Development Application Report

Byford Light Industrial Stage 2 (Automasters): Lot 2 on Lot 128 South Western Hwy, Byford

Corey Verwey

This planning report proposes an Automasters to replace the vehicle panel beating component approved in Stage 2 of the Byford Light Industrial Park, located at Lot 128 South Western Hwy, Byford.

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DA Submission Report Rev B

27 May 2022

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Client:	Parsons Management Group
Project Name:	Amend Byford Light Industrial Stage 2: Automasters
Revision	Stage 2A Updated Revision B
Author:	Corey Verwey *MPIA MAIPM* Principal | Urbanism

1 BACKGROUND

Stage 2 of Byford Light Industrial development received Development Approval (Ref. PA21/162) for several light industrial units, which includes the Holmes Panel and Paint vehicle repair centre on Lot 2. This planning report is submitted to replace the development on Lot 2 over a portion of Lot 128 South Western Highway in Byford. It presents the land use content and planning considerations for this change.

The service infrastructure solutions to Stage 2 also necessitated a change in the services delivery strategy and a revised Subdivision Application has been summitted to the WAPC in a combination of Freehold and Survey Strata lots. Access will be achieved via the extension of Robinson Road, which was approved in Stage 1, with some works remaining outstanding.

1.1 Development Locality

The property is located at 128 South Western Highway, along the western alignment of the highway and approximately 1.5km south of the Byford business centre/ activity area. The highway offers good connectivity to surrounding established and future residential areas in Mundjijong, Oakford and Darling Downs and is well positioned to serve these residential areas. Orton Road will be extended along the southern boundary of the lot to become a main local distributor road, providing connectivity between residential areas and the Byford Town Centre.

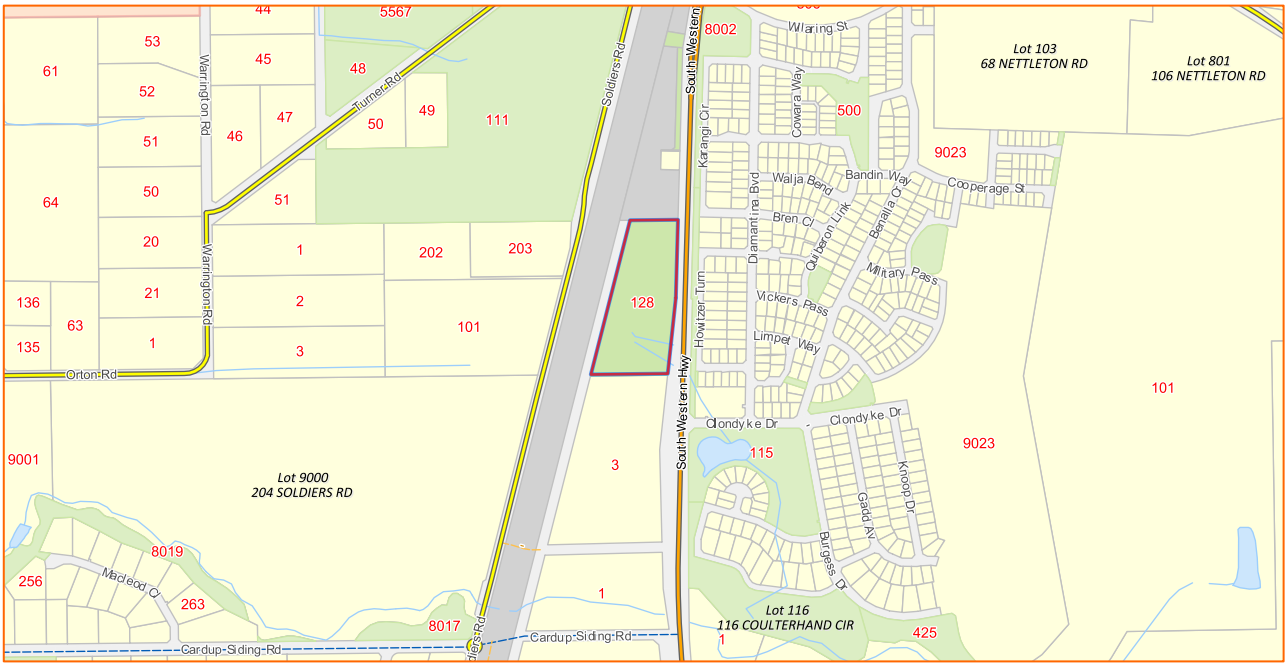


FIGURE 1: Locality

The Perth Bunbury Railway is to the west of the site, separated from the lot boundary by Robinson Road. The site has been extensively cleared and was previously used for grazing. Construction of the Stage 1 (National Storage facility) building and related infrastructure works have been completed. The remainder of the site has been largely cleared, but remains vacant.

1.2 Site Definition

The land is currently defined as Lot 128 on Deposited Plan 156237 and measures 37,614,m^2 – refer to Appendix A. The site is registered in the ownership of Byford Project 2018 Pty Ltd on Certificate of Title Vol 258 Fol 190A. Kerry Parsons, as the sole director of this company, authorised Urbanism to prepare this Development Application – refer to the Power of Attorney in Appendix A.

1.3 Current Approach

1.3.1 Stage 1: National Storage

Stage 1 Development Approval for a Warehouse (Self-Storage) was approved by the Shire of Serpentine Jarrahdale's Council on 18 May 2020.

The development comprises a 2-storey warehouse in two buildings, an L-shape (Building A) and island (Building B) buildings, serviced by a secure driveway and parking lanes on the northern portion of Lot 128. The site is known as Lot 1 on Lot 128 South Western Highway.

The Gross Floor Area for the Stage 1 storage facility totals 7,621.9m^2.

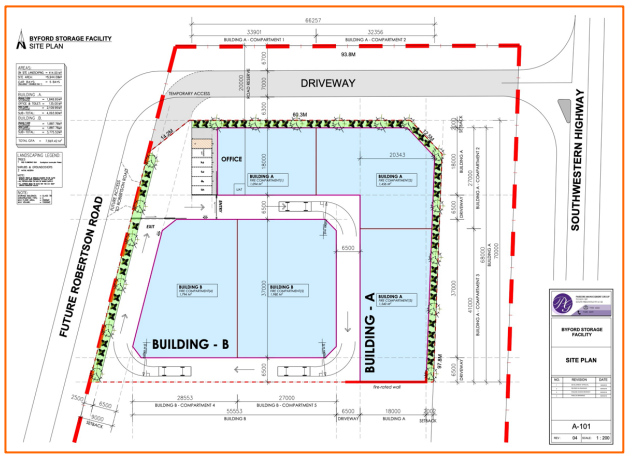


FIGURE 2: Stage 1 Footprint

1.3.2 Stage 2: Various Uses on Lots 2 and 3

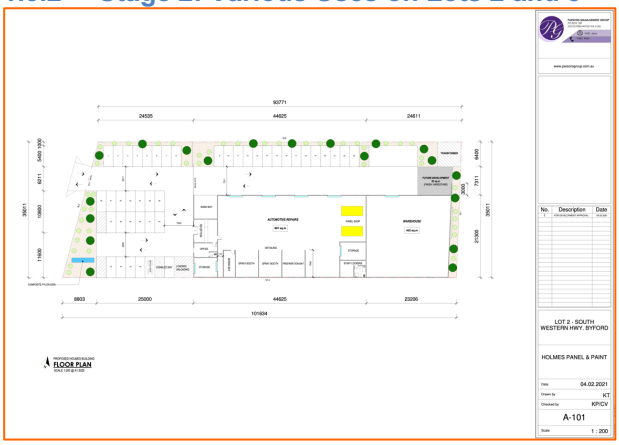


FIGURE 3: Stage 2 Holmes Panel and Paint (Lot 2)

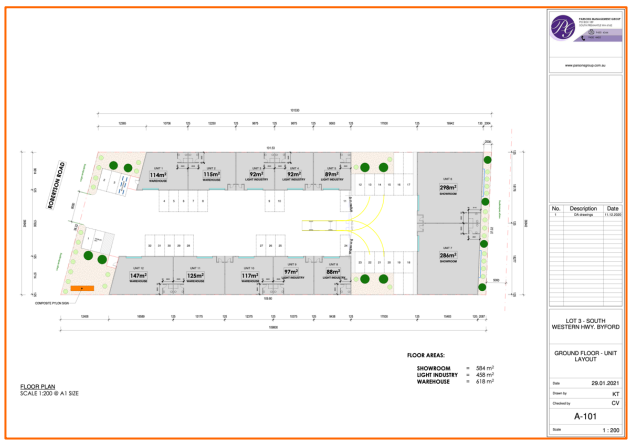


FIGURE 4: Mixed Industrial (Lot 3)

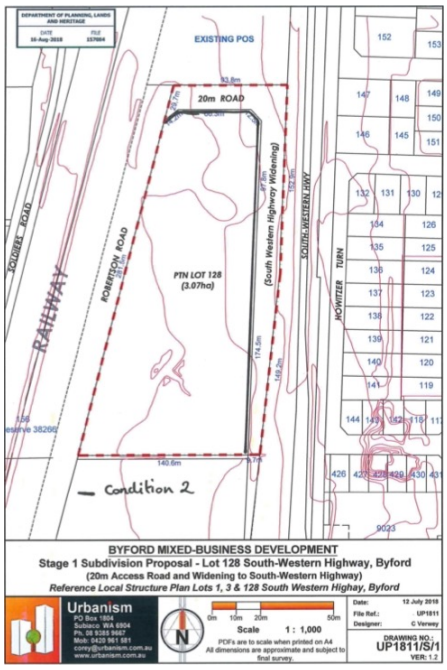
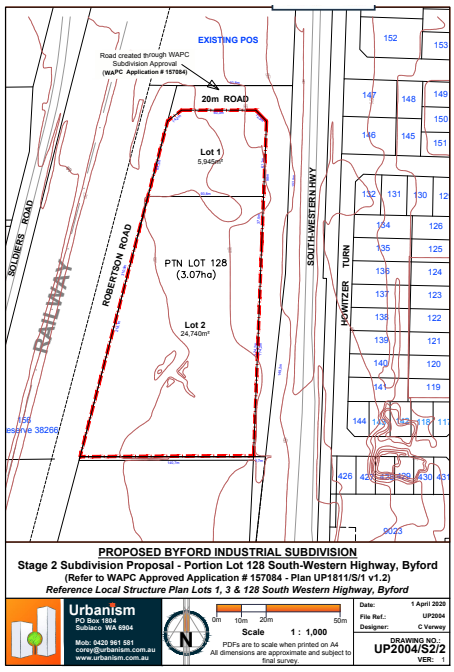
On 19 July 2021, The Shire approved Development Application PA21/162 for Vehicle Repair, Light Industry, Warehouse and Showroom:

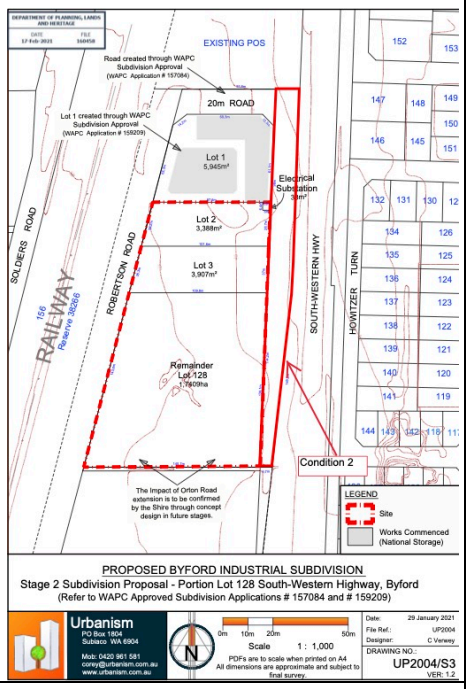
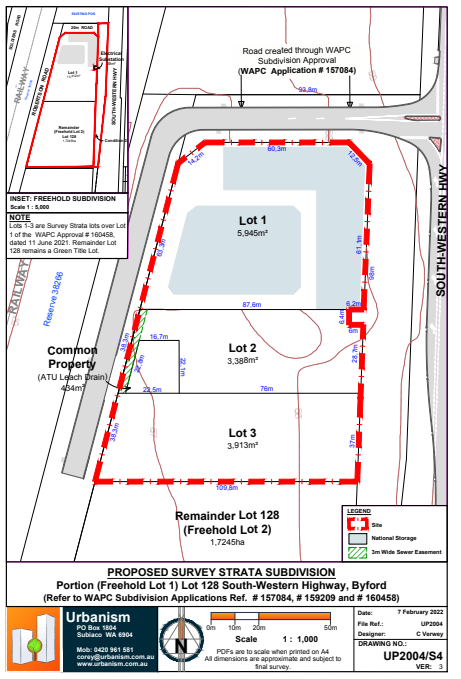
- On Lot 2, the 1,349m^2 building footprint for the automotive repair comprised of 897m^2 Vehicle Repair (panel beater and paint repairs), 452m^2 Warehouse, 56m^2 Office and 92m^2 of staff and storage areas. It accommodated 41 parking bays, including a disabled bay, and 4 bicycle racks (8 bicycles).

- Lot 3 was approved as a mix of Light Industrial (458m^2 total floor area), Light Industry (667m^2 total floor area) and Showrooms (579m^2 total floor area). The site planning allowed for 32 public parking bays, including a disabled bay, and 4 bicycle racks.

1.3.3 Site Subdivision

The development of Lot 128 South Western HWY has been implemented systematically with several subdivision and Development Applications being determined in parallel to past Development Applications:

WAPC Application #	157084	
Purpose/ Status	Approved Create road widening of South Western Highway and extension of Robin Road to secure new intersection. *Intersection design awaiting MRWA final approval before works may commence.*	
Date of Determination	16 November 2018	
WAPC Application #	159209	
Purpose	Approved Create Lot 1 for National Storage development site. *Works associated with the Development Application progressed, including basic service delivery, but excluding sewer infrastructure and road works.*	
Date of Determination	3 August 2020	

WAPC Application #	160458	
Purpose	Approved Create 3 industrial lots for Stage 2 development and in addition to the Stage 1 National Storage development, which is under construction. *Design approvals achieved and most works delivered, excluding sewerage infrastructure and South-West Highway intersection works.*	
Date of Determination	11 June 2021	
WAPC Application #	2022-223990	
Purpose	Approved Create an amalgamated Freehold Lot 1 from Lots 1-3, created in previous subdivision approvals, and subdivide into three Survey Strata Lots and Common Property. The Common Property lot accommodates private sewerage infrastructure through a Secondary Treatment System (ATU), as approved by Department of Health on 25 January 2022.	
Date of Determination	17 May 2022	

2 PLANNING FRAMEWORK

2.1 Statutory Planning Framework

2.1.1 Metropolitan Regional Scheme

The Metropolitan Regional Scheme (MRS) is the regional statutory land use scheme for the Perth Metropolitan Area. The principal function of the MRS is to reserve and zone land for future development. This form of land use control is more on a strategic level and provides the framework for local planning schemes and other statutory planning tools to control land development. A key outcome of the MRS is the reservation of land for the protection of regionally-significant open space and land for other regional infrastructure.

The site's zoning under the MRS is dedicated as "Urban" and "Primary Regional Roads". The Primary Regional Roads accommodates the widening of the South-Western Highway in this locality.

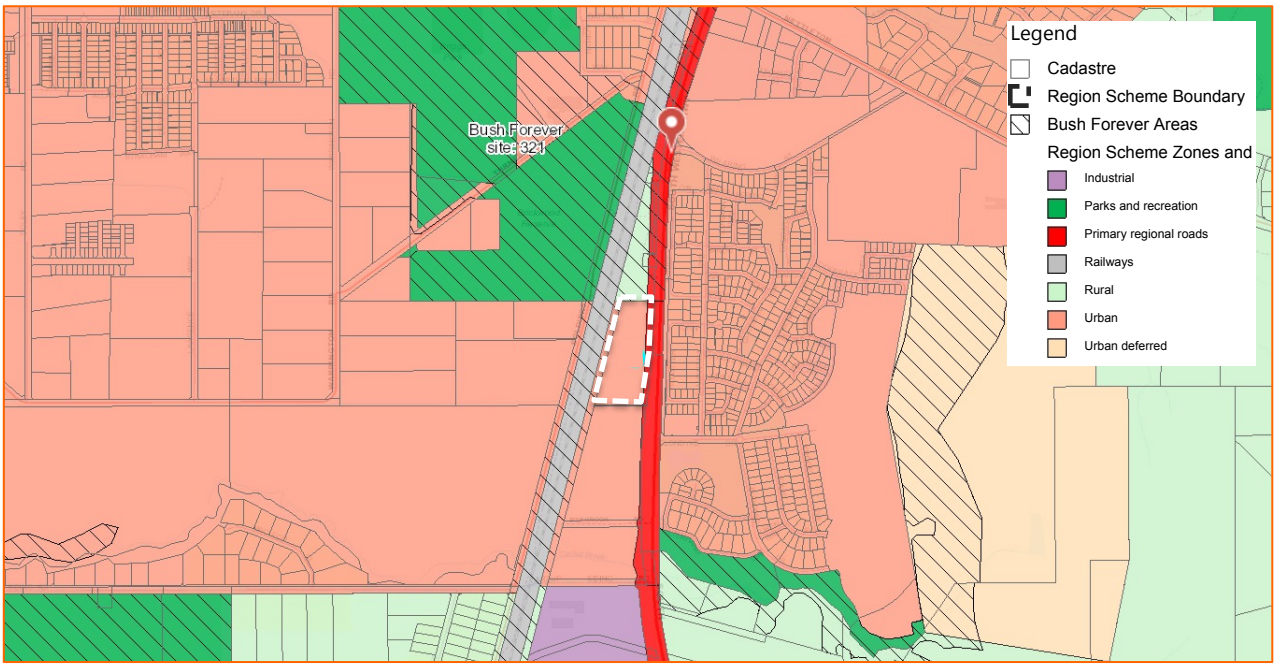


FIGURE 5: MRS Map

The MRS indicates the extent of Urban land and Bush Forever Areas. The Bush Forever Area aligns the northern and western site boundaries and some of this land covers major infrastructure to include the railway line, the South-Western Highway and the Robinson Road reserve, which aligns the western site boundary.

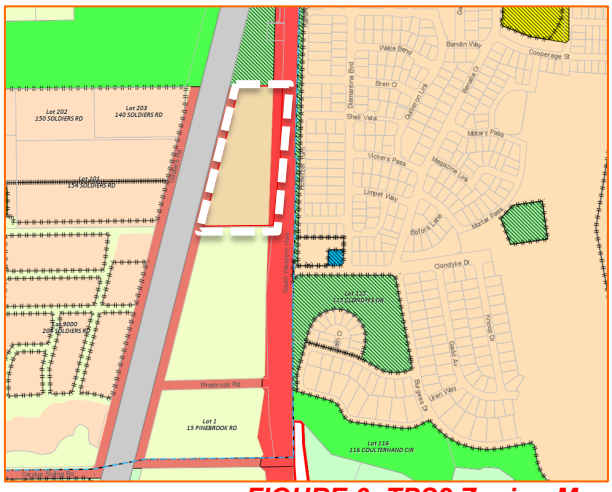
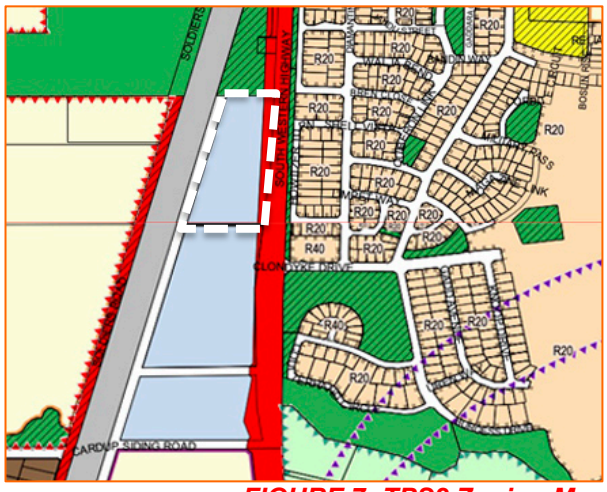
[It is noted that Stage 1 development processes confirmed no significant vegetation within this portion the Robinson Road reserve and associated Bush Forever Area abutting Lot 128. A Clearing Permit was achieved and works have been completed within this portion of the road reserve.]

