to existing and future local traffic and transport conditions provided by these officers.

2 The Site

2.1 Location

The Site is legally known as Lot 1 in DP 1253855 and is generally regular in shape with an area of approximately 3ha. It is currently clear of development.

The Site is located at the southern boundary of Charles Sturt University (CSU), on Estella Road, Estella (Wagga Wagga). It is bounded to the north and west by CSU, to the east by recreational facilities—currently on CSU land, but soon to be transferred to Wagga Wagga City Council ownership—and to the south by the residential estates of Estella.

The Site is shown in its local context in **Figure 1**, which also indicates the key roads providing Site access.



Figure 1: Site Location

3 The Road Network

The site for the proposed school is located the northern side of Estella Road between Pine Gully Road and Boorooma Street, Estella. The intersection of Estella Road / Gunn Drive is on the southern side of Estella Drive near the eastern boundary of the site. Shared pedestrian/bicycle paths connect to the CSU along the eastern boundary and Boorooma Street to Gunn Drive on the southern side of Estella Road. Key roads in the vicinity of the Site are described further in sections below.

3.1 Key Roads

3.1.1 Estella Road

Estella Road is a collector road that currently runs along the southern boundary of the Site, generally east-west between Boorooma Street and Pine Gully Road. The road reserve is approximately 50 metres wide and consists of the following characteristics:

- An undivided two-way rural type road with a sealed carriageway nominal width of 7 metres with two traffic lanes nominally 3.5m wide;
- 11 metre wide grassed-verge on the northern side, including unsealed shoulders suitable for parking and table drain;
- 32 metre wide landscapes buffer with grassed verge on the southern side including unsealed shoulder and table drain;
- Delineation of Estella Road is only with guide posts—there are no existing pavement markings.
- The sign posted speed limit is 70km/h.
- A shared path is provided on the southern side of Estella Road between Boorooma Street and Gunn Drive.

3.1.2 Boorooma Street

Boorooma Street is a sub-arterial road that runs generally north-south to the east of the Site and intersects with Estella Road. Boorooma Street provides access to the nearby residential estates of Estella and Boorooma via Farrer Road and is the main access to CSU via Darnell Smith Drive, has a road reserve width of approximately 60m and consists of the following characteristics:

3.1.3 Pine Gully Road

Pine Gully Road is a collector road that runs generally north-south to the west of the Site and intersects with Estella Road. It provides one traffic lane in each direction for two-way flow, as well as indented

parking lanes on both sides of the road as well as unsealed shoulders suitable for parking on both sides. The posted speed limit is 70km/h.

3.1.4 Local Roads

Given the internalisation of future School trips within the suburbs of Gobbagombalin, Estella and Boorooma, the majority of trips are expected to be generated to and from local roads intersecting with the key roads identified in sections above. The roads all have the same general profile, with two traffic lanes for two-way flows, adequate provision for parking or parking lanes on both sides of the road and local speed limits of 50km/h.

3.2 Existing Traffic Volumes

The City of Wagga Wagga Council provided historical traffic count data from Estella Road, Gunn Drive, Pine Gully Road and Boorooma Street and the derived average daily traffic (ADT) and peak hour traffic volumes (Veh/hr) in each direction and speed profile for these roads is shown in and also shown below on Figure 1 Existing Traffic Volume Plans below:

Table 2: Existing Traffic Volumes

Location/Direction	ADT (v/day)	Volumes (v/hr)		85th Percentile Speed (km/h)
		AM Peak	PM Peak	
Estella Road: Between Gunn Drive and Boorooma Street				
Westbound	576	29	76	40
Eastbound	656	92	58	
Estella Road: Between Gunn Drive and Pine Gully Road				
Westbound	509	83	36	66
Eastbound	595	52	66	
Pine Gully Road: South of Estella Road				
Northbound	1,328	176	88	79
Southbound	1,222	78	151	
Pine Gully Road: North of Estella Road				
Northbound	1,328	203	78	76
Southbound	1,314	81	167	
Boorooma Street: Between Farrer Road and Estella Road				
Northbound	2,739	621	171	67
Southbound	2,934	207	417	
Boorooma Street: Between Durack Circuit and Messenger Avenue				
Northbound	2,743	585	173	68
Southbound	3,026	236	404	
Gunn Drive: Between Pugsley Avenue and Estella Road				
Northbound	595	94	50	46
Southbound	606	36	78	

4 Public and Active Transport

4.1 Rail

The Site is located 8.5km north of Wagga Wagga Station, and access to the station from the Site is provided by buses connecting to and from the Wagga Wagga City Centre (see below).

4.2 Bus Services

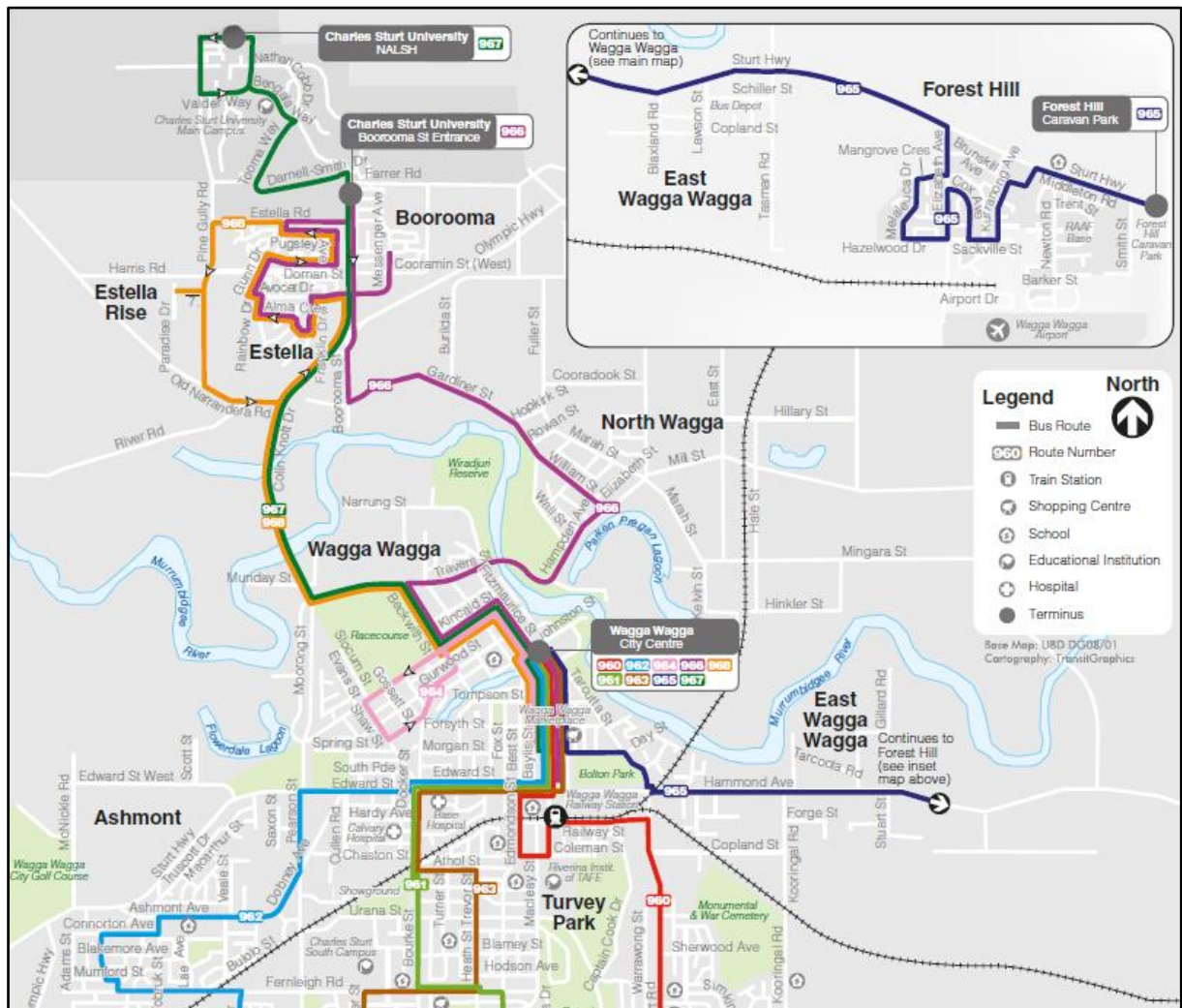


Figure 2: District and Local Bus Services

4.2.1 School Bus

While there is an expectation that the local and district bus services will provide the coverage and capacity required to accommodate student travel to and from the School, dedicated school bus services

could be introduced should demand exceed public bus capacity. However, in general students would be encouraged to travel on scheduled public transport routes.

Estella Road has been designated as a bus route corridor and as such has been / will be designed in accordance with the appropriate bus standards, including the provision of minimum 3.5m travel lanes and indented bus bays in the vicinity of the Site.

4.3 Active Transport

4.3.1 Bicycle network

In September 2016 Wagga Wagga City Council released the Active Travel Plan – Cycling (ATP). This Plan has been developed as a component of the Wagga Wagga Integrated Transport Strategy 2040 (WWITS).

The ATP presents a clear vision on how to promote cycling as a legitimate mode of transport, through the development of high-quality cycling networks and facilities across the city. The Plan is consistent with the principles of the WWITS, and provides connections and ease of movement between all centres and neighbourhoods whilst developing and maintaining an economically viable transport system based on long term usage and informed by life-cycle costing and resource availability

A proposed network of cycle routes and end-of-trip facilities is presented in the ATP. This proposed network includes 5 complete cycling networks linking the outer suburbs with the central business area. The indicative locations of cycle routes and facilities have been selected following consideration of cycling needs as part of the overall integrated transport vision for the city. These locations are not locked in and they will be further investigated during the design phase. Council is developing a 51km network of dedicated cycle paths which when complete will criss-cross the city and provide residents with a safe, alternative transport option for commuting.

The \$12.81M project includes 5 complete cycling networks which will link the outer suburbs with the central business area and end-of-trip facilities.

Dedicated city-wide cycling and sporting facilities are designed to improve health outcomes, enhance the liveability of the city, as well as attract new visitors to the city for sporting and recreational opportunities. The proposed bicycle (and pedestrian) network is shown in Figure 3.

4.3.2 Pedestrian network

The pedestrian network within the study area and the potential School catchment is currently limited to shared facilities with bicycles and connections along desire lines to major traffic generators and public

spaces such as CSU and Peter Hastie Oval, adjacent to the Site. However, the LICP has identified \$1,513,000 for future footpaths in the Boorooma, Estella and Gobbagombalin,

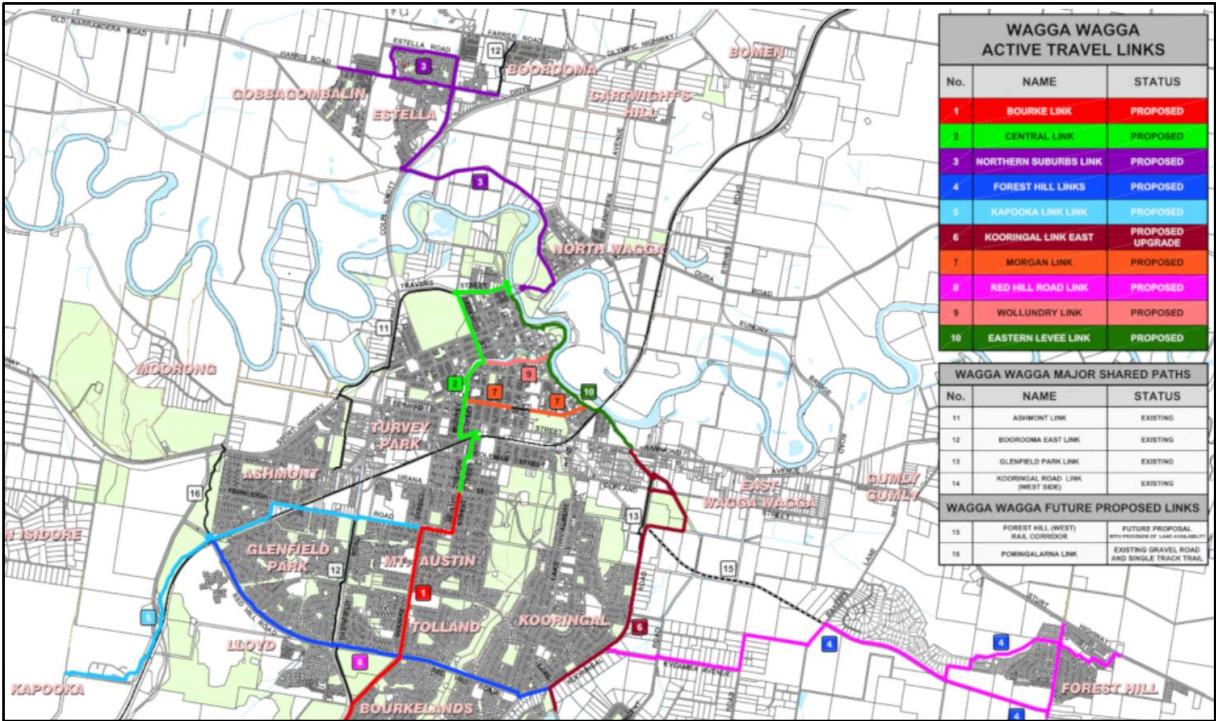


Figure 3: Active Transport Network

Currently, with no school constructed, there are no pedestrian (zebra) crossings or Children’s Crossing in the immediate area. As such, this infrastructure presents a potential opportunity to improve pedestrian connectivity.

5 The Proposal

5.1 The School

The SSD application seeks consent for the construction of a new school to accommodate up to 480 students with core school facilities provided to meet the needs of the future student numbers.

The application includes the following:

- Construction of five new two-storey school buildings comprising:
 - Collaborative learning spaces;
 - Classrooms;
 - Offices for teachers and administrative staff;
 - Hall; and
 - Library.
- Associated site landscaping and open space improvements;
- Parking and loading facilities;
- Removal of trees; and
- School signage.

An indicative concept scheme prepared by Perumal Pedavoli has been provided for information purposes (see **Figure 4** and **Attachment A**).

As discussed, the SSDA provides for the construction and operation of a new primary school on the Site, including:

- New permanent teaching spaces for 480 students (in line with EFSG Standards);
- Core facilities including a Library, Administration Centre, Canteen and general Student and Staff amenities;
- Outdoor playgrounds and learning spaces; and
- Off-street parking for 23 vehicles, including:
 - 22 car parking spaces for staff, and
 - 1 on-site service bay

Full details of the proposed School are provided in the EIS which this TIA accompanies.



Figure 4: Indicative Proposed Site Layout

5.2 Vehicle Access

5.2.1 Staff Car Park

Access to the staff car park will be provided from Estella Road and will be restricted to staff and students with accessible set down requirements only. The capacity of the car park (22 car spaces) is examined in further detail in **Section 5.6**.

5.2.2 Drop-Off / Pick-Up Zone (DOPUZ)

Drop-off and pick-up facilities will be provided on the northern (school) side Estella Road. The operation of the DOPUZ facilities is examined in further detail in **Section 0**.

5.2.3 Bus Stops

An indented bus bay with capacity for 2 buses will be provided on the northern side of Estella Road to the east of the Site and Gunn Drive.

5.2.4 General Parking

On-street parking is available in all streets adjacent to the Site. Notwithstanding, there is significant on-street capacity in the immediate adjacent local road network, providing simple access to parking from all directions.

5.2.5 Service Vehicles

Waste and other service vehicle access will be provided via and through the staff car park, which has been specifically design for larger vehicles. The requirement and path of service vehicles to, through and from the staff car park and service area is examined in further detail in **Sections 5.6** and **7.2**.

5.2.6 Emergency Vehicles

Emergency vehicle access will be provided via the staff car park and designed to provide compliance with the relevant Australian Standards and emergency vehicle access guidelines.

5.3 Pedestrian and Cycle Access

As discussed in **Section 4.3**, the School is provided with excellent pedestrian and cycle accessibility. A shared path is provided in Estella Road immediate adjacent to the School, with immediate access to the School's primary access points.