2.1.2 Town Planning Scheme

The Shire of Serpentine-Jarrahdale, Town Planning Scheme No. 2 (TPS2) zones the land for "Urban Development". The Primary Regional Roads is dedicated by the MRS and accommodates the widening of the South-Western Highway in this locality.

The Shire also recently endorsed the draft Local Planning Scheme No. 3 (LPS3). The Draft LPS3 adopts a more contemporary planning approach to the site and redefines the land use permissibility through a wider range of considered uses.

This section presented the relevant planning controls contained in both planning schemes and offers a comparison in compatibility in respect of the proposed development under the current TPS2 and Draft LPS3:

TPS2	Draft LPS3
Zone: Urban Development *The purpose of this zone is to provide for the orderly planning of large areas of land in a locally integrated manner and within a regional context, whilst retaining flexibility to review planning with changing circumstances.* The zone seeks orderly planning for a variety of lot sizes, cohesive built environment to establish retail, commercial, industrial and mixed-use facilities to address residents' needs and employment. The zone will consider open space networks and infrastructure. Coordination of development within this zone is facilitated through structure planning, infrastructure coordination, equitable cost share arrangements and administrative procedures to expedite development.	**Zone: Service Commercial** To accommodate commercial activities which, because of the nature of the business, require good vehicular access and/or large sites. To provide for a range of wholesale sales, showrooms, trade and services which, by reason of their scale, character, operational or land requirements, are not generally appropriate in, or cannot conveniently or economically be accommodated in, the central area, shops and offices or industrial zones.
 *FIGURE 6: TPS2 Zoning Map*	 *FIGURE 7: TPS2 Zoning Map*
Pursuant to clause 5.18 and Appendix 15 of TPS 2, a detailed Structure Plan has been adopted for this land. The Local Structure Plan for Lots 1, 3 & 128 South Western Highway, Byford dedicates the Urban Development zone for a Mixed Business use. **Assigned Zone: Mixed Business** *The purpose and intent for the Mixed Business zone is to provide for a range of light and service industrial, wholesaling, showrooms, trade and professional services which, by reason of their scale, character and operational land requirements, are not generally appropriate to, or cannot conveniently or economically be accommodated within centre zones or industrial zones. This zone only applies in specialist locations where this type of*	**Development Requirements** • Subdivision of land in the Service Commercial zone shall only be supported by the local government where an approved structure plan exists for the land. • End of trip bicycle facilities must be provided in new developments in accordance with the requirements of clause 37 of the Scheme. • The local government shall require wastewater connection to reticulated sewer. Subject to land capability and site constraint analysis to the satisfaction of the local government, alternate treatment units may be considered as a temporary solution until such time as reticulated sewer is available to the site, at which time

development is either existing or strategically justifiable. Unless otherwise approved by the Shire, an approved detailed area plan will be required to guide the subdivision and development of land zoned Mixed Business, prior to the Shire providing support for a subdivision application or approving development.	the development is to be connected to reticulated sewer. • The local government shall require connection to reticulated water. Subject to the demonstration of suitability, connection to an alternate water supply may be considered by the local government.
Permitted Uses • Automotive and Marine Services • Caravan or Trailer Hire • Craft Workshop • Funeral Parlour • Health Studio • Marine Collectors Yard • Public Utility • Showroom • Vehicle Hire • Warehouse **Discretionary Uses** • *Automotive Repairs* • Automotive Vehicle Wash • Caretakers Dwelling • Car Park • Civic Buildings • Commercial Vehicle Parking • Convenience Store • Fast Food/Takeaway • Market • Medical Centre • Nursery • Private Recreation • Public Worship - Place of • Radio, TV and Communication Installation • Service Station • Trade Display • Transport Depot • Veterinary Establishment **Discretionary Use (giving Notice)** • Fuel Depot **Incidental use** • *Office* • Shop	**Permitted Uses** • Bulky Goods Showroom • Motor Vehicle, Boat or Caravan Sales • Shop • Trade Display • Warehouse/ Storage **Discretionary Uses** • Amusement Parlour • Car park • Civic Use • Community purpose • Educational Establishment • Exhibition Centre • Fast Food Outlet • Funeral Parlour • Garden Centre • Liquor Store – Large • Medical Centre • Motor Vehicle Wash • Office • Reception Centre • Recreation – Private • Trade Supplies • Veterinary Centre **Discretionary Use (giving notice)** • Club Premises • Hospital • *Industry Light* • Industry Service • *Motor Vehicle Repair* • Place of Worship • Restricted Premises • Telecommunications Infrastructure

Building Envelope
• Setbacks
  ○ Minimum Frontage: 20m
  ○ Front 9m
  ○ Side and Rear: 0m for a masonry parapet wall, else 2.1m or the height of the wall whichever is greater.
• Maximum Plot Ratio 0.6:1 (General Industry)
• Landscaping determined by the Council
	Building Envelope
	• Setbacks
	  ○ Front 12m
	  ○ Secondary Street 6m
	  ○ Side 6m
	  ○ Rear 6m
	• Maximum Site Coverage 75%
	• Maximum Plot Ratio 1.0
	• Landscaping 10% in total, comprised of 4% in front setback

Parking • Light Industry: 1 Bay / 50m^2 GLA • Showroom: 1 Bay / 60m^2 GLA • Warehouse: 1 Bay / 100m^2 GLA	**Parking** • Motor Vehicle Repair: 1 Bay / 50m^2 GLA <u>plus</u> 1 Bay / Employee • Office: 1 Bay / 40m^2 GLA • Showroom: 1 Bay / 60m^2 GLA • Warehouse: 1 Bay / 2,000m^2 GLA
Bicycle Parking	**Bicycle Parking** • Office: Staff: 1 bay per 200m^2 NLA plus Visitors: 1 bay per 750m^2 NLA • Shop: 1 bay per 250m^2 NLA • Warehouse/ Storage: 1 bay per 2,000m^2 NLA

On 16 November 2020, the Council adopted Amendment 208 to TPS 2 as an amendment to the Byford Traditional Infrastructure Development Contribution Area.

The subject Lot 128 is excluded from the contributions within this Contribution Plan, as per Plan 10A. However, the plan includes the extension of Orton Road as a major east-west connection to the South Western Highway. The road reserve is noted as a 30m reserve width.

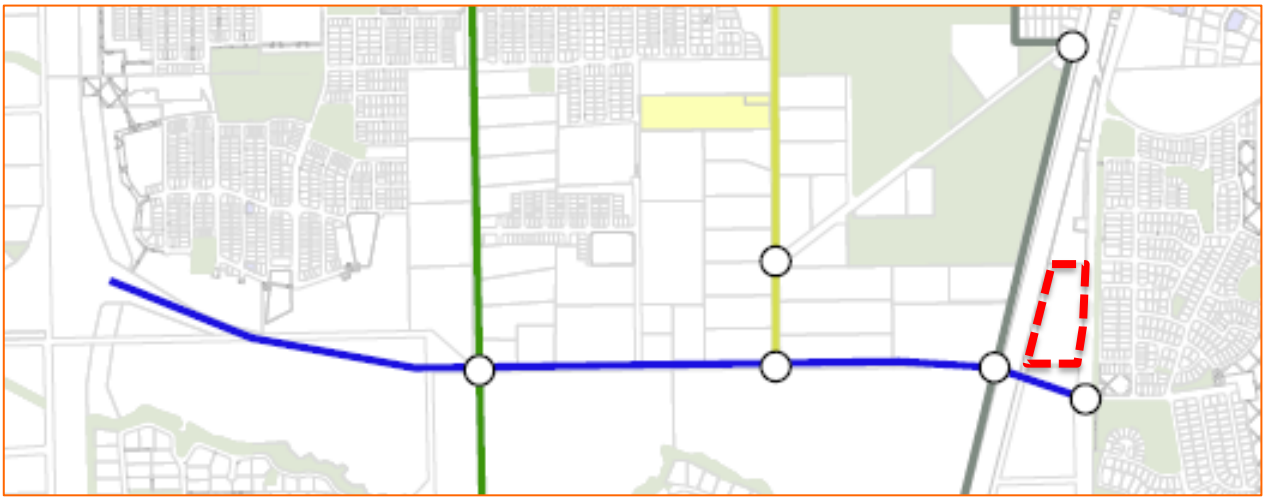


FIGURE 8: Extract DCP6 Roads Map (Orton Road)

The adoption of amendment 208 states that "the extension of Orton Road be noted on the Roads Map in the Byford Traditional Infrastructure DCP (and within the Byford DSP) be aligned equitably between land parcels throughout the full length". The DCA1 roads plan (Figure 6) shows the Orton Road extension and its intersection with the South Western Highway at Clondyke Drive.

The proposed alignment (Figure 8) does not seem to impact on Lot 128.

2.2 Planning Policy

2.2.1 Byford District Structure Plan

The Byford District Structure Plan was prepared in 2005 and updated in 2009 in response to the South Metropolitan Peel Sub- Regional Framework, the draft Local Planning Strategy vision and objectives, and the key opportunities and challenges identified in the plan.

A major review of the plan was adopted by the Shire Council on 16 November 2020, as the draft Byford District Structure Plan 2020. The draft plan also consolidates the Local Structure Plan for Lots 1,3 & 128 South Western Highway, Byford. It offers the following planning direction in respect of the site:

- It identifies Lot 128 as Service Commercial, aligning with the provisions in draft LPS3.
- Extension of Orton Road through to South Western Highway to reduce traffic congestion on Soldiers Road. This road is planned as a 30m reservation, of which 15m width will be over Lot 128.

FIGURE 9: Draft Byford DSP Map

The plan states that "Subdivision and development will be determined in accordance with the applicable zoning, planning scheme provisions, the Byford District Structure Plan and, where applicable, an approved LSP".

2.2.2 Local Structure Plan

The Local Structure Plan for Lots 1,3 & 128 South Western Highway, Byford (LSP) was adopted by the Council and the WAPC in 2005 to guide the development of land in the Byford area for urban purposes. It expands on the principles of the South-East Corridor Structure Plan and sets out a neighbourhood structure for the Byford area.

The plan identifies a Mixed Business use over the site and also identifies an area of 'Landscape Sensitivity' (remnant vegetation). It has been prepared to guide the subdivision and development of Lots 1, 3 and 128 South Western Highway in Byford.

The structure plan does not contain any specific development standards for the Mixed Business zone and requires compliance with the Shire's Local Planning Policy No. 19 Byford Development Requirements *[the Shire indicated that this policy has been rescinded]*. The structure plan does not allow for any residential use, but will permit a Caretaker's Dwelling where it is incidental to the pre-dominant non-residential use of the land. The structure plan requires the preparation of Design Guidelines.

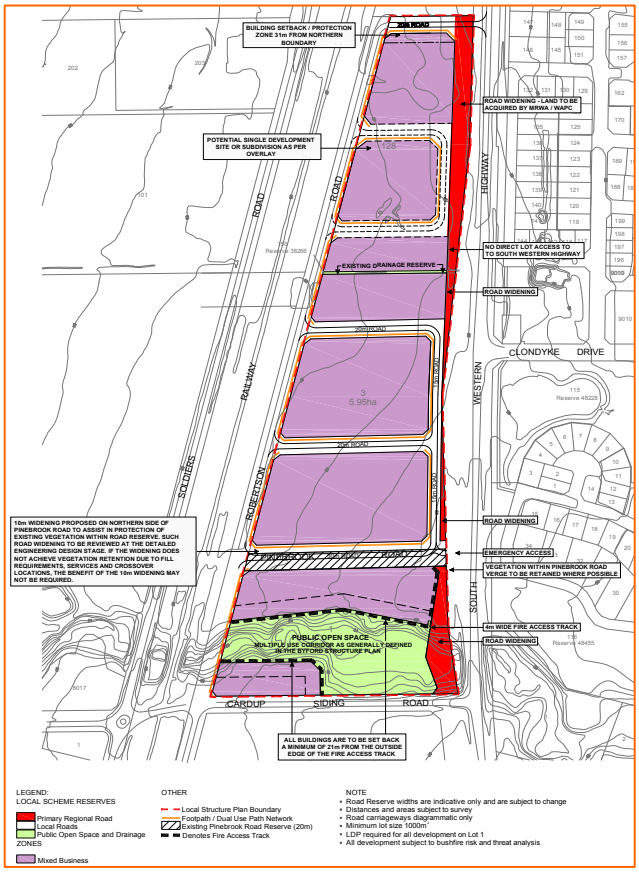


FIGURE 10: LSP Map

A vegetation assessment of the site underpinned the structure plan and identified the vegetation on the site as "Completely Degraded". "There is little merit in retaining the remnant trees in this area of the site. The requirement to fill the land by approximately 1.0m will mean that it is unlikely that these trees will survive in any event."

2.2.3 Local Planning Policies

LPP 1.6 Public Art

Development with a value exceeding $1m and up to $50m will provide or contribute towards public art to the value of 1% of the construction value. Generally, the artwork is to be designed by a professional artist and installation is to be overseen by the artist. The work is subject to a Public Art Report.

LPP 2.3: Development Standards for Development Applications

- Landscaping
  - Revegetation is required to replace mature native vegetation
  - Landscape plan is required
    - plants identified as pest plans are not permitted
    - a Deed of Agreement is required to ensure maintenance of landscaping within the verge.
    - landscaping works should incorporate water sensitive urban design systems
    - consider viewscapes, streetscape and privacy

- Drainage
  - Post-development discharges from the property should be equal to or less than the pre-development site for a design storm event.
  - Special drainage provisions for lots sloping towards the street
  - Design of stormwater system

- A potable water connection is required to development.

LPP4.15: Bicycle Facilities Policy
Bicycle facilities to be provided in accordance with the following standards:

Land Use	Employee	Visitor
Showroom	1 space (Class 1)/ 750m^2 sales floor	1 space (Class 3)/ 1,000m^2 sales floor
Light Industry	1 space (Class 1 or 2)/ 1,000m^2 NLA	
General Industry	1 space (Class 1 or 2)/ 150m^2 NLA	

Note:

Class 1: Individual bicycle locker, or secure compound
Class 2: Enclosure, shelter or compound
Class 3: Bicycle racks or rails

LPP 4.16: Landscape and Vegetation Policy
The importance of landscaping is defined by the following policy statement:
"*Landscaping can enhance privacy, act as a natural cooling system for homes, soften the built form, create visual relief and generally improve the aesthetic appeal of new and existing developments. landscaping with local native vegetation can help to protect biodiversity and natural heritage values and contribute to a 'sense of place' for the area."*

The policy requires that trees which are to be preserved on site, are to be protected in accordance with AS4970.

LPP 4.16: Street Tree Policy
The Shire requires the provision of street trees in accordance with Liveable Neighbourhoods and applying species in roads from the Shire's preferred species list. The mechanism is applied during clearances of subdivision conditions.

Furthermore, remnant vegetation in road reserves should be retained and enhanced wherever practical.

3 PROPOSAL

3.1 Current Status

3.1.1 Infrastructure Delivery

Building and site works associated with the National Storage development in Phase 1 was completed in 2021 and most of the works to create the subdivision of Lot 1 have been completed. However, the progress has been hampered by the inability to resolve a sewerage connection for the development. It was originally preferable to connect to existing sewerage infrastructure along Soldiers Road, to the west of the rail reserve. However, this required the removal of mature street trees and an alternative option was explored through a combination of private and public infrastructure to connect to existing infrastructure to the east of the highway.

Agreement on this option could not be reached with Watercorp and an alternative private sewerage infrastructure through a Secondary Treatment System (ATU) has now been approved by Department of Health on 25 January 2022. The subdivision strategy has therefore been amended to create Survey Strata lots and to facilitate private wastewater infrastructure in Common Property. This is also reflected on this Development Application.

Works along Robinson Road has mostly been completed. However, final design approval of the widening of the South Western Highway and its intersection with Robinson Road was significantly delayed. A contractor is now being procured for these road works.

3.1.2 Stage 2 Planning Application

Stage 2 development was approved on 19 July 2021 in Development Application PA21/162 for Vehicle Repair, Light Industry, Warehouse and Showroom is proposed on a portion of Lot 128. At the time of the Planning Application, the development was earmarked for Lots 2 and 3, measuring 3,388m^2 and 3,907m^2 respectively – note that Lot 2 contains the substation for this industrial precinct, which will be subdivided into the South Western Highway road reserve.

Development on Lot 2 is for the Holmes Panel and Paint vehicle repair centre. The development contains a building footprint of 1,349m^2. Lot 3 will accommodate light industrial development with a building footprint of 1,721m^2 to facilitate the location of small business workshops and warehousing opportunities.

Holmes Panel and Paint withdrew from the development and the development of Lot 2, as approved in Development Application PA21/162 will no longer be pursued. This Planning Application is for Stage 2 Lot 2 and replaces the approved Vehicle Repair and Showroom development under Development Application PA21/162.

3.2 Impact on Stage 2 Planning Approval

Previous discussions with the shire planners concluded that a new proposal for Lot 2 should be presented as a new planning application, rather than an amendment to the Stage 2 Development Application PA21/162. Although the application is a discreet proposal, it impacts on some of the conditions of approval associated with the Stage 2 approval. It is therefore pertinent to this planning application that the impact of this change be addressed:

3.2.1 Stage 2 Lot 2 Development Summary

The Holmes Panel and Paint vehicle repair centre was proposed Lot 2 of Lot 128, measuring 3,388m^2. The development was planned in a single building footprint, as follows:

- The Automotive Repair covered a building footprint of 897m^2 to accommodate work areas, office/ reception, storage and staff areas. The work areas accommodate the various work activities to fulfil automotive panel beating, which included spray painting.
- A Warehouse, with a floor area of 452m^2, was proposed at the rear of Lot 2. The warehouse was presented as a single building volume.

The site planning accommodates a small future extension to the proposed building measuring 63m2.