5.3.1 Pedestrian (Zebra) Crossing Warrant

RMS has a reduced warrant for sites used predominantly by children and by aged or impaired pedestrians. If the crossing is used predominantly by school children, is not a suitable site for a children's crossing and in two counts of one hour duration immediately before and after school hours:

(a) the pedestrian flow per hour (P) crossing the road is greater than or equal to 30

AND

(b) the vehicular flow per hour (V) through the site is greater than or equal to 200

a pedestrian (zebra) crossing may be installed. If at least 50% of pedestrians using the crossing are aged or impaired and for each three one hour periods in a typical day

(a) $P \geq 30$

AND

(b) $V \geq 200$

AND

(c) $PV \geq 60,000$

a pedestrian (zebra) crossing may be installed.

The above criteria are not known for the School when it will be operational and, whilst the vehicle volumes can be forecast with relative accuracy and may exceed the requirement, the pedestrian volumes and desire lines may not. This is particularly relevant given that the number of possible directions and access desire lines is likely to significantly spread the concentration of pedestrians and therefore reduce the effectiveness and efficiency of a crossing.

Notwithstanding, an indicative location has been shown on the drawings to demonstrate an appropriate and likely location should the warrants be met once the school is operational.

5.4 Trip Generation

Ason Group has undertaken a detailed review of the RMS School Survey, specifically to identify schools with similar characteristics to the proposed School. In this regard, we have considered the following key characteristics:

- An immediately adjacent residential area of such as to utilise all of the school's capacity, i.e. generate no 'external' trip demand;
- No major roads in the vicinity of the school or that requiring crossing along key routes to or from the school;
- Local bus services; and
- A high quality active transport network, including pedestrian, cycle and crossing facilities;

In this regard, Table 3 provides a summary of the RMS surveyed schools which provide the best comparative data for the assessment, noting that the trip rates also include staff and visitor trip generation.

Table 3: RMS School Survey Comparative Sites

Criterion	Grays Point Public School	Harrington Street Public School	Kurnell Public School
Region	Sydney	Sydney	Sydney
Suburb	Grays Point	Cabramatta	Kurnell
Students	383	1,055	215
Staff	20	73	15
Staff/Student	0.05	0.07	0.07
On-Site Parking Spaces	20	43	14
OOSH	Yes	Yes	Yes
AM Vehicle Trips/Student	0.43	0.63	0.60
PM Vehicle Trips/Student	0.14	0.52	0.32

With reference to Table 3, the surveyed trip rates for the Harrington Street Public School have been adopted for the assessment. As such, it is estimated that the School will have following trip generation:

- AM School peak hour: 303 vehicle trips
- PM School peak hour 250 vehicle trips

5.5 Trip Distribution and Assignment

Staff are expected to travel to / from the broader sub-region, with only a minority of trips generated within the School catchment. During the AM school peak period, all staff trips are expected to be arrival trips, while during the PM school peak period all staff trips are expected to be departure trips, though it is noted that the majority of departure trips would be later than the PM school peak period, i.e. coinciding more with the PM commuter peak period.

As discussed previously, the majority of students are expected to reside within the Estella, Boorooma and Gobbagombalin suburbs and, as such, student trips are expected to be distributed to the road network in accordance with residential densities. Student vehicle trips are expected to be evenly divided in the School peak periods between inbound and outbound trips.

The Northern Growth Area of Wagga Wagga is the fastest growing precinct within the LGA with a 5.2% growth rate. Table 4 in Section 5.5 of the Northern Growth Area suburb development shows the following ratios for neighbouring subdivisions:

- Estella: 1,660 lots = 44%
- Boorooma: 1,066 lots = 28%
- Gobbagombalin: 1,076 =28%

The AM school traffic peak has been used for this assessment as it represents the worst-case scenario traffic flows impacts. These ratios produce the estimated future (2030) AM traffic volumes calculated in **Sections 5.5.1 to 5.5.3** from each estate along the travel routes shown in **Figure 5**.

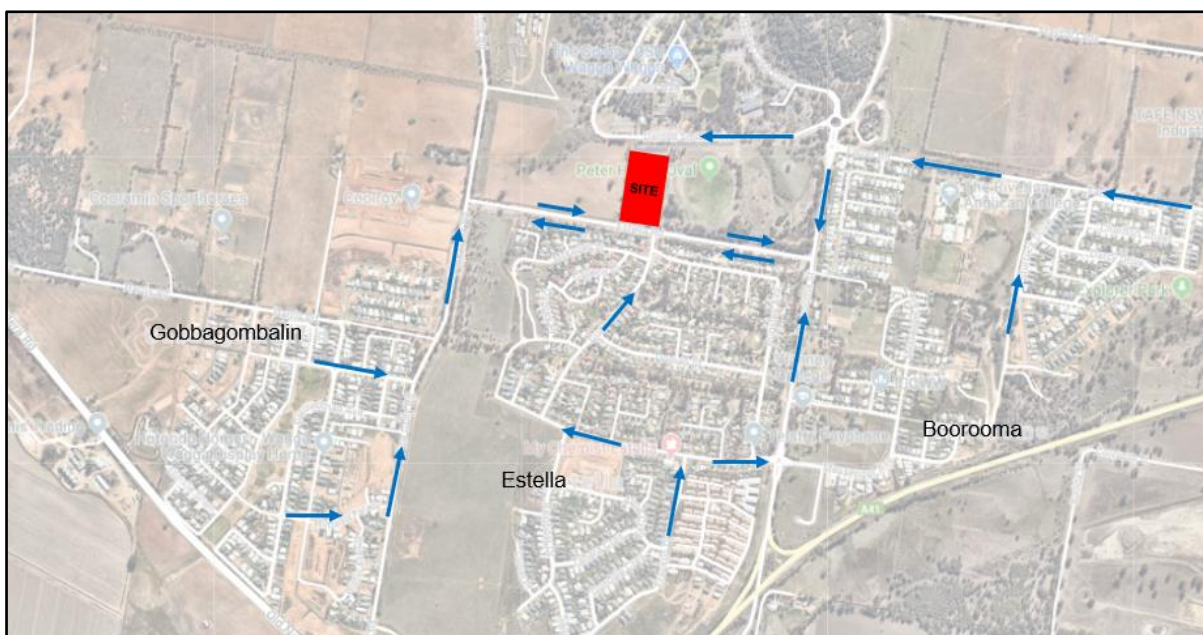


Figure 5: School Travel Routes

5.5.1 Estella Estate

- 44% (of future stages 303 veh/hr) = 133vph.
- 60/40 split between Gunn Drive (80vph) and Avocet Drive (53vph).
- Gunn Drive 80vph accessing Estella Drive and school. Estimate and even 75/25 split between left turn (60vph) and right turns (20vph) at Estella Drive/Gunn Drive intersection. Traffic will continue to Pine Gully Road and Boorooma Street.
- Avocet Drive (53vph) left turn onto Boorooma Street and left turn into Estella Road to access the school and 50/50 split to continue to Pine Gully Road (26vph) and turn left into Gunn Road (25vph).

5.5.2 Boorooma Estate

- 28% (of future stage 303vph) = 85vph.
- 60/20/20 split between Farrer Road to Darnell Smith Drive, Farrer Road to Boorooma Street south bound and Messenger Avenue to Boorooma Street northbound.
- Farrer Road to Darnell Smith Drive 51vph parking at CSU over-flow car park.
- Farrer Road to Boorooma Street south bound 17vph turning right into Estella Road to access school. 50/50 split of traffic to Gunn Drive (9vph) and Pine Gully Road (8vph).
- Messenger Avenue to Boorooma Street north bound 16vph turning left into Estella Road to access school. 50/50 split of traffic turning left at Gunn Drive (8vph) and through and turning left at Pine Gully Road (8vph).

5.5.3 Gobbagombalin Estate

- 28% (of future stage 287vph) = 80vph.
- 100% of 80vph will turn left onto Pine Gully Road from either Muttama Parade or Cootamundra Boulevard and 80vph will turn right into Estella Road and to access school.
- 70/30 split of traffic and continuing to Boorooma Street (56) and turning right and Gunn Drive (24) turning right.

5.6 Parking

5.6.1 Parking Requirements

The Wagga Wagga DCP2010 specifies parking rates for primary and secondary schools as 1 space/two employees plus 1 space/ten senior students (Years 11 and 12). Noting that the Proposal is for a primary school, there are no year 11 or 12 students.

5.6.2 Parking Provision

The School will provide a total of 22 off-street parking spaces, and therefore be fully compliant with the DCP as well as provide a surplus for additional visitor parking and future growth without impacting on the on-street parking. Parking spaces required are for 16 teachers (1 per classroom) and 8 additional admin staff = $24/2 = 12$ parking spaces. The School proposes 23 parking spaces managed as:

- 21 spaces (school use)
- 1 accessible
- 1 MRV for service vehicles (2.5m x 8.8m)

Accordingly, the proposed 23 onsite parking spaces provided for the Estella Public School is above the Wagga Wagga DCP 2010 parking requirement. However, the surplus does provide for future potential growth in staff numbers to cater for 800 students.

The parking rate for people with disabilities is in accordance with the Building Code of Australia 2011 Table D3.5 car parking numbers for people with a disability which specifies 1 space per 100 car parking spaces for a class 9b (a) School. The School meets the accessible parking requirement with the provision of 1 accessible parking space.

Car parking has been provided in accordance with the requirements in AS/NZS 2890.1 2009 Parking Facilities – Part 1: Off- street car parking for the design of car parks and AS/NZS 2890.6 2009 Parking Facilities Part 6: Off-street parking for people with disabilities.

5.6.3 Bicycle Parking

There is no DCP requirement for bicycle parking at schools. However, Table H1 in Cycling Aspects of Austroads Guides (CAAG) Table H 1 gives an indication of the levels of bicycle parking needed to be provided for various land uses. These bicycle parking provision rates may be used to provide guidance if local standards or data are not available. It should be noted that the application of these types of

provision rates needs to be undertaken with caution as local circumstances may often render them inappropriate.

The bicycle parking provision required for primary schools from CAAG is 1 per 5 students over year 4. Accordingly, a suitable provision is considered between approximately 30 bicycle racks for students, and staff, along with end of journey facilities including showers and lockers.

In response, the school proposes the provision of 40 bicycle racks to allow for future growth.

5.6.4 Servicing

As discussed in Section 5.6.2, servicing area (deliveries, waste collection) is provide by 1 space, accommodating up to an MRV is located in the south-eastern corner of the staff car park. Waste vehicle trips are expected to be no more than 2 – 4 trips weekly (and as previously stated, be generated outside of School peak periods) while additional service vehicle demand would not generate more than 5 vehicle trips each day.

6 Impact Assessment

6.1 Traffic

6.1.1 Intersection Performance

The future operation of the key intersections has been assessed using the RMS approved SIDRA intersection model. The SIDRA model provides a number of outputs by which to measure the performance of an intersection, including:

- **Average Vehicle Delay (AVD):** AVD (or average delay per vehicle in seconds) for intersections is used to determine an intersection's Level of Service (see below). For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection.
- **Degree of Saturation (DOS):** DOS is defined as the ratio of demand (arrival) flow to capacity.
- **Level of Service (LOS):** LOS is a comparative measure that provides an indication of the operating performance, based on AVD.

Table 4 provides the SIDRA recommended criteria for the assessment of intersections which reference to the RMS Guide.

Table 4: SIDRA Level of Service Criteria

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals & Roundabout	Give Way & Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays	At capacity, requires other control mode
		Roundabouts require other control mode	
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

6.1.2 Future Intersection Performance

Each of the three intersections modelled are priority controlled—with Stop and Give Way signs or operating under the T-junction rule. For roundabouts and priority control intersections the critical movement for level of service assessment is taken as the worst movement delay. With this in mind, **Table 6** provides a summary and comparison of the future performance of the key intersections further to the SIDRA analysis.

Table 5: 2020 AM Peak Intersection Performance

Intersection	2020 with School	
	Critical Movement LOS	Worst Movement Delay (sec)
Estella Road / Pine Gully Road	A	6.6
Estella Road / Gunn Drive	A	5.9
Estella Road / Boorooma Street	A	10.8

With reference to Table 5, the key intersections continue to operate at good levels of service, well within capacity, with minimal delays and a LOS A for all movements.

It is noted that, as far back as 2008 Council's Report for Wagga Wagga Planning Studies, Traffic Management - Boorooma East found that:

"The intersection of Boorooma Street and Estella Road would benefit from the construction of a roundabout to assist in reducing travel speeds on Boorooma Street and to provide improved access for traffic entering from Estella. A single lane roundabout would be appropriate and would accommodate the projected traffic flows at an acceptable level of service."

Further sensitivity analysis modelling the intersection with a roundabout confirms this and the results are included in **Appendix D** and summarised below. Therefore, it is recommended that Council include the upgrade of the Estella Road / Boorooma Street intersection to a roundabout or traffic signals in the future 2023-2027 Operational Plan.

Table 6: 2030 AM Peak Intersection Performance

Intersection	Existing		2030 Without School		2030 + School	
	Critical Movement LOS	Worst Movement Delay (sec)	Critical Movement LOS	Worst Movement Delay (sec)	Critical Movement LOS	Worst Movement Delay (sec)
Estella Road / Pine Gully Road	A	6.6	A	7.7	A	8.4
Estella Road / Gunn Drive	A	5.9	A	6.3	A	7.1
Estella Road / Boorooma Street	A	10.8	E	59.2	F	617.2

The intersection of Estella Road / Boorooma Street, when modelled using the forecast 2030 traffic (no additional school traffic), has a LOS E due to the right turn movement out of Estella Road not being able to find enough appropriate gaps to make the turn into the increased flows on Boorooma Street.

The results in **Table 5** show that with the addition of the Estella Public School 2020 AM traffic the Estella Road leg of the intersection had a LOS A for all turns and LOS A for all other movements and that the intersection is operating well within capacity, with minimal delays.

6.2 Drop-Off and Pick-Up

Student drop-off and pick-up trips are expected to be concentrated over 30–45 minutes rather than a full hour in each School peak periods.

With reference to our past assessment of primary schools, schools are required to use DOPUZ under the same conditions as No Parking zones, i.e. a maximum stay of 2 minutes, remaining in or within 3 metres of the vehicle. As such, an individual DOPUZ space could effectively serve approximately 15 - 20 vehicles across a 30 – 45 minute period.

It is also important to consider the different characteristics of the drop-off trip against the pick-up trip. In the AM school peak, the drop-off trip generally takes less time, as the students are in the car and simply need to be dropped-off. Conversely, in the PM school peak parents / carers must wait for the students, which can increase the average standing time; in addition, many parents / carers will arrive prior to the end of school, and as such queues can form behind the vehicles waiting in the pick-up area.

The arrival and departure times of students (through the broader AM and PM school peaks) utilising the DOPUZ facilities has been surveyed and observed by Ason Group over many years, with almost all primary schools having a similar build-up of trips prior to school finishing, with the peak DOPUZ demand occurring approximately 10 minutes prior to the commencement of school. These observed profiles have been assigned to the School demand for the PM peak pick-up period, as shown in **Figure 6**.

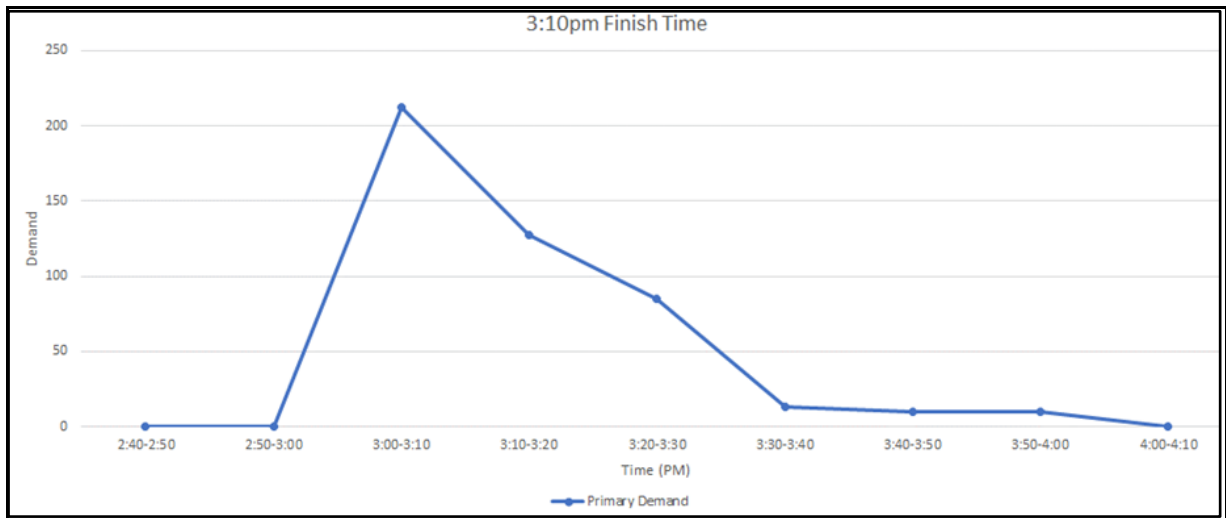


Figure 6: PM School Peak Pick-Up Peak Demand

It is assumed that the managed, time restricted (maximum 2 minutes) Drop-off/Pick-up zone (DOPUZ) zone could potentially cater for the following parent drop-off/pick-up movements over a 45 minute period during the AM and PM peak:

15 spaces x 45 minute period / 2 minute drop-off/pick-up = 338 vehicle movements

Estimated traffic generation = 303 veh/hr (AM) and 250 veh/hr (PM); therefore, there is sufficient capacity to accommodate the cumulative impact of car and bus drop-off and pick-up.

Additionally, it is understood that discussions with Council have progressed negotiating the utilisation of the road shoulder of the adjoining property to the east of the School to provide an indented bus bay accommodating 2 buses.

With reference to Section 7.1.1, it is recommended that a Traffic and Pedestrian Management Plan (TPMP) be developed by the DoE and the School, which would be reviewed on an annual basis to establish inefficiencies and areas for improvement, particularly in regard to the operation of the DOPUZ. Implementation of new strategies as required would then ensure that the demand for DOPUZ is accommodated while reducing impacts on the local road network. These future strategies may include staggering starting / finishing times to allow reduce the demand.

7 Additional Considerations

7.1 Road and Pedestrian Safety

7.1.1 Transport Management

It is recommended that prior to opening, the DoE and the School prepare a Traffic and Parking Management Plan (TPMP) to outline the strategies proposed to provide for safe and efficient operations on and off-site. The TPMP is expected to include operating strategies in regard to:

- The use of the staff car park;
- The use of the DOPUZ, including information in regard to length of stay and (for example) children's names on visors and staggered start and finish times to maximise the safety and efficiency of the DOPUZ;
- Bus loading and unloading; and
- Safe Routes to Schools measures, such as safe walking and cycle routes between the School and the surrounding residential areas.

The TPMP would then be reviewed annually by Council and updated as required.

7.1.2 Sight Distance

The minimum safe property access sight distance as set out in Section 3.2.4 Sight distance at access driveway exits, in AS2890.1 parking facilities Part 1: Off-street Car Parking requires clear visibility along the road frontage for a minimum 85m for a 70km/h road speed. A sight distance of over 100m was measured in both directions on Estella Road at the proposed new staff car park access driveway. Therefore, the sight distance criteria are satisfied.

7.2 Design

All access, parking and servicing areas have been designed with reference to the appropriate Australian Standards, and specifically AS 2890.1 (with regard to access driveways and parking modules) and AS 2890.2 (with regard to service vehicles). It is expected that a Condition of Consent in any future approval will require that the final design provide full compliance with the Australian Standards, which would provide for any minor design revisions that may arise through to construction commencing.

Existing and future off-site infrastructure such as on-street parking lanes and bus capable streets has/will necessarily be constructed in accordance with the requirements of the Wagga Wagga DCP.

7.3 Preliminary Construction Traffic and Pedestrian Management Plan

A Preliminary Construction Traffic and Pedestrian Management Plan (CTPMP) is provided in **Appendix B**, which considers the strategies to be undertaken during the School construction to maximise safety while retaining the efficiency of the road and active transport network.

Ason Group notes that the CTPMP will be revised in the future in consultation with Council and RMS further to receipt of additional details in regard to the construction program.

7.4 Crime Through Environmental Design (CPTED)

In line with the four main principles of CPTED, the Proposal provided the following:

- Providing excellent sight distance to facilitate natural surveillance.
- Providing controlled access points in accordance with Australian Standards.
- Segregation of school grounds and delineation of specific uses to provide territorial reinforcement.
- It is expected that an adequate maintenance program will be implemented to enhance each of the points above.

8 Conclusions and Recommendations

8.1 Conclusions

Further to a detailed assessment of the proposed development of the New Estella Road Public School, Wagga Wagga, we provide the following conclusions:

- The Site is subject to the provisions of Wagga Wagga Local Environmental Plan 2010 (LEP) and is zoned SP2 – Infrastructure: Educational Establishment. Accordingly, the proposed educational establishment is permitted with consent.
- The School will be centrally located within the Estella, Boorooma and Gobbagombalin catchment, from which the majority of students are expected to reside; given the active transport and future public transport accessibility, the School is expected to ultimately generate fewer vehicle trips than a 'standard' public school.
- Surveyed trip rates have been adopted for the assessment that broadly align with the rates and methodology for determining those rates specified by RMS and TfNSW. As such, it is estimated that the School will have following trip generation:
 - AM School peak hour: 303 vehicle trips
 - PM School peak hour: 250 vehicle trips

The majority of these trips will be generated to and from the drop-off/pick-up zone.

- With specific regard to the potential impact of these trips, the local intersections have significant spare capacity by which to accommodate these trips while continuing to operate with minimal delays.
- The traffic generated by the School in 2030 will have a minimal effect on queuing and delays at the key intersection of Estella Road and Boorooma Street. However, it is determined, that the major contributing impact to the operations of this intersection is the 5% residential estates background growth in network traffic.
- The on-street set down space available immediately adjacent to the School provides more than enough capacity to meet the peak drop-off and pick-up demand in both the AM and PM school peak periods.
- Parking is provided on-site in excess of the DCP school parking requirements, while there is additional on-street parking capacity to accommodate any additional before and after school demand.
- All access, parking and servicing areas have been specifically designed with reference to the appropriate Australian Standards. It is anticipated that any minor revisions to on-site demand could

be accommodated through a Condition of Consent specifically requiring final design compliant with Australian Standards.

- The criteria for a pedestrian (zebra) crossing—such as number of pedestrians and desire lines conflicting with specific traffic flows—are not known for the School when it will be operational. Therefore, an indicative location for a crossing has been shown on the drawings to demonstrate an appropriate and likely location should the warrants be met once the school is operational.

8.2 Recommendations

Further to the conclusions outlined above, Ason Group provides the following recommendations to further maximise the safety and efficiency of future School operations:

- NSW Department of Education to consult with Council and RMS in regard to appropriate sign-posting of set down and bus zones adjacent to the Site.
- The School implement and provide for future review of a Workplace Travel Plan to maximise public and active transport opportunities for staff.
- A final CTPMP be prepared once full details of the construction task are available, and further to consultation with Council and RMS.
- Council investigate upgrading the Estella Road / Boorooma Street intersection to a roundabout to accommodate the growth of the surrounding estates and include in the future 2023-2027 Operational Plan.
- A dedicated bus zone, Drop-off / Pick-up Zones and associated works be installed in Estella Road.
- Council and RMS investigate the provision of a supervised School Children's Crossing and associated works be installed across Estella Road in the vicinity of the School.

Appendix A

Green Travel Plan

Green Travel Plan

New Estella Road Public School, Wagga Wagga
Estella Road, Estella (Wagga Wagga)

Ref: P1049r02v01
22 October 2019

Document Control

Project No: P1049

Project: New Estella Road Public School – Green Travel Plan

Client: Hansen Yuncken

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1 Introduction

1.1 Background

Ason Group has been engaged to prepare a Sustainable Travel Plan (the Plan) — also known as a Green Travel Plan (GTP) or Workplace Travel Plan — in relation to the proposed New Estella Road Public School, Wagga Wagga (the School), located in Estella Road, Estella (the Site). The Site is located within the Wagga Wagga local government area (LGA) but is subject to approval under Section 89E of the Environmental Planning and Assessment Act 1979 as a State Significant Development (SSD 18_9477). Specifically, this GTP has been prepared in response to Secretary's Environmental Assessment Requirements (SEARS), which include the following requirement:

“...details of travel demand management measures to minimise the impact on general traffic and bus operations, including details of a location specific sustainable travel plan (Green Travel Plan and specific Workplace travel plan) and the provision of facilities to increase the non-car mode share for travel to and from the site.”

1.2 Purpose

This GTP is intended to develop a package of site-specific measures to promote and maximise the use of sustainable travel modes, including walking, cycling, public transport and car sharing. These strategies will therefore assist in less reliance on private vehicles for the proposed development, supporting sustainability initiatives for growth into the future.

In this regard, this GTP sets out objectives and strategies to assist both the NSW Government and Council in achieving their goals to improve sustainability.

This GTP includes a review of the existing transport choices and sets targets so that the effective implementation of the GTP can be assessed. These targets are intended to be realistic but ambitious enough to initiate substantive behavioural change to achieve the desired outcomes, given existing and future multi-modal transport networks.

This GTP is expected to be coordinated with the property owners or their representatives. It shall be reviewed regularly as part of an ongoing review to ensure it remains relevant and reflective of current conditions.

1.3 Reference Documents

In preparing this GTP, Ason Group has made reference the following key planning documents:

- Transport for NSW (TfNSW), Integrated Public Transport Service Planning Guidelines, Sydney Metropolitan Area, December 2013
- TfNSW, Future Transport Strategy 2056, March 2018
- NSW Government, Planning Guidelines for Walking and Cycling
- Austroads, Cycling Aspects of Austroads Guides, 2014
- City of Wagga Wagga, Wagga Integrated Transport Strategy and Implementation Plan 2040

2 Site Audit and Data Collection

2.1 Site Location

The Site is legally referenced as Lot 1 in DP1253855 — with a street address of Estella Road, Wagga Wagga — as identified below in **Figure 1**. It has a southern frontage to Estella Road, in the vicinity of its intersection with Gunn Drive.



Figure 1: Site Location

2.2 Proposed Development and Site Facilities

As it relates to the travel planning, the School includes provision of:

- 22 car parking spaces (including 1 accessible space), and
- Bicycle parking rails, with capacity for 40 bicycles near the main pedestrian entry.

2.3 Travel Mode Share Analysis

The Site is currently vacant and, as such, reliable travel mode data is not yet available.

Establishing baseline data will be key objective of future updates to this GTP, in accordance with the monitoring and maintenance requirements discussed in Section 6.

2.4 Surrounding Public Transport Services

2.4.1 Railway Services

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

The Site is located 8.5km north of Wagga Wagga Station, and access to the station from the Site is provided by buses connecting to and from the Wagga Wagga City Centre (see below).

As a local public school, the use of rail services by students is not anticipated. Given the distance to Wagga Wagga railway station, it is expected that any staff using rail services would also require the use of bus or other modes as part of a multi-modal trip.

2.4.2 Bus Services

Regarding standard bus travel, the *Integrated Public Transport Service Planning Guidelines* state that bus services influence the travel mode choices of sites within 400 metres (approximately 5 minutes) of a bus stop. While there is an expectation that the local and district bus services will provide the coverage and capacity required to accommodate student travel to and from the School, dedicated school bus services could be introduced should demand exceed public bus capacity. However, in general students would be encouraged to travel on scheduled public transport routes.

Estella Road has been designated as a bus route corridor and as such has been / will be designed in accordance with the appropriate bus standards, including the provision of minimum 3.5m travel lanes and indented bus bays in the vicinity of the Site. shown in **Error! Reference source not found..**

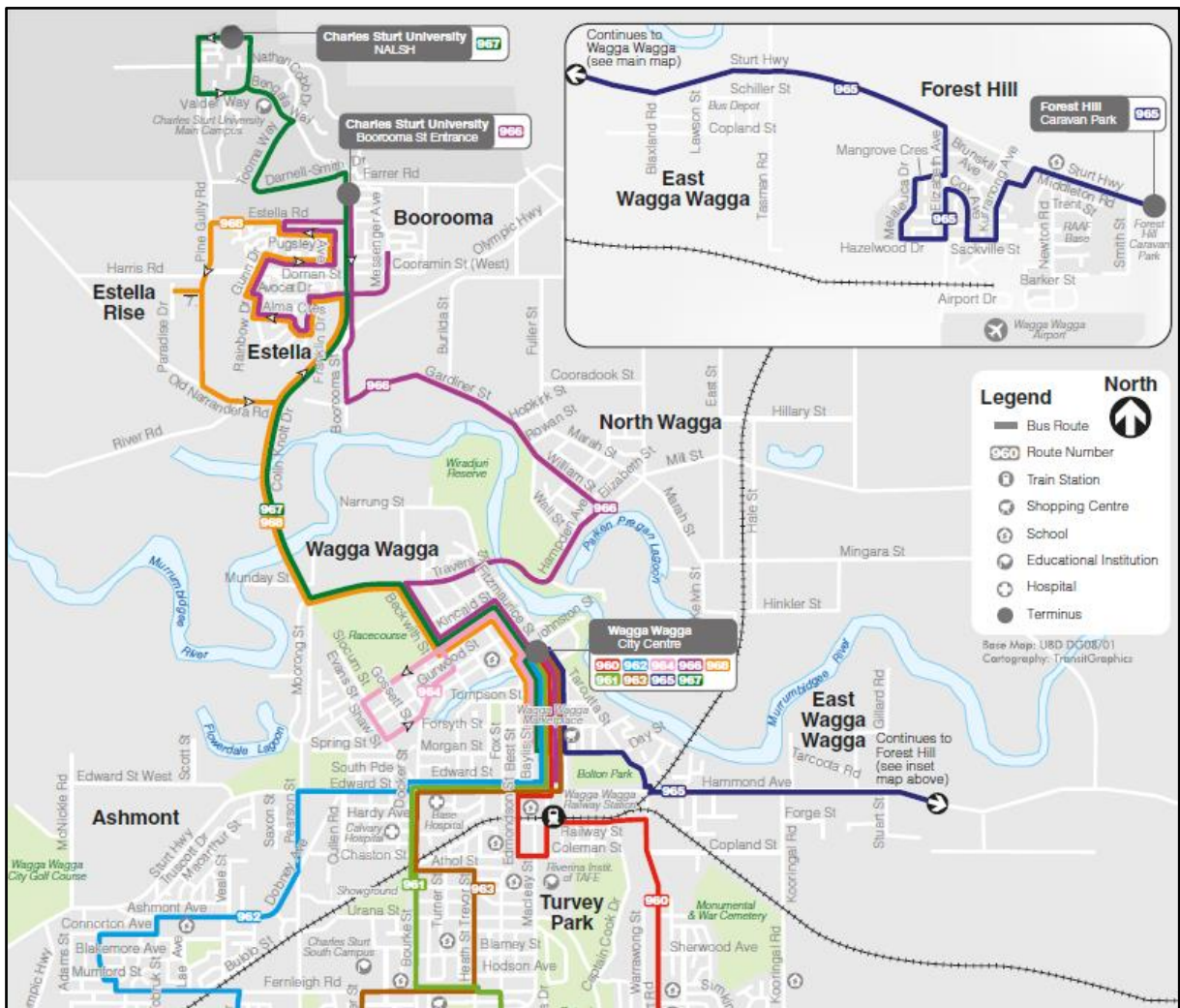


Figure 2: District and Local Bus Services

Bus stops are expected to be provided approximately every 400m along all bus routes, noting that bus stops are proposed directly adjacent to the School in Estella Road.

2.5 Active Transport Connectivity

2.5.1 Pedestrian Accessibility

Footpaths are (or will be) provided on all site frontages, providing connections to the broader area. Indeed, immediately fronting the site, these footpaths are provided as Shared Paths.

Currently — with no school constructed — there are no pedestrian (zebra) crossings or Children's Crossing in the immediate area. As such, this infrastructure presents a potential opportunity to improve pedestrian connectivity.

2.5.2 Cycle Routes

Regional cycle routes are still under development. However, it is noted that a wide path is provided on the southern side of Estella Road between Boorooma Street and Gunn Drive, which is expected to link to the broader regional cycle network, including the cycleways within the school catchment.

3 Objective and Targets

3.1 Objectives

The primary objectives of this GTP are to:

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

Having regard for the above, this GTP adopts the following movement hierarchy with priority given to ‘active transport’ followed by mass public transport and lastly the use of cars and other private vehicles.