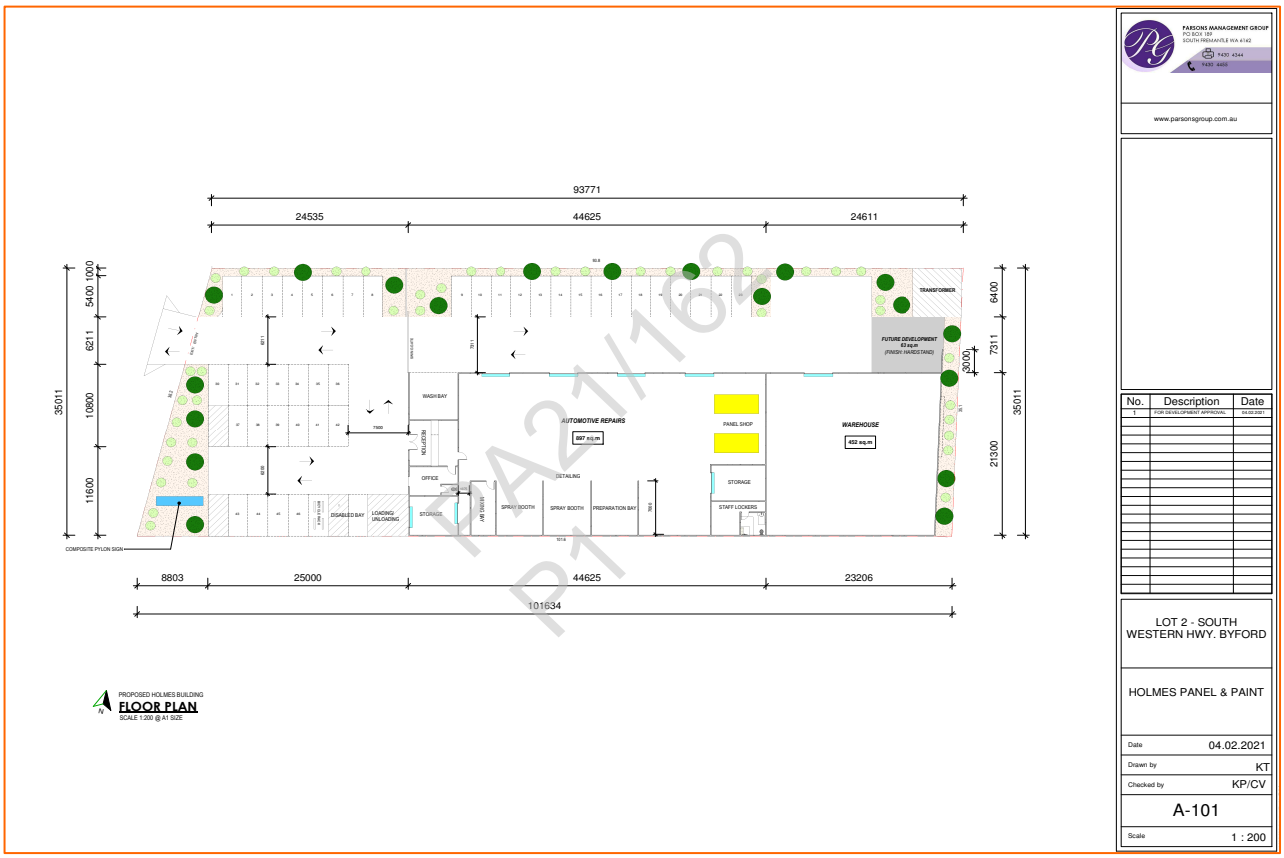


FIGURE 11: Stage 2 (Lot 2) Development Approval

The floor areas of the building uses may be summarised as follows:

Proposed Use	Floor Area
Automotive Repair	749m^2
Office	56m^2
Warehouse	452m^2
Staff/ Ablution *	31m^2
Future Office/ Industrial	63m^2
Storage *	61m^2

*Note: * Does not denote Floor Area, as per definition.*

The development presented as an industrial single storey building and the building envelope is defined by the following setbacks:

Primary Street (Robinson Road):	24.5 - 25m
Secondary Street (South Western Highway):	2m
Side Setbacks:	13.7m (north)
	0m (south)

The site planning indicates 26 public parking bays, including a disabled bay, and an additional 15 secure parking bays. In addition, the proposal accommodates 4 bicycle racks (8 bicycles) in the public car park, adjacent to the office. This represents an oversupply of parking, which would accommodate the planned additional 63m^2 of future Office/ Industrial use adjacent to the substation site.

The site landscaping is indicated on the site plan and accommodates 371m^2 of soft landscaping.

Key Statistics from the above Stage 2 Lot 2 development:

Site Area (Portion Lots 4 and 5)	3,388m^2
Soft Landscaping	371m^2 (10.9%)
Total Coverage/ Plot Ratio Area:	1,349m^2 (39.8%)

3.2.2 Impact of Stage 2 Lot 2 Development

The conditional Development Approval for Stage 2 Development Application PA21/162 on 28 July 2021, contained several conditions that pertained specifically to the proposed panel beating and spray painting operations:

Condition 5 The carpark must:

i. be designed in accordance with Australian/New Zealand Standard AS/NZS 2890.1:2004, Parking facilities, Part 1: Off-street car parking unless otherwise specified by this approval;
ii. include 78 bays, all of which are appropriately signed and marked to show their intended use;
iii. include two car parking space dedicated to people with disability designed in accordance with Australian/New Zealand Standard AS/NZS 2890.6:2009, Parking facilities, Part 6: Off-street parking for people with disabilities, linked to the main entrance of the development by a continuous accessible path of travel designed in accordance with Australian Standard AS 1428.1—2009, Design for access and mobility, Part 1: General Requirements for access—New building work;
iv. be constructed, sealed, kerbed, drained and marked prior to the development being occupied and maintained thereafter;
v. have lighting installed, prior to the occupation of the development.

The car park must comply with the above requirements for the duration of the development.

Comment:
The condition is specific and combines details of both developments. With the withdrawal of the panel beating and spray painting operations, the parking response will change through this Planning Application and can no longer be enforced, as stated.

Condition 9 Prior to the lodgement of a building permit application, a Noise Management Plan shall be submitted to and approved by the Shire of Serpentine Jarrahdale. The Noise Management Plan must address the following requirements as per the acoustic assessment submitted with the original application:

- The requirement of any acoustic shielding around roof and wall mounted exhaust extraction systems including heights, and locations to ensure compliance with the assigned noise levels;
- The construction of an acoustic wall of minimum height of 2.9m being constructed of recycled facebrick;
- The factory units being designed to contain all noise impacts at all times, so as to ensure such impacts do not extend beyond the property boundaries of the land;
- The factory units only being permitted to be tenanted for light industry use.

The NMP must also demonstrate how noise generated from the Automotive Repairs, Spray Painting and Panel Beating activities will be mitigated to an acceptable level at all times, to the satisfaction of the Shire of Serpentine Jarrahdale.

Comment:
This condition specifically addresses activities associated with the spray painting and panel beating. These activities are withdrawn from the development and are no longer applicable or enforceable. The updated Environmental Acoustic Assessment (section 3.7) concludes that the noise received at the neighbouring residential premises from the proposed Auto Masters and the industrial units would be deemed to comply and supersedes this condition.

Condition 10 Within six months of commencement of spray painting activities associated with the 'Vehicle Repair' land use, an updated Air Emission Assessment shall be submitted to and approved by the Shire of Serpentine Jarrahdale. The updated Air Emissions Assessment is required to assess emissions generated from the development across the first six months of operations and demonstrate that it has not impacted upon pre-development air quality levels, to the satisfaction of the Shire. The updated Air Emissions Assessment must include mitigation recommendations in the instance emissions have impacted upon the existing level of air quality.

Comment:
This condition specifically addresses activities associated with the spray painting and panel beating. These activities are withdrawn from the development and are no longer applicable or enforceable.

Condition 20 The operation times of the Vehicle Repair use are to be restricted to only between 7am to 7pm Monday to Friday, and between 7am to 5pm on Saturday, to the satisfaction of the Shire of Serpentine Jarrahdale.

Comment:
This condition was sourced from the Air Emission Assessment, prepared for the development of the spray painting and panel beating and may no longer be relevant.

3.3 Proposed Development

At the time of this development application, the dimensions of Lot 128 remains in accordance with its dimensions on Deposited Plan 156237; being 37,614m^2.

The proposed development is over Lot 2 and the Common Property (refer to the current subdivision application referenced in Section 1.3.3), previously known as Subdivision Lot 2 on a portion of Lot 128. This site abuts the southern boundary to the Stage 1 National Storage development and has a double frontage onto South Wester Highway (28.7m) and Robertson Road (36.29m), all access will be from Robertson Road. Lots 2 measures 3,388m^2, which includes 434m^2 of Common Property.

Development on this Lot 2 is for an Automotive Repair and associated Office (Automasters) and three (3) Light Industrial / Warehouse units.

- The Automasters workshop aligns the entire street boundary along the South Western Highway and wraps around the electrical substation site. It accommodates staff ablutions and therefore has a Net Floor Area of 276.52m^2. Automasters also has an ancillary Office, measuring 81.47m^2 and with a Net Floor Area of 77.12m^2.

- Three Light Industrial / Warehouse units are provided along the southern boundary of the site. Each unit contains ablutions and has a Net Floor Area of 337.5m^2, thus totalling a Net Floor Area of 1012.5m^2.

Site facilities will be shared across the development and includes:

- 31 public parking bays
- 1 disable parking bay
- 4 bicycle racks

The Common Property site will be landscaped, as it accommodates the Secondary Treatment System (STS, also known as ATU) and required drainage area. The drainage area accommodates 4 leach drains, refer to Figure 12. The Secondary Treatment System (ATU) was approved by Department of Health on 25 January

2022 and the details of this component of the proposal is not detailed in the Planning Application. The approval letter for this system is provided in Attachment C.

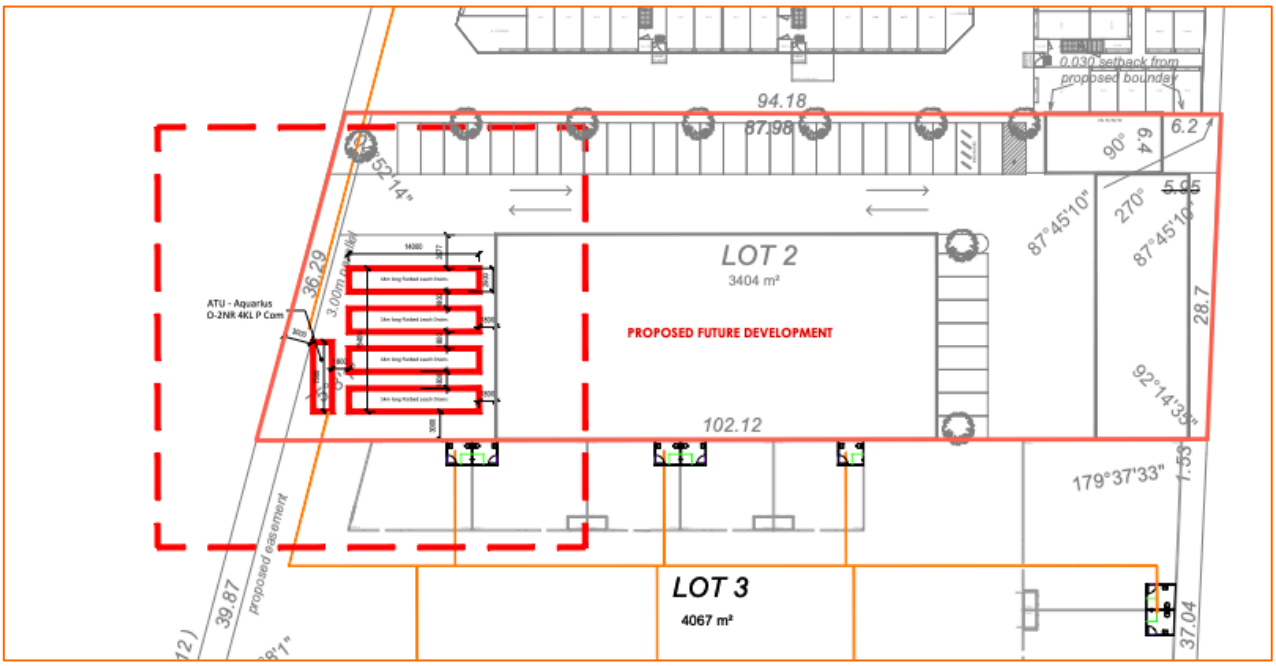


FIGURE 12: Secondary Treatment System (ATU)

The floor areas of the building uses may be summarised as follows:

Proposed Use	Floor Area	
	GBA	NLA*
Automotive Repair	285.6m^2	276.5m^2
Office	81.5m^2	77.1m^2
Light Industrial Units	1036.4m^2	1013.1m^2

*Note: * The plan include 36.8m^2 of Staff/ Ablution, which does not denote Floor Area (NLA), as per definition.*

The development presents as an industrial single storey building and the building envelope is defined by the following setbacks:

Primary Street (Robinson Road):	20 – 25.7m
Secondary Street (South Western Highway):	2m
Side Setbacks:	0m – 13m (north)
	0m (south)

The site landscaping is indicated on the site plan and accommodates 707.9m^2 of soft landscaping.

Key Statistics from the above Stage 2 Lot 2 development:

Site Area (includes Common Area ATU)	3,388m^2
Soft Landscaping	707.9m^2 (10.9%)
Total Coverage/ Plot Ratio Area (based on GBA):	1,403.5m^2 (41.4%)
Total Floor Area (NLA)	1,366.7m^2 (40.3% Plot Ratio)
Total Access and Parking	1,276.6 m^2 (37.7%)

The following table provides a comparison between the approved development on Lot 2 and the current proposal in this Development Application:

Land Use	Approved PA21/162	Proposed
Automotive Repair	897m^2	276.5m^2
Office	56m^2	77.1m^2
Light Industrial / Warehouse	452m^2	1,013.1m^2
Parking Offered	41 Bays	32 Bays

The approved development on Lot 2 has a floor area of 1,405m2, whereas the proposed development has a floor area of 1,366.7m2. The proposed development has a smaller floor area and offers significantly less parking than the approved development for similar land uses and is of a lower impact.

3.4 Landscape Plan

The landscape proposals for each development is presented on the updated Concept Landscape Plan, which incorporates and expands the public domain landscape treatments form the Stage 1 Concept Landscape Plan. The proposed landscaping on Lot 2 is simplified into tree planting (agonis flexuosa 'burgundy') and the evergreen native grass (lomandra tanika). The garden beds will be covered in mulch.

3.5 Development Impacts

3.5.1 Traffic Impact

KCTT prepared a Transport Impact Statement (TIS) in support of the approved Stage 2 Development Application PA21/162 on 19 July 2021. The development for Lot 2 accommodated Vehicle Repair and a Warehouse, which offered 41 parking bays. This Traffic Impact Statement has been updated by Revision C, dated May 2022 in Appendix C. This TIS provides the cumulative impact of Stages 1 and 2, as amended by the revised development in Stage 2A in this development application.

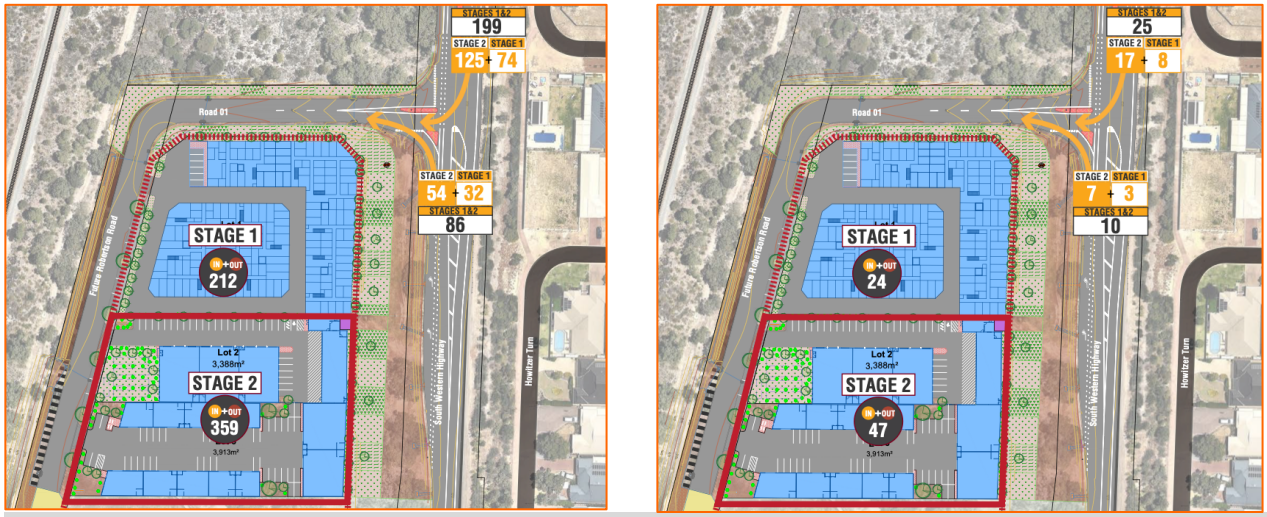
Key elements of the proposed Stage 2 development remain valid from the Transport Impact Statement (TIS):

- With 359 vehicular trips per day and 47 vehicular trips in the peak hour, the Stage 2 developments would have moderate impact on the surrounding road as per WAPC Guidelines.
- The TIS assess parking under the draft provisions of LPS3, which exceeds the requirements under the current TPS2. In this respect, the following is noted in respect of the Stage 2 development:
    - Lot 2 (Automasters and 3 light industrial units) require a total of 34 parking bays. Lot 2 will provide 32 parking bays on-site with 3 on-street parking bays located at the lot boundary with Robertson Road, meeting the requirements. The proposed provision of parking significantly exceed the requirements under TPS 2, which requires 27 parking bays.
    - The mixed light industrial development development on Lot 3 is already approved under the previous Stage 2 Development Applicaton. It is noted that LPS3 requires 25 parking bays for this development, whereas 37 bays have been provided.
    - The parking supply for Stage 2 is compliant to the requirements under LPS3 for Lot 2 and significantly in excess for the overall Stage 2 development. The supply also exceeds the requirements under TPS2.
    - KCTT concludes that car parking bays dimensions and aisle width are compliant with the Australian Standard.

- The proposal plans and the approved development on Lot 3 accommodates one ACROD bay for each lot to meet the requirements
- The TIS uses several existing WAPC and NSW RTA standards to calculate the traffic generation and the following demonstrates the traffic impact.

- The modelling suggests that the proposed Automasters and 3 light industrial units will generate 78 vpd with a peak hour generation of 24.
- The total combined traffic generation for Stage 2 is 359 vpd with a peak hour generation of 47. This amended Stage 2A development is a minor contributor to the Stage 2 traffic generation – Stage 2 development is considered to have moderate impact on the surrounding road network under WAPC Guidelines.
- The updated SIDRA Intersection analysis demonstrates that the surrounding road network can accommodate the expected traffic from the subject site and the remainder of the LSP area (Lot 128).

- The crossovers meet current design standards and is off set by more than 6m from street parking pockets. The proposed concept design of the cross overs therefore compiles with AS/NZS 2890.1:2004 Parking facilities Part 1.
- The nature of this development is completely car dependant and the current focus is therefore on formal footpath connections between street parking and the proposed development. The concept landscaping plan proposes a pedestrian path along Robinson Road, while the connection of this path to the footpaths along the South Western HWY is indicated as mulched path. The footpath will for the time being remain unconnected to the regional footpaths.
- Byford Train Station is currently located approximately 1km to the north of the subject site serviced by Australind regional rail service. Byford Rail Extension METRONET project includes construction of a new ground level Byford Station within the future Byford Town Centre, approximately 400 metres north of Abernethy Road, Byford. The development will be within a walkable catchment of the future METRONET project. There is also a possible future bus route planned to run through Soldiers Road and Turner Road west of the development.



Daily Traffic Flow *Peak Hour Flow*

FIGURE 13: Traffic Modelling (Stages 1&2)

Overall, the development in Stage 2, including the Stage 2A Automasters and 3 light industrial units within this development proposal would have moderate impact on the surrounding roads. The TIS demonstrates that the surrounding road network can accommodate the expected traffic from the proposed development of Lot 2 and the remainder of Lot 128. The concept design of traffic infrastructure related to this development proposal complies with various standards and guidelines.

3.5.2 Bushfire Risk

The site falls within an area identified as a bush fire prone area under the Map of Bushfire Prone Areas, prepared, by the Office of Bushfire Risk Management. Emerge Consultants prepared a Bushfire Management Plan, in accordance with Australian Standard 3959-2018 Construction of buildings in bushfire prone areas (AS 3959) for Stage 2 Development Approval PA21/162.