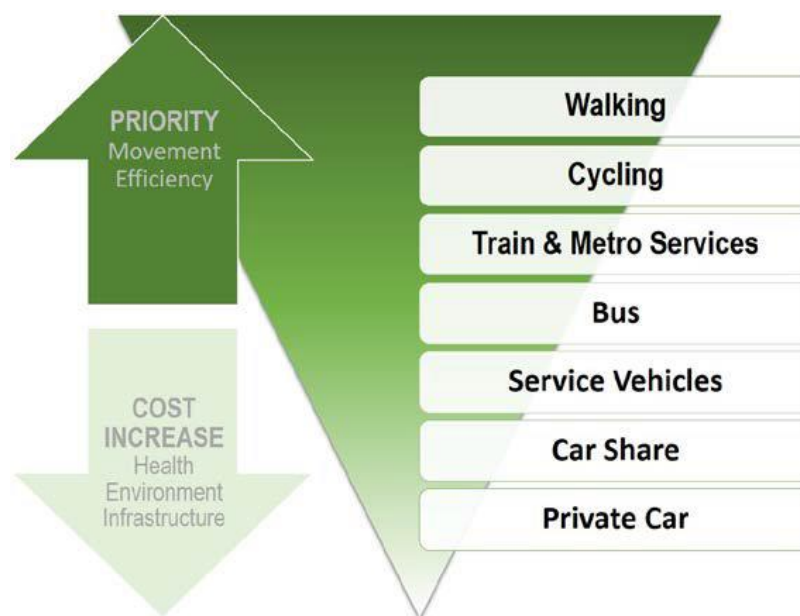


Figure 3 : Movement Hierarchy

In a broad sense, this GTP is intended to encourage the use of active transport thereby reducing the overall distance travelled by private vehicles.

3.2 Mode Share Targets

In the absence of 'existing' mode share figures for the school, the following target mode shares have been identified. It is expected that further travel mode surveys would be undertaken once the School is operational to establish baseline figures from which progress can be measured.

Table 1: Mode Share Targets

Travel Mode.	Existing	Proposed	
		Staff	Students
Walking	TBC ¹	5%	20%
Cycling ²		6%	10%
Train		1%	0%
Bus		3%	15%
Vehicle Passenger		15%	55%
Vehicle Driver		70%	n/a
Other/Mode Not Stated		n/a	n/a

Note: 1) 'Existing' mode share to be established via surveys, once the school is operational

2) Base targets obtained from the NSW *Planning guidelines for walking and cycling*. Increase cycle use to reflect close proximity to future regional cycle routes.

Strategies and specific actions to achieve these targets are discussed in the following section.

4 Action Plan

4.1 Action Plan Measures

The following specific actions have been identified to aid achievement of the targets outlined in Section 3.2.

These identified strategies include promotion of some event or day-specific activities. In isolation, these may not dramatically alter the day-to-day travel of staff. However, there are benefits of such activities whereby participation can increase awareness of alternative modes of travel that can then form the basis of future travel patterns.

Table 2: Action Plan Measures

Item No.	Action / Description	Responsibility
1. General		
1.1	Establish a centralised Travel Plan Coordinator (TPC) which is to take responsibility for the ongoing review and monitoring of this GTP. This person(s) shall also provide direction to staff / parents in relation to - specific requirements arising from the GTP.	School
1.2	Establish and maintain a transport coordinator to engage with the overall transport coordinator above.	School
1.3	Provide 'Travel Welcome Pack' for newly employed staff, highlighting alternate modes of transport other than use of a private vehicle.	School
1.4	Review of the GTP as a regular item on the agenda of staff / management meetings.	TPC
1.5	Encourage flexible work hours. Whilst not reducing mode share, this can permit travel outside of peak periods which has other positive benefits.	Employers
1.6	To aid the above, encourage before and after school care services to be provided on-site.	DoE
1.7	Preparation of a Transport Access Guide (TAG).	TPC
2. Walking and Cycling		
2.1	Lobby Council / DPIE for improved cycle connections in the broader area — consistent with Council's Active travel strategies (refer Wagga Integrated Transport Strategy and Implementation Plan 2040)	TPC / DoE
2.2	Promote Council's vision for <i>Walking School Bus</i> initiatives.	TPC / Council

Item No.	Action / Description	Responsibility
2.3	Promote participation in the community activities and events, such as: — National Ride2Work Day — Walk to Work Day — and other similar events	School / TPC
2.4	Develop further school-specific activities designed to get people moving with a reward participation. For example, a competition to see which staff and/or student in each year can get the most 'steps' in a given time period; similar to Steptember activities.	TPC
2.5	Provide and maintain clearly signposted bicycle parking within the Site.	School
2.6	In accordance with the cycling mode share targets identified, sufficient secure parking spaces and 'EoJ' facilities shall be provided and maintained. (NOTE: this can be staged to reflect realised demand)	School
3. Public Transport		
3.1	Display route maps and timetables (for services within 10 minutes walking distance) on noticeboards, regular flyers, emails and social media.	DoE / TPC
3.2	Advocate for TfNSW to improve public transport services in response to increased development within the surrounding area.	DoE / TPC
3.3	Update this GTP and TAG to reflect changes to any bus routes and service times.	TPC
3.4	Undertake a review to promote initiatives for staff using public transport. This may include a review of potential tax incentives for Government employees that use public transport.	TPC
4. Shared Vehicles		
4.1	Review initiatives for staff to promote car-pooling. This may include (but not limited to) the provision of online services or forums to facilitate ease of finding carpooling scheme participants.	TPC
4.2	Undertake research into the feasibility of providing shuttle services to and from the Site to train stations or other interchange nodes. This may require additional coordination with surrounding precincts to facilitate additional capacity potential.	TPC

4.2 Communications Strategy

4.2.1 Welcome Packs

New staff shall be provided with a 'welcome pack' as part of the on-site induction process which includes the GTP and other information in relation to sustainable transport choices. This pack shall include a copy of the GTP as well as general information regarding the health and social benefits of active transport. Advice on where to find further information should also be included such as links to Sydney Cycleways website (<http://www.sydneycycleways.net>).

4.2.2 Accurate Transport Information

In addition to these 'welcome packs', a Travel Access Guide (TAG) shall be provided to all staff.

A copy of the TAG should also be displayed prominently in staff areas, such as lunchrooms and foyer areas. The TAG shall be presented in a form that is reflective of the commitment to achieving positive transport objectives.

5 Governance and Support

5.1 Travel Plan Coordinator

A person(s) shall be nominated as the Travel Plan Coordinator (TPC) and be responsible for:

- Engagement with the staff and parent bodies,
- Implementation and promotion of the GTP actions,
- Monitoring the effectiveness of the GTP (refer to monitoring requirements outlined in **Section 6**) and ongoing maintenance of the GTP,
- Provide advice in relation to transport-related subjects to staff, management and visitors, as required, and
- Liaise with external parties (i.e. Council, public transport and car share operators) in relation to Travel Plan matters.

This role does not necessarily require full-time position; however, it should be clearly designated among the key responsibilities of the building management group.

This may include financial incentives for staff to use active transport and public transport to travel to work. However, this is not a mandatory requirement and would be subject to the management discretion.

5.2 Resourcing

It is not anticipated that the maintenance of this GTP will have significant ongoing cost implications and shall be reviewed on an annual basis by the TPC in order for the best outcome.

6 Monitoring and Review Process

6.1 GTP Maintenance

This GTP shall be subject to ongoing review and will be updated accordingly. Regular reviews will be undertaken by the TPC, as required.

Key considerations regarding the review of the GTP shall be:

- Updating baseline conditions to reflect any changes to the transport environment in the vicinity of the Site such as changes to bus services, new cycle routes etc. In this regard, review of the GTP – and associated TAG in particular - may be undertaken on a more frequent basis,
- Tracking progress against proposed travel mode targets,
- To identify any shortfalls and develop an updated action plan to address issues, and
- To ensure travel mode targets are updated (if necessary) to ensure they remain realistic but also ambitious.

6.2 Travel Mode Audit Requirements

Travel mode surveys will be undertaken to determine the proportion of persons travelling to/from the site by each transport mode.

This will be in the form of annual travel mode questionnaire surveys to be completed by all persons attending the Site, as far as practicable. This survey may be undertaken online or in-person at the discretion of the TPC.

It is recommended that an initial audit be undertaken within 6-months of the school opening to establish baseline mode share as early as possible.

Appendix B

Preliminary Construction Traffic and Pedestrian Management Plan

Preliminary Construction Traffic & Pedestrian Management Plan

New Estella Road Public School, Wagga Wagga
Estella Road, Estella (Wagga Wagga)

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22/10/2019

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Project No: P1049

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1 Introduction

1.1 Overview

Ason Group has been engaged by Hansen Yuncken (HY) to prepare a high-level Construction Traffic Management Plan (CTMP) for the New Estella Road Public School, Wagga Wagga (the School), located in Estella Road, Estella (the Site). This CTMP has been prepared to support the State Significant Development application and, as such, relevant conditions of consent have not yet been provided. Notwithstanding, as is standard practice, it is expected that the final CTMP shall:

The preparation of a preliminary Construction Traffic and Pedestrian Management Plan to demonstrate the proposed management of the impact in relation to construction traffic addressing the following:

- a) assessment of cumulative impacts associated with other construction activities (if any)
- b) an assessment of road safety at key intersection and locations subject to heavy vehicle construction traffic movements and high pedestrian activity
- c) details of construction program detailing the anticipated construction duration and highlighting significant and milestone stages and events during the construction process
- d) details of anticipated peak hour and daily construction vehicle movements to and from the site
- e) details of on-site car parking and access arrangements of construction vehicles, construction workers to and from the site, emergency vehicles and service vehicle and
- f) details of temporary cycling and pedestrian access during construction

Having regard for the above, the purpose of this report is establish the broad traffic principles for construction that would minimise traffic impacts on the surrounding road network, ensure safety and efficiency for workers, pedestrians and road users, and provide information regarding construction vehicle access routes and any changed road conditions (if applicable).

It is expected that this plan will be updated should any necessary changes to the currently proposed arrangements arise in the future. Any special events (if required) would be subject to a separate request for a specific permit not covered by this report.

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

1.2 Statutory Requirements

Following SSD approval, it is expected that this Plan shall be updated to include a comprehensive list of requirements.

1.3 Site Location

The Site is legally referenced as Lot 1 in DP 1253855, with a street address of Estella Road, Estella. The Site has an area of approximately 3 hectares and is currently zoned SP2 – Infrastructure: Educational Establishment. The Site is located at the southern boundary of Charles Sturt University (CSU), on Estella Road, Estella (Wagga Wagga). It is bounded to the north and west by CSU, to the east by recreational facilities—currently on CSU land, but soon to be transferred to Wagga Wagga City Council ownership—and to the south by the residential estates of Estella.

1.4 Road Hierarchy

The key roads surrounding the Site are as shown in Figure 1 and are described as the following:

- **Estella Road:** a collector road that currently runs along the southern boundary of the Site, generally east-west between Boorooma Street and Pine Gully Road. In the vicinity of the Site, the unmarked, 6.5m average width pavement provides one lane in each direction, as well unsealed shoulders suitable for parking on both sides of the road, and has a posted speed limit of 70km/h. A shared path is provided on the southern side of Estella Road between Boorooma Street and Gunn Drive,
- **Boorooma Street:** A sub-arterial road that runs generally north-south to the east of the Site and intersects with Estella Road. It provides one traffic lane in each direction for two-way flow, as well as indented parking lanes on both sides of the road as well as unsealed shoulders suitable for parking on both sides. The posted speed limit is 70km/h. A shared path is provided on the western side of Boorooma Street between Estella Road and Darnell Smith Drive.
- **Pine Gully Road:** A collector road that runs generally north-south to the west of the Site and intersects with Estella Road. It provides one traffic lane in each direction for two-way flow, as well as indented parking lanes on both sides of the road as well as unsealed shoulders suitable for parking on both sides. The posted speed limit is 70km/h.
- **Local Roads:** Given the internalisation of future School trips within the suburbs of Gobbagombalin, Estella and Boorooma, the majority of trips are expected to be generated to and from local roads intersecting with the key roads identified in sections above. The roads all have the same general profile, with two traffic lanes for two-way flow, adequate provision for parking or parking lanes on both sides of the road and local speed limits of 50km/h.

With regard for the above, the Site is suitably located to disperse construction traffic onto the arterial road network and direct access can be achieved via Boorooma Drive to Colin Knott Drive / Olympic Highway (A41).

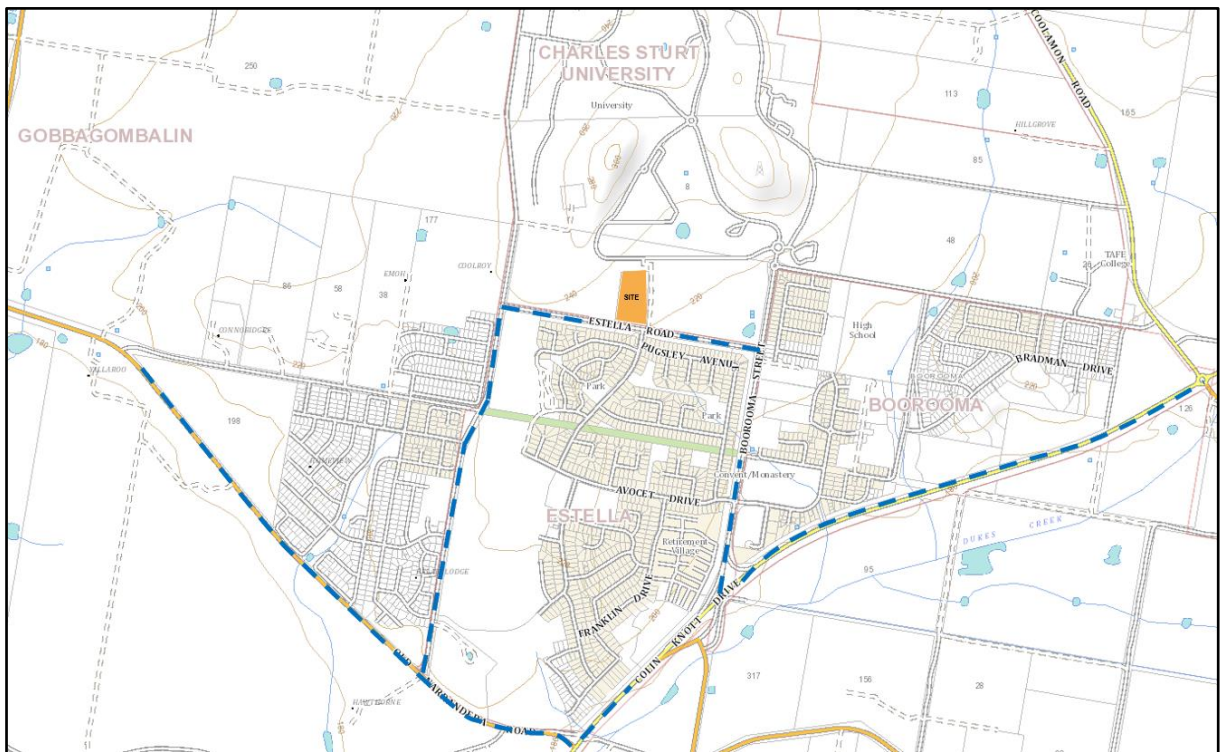


Figure 1: Location Plan

2 Overview of Works

2.1 Staging and Duration of Works

Recognising the purpose of this CTMP, the total duration of construction works is currently unknown. Notwithstanding, it is expected that the following outlines the key aspects of the construction stages:

- Stage 1: General earthworks and benching, and the construction of the temporary access. This is to prepare a temporary construction entrance to the Site for the main construction of the School. It is proposed that this construction access will be within the same location as the final access, which is via Estella Road.
- Stage 2: The general construction and associated landscape works will occur during Stage 2. During this stage, the primary access to the site will be restricted to construction vehicles only.

2.2 Hours of Operation

The type of work being undertaken may vary depending on the phase of construction and associated activities and includes both construction and design personnel. However, all works will be in accordance with standard construction working hours, which are likely to be as follows:

- Monday to Friday (other than Public Holidays): 7:00AM – 6:00PM.
- Saturday: 8:00AM – 1:00PM.
- Sunday and Public Holidays: No works to be undertaken.