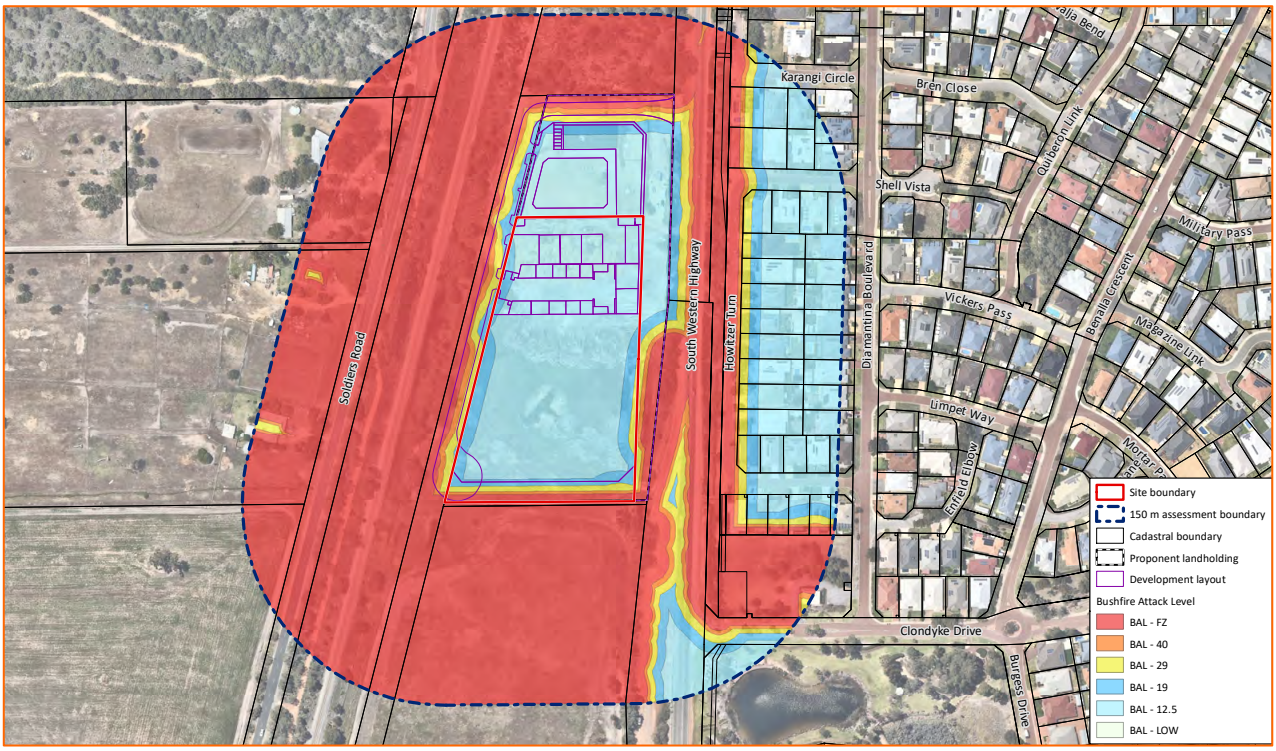


FIGURE 14: Bushfire Risk Modelling

The proposed development is completely contained within Lot 2 and of similar building envelopes, orientation and construction type than the previously approved development over this site. The modelling and conclusions from the approved Bushfire Management Plan (refer to Appendix C) therefore remains valid for this amended development proposal.

"Overall, the outcomes of this BMP demonstrate that as development progresses, it will be possible for the intent of the bushfire protection criteria outlined in the Guidelines to be satisfied. The management/mitigation measures to be implemented through the proposed subdivision of the site, demonstrate that the acceptable solutions and/or intent of each element can be met. Accordingly, having regard to clause 6.11 of SPP 3.7, the precautionary principle has been satisfied. Following certification, the BAL ratings determined within this BMP can be used to support future building approval processes where required."

3.5.3 Acoustic Impacts

Herring Storer Acoustics prepared an Environmental Acoustic Assessment in their report dated May 2022. The report assesses the potential noise impacts of the proposed development on receptors within a highly sensitive area within 100m and 450m from the proposed development and assumes a maximum noise impact scenario that includes operations on a Sunday (note the development proposal does not suggest Sunday operations for these uses). The modelling determines the environmental acoustic impact on the ten most affected residences within the highly sensitive area, considering measured noise activities, ground contours and climatic conditions. The modelling results also applies 5 dB(A) penalty to the assessable noise level in a conservative approach for the tonal component of the potential impacts on nearby residences.

The modelling assume that the measured noise levels for noise mitting activities in the proposed Automasters development will be attenuated within the structural elements of the proposed buildings. The open door operations for the Automasters and light industrial units is therefore the focus of the noise egress and potential noise impact. The modelling concludes a noise impact ranging between 20 dB(A) and 30 dB(A), plus a tonal impact of 5dB(A). This is well below the ambient noise levels, which are estimated to range between 50dB(A) and 60 dB(A) for the ten most affected residences within the highly sensitive area.

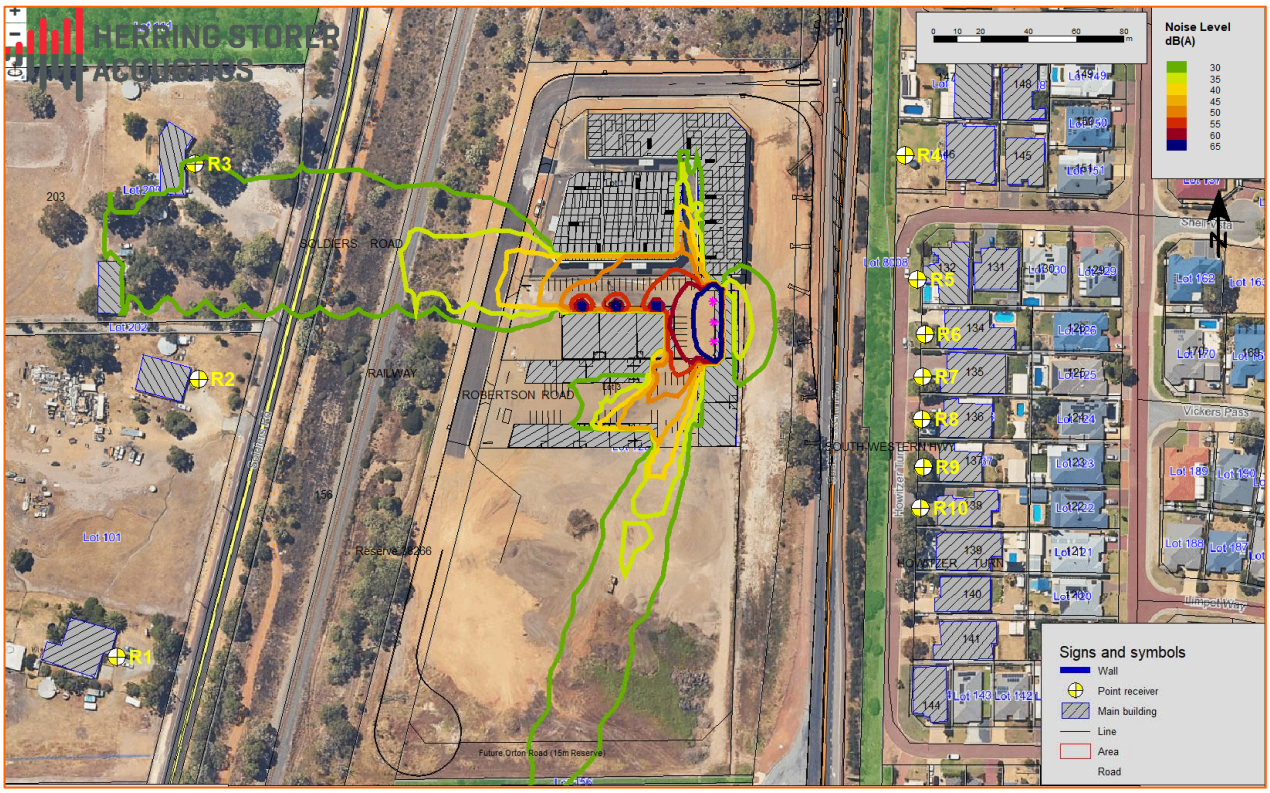


FIGURE 15: Noise Emission Modelling

The Environmental Acoustic Assessment concludes that the noise received at the neighbouring residential premises from the proposed Auto Masters and the industrial units would be deemed to comply with the requirements of the Environmental Protection (Noise) Regulations 1997

4 PLANNING COMPLIANCE

This section evaluates planning outcomes achieved through the proposed Stage 2, Lot 2 only, Automotive Repair and associated Office (Automasters) and three Light Industrial units against key planning standards reference in Section 2 of this planning report.

4.1 Compliance to Statutory Framework

The proposal aligns with the planning provisions under the MRS by proposing an "Urban" use and Stage 1 already accommodates road widening of the "and "Primary Regional Roads" (South Western Highway) through the Stage 1 subdivision and ongoing works. The current development processes confirmed no significant vegetation within this portion the Robinson Road reserve and associated Bush Forever Area abutting Lot 128.

Compliance with the land use provisions under the shire's planning scheme is considered for both TPS2 and draft LPS3 below:

<table>
<tr><th>TPS Requirement</th><th>Proposed Design Measure/ Comment</th><th>Comp-liance</th></tr>
<tr><td>Zoning Provisions
TPS2 Zone:</td><td>The provisions of the Urban Development zone is defined through the Local Structure Plan for Lots 1, 3 & 128 South Western Highway, Byford dedicates a Mixed Business use. The purpose and intent for the Mixed Business zone is to provide for a range of light and service industrial, and showrooms.

The proposed Automotive Repair and Light Industrial/ Warehouse units on Lot 2 comply with the intent and objectives of the Mixed Business land use dedication.</td><td>Yes</td></tr>
<tr><td>LPS 3 Zone</td><td>The draft LPS3 zones the land for Service Commercial, which considers Warehouse/ Storage (P), Light Industry (D) and Motor Vehicle Repair (D).

The proposed development aligns with the land use table under the draft LPS3 and the application will require the Shire to advertise the proposal for comment.</td><td>Yes</td></tr>
<tr><td>Building Envelope</td><td>The permitted building envelope under the two schemes are inconsistent and the proposal adopted the following approach
<table>
<tr><th>Control</th><th>TPS 2</th><th>LPS3</th><th>Prop-osed</th><th></th></tr>
<tr><td>Minimum Frontage</td><td>20m</td><td>-</td><td>36.2m</td><td>Yes</td></tr>
<tr><td>Primary Setback</td><td>20m</td><td>12m</td><td>20m</td><td>Yes</td></tr>
<tr><td>Secondary Setback</td><td></td><td>6m</td><td>2m</td><td>No</td></tr>
<tr><td>Side Setback</td><td>0m</td><td>6m</td><td>0m</td><td>Yes/ No</td></tr>
<tr><td>Rear Setback</td><td>0m</td><td>6m</td><td></td><td>N/A</td></tr>
<tr><td>Maximum Coverage</td><td>-</td><td>75%</td><td>41.4%</td><td>Yes</td></tr>
<tr><td>Max Plot Ratio</td><td>0.6</td><td>1.0</td><td>0.4</td><td>Yes</td></tr>
<tr><td>Landscaping</td><td>Discretion</td><td>10%</td><td>10.9%</td><td>Yes</td></tr>
</table>
The South Western Highway is the defined secondary street setback. TPS2 does not define a secondary street setback, whereas draft LPS3 requires a 6m setback. It is an agreed design objective for this industrial precinct to establish a strongly defined built form edge along the South Western Highway. To achieve this, the development assumes the setbacks applied to the South Western Highway boundary in Stage 1: National Storage, which is 2m and in compliance to TPS2. Although this</td><td></td></tr>
</table>

<table>
<tr>
<td>

Parking

Lot 2: Holmes Panel and Paint

</td>
<td>

approach does not respond to draft LPS3, it delivers the built form address to the South Western Highway in a consistent manner and in compliance to TPS2.

TPS2 does not specify any side setbacks and the proposal is in compliance. The introduction of 6m side setbacks under draft LPS3 will require much larger building site areas which will be an unproductive use of land, given that this assessment demonstrates compliance to all other building envelope planning and design objectives. *The side setback requirement under draft LPS3 is considered unsustainable for this small-scale light industrial development and compliance to TPS2 provides a more appropriate approach.*

Parking is assessed for both developments under both TPS2 and draft LPS3 as follows:

<table>
<tr><th>Use</th><th>TPS2</th><th>LPS3</th><th>Floor Area</th><th>Req. Bays</th></tr>
<tr><td>Light Industry</td><td>1/50m^2 GLA</td><td>1/50m^2 GLA</td><td>1013.1m^2</td><td>21/21</td></tr>
<tr><td>Motor Vehicle Repair</td><td>1/50m^2 GLA</td><td>1/50m^2 GLA
1/Employee</td><td>276.5m^2</td><td>6/14</td></tr>
<tr><td>Office</td><td></td><td>1/40m^2 GLA</td><td>77.1m^2</td><td>-/2</td></tr>
<tr><td>Total</td><td colspan="3"></td><td>1,366m^2</td><td>27/37</td></tr>
</table>

Automasters may employ up to 5 staff, requiring up to 5 staff parking bays under draft LPS3. TPS2 requires 27 parking bays, whereas draft LPS3 may require up to 34 parking bays, including staff parking.

The proposal accommodates 32 parking bays to meet the requirements under TPS2. Although it represents a potential shortfall of up to 5 bays under LPS3, the approved Landscape Plan includes 9 street parking bays, of which 3 on-street parking bays located at the lot boundary. The TIS therefore considers parking provision to also meet the requirements under LPS3. It is also noted that the approved development on Lot 3 accommodates 12 bays more than the requirement under draft LPS 3 and the Stage 2 development exceeds the overall parking requirements under both schemes.

</td>
<td>

Yes

</td>
</tr>
<tr>
<td>

Bicycle Parking

</td>
<td>

Draft LPS3 requires 3 bicycle parking bays for staff and visitors to the Lot 2 Automasters and Light Industrial units.

The proposal accommodates 4 bicycle racks, accommodating up to 8 bicycles to exceed the requirements.

</td>
<td>

Yes

</td>
</tr>
</table>

4.2 Planning Policy Compliance

4.2.1 Structure Plans

The Byford District Structure Plan confirms the Service Commercial zone for the land to correlate with the land use provisions of LPS3. The land use proposal is therefore in compliance.

The structure plan also indicates the Orton Road extension along the southern boundary of Lot 128. This alignment does not connect to Clondyke Drive, as indicated on the Development Contribution Plan 6. Notwithstanding this, *the proposed Orton Road extension does not affect the current proposals, but the alignment of Orton Road will need to be resolved for future planning of the balance of Lot 128.*

The Local Structure Plan for Lots 1, 3 & 128 South Western Highway, Byford has been superseded by the adoption of the Byford District Structure Plan and the draft LPS3. The Shire confirmed that the structure plan is a guide and agreed at officer level that the road pattern may no longer be considered appropriate and that all access could be achieved from Robinson Road. The Shire also requested that the extension of Orton Road be accommodated in future planning.

4.2.2 Local Planning Policies

The proposal does not contain any definitive public art solution. The DA determination is likely to condition that public art be delivered through works or a contribution to the value of 1% of the project construction value. This initiative may be combined with Stage 1.

The site has largely been cleared and revegetation and landscaping will be achieved in accordance with the Concept Landscape Plan. This plan provides the principles for soft and hard landscaping, which will be further resolved in detail design. The proposed development delivers 708m^2 of landscaped areas on Lot 2, constituting 10.9% of the site area. This significantly increases the total landscape provisions under the previous Planning Approval, which accommodates 788m^2 of soft landscaped areas within Lots 2 and 3. The landscaping concept for the development sites and the adjoining road verges is indicated on the updated Concept Landscape Plan for Stages 1 and 2.

Street trees (agonis flexuosa burgubdy) will be planted in accordance with the Concept landscape Plan.

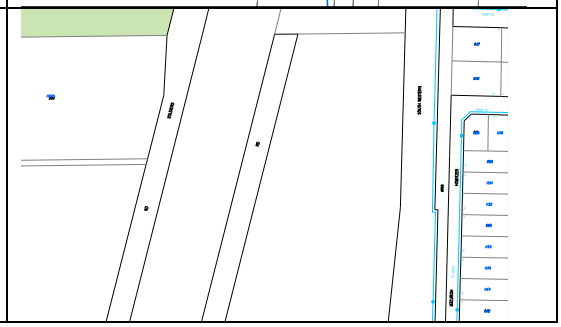
4.3 Service Infrastructure

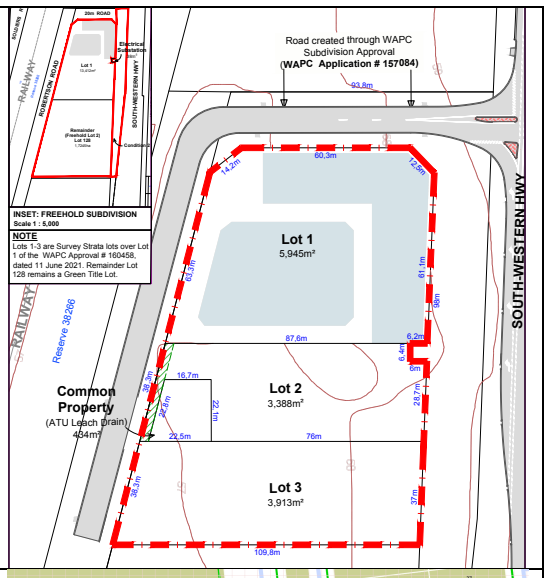
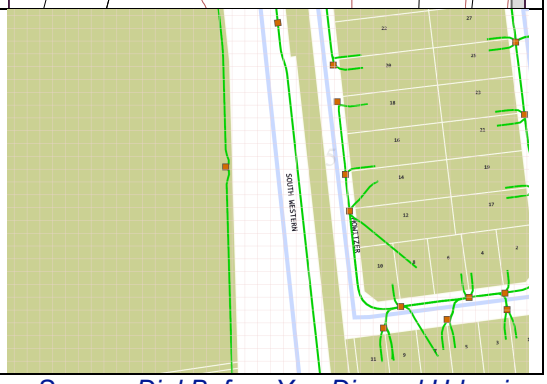
This development application replaces the approved development on Lot 2 with a lower intensity use and focuses on land use impacts of the proposed developments on portion of Lot 128 South Western Highway. It does not address infrastructure requirements, other than the accommodation of various transport options.

An amended Stage 2 subdivision application has been submitted to the WAPC. The application now proposes a Survey Strata tenure model to allow for private waste water management systems to be employed. This subdivision application is being assessed in parallel to this development application and all service infrastructure requirements will be addressed through subdivision works to achieve fully serviced and clearances for Lots 2 and 3.

It is noted that the drainage solution relies in subsoil drainage and is indicated on the updated Concept Landscape Plan for Stages 1 and 2. An Urban Water Management Plan has been approved by the Shire in previous applications. With a smaller building footprint, less parking and significantly more soft landscaping proposed on Lot 2, stormwater runoff will be lower as a result of this proposal. Drainage design will be resolved in accordance with the principles of the UWMP.

Also note the following comments on infrastructure connections:

Western Power has High Voltage overhead electrical infrastructure along South Western Highway. A substation for the proposed development of Lot 128 will be created between the proposed Lots 1 and 2 to serve the development.	
Watercorp water infrastructure is available along the western alignment of South Western Highway. A water connection will be established through the subdivision of the land.	

The development will no longer connect to public sewer infrastructure. Instead, the Department of Health approved the implementation of a Secondary Treatment System (ATU) to service Lots 1 – 3 within this development. The drainage area accommodates 4 leach drains, will be located, along with the ATU within Common property on Lot 2.	
NBN copper/ fibre networks exists along South Western Highway. This infrastructure will be extended to create new connections to each lot.	

Source: Dial Before You Dig and Urbanism

Appendices:

Legal:

DA Form & Checklist

Certificate of Title

Power of Attorney

A

Plans:

Architectural Plans

Concept Landscape Plan

B

Reports:

Secondary Treatment System (ATU)

Environmental Acoustic Assessment

Bushfire Management Plan

Traffic Impact Statement

C

All Appendices are bound separately into the hard copy submission

VEHICLE SERVICE CENTRE AND INDUSTRIAL UNITS

LOT 2 ROBERTSON ROAD, BYFORD

ENVIRONMENTAL ACOUSTIC ASSESSMENT

MAY 2022

OUR REFERENCE: 29576-1-22157

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
HERRING STORER ACOUSTICS
P.O. Box 219, Como, W.A. 6952
(08) 9367 6200
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DOCUMENT CONTROL PAGE

ENVIRONMENTAL ACOUSTIC ASSESSMENT

VEHICLE SERVICE CENTRE
AND INDUSTRIAL UNITS

Job No: 22157

Document Reference: 29576-1-22157

FOR

PARSONS MANAGEMENT GROUP

DOCUMENT INFORMATION			
Author:	Paul Daly	**Checked By:**	Tim Reynolds
Date of Issue:	27 May 2022		

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Revision	Description	Date	Author	Checked

DOCUMENT DISTRIBUTION

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1	1	Parsons Management Group Attn: Cale Parsons Email: cale@parsonsgroup.com.au		☐

CONTENTS

1. INTRODUCTION

Herring Storer Acoustics were commissioned by Parsons Management Group Pty Ltd to undertake an acoustic assessment of noise emissions associated with the proposed Vehicle Service Centre (Auto Masters) and 3 industrial units to be located on Lot 2 Robertson Road, Byford.

This report is to provide an assessment of proposed noise emissions from the Auto Masters and industrial units with respect to compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*. We understand that this has been requested by council as part of obtaining development approval. For information, a pan of the proposed is shown in Figure 1.1 below, with further details contained in Appendix A.

FIGURE 1.1 PROPOSDED DEVELOPMENT PLAN

2. SUMMARY

Based on the assessment, noise received at the neighbouring residential premises from the proposed Auto Masters and the industrial units would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the hours of operation.

3. CRITERIA

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels. For highly sensitive area of a noise sensitive premises this is determined by the calculation of an influencing factor, which is then added to the base levels shown below in Table 3.1. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. For other areas within a noise sensitive premises, the assigned noise levels are fixed throughout the day, as listed in Table 3.1.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

Under the Regulations, a highly sensitive area means that area (if any) of noise sensitive premises comprising –

(a) A building, or a part of a building, on the premises that is used for a noise sensitive purpose; and

(b) Any other part of the premises within 15 m of that building or that part of the building.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax(Slow)}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} in any one-third octave band;

(b) is present for more at least 10% of the representative assessment period; and

(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 3.2 below.

TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

The closest residence adjacent to the development have been identified using Shire of Serpentine Jarrahdale Intramaps and are located to the east and west. We note that the residences to the east are within 100m of South Western Highway, which is a secondary road. Thus, the Influencing Factor has been the determination, as outlined in Table 3.3, with Figure 3.1 showing the zoning map.

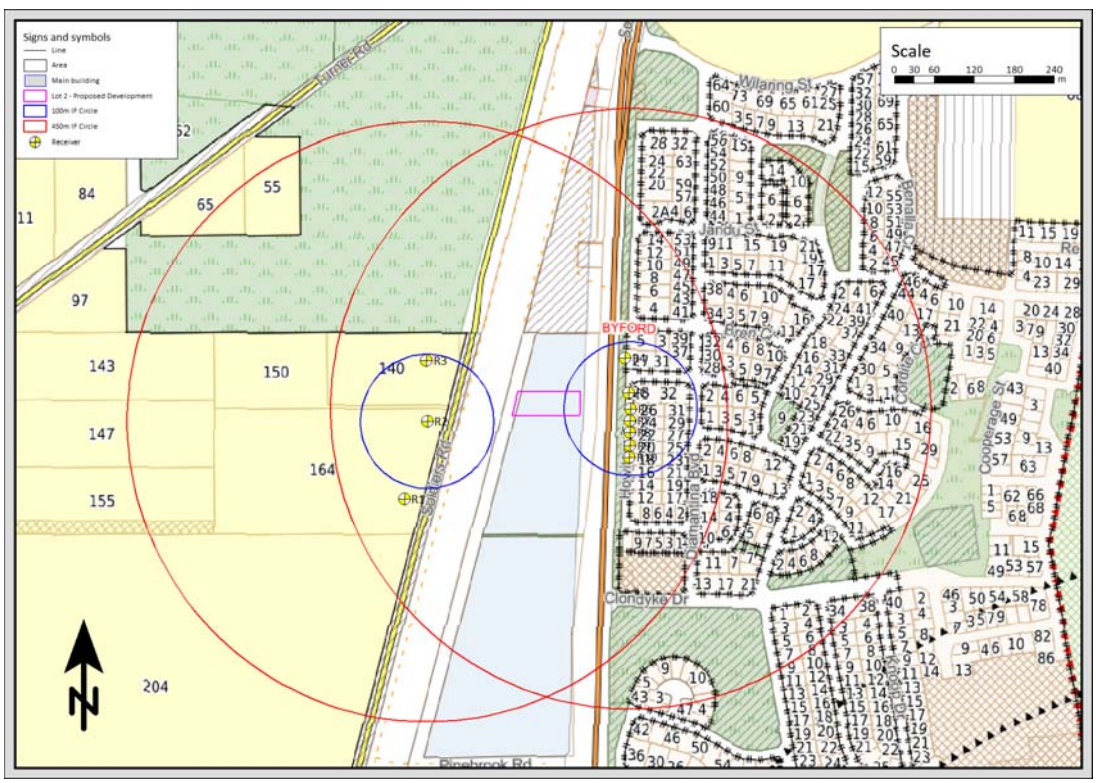


FIGURE 3.1 - RESIDENTIAL LOCATIONS AND INFLUENCING FACTOR

TABLE 3.3 – CALCULATION OF NOISE INFLUENCING FACTOR

Description	Residence	
	R1 to R3	R4 to R10
Commercial (Inner Circle)	0	20% = +1.0 dB
Commercial (Outer Circle)	20% = +1.0 dB	20% = +1.0 dB
Roads Secondary (Inner Circle)	0	+ 2 dB
TOTAL	1 dB	4 dB

The Assigned Noise Levels at the closest neighbouring residences would be as listed in Tables 3.4.

TABLE 3.4 - ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
R1 to R3 (+1)	0700 - 1900 hours Monday to Saturday (Day)	46	56	66
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	41	51	66
	1900 - 2200 hours all days (Evening)	41	51	56
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	36	46	56
R4 to R10 (+4)	0700 - 1900 hours Monday to Saturday (Day)	49	59	69
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	44	54	69
	1900 - 2200 hours all days (Evening)	44	54	59
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	39	49	59
Commercial Premise	All Hours	60	70	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

4. DEVELOPMENT

From information available, we understand that the Auto Masters hours of operation are:

Monday – Friday - 7:30am to 5:30pm
Saturday - 8:00am to 12:00pm

Note: Auto Masters is closed on Sundays and Public Holidays.

For the industrial units it has been assumed these could operate 7 days a week, hence noise emissions have been assumed to be present prior to 0900 on a Sunday, being the most stringent assessment criteria.

5. MEASUREMENTS

Previously, noise level measurements were recorded of noise emissions from an established Auto Masters at a different location.

The results of the measurements are summarised in Table 5.1

TABLE 5.1 – MEASURED NOISE LEVELS

Item	Noise Level, dB(A)
Hoist (1.5 metres)	80
Blower (1.5 metres)	85
Air Compressor (1.5 metres)	86
Rattle Gun (1.5 metre)	92

6. MODELLING

To determine the noise that would be received at the surrounding premises from the facility, modelling of noise emission propagation was carried out using "SoundPlan".

Based on previous experience and the measured noise levels from existing facilities with the same operations, Table 6.1 contains the sound power level used for the modelling. As the building are assumed to attenuate the noise levels due to the structure (concrete walls etc.) for internal noise emissions, the focus of the noise egress has been on the open roller doors at each location. For the auto masters, three noise sources have been allowed for open door operations. The industrial units have only single doors; hence a noise source has been situated at each unit. Figure 6.1 details the source locations.

TABLE 6.1 – SOUNDPOWER LEVEL

Noise Source	Quantity	Sound Power Level dB(A)
Vehicle Service Centre (Auto Masters)	3	88
Industrial Unit	1	80

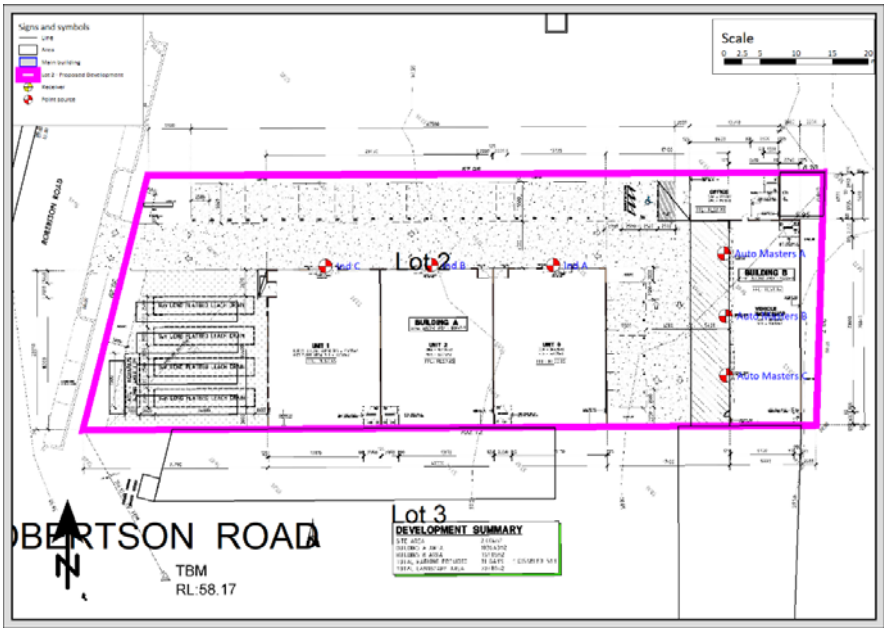


FIGURE 6.1 - SOURCE LOCATIONS

The calculations used the following input data:

a) Ground contours (site topography).

c) DWER worst case day weather conditions.

Weather conditions for the modelling were undertaken using the "Default Conditions for Noise Modelling" as stipulated within the Environmental Protection Authority's "*Draft Guidance for Environmental Noise for Prescribed Premises"* as listed in Table 6.2.

TABLE 6.2– WEATHER CONDITIONS

Condition	Day
Temperature	20°C
Relative humidity	50%
Pasquil Stability Class	E
Wind speed	4 m/s*

* From sources, towards receivers.

7. RESULTS

The results of the noise modelling are attached in Appendix B.

Additionally, for information, the resultant noise level at the worst-case receiver for the above scenario is listed in Table 7.1 with Figure 7.1 showing the receiver location in relation to the development.

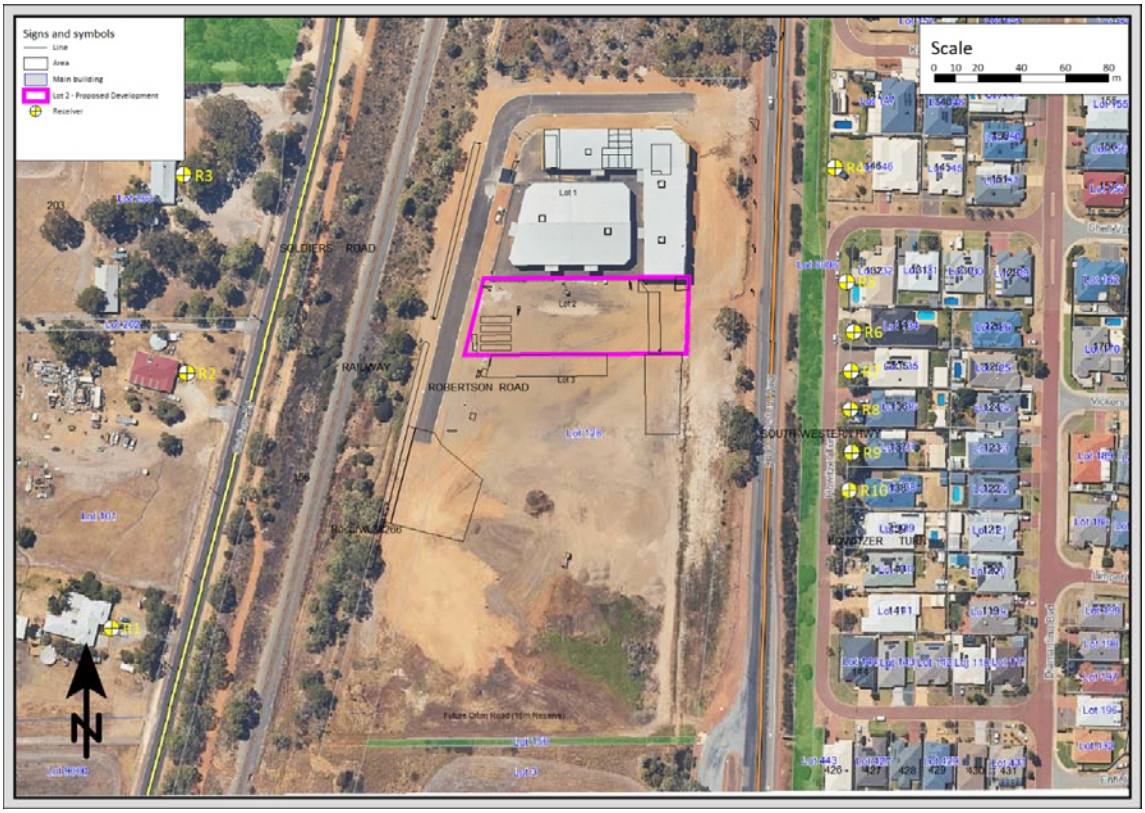


FIGURE 7.1 - RECEIVER LOCATIONS

TABLE 7.1 – SUMMARY OF RESULTS
WORST CASE RECIEVER

Receiver Location	Calculated Noise Level dB(A)
R1	20
R2	23
R3	30
R4	22
R5	24
R6	24
R7	23
R8	23
R9	22
R10	21

8. ASSESSMENT

For the day time operations, based on calculated noise levels at the nearest premises, noise levels could be considered as being tonal in characteristics. This would be highly conservative as the ambient noise levels range is likely to be around from 50 to 60 dB(A) during the day periods. However, a +5 dB(A) penalty has been included to allow for a tonal component for the residence.

Hence, Table 8.1 summarises the applicable Assigned Noise Levels, and assessable noise level emissions, for the cumulative (all industry) scenario considered.

TABLE 8.1 – APPLICABLE ADJUSTMENTS AND ASSESSABLE LEVEL OF NOISE EMISSIONS, dB(A)

Receiver	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A) Where Noise Emission Is Not Music			Assessable Noise Level, dB(A)
		Tonality	Modulation	Impulsiveness	
R1	20	+5	-	-	25
R2	23	+5	-	-	28
R3	30	+5	-	-	35
R4	22	+5	-	-	27
R5	24	+5	-	-	29
R6	24	+5	-	-	29
R7	23	+5	-	-	28
R8	23	+5	-	-	28
R9	22	+5	-	-	27
R10	21	+5	-	-	26

Based on the assessable noise levels above, comparison against the relevant assigned noise level is contained in Table 8.2. It is noted that as the proposed operations for the Auto masters is only during the day period, however the other units could operate from 07:00 on a Sunday or Public Holiday, i.e. prior to 09:00, therefore most stringent criteria (night) needs to be assessed. To ensure a conservative assessment, all noise emissions for Lot 2 have been assessed against the night period.

TABLE 8.2 – ASSESSMENT OF NOISE LEVELS

Receiver	Noise Assessable Noise Level dB(A)	Time of Day	Assigned Level (dB)	Compliance
R1	25	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	36	Complies
R2	28			Complies
R3	35			Complies
R4	27		39	Complies
R5	29			Complies
R6	29			Complies
R7	28			Complies
R8	28			Complies
R9	27			Complies
R10	26			Complies

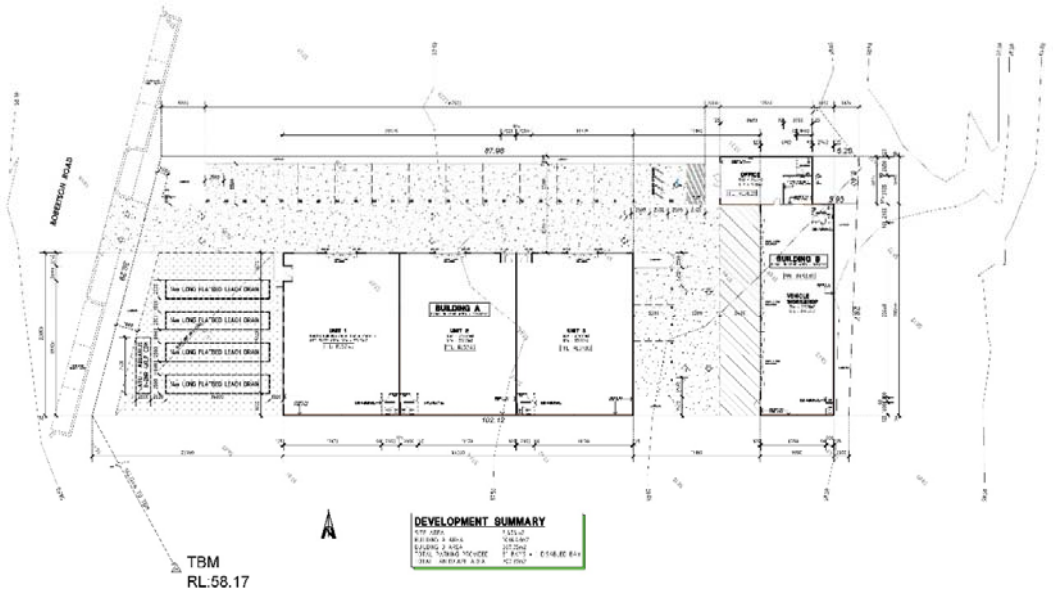
9. CONCLUSION

Based on the above assessment, noise received at the neighbouring residential premises from the proposed Auto Masters and the industrial units would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the hours of operation.