2.3 Proposed Site Access

All access to the site by construction personnel is proposed via the access in the location of future connections to Estella Road.

Emergency vehicle access to and from the Site will be available at all times while the Site is occupied by construction workers. This process would be implemented through emergency protocols on the site which will be developed by the Contractor.

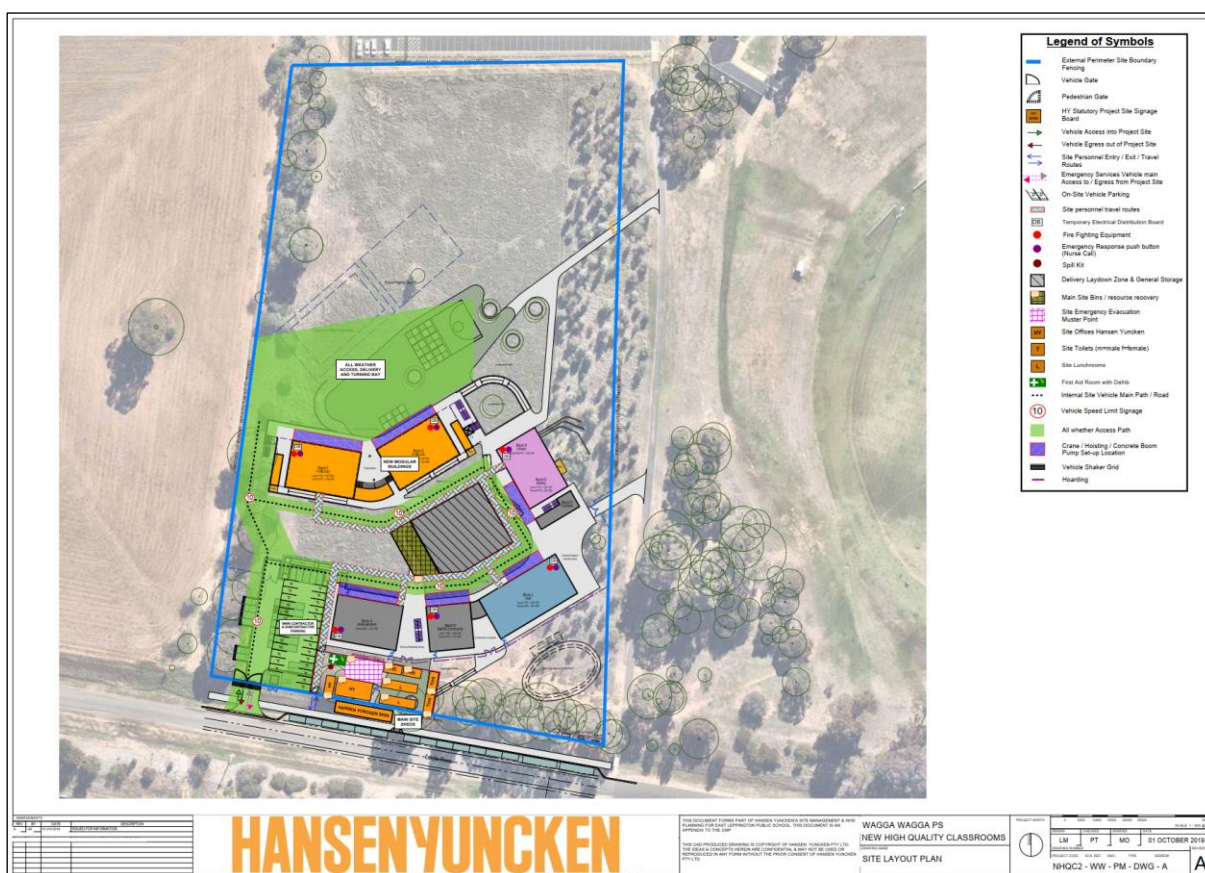


Figure 2: Construction Site Plan

2.4 Construction Vehicle Access Routes

It is proposed that all construction vehicles shall enter and exit the site via the routes shown in **Figure 3**. The routes shown are to be utilised by all construction vehicles travelling to and from the site and represents the shortest route between the local and regional road network - hence minimising the impacts of the construction process. An on-site turning area shall be provided within the future car park area so that movement to/from the site is undertaken in a forward direction, at all times.

It is expected that a copy of the approved routes will be distributed by the Lead Contractor to all drivers by before their arrival to site. All vehicles shall enter and leave the site in a forward direction.

Any vehicles required to access the Site that do not comply with the mass, dimension or operating requirements as specified by the National Heavy Vehicle Regulator (NHVR) will need to apply for a class 1 Oversize Overmass (OSOM) permit. Permits may be issued with conditional restrictions that limit the time and days that these vehicles are allowed to access the Site. Additionally, specific TCPs may be required to facilitate safe manoeuvring of these vehicles.

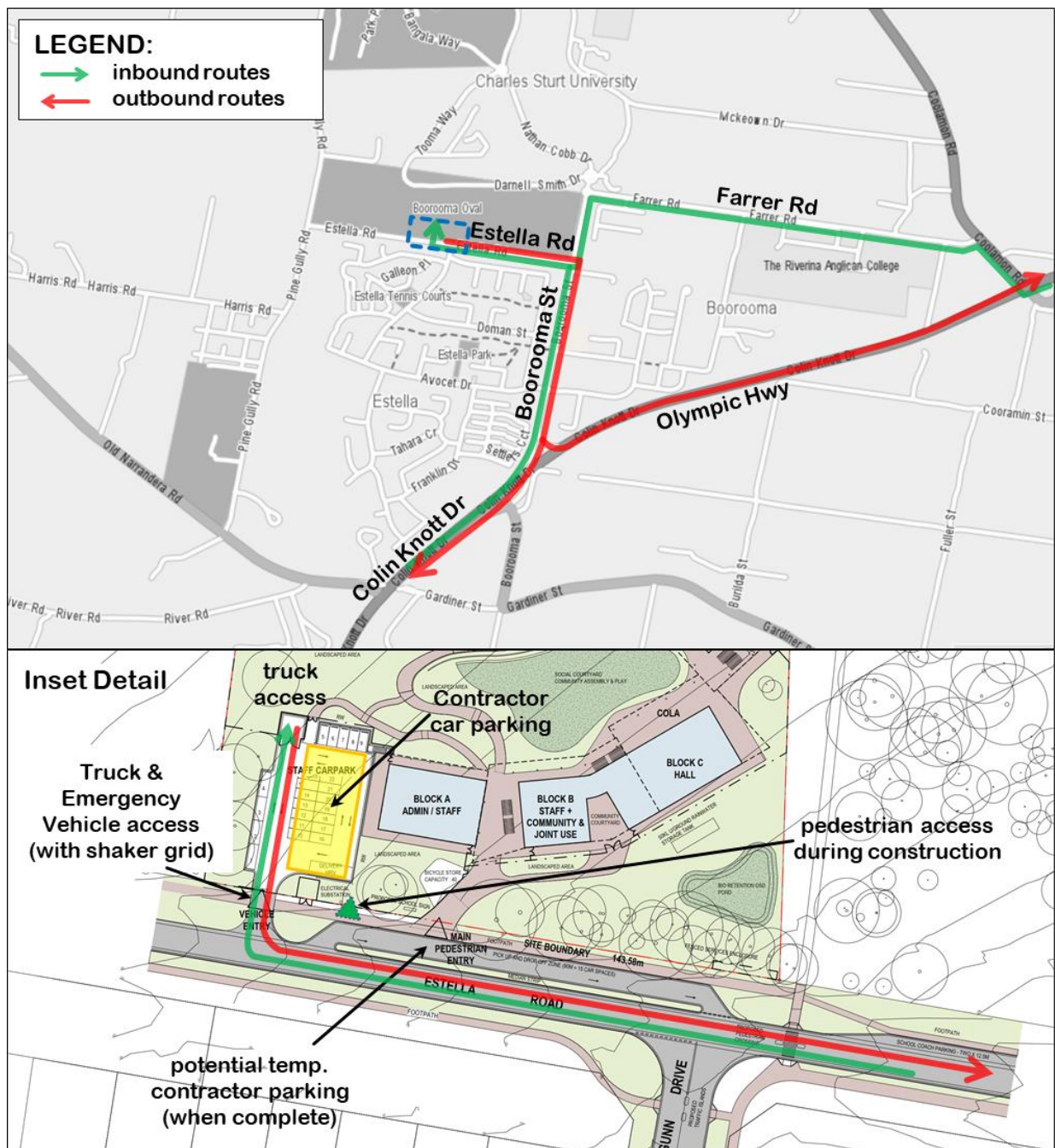


Figure 3: Construction Vehicle Route

2.5 Fencing Requirements

Temporary exclusion fencing will be erected along the entire boundary of the site as shown in **Figure 2: Construction Site Plan** and will be maintained for the duration of the construction program. The fencing is to ensure unauthorised persons are kept out of the Site. Site access gates would be provided within Estella Road and will be closed at all times outside of the permitted construction hours.

Any control points — operational during work hours — shall be sufficiently setback so that no queuing will occur on-street.

2.6 Materials Handling

Handling of all materials throughout the construction shall adhere to the following;

- It is proposed that all material loading will occur within the construction site boundary.
- No loading is proposed to occur outside of the provisioned areas.
- Equipment, materials and waste will be kept within the construction site boundary.

During latter stages of construction, tie in works will be required within the kerbside of Estella Road. All materials handling shall be undertaken off public roadways, however in the event materials handling is required from a public roadway, then prior approval shall be sought and obtained from the relevant Authorities. If required Works Zones may be required.

3 Assessment of Traffic and Transport Impacts

3.1 Construction Vehicle Traffic Generation and Impacts

Light Vehicle traffic generation would be generally associated with construction contractor movements to and from the Site. Contractors would be comprised of project managers, various trades and general construction employees. Over the full period, the peak workforce represents the worst-case scenario for vehicle movements during the morning or evening road network peak hour. The workforce arrival and departure periods (6:30-7:00AM and 6:00-6:30PM) represent the peak construction traffic periods.

It is expected that the Heavy Vehicles would generally arrive outside of peak periods, therefore not contribute to the estimated peak hour volumes.

Whilst the construction traffic volumes are yet to be determined (these volumes will be finalised post SSD Approval), it is expected that these volumes will not exceed to the proposed operational volumes. In this regard, it is noted that the school when operational, is expected to generate far less traffic.

As mentioned in section 2.4, any vehicles required to access the Site that do not comply with the mass, dimension or operating requirements as specified by the National Heavy Vehicle Regulator (NHVR) will need to apply for a class 1 Oversize Overmass (OSOM) or Special Purpose Vehicle (SPV) permit and comply with restrictions limiting access to the Site to reduce the impact on traffic management and safety.

Accordingly, the estimated construction traffic flows for the proposed construction activities would not result in any adverse impact on the operational capacity of the surrounding road network.

3.2 Vehicle Management – Principles

All vehicles transporting loose materials will have the entire load covered and/or secured to prevent any large items, excess dust or dirt particles depositing onto the roadway during travel to and from the site. Drivers are to be familiar with the Driver Code of Conduct before attending the Site – A copy of the Code is included in **Appendix A**.

All subcontractors must be inducted by the Contractor to ensure that the procedures are met for all vehicles entering and exiting the construction site. The Head Contractor will monitor the roads leading to and from the site and take all necessary steps to rectify any road deposits caused by site vehicles.

Vehicle movements to, from and within the site shall do so in a manner, which does not create unreasonable or unnecessary noise or vibration.

No tracked vehicles will be permitted or required on any paved roads. Public roads and access points shall not be obstructed by any materials, vehicles, refuse skips or the like, under any circumstances.

A review of the crash history surrounding the site indicates that there is no crash history.

3.3 Employee Parking

It is intended that all contractor and construction light vehicle parking utilise the designated construction access gate as shown in **Figure 2**. At no time shall parking be permitted on the public roadway.

Contractors are also encouraged to carpool or utilise public transport service within the area, thereby further reducing the minimal parking demand. The Site's accessibility to public and active transport is discussed in Sections 3.4 and 3.5.

3.4 Pedestrian and Cyclist Access

Some external construction activities will occur on Estella Road at some point during the build. Accordingly, the pedestrian footpath shall be managed by an accredited Traffic Controller during crossover works and deliveries to site.

During construction of the temporary and final driveway crossovers, pedestrians will be directed around the construction site by the installation of temporary fencing and management of an accredited Traffic Controller.

The existing footpaths shall remain open at all times as the construction site does not interfere with pedestrians or cyclists, with efforts to minimise impacts where possible. This may include staged construction of driveway crossovers to maintain the availability of suitable pedestrian connectivity.

3.5 Public Transport

There is minimal existing public transport on surrounding roads. Two services travel between Estella Road and the Wagga City Centre. The frequency of these services is low (one per peak) during morning and evening periods, Monday to Friday.

The construction activities will have no impact on the existing public transport services with all bus services to continue as is.

4 Traffic Control

4.1 Traffic Control

The RMS guide “Traffic Control at Worksites” (TCAW) manual contains standard traffic control plans (TCPs) for a range of work activities, with the objective to maximise safety by ensuring traffic control at worksites complies with best practice.

The RMS TCAW outlines the requirement for a Vehicle Movement Plan (VMP), where Heavy Vehicles movements exceed 20 in a single shift (or day), or 10 trucks per day (1 truck = 2 movements)

A VMP is a diagram showing the preferred travel paths for vehicles associated with a work site entering, leaving or crossing the through traffic stream. A VMP should also show travel paths for trucks at key points on routes remote from the work site such as places to turn around, accesses, ramps and side roads.

4.2 Authorised Traffic Controller

An authorised Traffic Controller is to be present on-site throughout the construction stage of the project. Responsibilities include:

- Supervision of all construction vehicle movements into and out of site at all times,
- Supervision of all loading and unloading of construction materials during the deliveries in the construction phase of the project, and
- Pedestrian management, to ensure that adverse conflicts between vehicle movements and pedestrians do not occur, while maintaining radio communication with construction vehicles at all times.

5 Monitoring and Communication Strategies

5.1 Development of Monitoring Program

The development of a program to monitor the effectiveness of this CTMP shall be established by the lead contractor. It is not anticipated that the monitoring of the processes will have any material cost implications.

This CTMP shall be subject to ongoing review and will be updated accordingly. Regular reviews will be undertaken by the on-site coordinator. As a minimum, review of the CTMP shall occur monthly, however a weekly review would be preferred.

- All and any reviews undertaken should be documented, however key considerations regarding the review of the CTMP shall be:
- Tracking deliveries against the estimated volumes.
- To identify any shortfalls and develop an updated action plan to address issues that may arise during construction (Parking and access issues)
- To ensure TCP's are updated (if necessary) by "Prepare a Work Zone Traffic Management Plan" card holders to ensure they remain consistent with the set-up on-site.
- Regular checks undertaken to ensure all loads are leaving site covered as outlined within this CTMP.

5.2 Communications Strategy

A communications strategy shall be prepared by the Head Contractor and will outline the most effective communication methods to ensure adequate information within the community and assist the project team to deliver the traffic changes with minimal disruption to the road network.

Surrounding resident and landowners shall be notified of any work that is deemed disruptive to the surrounding network prior to commencement. Ongoing communication is also proposed so that all key stakeholders are kept up to date of works and potential impacts.

Nearby property owners that may be affected directly by the construction works shall be included within the communications strategy.

6 Recommended Mitigation Measures

Referencing the above information, it is proposed that the following mitigation measures be undertaken in order to offset any construction impacts:

- Construction:
 - Planning of all appropriate routes to travel to and from site,
 - Discussions with Council, and RMS will be undertaken to identify all (if any) roads of interest to be assessed in order to quantifiably measure the condition of the road before and after construction.
 - Providing options for workers to carpool to and from site,
 - Ensuring that gates to and from site are locked at all times outside of construction hours.
 - Continual review of the CTMP to identify any shortfalls and develop an updated action plan to address said issues.
- Road occupancy:
 - In order to reduce the impact on any and all roads, it is proposed to complete the work in the shortest reasonable duration,
 - To improve road safety, TCPs are to be prepared for all works to be undertaken,
 - Prior to travel, drivers must be aware of the Driver Code of Conduct, which is to be handed to all construction employees,
 - Public roads and access points will not be obstructed by any materials, vehicles, skips or the like, under any circumstance,
 - All loads travelling to and from the site shall be covered at all times,
- Notification processes:
 - Notification of any adjoining residents or businesses will be undertaken prior to construction. It is proposed that all affected properties will be notified at least 14 days in advance of any impacts (including road closures),
 - Appropriate approvals must be obtained prior to construction in the relevant area from private residences, road authorities, utility providers and any other stakeholder requiring preapproved access.