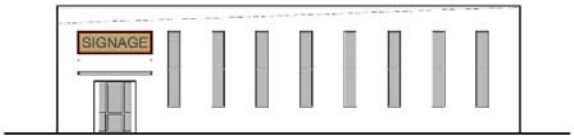
APPENDIX A

PLAN


N
SOLDIERS ROAD
RAILWAY
ROBERTSON ROAD
SOUTH WESTERN HWY
HOWITZER TURN
Lot 1
5,345m²
Lot 2
3,388m²
Lot 3
3,913m²
Remainder Lot 128
1.7409ha
(Future Development)
Cleared and finished as APZ and Emergency Muster Point
Future Orton Road (15m Reserve)
BYFORD INDUSTRIAL PARK
Development Concept for Stage 1 (National Storage) and Stage 2 (Automasters and Mixed-Use Industrial Units)
0m 10m 20m 50m
Scale (A3) 1 : 1,000
All dimensions are approximate and subject to final survey.
Urbanism
P.O Box 1804
Subiaco WA 6904
Mob: 0420 961 581
corey@urbanism.com.au
www.urbanism.com.au



SITE & FLOOR PLAN

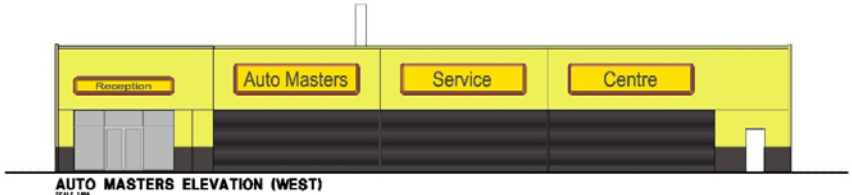


FACTORY UNITS ROBERTSON ROAD ELEVATION (WEST)

FACTORY UNITS ELEVATION (NORTH)

AUTO MASTERS SOUTH WEST HWY ELEVATION (EAST)

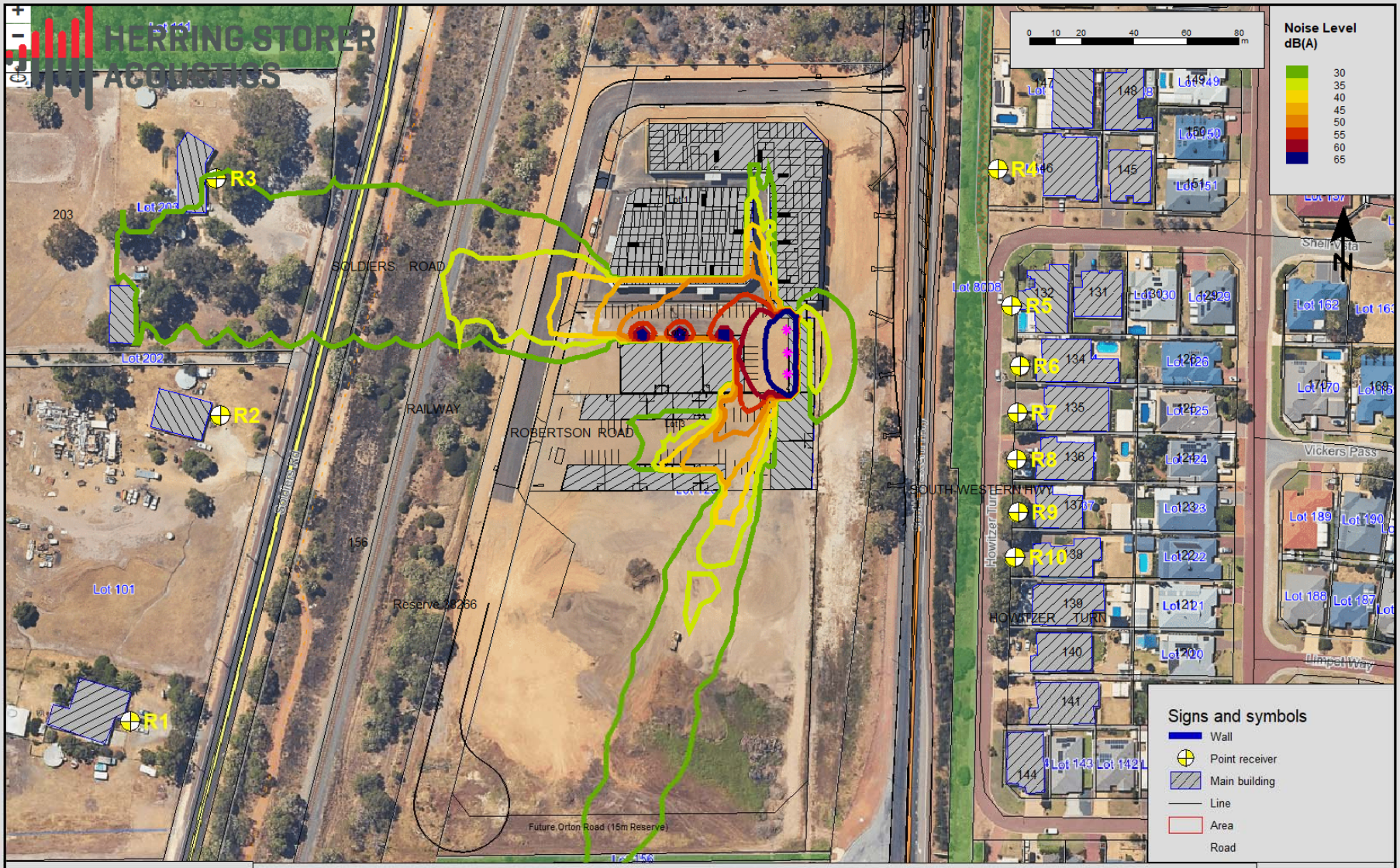
AUTO MASTERS SIDE ELEVATION (SOUTH)



AUTO MASTERS ELEVATION (WEST)

APPENDIX B

NOISE CONTOUR PLOT



Herring Storer Acoustics
Job No - 22157

PROPOSED DEVELOPMENT - LOT 2 ROBERTSON ROAD, BYFORD
ALL OPERATIONS
NOISE CONTOUR PLOT

Figure B1
Ref # 005

Bushfire Management Plan

Portion Lot 128 South Western Highway, Byford

Project No: EP19-002(02)

Prepared for Parsons Management Group Pty Ltd
May 2022

Document Control

Doc name:	Bushfire Management Plan Portion Lot 128 South Western Highway, Byford				
Doc no.:	EP19-002(02)—002b HPB				
Version	Date	Author		Reviewer	
1	January 2021	Heidi Becker	HPB	Kirsten Knox	KK
				Anthony Rowe	AJR
	Report issued for client review.				
A	July 2021	Kirsten Knox	KK	Kirsten Knox	KK
	Minor text change to address Shire of Serpentine Jarrahdale development approval condition				
B	May 2022	Kirsten Knox	KK	Kirsten Knox	KK
	Update to address minor change in development layout				

Disclaimer:

This document has been prepared in good faith and is derived from information sources believed to be reliable and accurate at the time of publication. Nevertheless, it is distributed on the terms and understanding that the author is not liable for any error or omission in the information sources available or provided to us, or responsible for the outcomes of any actions taken based on the recommendations contained herein. It is also expected that our recommendations will be implemented in their entirety, and we cannot be held responsible for any consequences arising from partial or incorrect implementation of the recommendations provided.

This document has been prepared primarily to consider the layout of development and/or the appropriate building construction standards applicable to development, where relevant. The measures outlined are considered to be prudent minimum standards only based on the standards prescribed by the relevant authorities. The level of bushfire risk mitigation achieved will depend upon the actions of the landowner or occupiers of the land and is not the responsibility of the author. The relevant local government and fire authority (i.e. Department of Fire and Emergency Services or local bushfire brigade) should be approached for guidance on preparing for and responding to a bushfire.

Notwithstanding the precautions recommended in this document, it should always be remembered that bushfires burn under a wide range of conditions which can be unpredictable. An element of risk, no matter how small, will always remain. The objective of the Australian Standard AS 3959-2018 is to “prescribe particular construction details for buildings to reduce the risk of ignition from a bushfire while the front passes” (Standards Australia 2018). Building to the standards outlined in AS 3959 does not guarantee a building will survive a bushfire or that lives will not be lost.

Executive Summary

Parsons Management Group Pty Ltd (the proponent) is progressing a subdivision and development application for the remaining portion of Lot 128 South Western Highway, Byford (herein referred to as 'the site'). The site is proposed to be developed for commercial and light industrial purposes, with the development application only covering a portion of the site. The remainder of Lot 128 South Western Highway, Byford is not subject to this subdivision and development application (i.e. the broader proponent landholding is subject to a separate subdivision approval (in accordance with Western Australian Planning Commission (WAPC) subdivision approval reference 157084 and 159209) and development application (which has been approved and is currently being progressed)). The proposed subdivision and development application has been prepared cognisant of these existing approvals.

The site consists of an area approximately 2.47 ha in size and is located within the Shire of Serpentine Jarrahdale. It is bounded by the remainder of the proponent's landholding to the north (which is subject to an existing development approval), South Western Highway to the east of the site, future commercial development to the south and the unconstructed Robertson Road reserve to the west of the site.

The site is currently identified as a 'bushfire prone area' under the state-wide *Map of Bush Fire Prone Areas* prepared by the Office of Bushfire Risk Management (OBRM 2021). The identification of the site within an area declared as bushfire prone necessitates that a further assessment of the determined bushfire risk affecting the site (in accordance with *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas* (AS 3959)) and the satisfactory compliance of the proposal with the policy measures described in *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) (WAPC 2015) and its associated *Guidelines for Planning in Bushfire Prone Areas Version 1.3* (the Guidelines) (WAPC and DFES 2017).

The purpose of SPP 3.7 and its policy intent is best summarised as preserving life and reducing the impact of bushfire on property and infrastructure through effective risk-based land use planning. Importantly, it is required by SPP 3.7 that the determining authority is to apply its consideration to the precautionary principle (clause 6.11 in SPP 3.7) and it must be satisfied that the intent of the policy measures have been met, before it issues an approval.

This Bushfire Management Plan (BMP) examines the various responses to the identified bushfire risk (following development) that will make the ultimate use of the land suitable for its intended purpose. As part of this, a bushfire attack level (BAL) assessment has been undertaken to determine the associated bushfire risk, the applicable BAL ratings (if any), and in turn the building siting and construction response that will achieve compliance with the bushfire protection criteria and satisfy the precautionary principle.

As part of assessing the long-term bushfire risk to the site, the vegetation within the site and 150 m of the site has been classified in accordance with AS 3959. The following bushfire hazards were identified within 150 m of the site in the post-development scenario:

- Forest (Class A) vegetation, largely associated with Brickwood Reserve and private landholdings to the west of the site.
- Woodland (Class B) vegetation, associated with landholdings to the north, east and south of the site, and within the Perth – Bunbury railway reserve to the west of the site.
- Shrubland (Class C) vegetation, associated with areas of vegetation adjacent to South Western Highway to the south of the site and within the Perth – Bunbury railway reserve to the west of the site.
- Scrub (Class D) vegetation, associated with remnant vegetation within the South Western Highway road reserve to the east of the site.
- Grassland (Class G) vegetation, associated with landholdings to the east, south and west of the site, in addition to areas within the Perth – Bunbury railway reserve and the unconstructed portions of the Robertson Road reserve to the west of the site.

Overall, the outcomes of this BMP demonstrate that as development progresses, it will be possible for the intent of the bushfire protection criteria outlined in the Guidelines to be satisfied. This includes:

- **Element 1 Location:** future habitable buildings within the site will be located in a moderate bushfire hazard level area.
- **Element 2 Siting and Design:** future habitable buildings can be sited within the proposed development so that BAL-29 or less can be achieved based on the development layout and separation to external bushfire hazards through the provision of public roads. As part of staged development, the proponent will be required to maintain the undeveloped portions of the site and their broader landholdings to achieve low threat pursuant to Section 2.2.3.2 of AS 3959 until commercial development is progressed.
- **Element 3 Vehicular Access:** appropriate vehicle access can be provided, with the site having direct access to the public road network via Robertson Road which will connect to South Western Highway immediately east of the site and Orton Road to the south (when it is extended). South Western Highway is a primary regional road providing a major freight and vehicle connection within the Perth metropolitan region and south-west Western Australia. The northern portion of Robertson Road is being constructed as part of the existing Stage 1 development (as per subdivision approval WAPC# 157084) and will be extended as part of staged development within the site. Robertson Road will eventually connect to the future extension of Orton Road within the southern portion of the site.
- **Element 4 Water:** the development will be provided with a permanent and reticulated water supply to support onsite firefighting requirements.

The management/mitigation measures to be implemented through the proposed subdivision of the site, as discussed in this BMP, demonstrate that the acceptable solutions and/or intent of each element can be met. Accordingly, having regard to clause 6.11 of SPP 3.7, the precautionary principle has been satisfied. Following certification, the BAL ratings determined within this BMP can be used to support future building approval processes where required.

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List of Abbreviations

Table A1: Abbreviations – General terms

General terms	
AHD	Australian Height Datum
AS	Australian Standard
APZ	Asset Protection Zone
BAL	Bushfire Attack Level
BMP	Bushfire Management Plan
BPAD	Bushfire Planning and Design
EEP	Emergency Evacuation Plan
ESL	Emergency Services Levy
FDI	Fire Danger Index
FZ	Flame Zone

Table A2: Abbreviations – Organisations

Organisations	
DBCA	Department of Biodiversity Conservation and Attractions
DoW	Department of Water (now known as Department of Water and Environment Regulation)
DFES	Department of Fire and Emergency Services
DPLH	Department of Planning, Lands and Heritage
OBRM	Office of Bushfire Risk Management
SES	State Emergency Services
WAPC	Western Australian Planning Commission

Table A3: Abbreviations – Legislation and policies

Legislation	
Guidelines	*Guidelines for Planning in Bushfire Prone Areas version 1.3 (WAPC and DFES 2017)*
SPP 3.7	*State Planning Policy 3.7 Planning in Bushfire Prone Areas* (WAPC 2015)

Table A4: Abbreviations – Planning and building terms

Planning and building terms	
AS 3959	*Australian Standard 3959-2018 Construction of buildings in bushfire prone areas*
LPS	Local Planning Scheme
MRS	Metropolitan Region Scheme

1 Introduction

1.1 Background

Parsons Management Group Pty Ltd (the proponent) is progressing the subdivision for the remainder of Lot 128 South Western Highway, Byford (herein referred to as the 'site'). The site is proposed to be subdivided and developed for commercial and light industrial purposes, as shown in the attached subdivision plan in **Appendix A**. The remainder of Lot 128 South Western Highway, Byford which is not subject to this subdivision and development application (i.e. the broader 'proponent landholding') is subject to a separate subdivision approval (in accordance with Western Australian Planning Commission (WAPC) subdivision approval reference 157084 and 159209) and development application (which has been approved and is currently being implemented). The proposed subdivision and development application applicable to the site has been prepared cognisant of the existing approvals.

The site is shown in **Figure 1** and consists of an area of approximately 2.47 ha in size and is located within the Shire of Serpentine Jarrahdale. It is bounded by the remainder of the proponent's landholding to the north (which has been subject to an existing development approval) and east, South Western Highway to the east of the site, future commercial development to the south and the Perth-Bunbury railway reserve and current unconstructed Robertson Road reserve to the west of the site.

The site is currently identified as a 'bushfire prone area' under the state-wide *Map of Bush Fire Prone Areas* prepared by the Office of Bushfire Risk Management (OBRM 2021) and is shown in **Plate 1** below. The identification of an area within a declared bushfire prone area necessitates a further assessment of the bushfire risk and suitability of the proposed development to be undertaken in accordance with *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) (WAPC 2015) and the *Guidelines for Planning in Bushfire Prone Areas Version 1.3* (the Guidelines) (WAPC and DFES 2017).

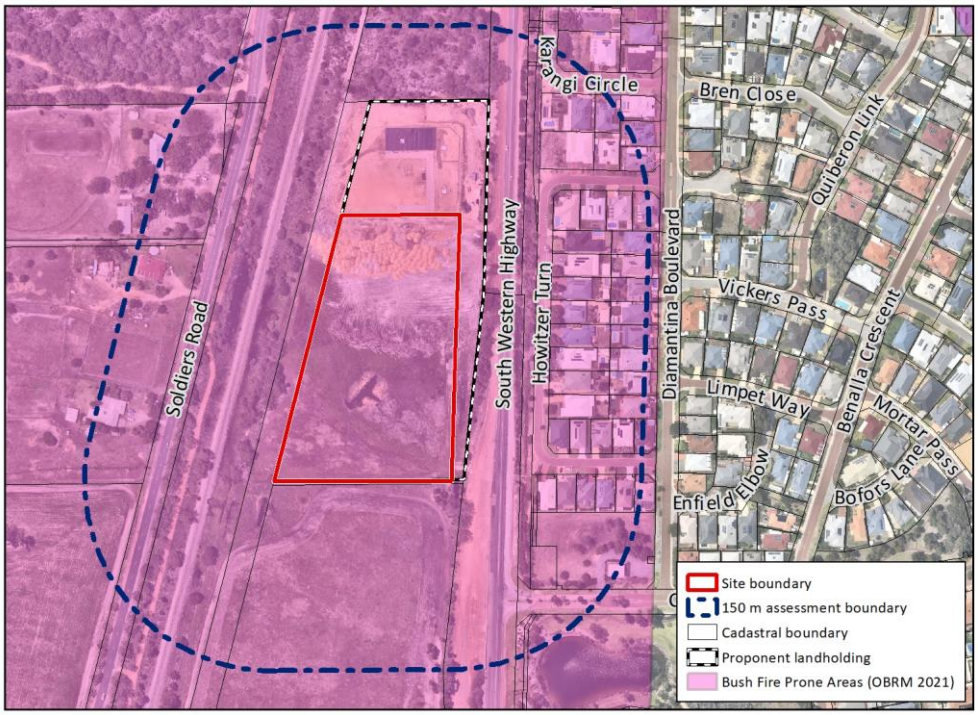

Plate 1: Areas within and surrounding the site identified as 'bushfire prone areas' (as indicated in purple) under the state-wide Map of Bush Fire Prone Areas (OBRM 2021).

1.2 Aim of this report

The aim of this BMP is to assess bushfire hazards within the site and nearby areas and ensure that the threat posed by any identified hazards can be appropriately mitigated and managed and demonstrate satisfaction of clause 6.11 of SPP 3.7 the precautionary principle. It has been prepared to support the subdivision of the site, but also considers the development application prepared for the northern portion of the site. It addresses the requirements of SPP 3.7 (WAPC 2015), the Guidelines (WAPC and DFES 2017) and *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas* (AS 3959) (Standards Australia 2018). The document provides an assessment of the general bushfire management strategies to be considered as part of the future commercial development within the site and includes:

- Overview of the proposed development (see **Section 1.4**).
- An assessment of the existing classified vegetation in the vicinity of the site (within 150 m) and consideration of bushfire hazards that will exist in the post-development scenario (**Section 3**).
- Commentary on how future development can achieve the bushfire protection criteria outlined within the Guidelines (**Section 5**).
- An outline of the roles and responsibilities associated with implementing this BMP (see **Section 6**).

1.3 Statutory policy and framework

The following key legislation, policies and guidelines are relevant to the preparation of a bushfire management plan:

- *Fire and Emergency Services Act 1998*
- *Bush Fires Act 1954*
- *Planning and Development Act 2005* and associated regulations
- *Building Act 2011* and associated regulations
- *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (WAPC 2015)
- *Guidelines for Planning in Bushfire Prone Areas version 1.3* (WAPC and DFES 2017)
- *Australian Standard AS 3959 – 2018 Construction of buildings in bushfire prone areas* (Standards Australia 2018).

The site is located within the *Lot 1, Lot 3 and Lot 128 South Western Highway Local Structure Plan* area, with the site to be developed in accordance with the approved structure plan (Gray and Lewis 2014).

A Bushfire Management Plan was previously prepared by (Emerge Associates 2019) to support the development application for the construction and operation of a self-storage facility north of the site but within the broader proponent landholding. This area is shown as 'Lot 1' within **Appendix A**. The outcomes from this BMP have been considered as part of this assessment.

1.4 Description of the proposed development

The site is proposed to be subdivided in accordance with the subdivision plan provided in **Appendix A**. The subdivision is proposed to result in the creation of 3 lots, including:

- Lot 2, approximately 3,388 m^2 in size,
- Lot 3, approximately 3,907 m^2 in size, and
- The remainder of Lot 128, approximately 1.74 ha in size (including an area proposed for the future extension of Orton Road).

Appendix A includes the proposed development layout for Lot 2 and Lot 3. Development within the lots is proposed to include:

- Lot 2 is proposed to support the construction and operation of a panel and paint facility, which will include:
  - Light industrial/automotive repair, approximately 749 m^2 in size
  - Office space, approximately 56 m^2 in size
  - Warehouse, approximately 452 m^2 in size
  - Storage area, approximately 61 m^2 in size
  - Approximately 371 m^2 of soft landscaping, and
  - 47 car parks.