7 Conclusions

Ason Group has been commissioned by Hansen Yuncken to examine the access, traffic and parking characteristics of the proposed New Estella Road Public School, Estella Road, Wagga Wagga. Further to our assessment Ason Group has concluded that:

- The construction staff arrival and departure periods (6:30-7:00AM and 6:00-6:30PM) represent the peak construction traffic periods and it is expected that the Heavy Vehicles would also generally arrive outside of peak periods, therefore not contribute to the estimated peak hour volumes.
- All construction vehicles will use dedicated construction routes between the site and the regional road network.
- With reference to all applicable road capacity guidelines, the introduction of the site construction traffic will have no significant impact on the operation or capacity of key regional, urban, local or unsealed roads and intersections providing access to the site.
- Appropriate mechanisms – including site-specific TCPs - can be established to monitor the condition of the roads providing access to the construction site such that access is maintained (for public and construction vehicles) at all times.
- All light and heavy vehicle parking throughout the construction phase will be provided on-site to minimise the impact to on-street parking.
- Appropriate management conditions can be introduced to ensure that all roads are maintained to an appropriate standard throughout and after construction.
- A detailed Construction Traffic Management Plan will be formalised prior to the commencement of the pipeline development construction for approval by the relevant Local and State Government authorities.

Appendix CTMP-A

Driver Code of Conduct

- Driver Code of Conduct -

Drivers Code of Conduct

Safe Driving Policy for New Estella Road Public School.

Objectives of the Drivers Code of conduct

- To minimise the impact of earthworks and construction on the local and regional road network;
- Minimise conflict with other road users;
- Minimise road traffic noise; and
- Ensure truck drivers use specified routes

Code of Conduct

All vehicle operators accessing the site must:

- Take reasonable care for his or her own personal health and safety.
 - Not adversely, by way of actions or otherwise, impact on the health and safety of other persons.
 - Notify their employer if they are not fit for duty prior to commencing their shift.
 - Obey all applicable road rules and laws at all times.
 - In the event an emergency vehicle behind your vehicle, pull over and allow the emergency vehicle to pass immediately.
 - Obey the applicable driving hours in accordance with legislation and take all reasonable steps to manage their fatigue and not drive with high levels of drowsiness.
 - Obey all on-site signposted speed limits and comply with directions of traffic control supervisors in relation to movements in and around temporary or fixed work areas.
 - Ensure all loads are safely restrained, as necessary.
 - Drive over cattle grids – located at the Site's access – to vibrate off any loose material attached to construction vehicles.
 - Operate their vehicles in a safe and professional manner, with consideration for all other road users.
 - Hold a current Australian State or Territory issued driver's licence.
-

- Notify their employer or operator immediately should the status or conditions of their driver's license change in any way.
- Comply with other applicable workplace policies, including a zero tolerance of driving while under the influence of alcohol and/or illicit drugs.
- Not use mobile phones when driving a vehicle or operating equipment. If the use of a mobile device is required, the driver shall pull over in a safe and legal location prior to the use of any mobile device.
- Advise management of any situations in which you know, or think may, present a threat to workplace health and safety.
- Drive according to prevailing conditions (such as during inclement weather) and reduce speed, if necessary.
- Have necessary identification documentation at hand and ready to present to security staff on entry and departure from the site, as necessary, to avoid unnecessary delays to other vehicles.

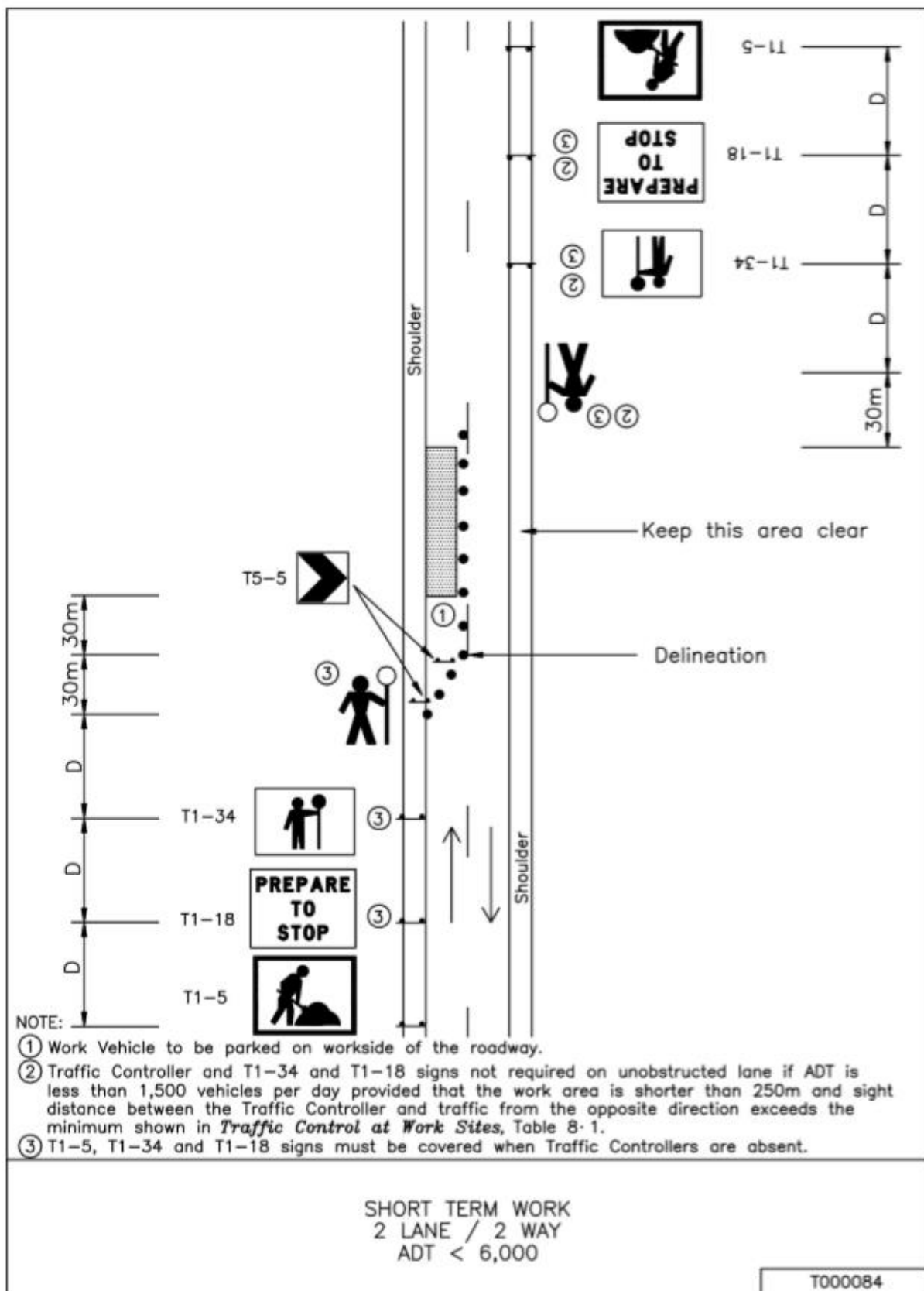
Crash or Incident Procedure

- Stop your vehicle as close to it as possible to the scene, making sure you are not hindering traffic. Ensure your own safety first, then help any injured people and seek assistance immediately if required.
 - Ensure the following information is noted:
 - Details of the other vehicles and registration numbers
 - Names and addresses of the other vehicle drivers
 - Names and addresses of witnesses
 - Insurers details
 - Give the following information to the involved parties:
 - Name, address and company details
 - If the damaged vehicle is not occupied, provide a note with your contact details for the owner to contact the company.
 - Ensure that the police are contacted should the following circumstances occur:
 - If there is a disagreement over the cause of the crash.
 - If there are injuries.
 - If you damage property other than your own.
 - As soon as reasonably practical, report all details gathered to your manager
-

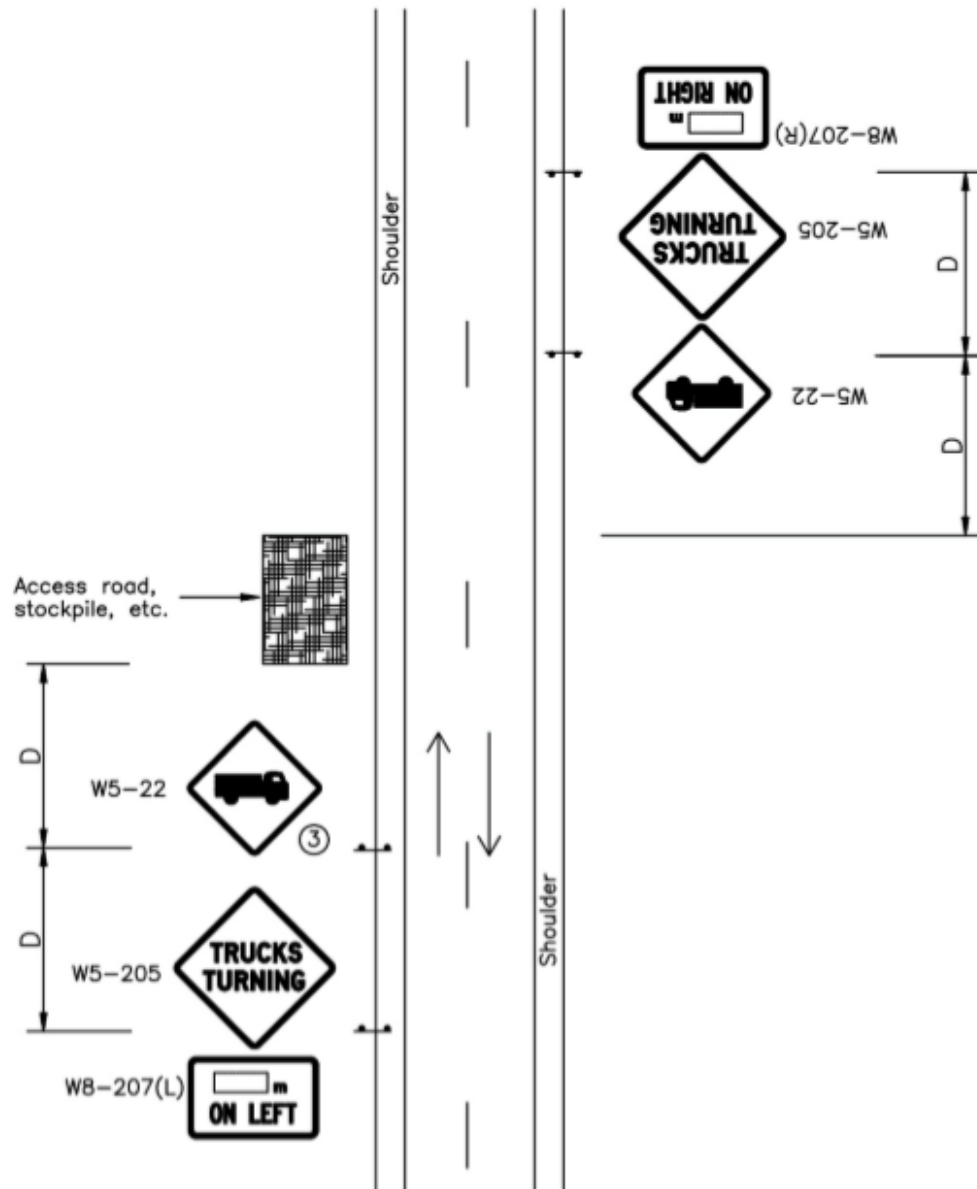
Appendix CTMP-B

Traffic Control Plan(s)

TCP 84



TCP 195



NOTE:

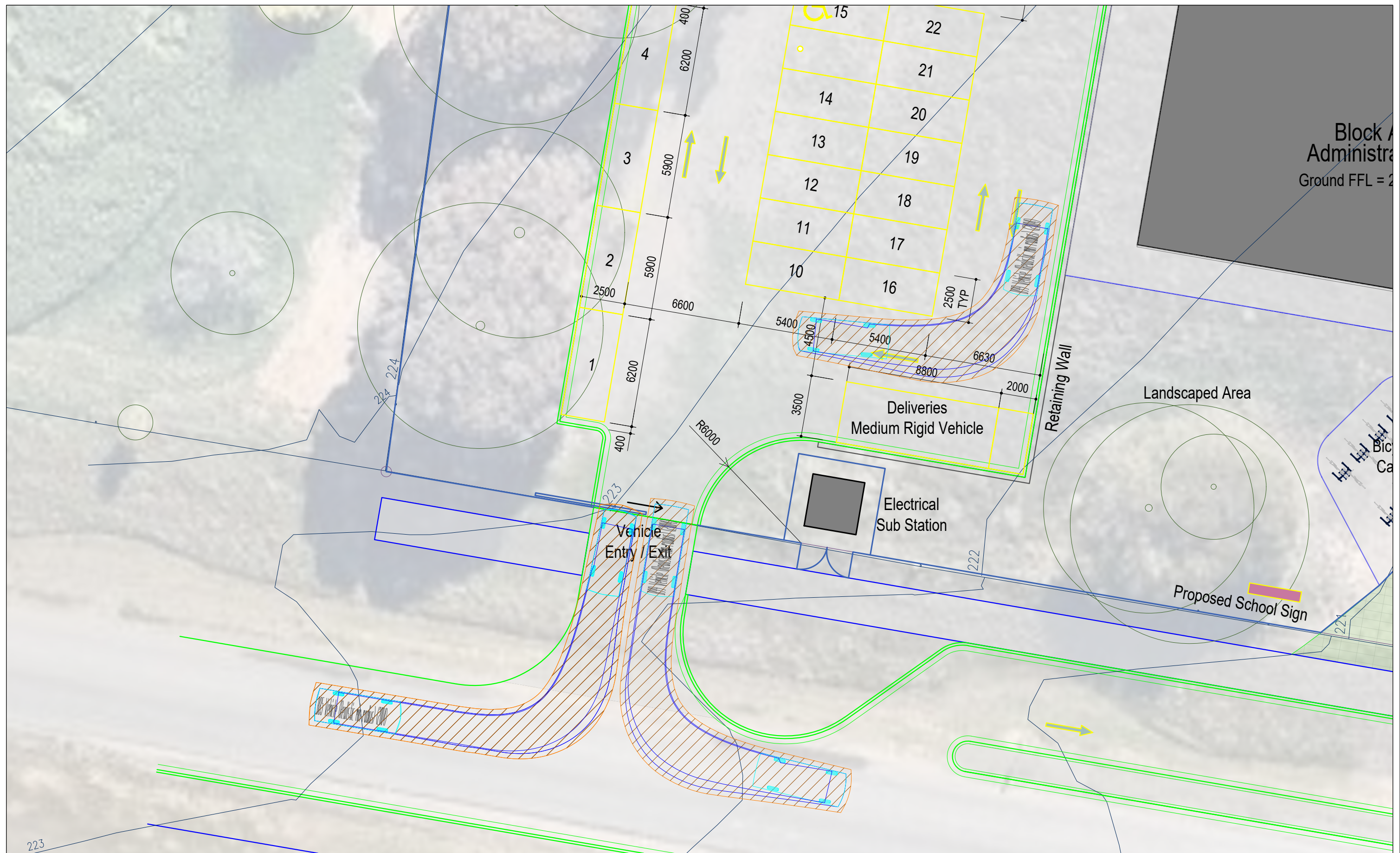
- ① For use where roadside is generally undeveloped, ADT is more than 1,500 vehicles per day, sight distance is restricted and there are more than 20 truck movements per shift.
- ② See *Traffic control at work sites*, Section 7.7, *Signs for depots, stockpiles, quarries, gravel pits etc.*
- ③ For short term works use T2-25.

ACCESS TO DEPOT, STOCKPILE, QUARRY, GRAVEL PIT ETC.
ALL ROADS
LONG TERM USE

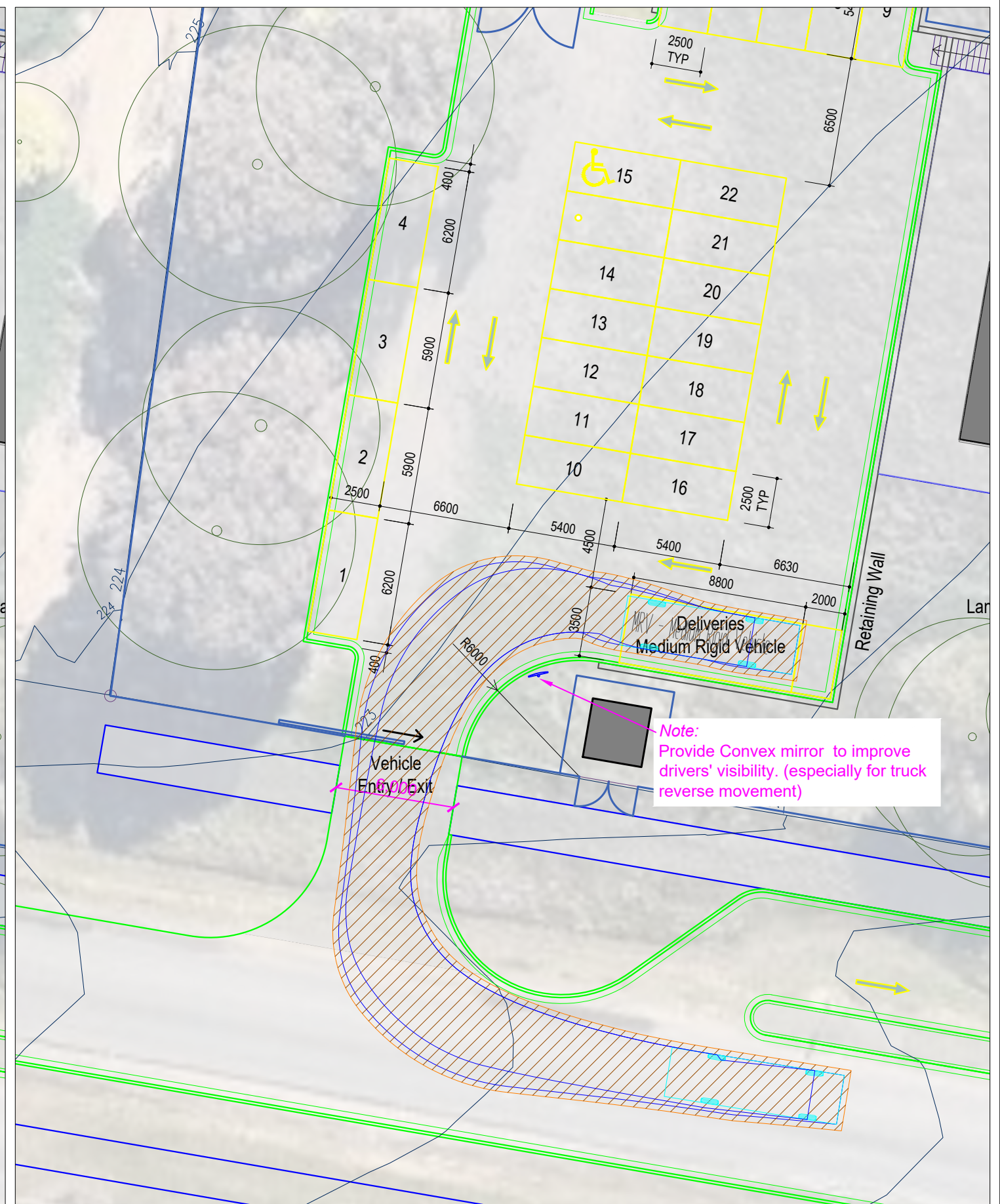
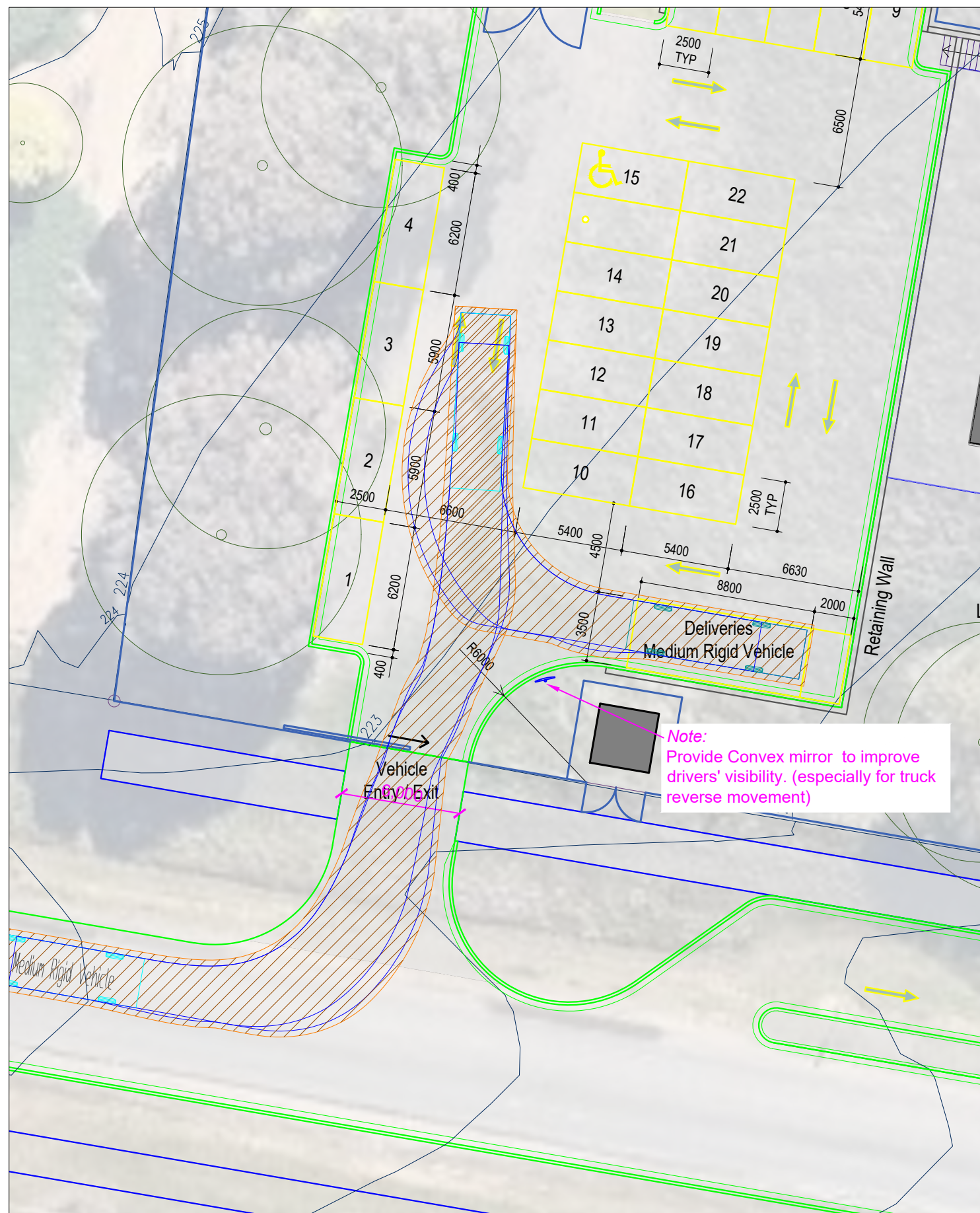
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Appendix C

Swept Path Analysis



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		Client: Hansen Yuncken Pty Ltd	Drawing Title: Site Access B85 & B99	Scale @ A3: [scale]	
				Drawing Number: AG01	



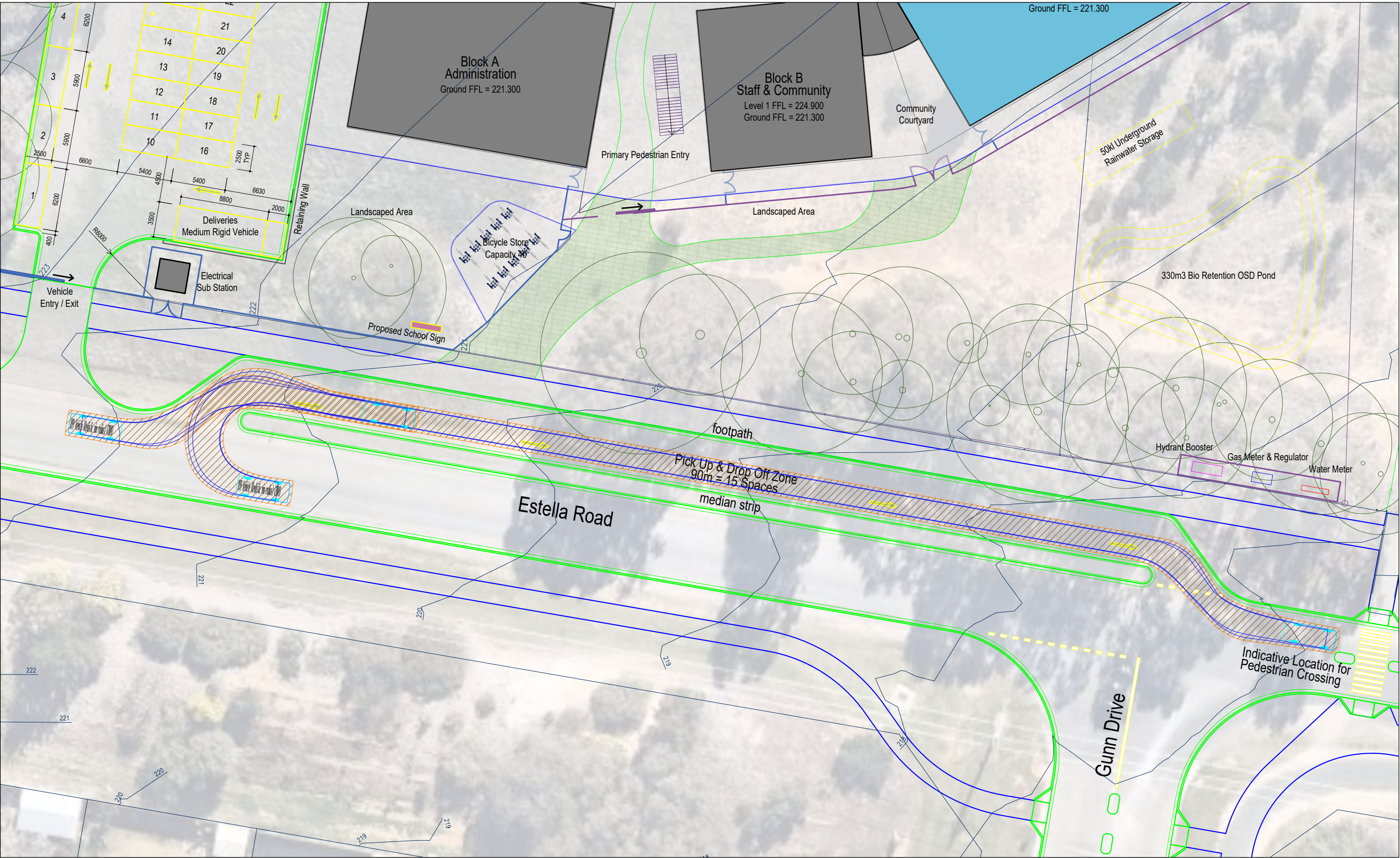
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Project: 1049 High Quality Classrooms (Wagga Wagga)	Drawing Title: Loading Bay Access MRV
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Date: 17-Oct-19	Scale @ A3: [scale]
Drawing Number: AG02	

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Client:
Hansen Yuncken Pty Ltd

Project:
1049
High Quality Classrooms (Wagga Wagga)

Drawing Title:
Drop-off
B99

Date:
17-Oct-19

Scale @ A3:
[scale]

Drawing Number:
AG03

asongroup

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Sydney NSW 2000
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Appendix D

SIDRA Outputs

MOVEMENT SUMMARY

▽ Site: 1 [Pine Gully Road x Estella Road AM Peak]

Pine Gully Road x Estella Road
Existing
AM Peak
Site Category: (None)
Giveaway / 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: Pine Gully Road (South)												
2	T1	151	2.0	0.100	0.1	LOS A	0.2	1.6	0.09	0.12	0.09	67.9
3	R2	35	2.0	0.100	6.6	LOS A	0.2	1.6	0.09	0.12	0.09	63.8
Approach		185	2.0	0.100	1.3	NA	0.2	1.6	0.09	0.12	0.09	67.1
East: Estella Road												
4	L2	24	2.0	0.016	5.7	LOS A	0.1	0.4	0.14	0.54	0.14	55.4
6	R2	63	2.0	0.063	6.5	LOS A	0.2	1.5	0.31	0.62	0.31	54.6
Approach		87	2.0	0.063	6.3	LOS A	0.2	1.5	0.26	0.60	0.26	54.8
North: Pine Gully Road (North)												
7	L2	40	2.0	0.052	5.6	LOS A	0.0	0.0	0.00	0.24	0.00	56.2
8	T1	58	2.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	57.8
Approach		98	2.0	0.052	2.3	NA	0.0	0.0	0.00	0.24	0.00	57.2
All Vehicles		371	2.0	0.100	2.7	NA	0.2	1.6	0.11	0.26	0.11	61.1

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.

MOVEMENT SUMMARY

▽ Site: 1 [Pine Gully Road x Estella Road PM Peak]

Pine Gully Road x Estella Road
Existing
PM Peak
Site Category: (None)
Giveaway / 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: Pine Gully Road (South)												
2	T1	78	2.0	0.050	0.1	LOS A	0.1	0.7	0.10	0.09	0.10	63.6
3	R2	15	2.0	0.050	6.0	LOS A	0.1	0.7	0.10	0.09	0.10	59.5
Approach		93	2.0	0.050	1.1	NA	0.1	0.7	0.10	0.09	0.10	62.9
East: Estella Road												
4	L2	34	2.0	0.023	5.9	LOS A	0.1	0.6	0.21	0.54	0.21	55.2
6	R2	4	2.0	0.004	6.3	LOS A	0.0	0.1	0.28	0.57	0.28	54.6
Approach		38	2.0	0.023	6.0	LOS A	0.1	0.6	0.22	0.54	0.22	55.1
North: Pine Gully Road (North)												
7	L2	40	2.0	0.085	5.6	LOS A	0.0	0.0	0.00	0.15	0.00	57.0
8	T1	121	2.0	0.085	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	58.7
Approach		161	2.0	0.085	1.4	NA	0.0	0.0	0.00	0.15	0.00	58.2
All Vehicles		292	2.0	0.085	1.9	NA	0.1	0.7	0.06	0.18	0.06	59.2

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.
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.

MOVEMENT SUMMARY

▽ Site: 2 [Estella Road x Guun Drive AM Peak]

Estella Road x Guun Drive

Existing

AM Peak

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: Guun Drive												
1	L2	44	2.0	0.028	5.6	LOS A	0.1	0.8	0.09	0.54	0.09	55.6
3	R2	59	2.0	0.051	5.9	LOS A	0.2	1.2	0.19	0.58	0.19	54.9
Approach		103	2.0	0.051	5.8	LOS A	0.2	1.2	0.15	0.56	0.15	55.2
East: Estella Road (East)												
4	L2	12	2.0	0.022	5.6	LOS A	0.0	0.0	0.00	0.16	0.00	56.9
5	T1	31	2.0	0.022	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	58.5
Approach		42	2.0	0.022	1.5	NA	0.0	0.0	0.00	0.16	0.00	58.1
West: Estella Road (West)												
11	T1	55	2.0	0.042	0.1	LOS A	0.1	0.9	0.07	0.17	0.07	63.0
12	R2	22	2.0	0.042	5.6	LOS A	0.1	0.9	0.07	0.17	0.07	58.9
Approach		77	2.0	0.042	1.7	NA	0.1	0.9	0.07	0.17	0.07	61.8
All Vehicles		222	2.0	0.051	3.5	NA	0.2	1.2	0.09	0.35	0.09	57.9

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.

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.