- Lot 3 is proposed to support mixed-use industrial units, including:
  - Light industry/showroom, approximately 584 m^2 in size
  - Light industry, approximately 458 m^2 in size
  - Warehouse, approximately 618 m^2 in size
  - 36 car parks, and
  - Landscaped areas.

The entire site is zoned 'Urban' under the Metropolitan Region Scheme (MRS), as shown in **Plate 2**, and 'Service commercial' under the Shire of Serpentine Jarrahdale Local Planning Scheme No. 3 (LPS 3).

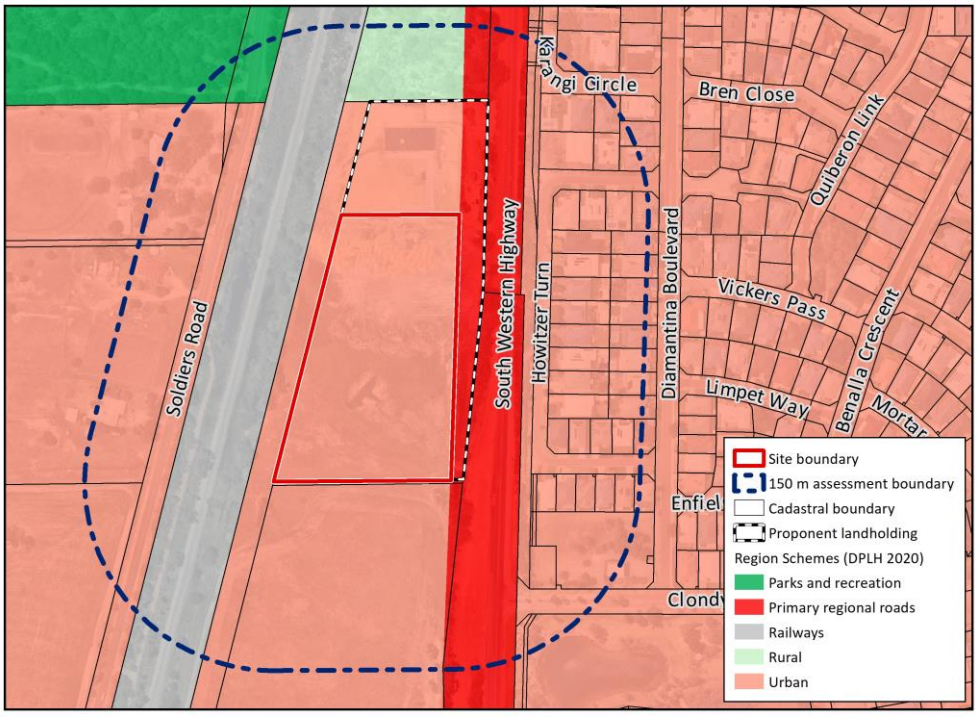

Plate 2: Existing MRS zoning for the site and surrounds.

1.5 Description of land characteristics

The natural topographical contours indicate that the site has an elevation of approximately 58 m Australian Height Datum (m AHD) along the eastern boundary of the site dropping to 56 m AHD along the western boundary of the site, as shown in **Figure 1**.

Based on a review of publicly available historic aerial imagery (Landgate 2020), the majority of the site was historically cleared of native vegetation prior to 1953 to support agricultural activities, with scattered paddock trees remaining within the northern portion of the site. Since 1953, sporadic patches of vegetation regrew throughout the site. In 2020 as part of progressing the development of 'Lot 1', the regrown vegetation was cleared and the site is now composed of areas of bare mineral earth and paddock grasses.

The land uses surrounding the site (within 150 m) include:

- Areas of bare mineral earth associated with the proponent's landholding immediately to the north, and a public reserve further to the north supporting the retention of remnant vegetation.
- South Western Highway to the east, and existing residential development further to the east.
- Vacant land zoned for future commercial development to the south.
- Robertson Road reserve to the west and the Perth-Bunbury railway further to the west.

2 Environmental Considerations

In accordance with the *Bushfire Management Plan – BAL Contour* template prepared by Department of Planning, Lands and Heritage (2018), this BMP has considered whether there are any environmental values that may restrict the implementation of routine bushfire protection measures. A review of publicly available databases, has been undertaken as well as a review site specific information (where available) with particular reference to the Shared Location Information Platform (SLIP) databases. A summary of the search results has been provided in **Table 1**.

The site has previously been cleared of all remnant vegetation, with the site composed of areas of bare mineral earth and paddock grasses.

Table 1: Summary of potential environmental considerations that may be associated with the site (based on a search of the SLIP databases)

Key environmental feature (information in brackets refers to mapping data source)	Yes / no / potentially occurring within the site	If yes / potentially, describe the value that may be impacted
Conservation category wetlands and buffer (Swan Coastal Plain (DBCA-019))	No	No wetland values that require specific protection have been identified within the site. The southern portion of the site is identified as a multiple use wetland (MUW) (Unique Feature Identifier (UFI) #15382). A conservation category wetland (UFI #13010) is mapped approximately 40 m to the west of the site. No buffers for these wetlands need to be accommodated within the site.
RAMSAR wetlands (DBCA-010)	No	Not applicable. No RAMSAR sites are located within or nearby to the site.
Threatened and priority flora (Landform Research 2010)	No	A flora and vegetation assessment (Landform Research 2010) undertaken to support the structure plan did not identify any threatened or priority fauna within the site. Since the survey was completed the site has been cleared of remnant vegetation and now consists of areas of bare mineral earth and paddock grasses.
Threatened and priority fauna (DBCA-037)	No	It is highly unlikely that any threatened or priority fauna utilise the site, given the site consists of areas of bare mineral earth and paddock grasses.
Threatened ecological communities (Landform Research 2010)	No	The site consists of areas of bare mineral earth and paddock grasses and is not considered to be a TEC.
Department of Biodiversity Conservation and Attractions (DBCA) controlled lands or waters (DBCA-011)	No	Not applicable. No DBCA controlled lands or water exist within or in close proximity to the site.
Bush Forever areas (DOP-071)	No	Bush Forever Site 350 is located adjacent to the western boundary of the site and to the north of the site, and is associated with the vegetated portions of the public open space to the north and the Perth - Bunbury railway reserve to the west. Robertson Road reserve is identified as part of Bush Forever Site 350, however it is largely cleared of native vegetation, being composed mostly of paddock grasses with some scattered trees.

Table 1: Summary of potential environmental considerations that may be associated with the site (based on a search of the SLIP databases) (continued)

Key environmental feature (information in brackets refers to mapping data source)	Yes / no / potentially occurring within the site	If yes / potentially, describe the value that may be impacted
Clearing regulations – Environmentally Sensitive Areas (DWER-046)	Yes	While the site is identified in an environmentally sensitive area (ESA), it is likely that the designation of the site as an ESA would be associated with a buffer applied to TECs located in the Perth-Bunbury railway reserve, to the west of the site. As no native vegetation is present within the site, the ESA is not a relevant consideration.
Conservation Covenants Western Australia (DPIRD-023)	No	Not applicable.
Aboriginal heritage (DAA-001)	No	Not applicable. No registered Aboriginal heritage sites were identified within the site. One registered Aboriginal heritage site is located approximately 37 m to the south-east of the site (Site ID 16096, Byford 08) and is associated with artefacts/scatter. In addition, registered Aboriginal heritage Site ID 16097, Byford 09 is located approximately 160 m to the north-east of the site.
Non-indigenous heritage (SHO-003)	No	Not applicable. No non-indigenous heritage sites were identified within or nearby to the site based on the publicly available mapping.

2.1 Native vegetation – modification and clearing

While the site is shown as an environmentally sensitive area (ESA), this is likely to be related to a 500 m buffer that is typically applied to known TECs, with TECs known to occur within the Perth-Bunbury railway reserve to the west of the site. Where an ESA is present, clearing exemptions pursuant to the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 do not apply. As no native vegetation is present within the site, the ESA is not a relevant consideration.

2.2 Revegetation and landscape plans

No revegetation is proposed within the site or the broader proponent landholding as part of the proposed future development.

Portions of the site will be landscaped as part implementing the commercial development, and will include Robertson Road and the portion of land adjacent to South Western Highway. The landscaped areas within the site and the broader proponent landholding (as well as within Robertson Road reserve) will be designed and maintained to achieve low threat vegetation in accordance with Section 2.2.3.2 of AS 3959. The management of the landscaped areas will be the responsibility of the proponent, with ongoing management likely to include:

- Regular mowing/slashing of grass/turf to less than 150 mm in height (where present).
- Irrigation of grass and garden beds (where required).
- Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.).
- Low pruning of trees (branches below 2 m in height removed where appropriate).

- Application/replacement of ground/surface covers such as mulch or non-flammable materials as required.

Following a minimum 2 year developer maintenance period, the ongoing maintenance of the Robertson Road reserve will be the responsibility of the Shire of Serpentine Jarrahdale.

3 Bushfire Assessment Results

Bushfire risk for the site has been appropriately considered in the specific context of the Guidelines (WAPC and DFES 2017) and AS 3959. The Guidelines require the identification of the bushfire risk (using AS 3959) out to 150 m from the development site, but for determining the likely bushfire impacts upon a building, a distance of 100 m is used. The objective of AS 3959 is to reduce the risk of ignition and loss of a building to bushfire. It provides a consistent method for determining a radiant heat level (radiant heat flux) as a primary consideration of bushfire attack on a building or object. It also prescribes simple national construction responses that can resist the determined radiant heat level at a given distance from the fire and are based on six Bushfire Attack Level (BAL) ratings: BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ.

The construction requirements detailed in AS 3959 that may be indicated as part of the BAL assessment will only apply to new Class 1, 2, 3 and 10a buildings to be constructed as part of the development of the site and that are designated as bushfire prone within the state-wide *Map of Bush Fire Prone Areas* (as updated).

Two separate methods are outlined in AS 3959 for determining the impact of bushfire on dwellings and have been outlined below:

- **Method 1**, outlined in Section 2 and Appendix A of AS 3959, provides a basic assessment of radiant heat flux levels at various distances from classified vegetation (up to 100 m). This method assumes standard fuel loads for classified vegetation as outlined in AS 3959 and considers the effective slope beneath vegetation. This method can be used to determine appropriate setbacks to dwellings to achieve different levels of radiant heat exposure (i.e. BAL-12.5 to BAL-FZ).
- **Method 2**, outlined in Appendix B of AS 3959, provides access to the formula used to derive the Method 1 values. Where justified, it enables the inputs used in Method 1 to be varied, to reflect true site conditions to provide a site-specific assessment of the radiant heat level at any given distance from the fire.

Not all vegetation is a classified bushfire risk. Vegetation and ground surfaces that are exempt from classification as a potential hazard is identified as a low threat under Section 2.2.3.2 of AS 3959. Low threat vegetation includes the following:

a) Any vegetation that is more than 100 m from the site.
b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified.
c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other, or of other areas of vegetation being classified.
d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified.
e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

f) Vegetation regarded as a low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and wind breaks.

3.1 Bushfire attack level (BAL) assessment

In accordance with Appendix Five of the Guidelines, a method 1 BAL assessment has been undertaken to support the subdivision of the site, in order to determine the BAL ratings potentially applicable to the habitable buildings: based on the vegetation classification and effective slope. The BAL ratings are illustrated across the site in the BAL contour plan.

3.1.1 Assessment inputs

Assessing bushfire hazards takes into account the classes of vegetation within the site and surrounding area for a minimum of 100 m, in accordance with AS 3959. The assignment of vegetation classifications is based on an assessment of vegetation structure, which includes consideration of the various fuel layers of different vegetation types. For example, fuel layers in a typical forest environment can be broken-down into five segments as illustrated in **Plate 3** below. These defined fuel layers are considered when determining the classification of vegetation and associated bushfire hazard levels.

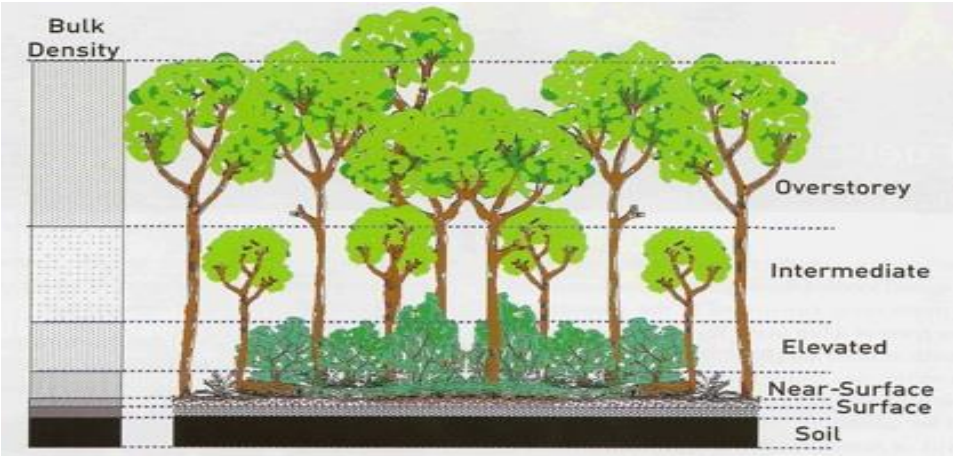

Plate 3: The five fuel layers in a forest environment that could be associated with fire behaviour (Gould et al. 2007)

An assessment of existing vegetation within the site and surrounding 150 m and the effective slope was undertaken on the 12th November 2020, following the method detailed in Section 2.2 of AS 3959 and the Guidelines.

Table 2 below outlines:

- The pre-development AS 3959 vegetation classifications (and associated photo locations), which are also shown in **Figure 2**. Additional photos not shown in **Table 2** are provided in **Appendix B**.

- The post-development AS 3959 vegetation classifications, which are also shown in **Figure 3**.
- The effective slope for each area of classified vegetation present in the post-development scenario, which is also shown in **Figure 4**.

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Table 2: Vegetation classification, effective slope and future management

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
1	Forest vegetation has been identified to the west of Soldiers Road, within Brickwood Reserve and private landholdings. These areas of vegetation are not managed and are associated with multiple fuel layers, including near-surface, understorey, elevated and overstorey. **AS 3959 classification (Figure 2):** Forest (Class A) **Photo points:** 1, 2, 3, 4	 *Photo location 1: forest vegetation within Brickwood Reserve to the west of the site, looking west.*  *Photo location 2: forest vegetation to the west of the site, looking west.*  *Photo location 3: forest vegetation with multiple fuel layers within Brickwood Reserve, looking west.*  *Photo location 4: forest vegetation within Brickwood Reserve, looking north-west.*	1	The forest vegetation outside the site is assumed to remain in the same condition as the pre-development assessment in the long-term and will therefore remain a bushfire hazard. **AS 3959 classification (Figure 3):** Forest (Class A) **Effective slope (Figure 4):** Flat/upslope

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
2 - 6	Patches of woodland vegetation have been identified outside of the site, associated with areas of remnant vegetation within: • Public open space/reserve to the north of the proponent's landholding (Plot 2). • Perth – Bunbury railway reserve located to the west of the site (Plot 3). • Remnant vegetation within Soldiers Road reserve to the west of the site (Plot 4). • Private landholdings to the south of the site (Plot 5). • Private landholdings to the east of the site (Plot 6). These areas of vegetation have been highly modified in the past and contains overstorey vegetation with some surface/ near-surface fuels. **AS 3959 classification (Figure 2):** Woodland (Class B) **Photo points:** 7, 17, 19, 29, 36, 47, 49, 50	 *Photo location 7: woodland vegetation within the railway reserve (Plot 3), looking south-west.*  *Photo location 29: woodland vegetation within landholdings to the south of the site (Plot 5), looking north.*  *Photo location 49: woodland vegetation to the north of the site (Plot 2), looking west.*  *Photo location 50: woodland vegetation within the landholdings to the north of the site (Plot 2), looking north.*	2 - 6	The woodland vegetation outside the site is assumed to remain in the same condition as the pre-development assessment in the long-term and will therefore remain a bushfire hazard. It is possible that woodland vegetation to the south of the site (Plot 5) may be removed or modified to achieve low threat in the long-term (as part of future commercial development), however as the timing for this development is unknown, it has been assumed to remain a hazard. **AS 3959 classification (Figure 3):** Woodland (Class B) **Effective slope (Figure 4):** Flat/upslope

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
7, 8	Shrubland vegetation has been identified: • To the west of the site, associated with the Perth – Bunbury railway reserve (Plot 7). • To the east of the site, within private landholdings (Plot 8). The vegetation is associated with a mix of species, including scattered *Xanthorrhoea preissii* and other species less than 2 m in height. This appears to be a steady-state vegetation structure, and is typical of some of the clay pan vegetation communities found on this part of the Swan Coastal Plain. **AS 3959 classification (Figure 2):** Shrubland (Class C) **Photo points:** 5, 7, 9, 11, 14, 27	 *Photo location 5: shrubland vegetation within the railway reserve (Plot 7), looking south.*  *Photo location 7: shrubland vegetation within the railway reserve (Plot 7), looking south-west.*  *Photo location 11: shrubland vegetation (Plot 7), looking south-east.*  *Photo location 27: strip of shrubland vegetation (right side of photo) associated with Plot 8, looking south.*	7, 8	The shrubland vegetation outside the site is assumed to remain in the same condition as the pre-development assessment in the long-term and will therefore remain a bushfire hazard. **AS 3959 classification (Figure 3):** Shrubland (Class C) **Effective slope (Figure 4):** Flat/upslope

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
9	An area of scrub vegetation has been identified within the eastern portion of the proponent landholding, extending into the South Western Highway road reserve. This vegetation appears to be less than 6 m in height. **AS 3959 classification (Figure 2):** Scrub (Class D) **Photo points:** 38, 39, 40, 41	 *Photo location 38: scrub vegetation along the eastern boundary of the site, looking north-east.*  *Photo location 39: scrub vegetation, less than 6 m in height, looking north-west.*  *Photo location 40: scrub vegetation, looking north-east.*  *Photo location 41: scrub vegetation, looking south-west.*	9	The scrub vegetation within the South Western Highway road reserve is assumed to remain in the same condition as the pre-development assessment in the long-term and will therefore remain a bushfire hazard. **AS 3959 classification (Figure 3):** Scrub (Class D) **Effective slope (Figure 4):** Flat/upslope
			18	The areas identified as scrub within the proponent's landholding will be removed as part of development. This area will be maintained to a low threat standard in accordance with exclusion clause 2.2.3.2 (f) and the APZ standards (discussed in **Section 5.1.2**), until development within the southern portion of the site progresses. **AS 3959 classification (Figure 3):** Low threat vegetation (exclusion clause 2.2.3.2(f)) **Effective slope (Figure 4):** Not applicable

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
10	A strip of scrub vegetation has been identified within the road reserve to the east of the site, associated with South Western Highway and Howitzer Turn. These areas of scrub are associated with vegetation that is between 2m and 6 m in height and does not appear to be subject to regular maintenance. Due to this strip of vegetation being within 20 m of other classified vegetation, it cannot be excluded as a hazard. **AS 3959 classification (Figure 2):** Scrub (Class D) **Photo points:** 37, 43, 44, 48	 *Photo location 37: scrub vegetation within the road reserve to the east, looking north.*  *Photo location 43: scrub vegetation, looking north-west.*  *Photo location 44: scrub vegetation, looking north-west.*  *Photo location 48: scrub vegetation, looking south.*	10	The strip of scrub vegetation to the east (Plot 10) of the site is assumed to remain in the same condition as the pre-development assessment in the long-term and will therefore remain a permanent bushfire hazard. **AS 3959 classification (Figure 3):** Scrub (Class D) **Effective slope (Figure 4):** Flat/upslope