MOVEMENT SUMMARY

▽ Site: 2 [Estella Road x Guun Drive PM Peak]

Estella Road x Guun Drive

Existing

PM Peak

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: Guun Drive												
1	L2	18	2.0	0.011	5.6	LOS A	0.0	0.3	0.09	0.54	0.09	55.6
3	R2	17	2.0	0.015	5.9	LOS A	0.0	0.3	0.20	0.57	0.20	54.9
Approach		35	2.0	0.015	5.8	LOS A	0.0	0.3	0.14	0.56	0.14	55.2
East: Estella Road (East)												
4	L2	40	2.0	0.037	5.6	LOS A	0.0	0.0	0.00	0.34	0.00	55.4
5	T1	29	2.0	0.037	0.0	LOS A	0.0	0.0	0.00	0.34	0.00	57.0
Approach		69	2.0	0.037	3.2	NA	0.0	0.0	0.00	0.34	0.00	56.1
West: Estella Road (West)												
11	T1	45	2.0	0.047	0.1	LOS A	0.2	1.3	0.14	0.26	0.14	61.7
12	R2	38	2.0	0.047	5.7	LOS A	0.2	1.3	0.14	0.26	0.14	57.8
Approach		83	2.0	0.047	2.7	NA	0.2	1.3	0.14	0.26	0.14	59.9
All Vehicles		187	2.0	0.047	3.5	NA	0.2	1.3	0.09	0.34	0.09	57.5

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.

MOVEMENT SUMMARY

▽ Site: 3 [Estella Road x Boorooma Street AM Peak]

Estella Road x Boorooma Street

Existing

AM Peak

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: Boorooma Street (South)												
1	L2	5	2.0	0.323	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.2
2	T1	616	2.0	0.323	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.9
Approach		621	2.0	0.323	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.9
North: Boorooma Street (North)												
8	T1	187	2.0	0.132	0.9	LOS A	0.4	2.8	0.22	0.09	0.22	62.9
9	R2	31	2.0	0.132	8.7	LOS A	0.4	2.8	0.22	0.09	0.22	58.9
Approach		218	2.0	0.132	2.0	NA	0.4	2.8	0.22	0.09	0.22	62.3
West: Estella Road												
10	L2	38	2.0	0.045	8.3	LOS A	0.2	1.2	0.53	0.72	0.53	53.6
12	R2	59	2.0	0.117	10.8	LOS A	0.4	2.6	0.63	0.85	0.63	51.3
Approach		97	2.0	0.117	9.8	LOS A	0.4	2.6	0.59	0.80	0.59	52.2
All Vehicles		936	2.0	0.323	1.5	NA	0.4	2.8	0.11	0.11	0.11	59.5

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.

MOVEMENT SUMMARY

▽ Site: 3 [Estella Road x Boorooma Street PM Peak]

Estella Road x Boorooma Street

Existing

PM Peak

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: Boorooma Street (South)												
1	L2	4	2.0	0.096	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.1
2	T1	180	2.0	0.096	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.9
Approach		184	2.0	0.096	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
North: Boorooma Street (North)												
8	T1	363	2.0	0.241	0.2	LOS A	0.6	4.3	0.14	0.10	0.14	63.4
9	R2	76	2.0	0.241	6.3	LOS A	0.6	4.3	0.14	0.10	0.14	59.2
Approach		439	2.0	0.241	1.2	NA	0.6	4.3	0.14	0.10	0.14	62.6
West: Estella Road												
10	L2	1	2.0	0.001	6.1	LOS A	0.0	0.0	0.26	0.51	0.26	55.0
12	R2	60	2.0	0.089	8.6	LOS A	0.3	2.0	0.50	0.77	0.50	52.9
Approach		61	2.0	0.089	8.6	LOS A	0.3	2.0	0.50	0.77	0.50	53.0
All Vehicles		684	2.0	0.241	1.6	NA	0.6	4.3	0.13	0.14	0.13	60.9

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.

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.

MOVEMENT SUMMARY

▽ Site: 1 [Pine Gully Road x Estella Road AM Peak]

Pine Gully Road x Estella Road
2020 + School
AM Peak
Site Category: (None)
Giveaway / 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: Pine Gully Road (South)												
2	T1	165	2.0	0.138	0.2	LOS A	0.5	3.5	0.15	0.20	0.15	66.5
3	R2	82	2.0	0.138	6.6	LOS A	0.5	3.5	0.15	0.20	0.15	62.5
Approach		247	2.0	0.138	2.3	NA	0.5	3.5	0.15	0.20	0.15	65.1
East: Estella Road												
4	L2	81	2.0	0.053	5.7	LOS A	0.2	1.5	0.14	0.54	0.14	55.4
6	R2	69	2.0	0.074	6.8	LOS A	0.2	1.7	0.35	0.65	0.35	54.4
Approach		151	2.0	0.074	6.2	LOS A	0.2	1.7	0.24	0.59	0.24	54.9
North: Pine Gully Road (North)												
7	L2	40	2.0	0.052	5.6	LOS A	0.0	0.0	0.00	0.24	0.00	56.2
8	T1	58	2.0	0.052	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	57.8
Approach		98	2.0	0.052	2.3	NA	0.0	0.0	0.00	0.24	0.00	57.2
All Vehicles		496	2.0	0.138	3.5	NA	0.5	3.5	0.15	0.33	0.15	60.1

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.

MOVEMENT SUMMARY

▽ Site: 2 [Estella Road x Guun Drive AM Peak]

Estella Road x Guun Drive
2020 + School
AM Peak
Site Category: (None)
Giveaway / 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: Guun Drive												
1	L2	81	2.0	0.052	5.7	LOS A	0.2	1.5	0.14	0.54	0.14	55.4
3	R2	77	2.0	0.072	6.3	LOS A	0.2	1.7	0.27	0.60	0.27	54.7
Approach		158	2.0	0.072	6.0	LOS A	0.2	1.7	0.20	0.57	0.20	55.0
East: Estella Road (East)												
4	L2	46	2.0	0.055	5.6	LOS A	0.0	0.0	0.00	0.27	0.00	56.0
5	T1	57	2.0	0.055	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	57.6
Approach		103	2.0	0.055	2.5	NA	0.0	0.0	0.00	0.27	0.00	56.9
West: Estella Road (West)												
11	T1	91	2.0	0.071	0.1	LOS A	0.2	1.6	0.13	0.17	0.13	62.7
12	R2	38	2.0	0.071	5.8	LOS A	0.2	1.6	0.13	0.17	0.13	58.6
Approach		128	2.0	0.071	1.8	NA	0.2	1.6	0.13	0.17	0.13	61.4
All Vehicles		389	2.0	0.072	3.7	NA	0.2	1.7	0.13	0.36	0.13	57.5

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.

MOVEMENT SUMMARY

▽ Site: 3 [Estella Road x Boorooma Street AM Peak]

Estella Road x Boorooma Street
2020 + School
AM Peak
Site Category: (None)
Giveaway / 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: Boorooma Street (South)												
1	L2	42	2.0	0.375	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	57.9
2	T1	678	2.0	0.375	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	59.6
Approach		720	2.0	0.375	0.4	NA	0.0	0.0	0.00	0.03	0.00	59.5
North: Boorooma Street (North)												
8	T1	206	2.0	0.164	1.5	LOS A	0.6	4.6	0.31	0.13	0.31	61.9
9	R2	43	2.0	0.164	9.8	LOS A	0.6	4.6	0.31	0.13	0.31	57.9
Approach		249	2.0	0.164	2.9	NA	0.6	4.6	0.31	0.13	0.31	61.1
West: Estella Road												
10	L2	42	2.0	0.055	8.8	LOS A	0.2	1.4	0.56	0.75	0.56	53.2
12	R2	107	2.0	0.253	13.2	LOS A	0.9	6.2	0.73	0.92	0.82	49.6
Approach		149	2.0	0.253	12.0	LOS A	0.9	6.2	0.68	0.87	0.75	50.6
All Vehicles		1119	2.0	0.375	2.5	NA	0.9	6.2	0.16	0.17	0.17	58.5

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.

MOVEMENT SUMMARY

▽ Site: 1 [Pine Gully Road x Estella Road AM Peak]

Pine Gully Road x Estella Road
2030 Background
AM Peak
Site Category: (None)
Giveaway / 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: Pine Gully Road (South)												
2	T1	271	2.0	0.183	0.2	LOS A	0.5	3.3	0.13	0.12	0.13	67.7
3	R2	62	2.0	0.183	6.9	LOS A	0.5	3.3	0.13	0.12	0.13	63.6
Approach		333	2.0	0.183	1.4	NA	0.5	3.3	0.13	0.12	0.13	66.9
East: Estella Road												
4	L2	43	2.0	0.029	5.9	LOS A	0.1	0.8	0.19	0.54	0.19	55.2
6	R2	114	2.0	0.141	7.7	LOS A	0.5	3.4	0.45	0.73	0.45	53.6
Approach		157	2.0	0.141	7.2	LOS A	0.5	3.4	0.38	0.68	0.38	54.1
North: Pine Gully Road (North)												
7	L2	72	2.0	0.093	5.6	LOS A	0.0	0.0	0.00	0.24	0.00	56.2
8	T1	104	2.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	57.8
Approach		176	2.0	0.093	2.3	NA	0.0	0.0	0.00	0.24	0.00	57.2
All Vehicles		665	2.0	0.183	3.0	NA	0.5	3.4	0.16	0.28	0.16	60.8

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.

MOVEMENT SUMMARY

▽ Site: 2 [Estella Road x Guun Drive AM Peak]

Estella Road x Guun Drive
2030 Background
AM Peak
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: Guun Drive												
1	L2	80	2.0	0.052	5.7	LOS A	0.2	1.5	0.14	0.54	0.14	55.4
3	R2	106	2.0	0.100	6.3	LOS A	0.3	2.4	0.28	0.61	0.28	54.7
Approach		186	2.0	0.100	6.0	LOS A	0.3	2.4	0.22	0.58	0.22	55.0
East: Estella Road (East)												
4	L2	21	2.0	0.040	5.6	LOS A	0.0	0.0	0.00	0.17	0.00	56.9
5	T1	55	2.0	0.040	0.0	LOS A	0.0	0.0	0.00	0.17	0.00	58.5
Approach		76	2.0	0.040	1.5	NA	0.0	0.0	0.00	0.17	0.00	58.0
West: Estella Road (West)												
11	T1	99	2.0	0.076	0.1	LOS A	0.2	1.7	0.11	0.17	0.11	62.8
12	R2	40	2.0	0.076	5.8	LOS A	0.2	1.7	0.11	0.17	0.11	58.8
Approach		139	2.0	0.076	1.7	NA	0.2	1.7	0.11	0.17	0.11	61.6
All Vehicles		401	2.0	0.100	3.7	NA	0.3	2.4	0.14	0.36	0.14	57.7

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.

MOVEMENT SUMMARY

▽ Site: 3 [Estella Road x Boorooma Street AM Peak]

Estella Road x Boorooma Street
2030 Background
AM Peak
Site Category: (None)
Giveaway / 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: Boorooma Street (South)												
1	L2	9	2.0	0.581	5.7	LOS A	0.0	0.0	0.00	0.01	0.00	58.0
2	T1	1108	2.0	0.581	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach		1118	2.0	0.581	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
North: Boorooma Street (North)												
8	T1	337	2.0	0.337	6.6	LOS A	2.7	19.6	0.53	0.12	0.69	56.6
9	R2	55	2.0	0.337	19.9	LOS B	2.7	19.6	0.53	0.12	0.69	53.3
Approach		392	2.0	0.337	8.4	NA	2.7	19.6	0.53	0.12	0.69	56.1
West: Estella Road												
10	L2	68	2.0	0.208	16.6	LOS B	0.7	4.9	0.83	0.94	0.88	47.8
12	R2	106	2.0	0.793	59.2	LOS E	3.2	23.1	0.98	1.20	1.87	30.5
Approach		175	2.0	0.793	42.5	LOS D	3.2	23.1	0.92	1.10	1.49	35.5
All Vehicles		1684	2.0	0.793	6.5	NA	3.2	23.1	0.22	0.14	0.31	55.0

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.

MOVEMENT SUMMARY

▽ Site: 1 [Pine Gully Road x Estella Road AM Peak]

Pine Gully Road x Estella Road
2030 Background + School
AM Peak
Site Category: (None)
Giveaway / 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: Pine Gully Road (South)												
2	T1	271	2.0	0.242	0.4	LOS A	1.1	7.5	0.24	0.22	0.24	65.8
3	R2	151	2.0	0.242	7.0	LOS A	1.1	7.5	0.24	0.22	0.24	61.9
Approach		421	2.0	0.242	2.8	NA	1.1	7.5	0.24	0.22	0.24	64.4
East: Estella Road												
4	L2	153	2.0	0.103	5.9	LOS A	0.4	3.1	0.21	0.55	0.21	55.2
6	R2	114	2.0	0.156	8.4	LOS A	0.5	3.7	0.50	0.78	0.50	53.1
Approach		266	2.0	0.156	7.0	LOS A	0.5	3.7	0.33	0.65	0.33	54.3
North: Pine Gully Road (North)												
7	L2	72	2.0	0.093	5.6	LOS A	0.0	0.0	0.00	0.24	0.00	56.2
8	T1	104	2.0	0.093	0.0	LOS A	0.0	0.0	0.00	0.24	0.00	57.8
Approach		176	2.0	0.093	2.3	NA	0.0	0.0	0.00	0.24	0.00	57.2
All Vehicles		863	2.0	0.242	4.0	NA	1.1	7.5	0.22	0.36	0.22	59.4

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.
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.

MOVEMENT SUMMARY

▽ Site: 2 [Estella Road x Guun Drive AM Peak]

Estella Road x Guun Drive
2030 Background + School
AM Peak
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: Guun Drive												
1	L2	139	2.0	0.093	5.9	LOS A	0.4	2.8	0.20	0.55	0.20	55.2
3	R2	128	2.0	0.142	7.1	LOS A	0.5	3.5	0.40	0.69	0.40	54.1
Approach		267	2.0	0.142	6.5	LOS A	0.5	3.5	0.29	0.61	0.29	54.7
East: Estella Road (East)												
4	L2	87	2.0	0.100	5.6	LOS A	0.0	0.0	0.00	0.28	0.00	55.9
5	T1	100	2.0	0.100	0.0	LOS A	0.0	0.0	0.00	0.28	0.00	57.5
Approach		187	2.0	0.100	2.6	NA	0.0	0.0	0.00	0.28	0.00	56.8
West: Estella Road (West)												
11	T1	161	2.0	0.129	0.3	LOS A	0.4	3.2	0.19	0.17	0.19	62.4
12	R2	66	2.0	0.129	6.2	LOS A	0.4	3.2	0.19	0.17	0.19	58.4
Approach		227	2.0	0.129	2.0	NA	0.4	3.2	0.19	0.17	0.19	61.2
All Vehicles		682	2.0	0.142	3.9	NA	0.5	3.5	0.18	0.37	0.18	57.3

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.

MOVEMENT SUMMARY

▽ Site: 3 [Estella Road x Boorooma Street AM Peak]

Estella Road x Boorooma Street
2030 Background + School
AM Peak
Site Category: (None)
Giveaway / 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: Boorooma Street (South)												
1	L2	81	2.0	0.620	5.7	LOS A	0.0	0.0	0.00	0.04	0.00	57.7
2	T1	1108	2.0	0.620	0.1	LOS A	0.0	0.0	0.00	0.04	0.00	59.4
Approach		1189	2.0	0.620	0.5	NA	0.0	0.0	0.00	0.04	0.00	59.3
North: Boorooma Street (North)												
8	T1	337	2.0	0.438	11.5	LOS A	6.2	43.9	1.00	0.19	1.31	52.3
9	R2	73	2.0	0.438	24.4	LOS B	6.2	43.9	1.00	0.19	1.31	49.4
Approach		409	2.0	0.438	13.8	NA	6.2	43.9	1.00	0.19	1.31	51.7
West: Estella Road												
10	L2	68	2.0	0.208	16.6	LOS B	0.7	4.9	0.83	0.94	0.88	47.8
12	R2	191	2.0	1.637	617.2	LOS F	51.6	367.6	1.00	3.74	13.15	5.3
Approach		259	2.0	1.637	458.5	LOS F	51.6	367.6	0.96	3.00	9.91	6.9
All Vehicles		1858	2.0	1.637	67.3	NA	51.6	367.6	0.35	0.49	1.67	28.4

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.
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.