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
11, 12	Areas of grassland vegetation have been identified within the site and the portion of Robertson Road reserve adjacent to the western boundary of the site. These areas appear to be subject to some management (in the form of slashing), however it is unclear how regularly this occurs and therefore has been identified as a bushfire hazard. **AS 3959 classification (Figure 2):** Grassland (Class G) **Photo points:** 18, 20, 21, 22, 24, 26	 *Photo location 18: grassland vegetation within Robertson Road reserve, looking south.*  *Photo location 20: grassland vegetation within the central portion of the site, looking east.*  *Photo location 21: grassland vegetation within the site, looking south.*  *Photo location 22: grassland vegetation within the central portion of the site, looking south.*	17	The grassland areas within the site and the portion of Robertson Road adjacent to the site will be converted to hardstand areas in the form of buildings, carparks and roads and are therefore considered to be low threat in accordance with exclusion clause 2.2.3.2 (e). It is noted that some of these areas may contain managed grass/garden areas/verges in the future, however, for ease of reference have been excluded as non-vegetated on the basis that these will form part of the development. As part of staged development (particularly based on the development application), areas within the site and Robertson Road reserve not subject to development will need to be maintained to a low threat standard in accordance with Section 2.2.3 of AS 3959. This will include, as a minimum, regular slashing/mowing of grass fuels. The area likely to require temporary management is shown in **Figure 3**. **AS 3959 classification (Figure 3):** Non-vegetated (exclusion clause 2.2.3.2(e)) **Effective slope (Figure 4):** Not applicable

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
13 - 16	Areas of grassland vegetation have been identified outside the site within: • The Perth – Bunbury railway reserve to the west (Plot 13). • Private landholdings to the west of the Perth-Bunbury railway reserve and Soldiers Road (Plot 14). • Landholdings to the south and within South Western Highway to the east (Plot 15). • Landholdings to the east, which appears to be an undeveloped parcel of land associated with existing urban development (Plot 16). Some areas of the identified grassland vegetation (Plot 14) appear to be subject to some maintenance (i.e. mowing/ slashing), while other areas appear to have no/only limited maintenance. All areas have been classed as a hazard. **AS 3959 classification (Figure 2):** Grassland (Class G) **Photo points:** 12, 16, 25, 30, 35, 51	 *Photo location 12: grassland vegetation within Soldiers Road reserve and landholdings to the west of the site (Plot 14), looking west.*  *Photo location 16: grassland vegetation within the Perth – Bunbury railway reserve (Plot 13), looking south-east.*  *Photo location 25: grassland vegetation within landholdings to the south of the site (Plot 15), looking south.*  *Photo location 30: grassland vegetation within landholdings to the south of the site (Plot 15), looking west.*	13 - 16	It is assumed that the grassland vegetation outside of the site will remain in the same condition as the pre-development assessment and be a bushfire hazard to future development. **AS 3959 classification (Figure 3):** Grassland (Class G) **Effective slope (Figure 4):** Flat/upslope

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
17	Non-vegetated areas such as roads, access tracks, pathways, railway lines, existing buildings, and areas of mineral earth (i.e. associated with current construction activities in the proponent's landholding) within and surrounding the site have been excluded in accordance with clause 2.2.3.2(e) of AS 3959. **AS 3959 classification (Figure 2):** Non-vegetated (exclusion clause 2.2.3.2(e)) **Photo points:** 8, 10, 13, 15, 23, 28, 42, 45, 46, 53	 *Photo location 8: cleared areas within the proponent's landholding, looking east.*  *Photo location 13: Soldiers Road to the west of the site, looking north.*  *Photo location 15: Perth – Bunbury railway line to the west of the site, looking south.*  *Photo location 42: existing residential development to the east of the site, looking east.*	17	The existing non-vegetated areas will remain in this state, but will be converted to hardstand areas in the form of buildings, driveways and roads and existing non-vegetated areas will therefore continue to be low threat in accordance with (exclusion clause 2.2.3.2(e)). This includes Robertson Road reserve, which will be constructed as part of the development. It is noted that some of these areas may contain managed grass, garden areas or verges in the future (as development is completed), however for ease of reference have been excluded as non-vegetated on the basis that these will form part of developed lots and road reserves. Existing non-vegetated areas outside the site are assumed to remain the same in the post-development scenario, with existing land uses and maintenance regimes to continue. **AS 3959 classification (Figure 3):** Non-vegetated (exclusion clause 2.2.3.2(e)) **Effective slope (Figure 4):** Not applicable

Table 2: Vegetation classification, effective slope and future management (continued)

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	**AS 3959 classification**	**Site photo/s (location points shown in Figure 2)**	**Plot no.**	**AS 3959 classification, effective slope and assumptions**
18	Surrounding the site, areas of low threat vegetation have been identified and are largely associated with well managed public open space to the south-east of the site. **AS 3959 classification (Figure 2):** Low threat vegetation (exclusion clause 2.2.3.2(f)) **Photo points:** 31, 32, 33, 34	 *Photo location 31: managed garden beds to the south-east of the site, looking south.*  *Photo location 32: public open space with irrigated and mown grass, looking east.*  *Photo location 33: public open space to the south-east of the site, looking south.*  *Photo location 34: managed road verge associated with Clondyke Drive, looking east.*	18	The maintenance regimes for all existing low-threat vegetation surrounding the site is assumed to continue in the long-term based on current land uses and management arrangements, and also the requirements of the Shire of Serpentine Jarrahdale fire control notice. **AS 3959 classification (Figure 3):** Low threat vegetation (exclusion clause 2.2.3.2(f)) **Effective slope (Figure 4):** Not applicable

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3.1.1.1 Post development assumptions

The BAL assessment, to determine the predicated BAL ratings applicable to the site, has assumed the following:

- **Designated FDI**: 80
- **Flame temperature**: 1090 K
- **Vegetation classification**: forest (Class A), woodland (Class B), shrubland (Class C), scrub (Class D) and grassland (Class G) vegetation identified within the post-development scenario, see **Figure 3**.
- **Effective slope beneath classified vegetation**: flat/upslope (see **Figure 4**)
- **Setback distances**: as per Table 2.5 in AS 3959 with the relevant distances used to inform the BAL contour plan summarised in **Table 3** with the BAL contour provided in **Figure 5**.

In addition to the above, the following key assumptions have informed this assessment:

- Any classified vegetation associated with proposed landscaped areas within the site (including Robertson Road reserve) will be removed or modified to achieve low threat in accordance with Section 2.2.3.2 of AS 3959. Where applicable, management of low threat areas will be similar to typical public open space requirements and may include (but is not limited to):
  - Regular mowing/slashing of grass/turf to less than 100 mm in height (where present).
  - Irrigation of grass and garden beds (where required).
  - Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.).
  - Low pruning of trees (branches below 2 m in height removed where appropriate).
  - Application/replacement of ground/surface covers such as mulch or non-flammable materials as required.
- Areas identified as 'temporary hazards to be managed by the proponent' within **Figure 3** will be maintained by the proponent to an asset protection zone (APZ) standard to achieve low threat in accordance with Section 2.2.3.2 of AS 3959, until commercial development is progressed within this area (including the construction of Robertson Road). The APZ will be designed and maintained in accordance with the principles of Element 2, Schedule 1 of Appendix Four of the Guidelines (WAPC and DFES 2017), with an excerpt of the requirements provided in **Appendix C**. Given the characteristics of this area (cleared paddocks), management of this area will include (but is not limited to):
  - Regular mowing/slashing of grass to less than 100 mm in height (where present).
  - Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.).
  - Application/replacement of ground/surface covers such as mulch or non-flammable materials as required/where applicable.
- Areas of low threat vegetation outside of the site (and not under the proponent's control) will continue to be managed and/or considered to achieve low threat (in accordance with Section 2.2.3.2 of AS 3959) based on the existing maintenance regimes, and/or as per the Shire of Serpentine Jarrahdale's fire control notice.
- Classified vegetation that has been identified outside of the proponent's landholdings has been assumed to remain in its current state (unless stated otherwise), and will, therefore, remain a bushfire hazard to development within the site.

3.1.2 Assessment outputs

The BAL assessment completed for the site indicates that a BAL rating of BAL-29 or less can be achieved at future habitable buildings based on the proposed subdivision layout, with commercial and industrial development typical including hardstand and carpark areas that can provide separation. The development application that has been prepared for Lot 2 and Lot 3 demonstrates that buildings can be located in an area subject to BAL-19 or less, as shown in **Figure 5**. The majority of the site is likely to be subject to a BAL rating of BAL-12.5.

Table 3 provides a summary of the setback distances necessary from classified vegetation to achieve the indicated BAL ratings, with the BAL Contour Plan (**Figure 5**) being a visual representation of these distances. The setback distances are based on the post-development classified vegetation (**Figure 3**), effective slope (**Figure 4**) and are taken from Table 2.5 of AS 3959.

Table 3: Setback distances based on vegetation classification and effective slope and Table 2.5 of AS 3959, as determined by the method 1 BAL assessment

Post development plot number (see Figure 3)	Vegetation classification (see Figure 3)	Effective slope (see Figure 4)	Distance to vegetation (from Table 2.5 of AS 3959)	BAL rating (see Figure 5)
Plot 1	Forest (Class A)	Flat/upslope	< 16 m	BAL-FZ
			16 - < 21 m	BAL-40
			21 - < 31 m	BAL-29
			31 - < 42 m	BAL-19
			42 - < 100 m	BAL-12.5
			> 100 m	BAL-LOW
Plot 2 - 6	Woodland (Class B)	Flat/upslope	< 10 m	BAL-FZ
			10 - < 14 m	BAL-40
			14 - < 20 m	BAL-29
			20 - < 29 m	BAL-19
			29 - < 100 m	BAL-12.5
			> 100 m	BAL-LOW
Plot 7, 8	Shrubland (Class C)	Flat/upslope	< 7 m	BAL-FZ
			7 - < 9 m	BAL-40
			9 - < 13 m	BAL-29
			13 - < 19 m	BAL-19
			19 - < 100 m	BAL-12.5
			> 100 m	BAL-LOW

Table 3: Setback distances based on vegetation classification and effective slope and Table 2.5 of AS 3959, as determined by the method 1 BAL assessment (continued)

Post development plot number (see Figure 3)	Vegetation classification (see Figure 3)	Effective slope (see Figure 4)	Distance to vegetation (from Table 2.5 of AS 3959)	BAL rating (see Figure 5)
Plot 9, 10	Scrub (Class D)	Flat/upslope	< 10 m	BAL-FZ
			10 - < 13 m	BAL-40
			13 - < 19 m	BAL-29
			19 - < 27 m	BAL-19
			27 - < 50 m	BAL-12.5
			> 50 m	BAL-LOW
Plot 13 – 16	Grassland (Class G)	Flat/upslope	< 6 m	BAL-FZ
			6 - < 8 m	BAL-40
			8 - < 12 m	BAL-29
			12 - < 17 m	BAL-19
			17 - < 50 m	BAL-12.5
			> 50 m	BAL-LOW

4 Identification of Bushfire Hazard Issues

From a bushfire hazard management perspective, the key issues that are likely to require management and/or consideration as part of future development within the site include:

- Provision of appropriate separation distances from temporary and permanent bushfire hazards surrounding the site to ensure a BAL rating of BAL-29 or less can be achieved at the future habitable buildings.
- Ensuring that the southern portion of the site is managed as an asset protection zone to achieve a low threat standard in accordance with Section 2.2.3.2 of AS 3959 on an ongoing basis, until commercial development progresses within this area.
- Ensuring that any landscaped areas, including road reserves, that are developed as part of this subdivision are appropriately designed and managed to achieve a low threat standard in accordance with AS 3959.
- Provision of appropriate vehicular access to ensure that egress to at least two different destinations will be available to future workers/visitors and emergency personnel, including connection to South Western Highway and the future extension of Orton Road. As part of staged development, provision will need to be made for temporary cul-de-sacs/turn-around areas along Robertson Road that can support a type 3.4 fire appliance. A temporary emergency access way may be required, depending upon staging of development and timing of Orton Road.
- Provision of appropriate water supply and associated fire-fighting infrastructure.

These issues are considered further in **Section 5.**

5 Assessment Against the Bushfire Protection Criteria

This BMP provides an outline of the mitigation strategies that will ensure that as development progresses within the site, an acceptable solution and/or performance-based system of control can be adopted for each of the bushfire protection criteria detailed within Appendix Four of the Guidelines (WAPC and DFES 2017). The bushfire protection criteria identified in the Guidelines and addressed as part of this BMP are:

- Element 1: Location of the development
- Element 2: Siting and design of the development
- Element 3: Vehicular access
- Element 4: Water supply.

As part of future development, the intent of the bushfire protection criteria can be satisfied through an acceptable solution. A summary of how this can be achieved and an associated compliance statement for each has been provided in **Table 4**.

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Table 4: Summary of bushfire protection criteria and compliance statement

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 1: Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.	A1.1 Development location		The developable land[1] will be a moderate bushfire hazard level on completion. The subdivision layout demonstrates that 'developable land' is available and can achieve a BAL rating of BAL-29 or less based on the proposed separation to hazards outside the proponent's landholding. This is achieved through the location of the public road network and the design and ongoing management of landscape areas within the proponents landholding and Robertson Road. As part of staged development (i.e. see development application in **Appendix A** and proposed layout), the proponent will maintain temporary grassland hazards within the undeveloped portion of the site and Robertson Road to achieve low threat as per APZ standards outlined within **Appendix C**. This is discussed further below. The proposed development is, therefore, able to satisfy the acceptable solution.	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 1: Location. Future habitable buildings within the site can be located in an area subject to BAL-29 or less. The development application for Lot 2 and Lot 3 and shown in **Figure 5** demonstrates this.
		Yes.	N/A		

[1] *Position Statement: Planning in bushfire prone areas - Demonstrating Elements 1: Location and Element 2: Siting and design* (DPLH 2019) has outlined that 'developable land' is "*land that can accommodate a habitable dwelling and would not generally include areas of BAL-40 and/or BAL-FZ, areas within the local government setback and areas subject to environmental constraints*".

Table 4: Summary of bushfire protection criteria and compliance statement (continued)

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 2: Siting and design	To ensure the siting and design of development minimises the level of bushfire impact.	A2.1 Asset Protection Zone		Asset protection zones (APZ) around buildings are an important bushfire protection measure influencing the safety of people and property. The APZ is a low fuel area immediately surrounding a building and can include non-flammable features such as irrigated landscapes, gardens, driveways, public roads and managed public open space. The bushfire hazards in the post-development scenario that are relevant to the site are shown in **Figure 3**. These include areas of forest, woodland, shrubland, scrub and grassland vegetation located outside the proponent's landholding. The subdivision provides sufficient area for habitable buildings to be located to achieve a BAL rating of BAL-29 or less, as demonstrated by the BAL contour plan (see **Figure 5**) and the site being largely subject to BAL-12.5. Separation from bushfire hazards can be accommodated through the local road network (i.e. construction of Robertson Road to the west of the site), appropriate design and management of landscaped areas and management of temporary vegetation that will be present due to staging of development. The areas to be managed to an APZ standard on an ongoing basis or as part of staged development is shown on **Figure 6**. The development layout for the first stages of development within the site (i.e. considered as part of the concurrent development application, with the layout included in **Appendix A**) demonstrates how habitable buildings associated with commercial/light industrial development can be designed to ensure hardstand, carparking and landscape areas are located to provide separation to bushfire hazards. Overall, the acceptable solution can be satisfied for the subdivision and development application. If located within a designated bushfire prone area, any Class 1, 2, 3 and 10a buildings, will need to satisfy construction standards in accordance with AS 3959 and the determined BAL rating.	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 2: Siting and design. Future built form will be able to achieve a BAL rating of BAL-29 or less based on the location of public roads, and an asset protection zone.
		Yes.	N/A		

Table 4: Summary of bushfire protection criteria and compliance statement (continued)

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 3: Vehicular access	To ensure vehicular access serving a subdivision/ development is available and safe during a bushfire event.	A3.1 Two access routes		The site will have direct access to the public/local road network, with connections to Robertson Road to the west of the site. Robertson Road will connect directly to South Western Highway to the east of the site and the future Orton Road extension (to be progressed in accordance with broader structure planning for the area) to the south. This is shown in **Figure 6**. South Western Highway is a primary regional road providing a major freight and vehicle connection within the Perth metropolitan region and south-west Western Australia, providing egress to the north and south and connections to the broader road network. The northern portion of Robertson Road is currently being constructed as part of the existing Stage 1 development and will be extended as part of staged development within the site. As outlined, Robertson Road will eventually connect to the future extension of Orton Road within the southern portion of the site. Orton Road, once constructed it will provide egress to the east (connecting to South Western Highway) and to the west (connecting to Soldiers Road and future urban development). .	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 3: Vehicular access. The proposed subdivision (and development application) supports direct access to the public/local road network, and when fully constructed it will enable egress to at least two different destinations.
		Yes	N/A		
		A3.2 Public road		Existing or proposed roads surrounding the site, including Robertson Road adjacent to the western boundary of the site, can and will comply with the minimum standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) and includes a minimum 6 m-wide trafficable surface. An excerpt of the requirements (from Table 6 of the Guidelines) has been provided below. *Excerpt of Table 6 from The Guidelines (WAPC & DFES 2017)*	
		Yes	N/A		

TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway	4 Emergency access way	5 Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5
*Refer to E3.2 Public roads: Trafficable surface					

Table 4: Summary of bushfire protection criteria and compliance statement (continued)

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 3: Vehicular access (continued from above)	Continued from above.	A3.3 Cul-de-sac (including dead-end-road)		As part of staged development of the site, temporary cul-de-sacs and/or turn-around areas will be required along Robertson Road until the permanent road network (including connection to Orton Road) is constructed. Based on the development application, the location a proposed temporary turn-around area is shown in **Figure 6**. As outlined a part of A 3.1, Robertson Road will connect directly to South Western Highway, which provides egress to the north and south and connections to the broader public road network. The temporary turn-around area should be designed and maintained in accordance with Appendix Four of the Guidelines, and in particular should have a minimum 17.5 m diameter head (or other suitable turning arrangement agreed with the Shire of Serpentine-Jarrahdale).	Continued from above.
		Yes (temporary)	N/A		
		A3.4 Battle-axe		Not applicable. No battle-axe properties are proposed as part of the development within the site.	
		N/A	N/A		
		A3.5 Private driveway longer than 50 m		Not applicable. No private driveways longer than 50 m are likely based on the width of the proposed lots and the proposed development layout Lot 2 and Lot 3 shown in **Appendix A**. If private driveways longer than 50 m are proposed as part of future stages not assessed as part of this BMP, these should be designed to comply with the requirements detailed in Appendix Four of the Guidelines. This includes (or as agreed with the Shire of Serpentine Jarrahdale): • Requirements in Table 6, Column 3 of the Guidelines • Minimum 20 m-long passing bays every 200 m where the driveway is less than 6 m-wide. • Turn-around areas suitable for type 3.4 appliances within 50 m of a building • Constructed of an all weather surface suitable for two-wheel drive vehicles.	
		N/A	N/A		

Table 4: Summary of bushfire protection criteria and compliance statement (continued)

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 3: Vehicular access (continued from above)	Continued from above.	A3.6 Emergency access way		The subdivision of the site will support egress to at least two destinations, with the proposed lots within the site accessing Robertson Road that will connect to South Western Highway and Orton Road. On this basis, an emergency access way (EAW) is not required. However, it is possible as part of future staged development, particularly if there are delays to the construction of Orton Road when development south of Lot 3 is progressed, that a temporary EAW may be required. The requirement for an EAW in future development stages should be determined in consultation with the Shire of Serpentine Jarrahdale and Main Roads Western Australia. Where required, an EAW will need to comply with the requirements in Appendix Four of the Guidelines (or as agreed with the Shire of Serpentine Jarrahdale), including: • Requirements in Table 6, Column 4 (and in particular, being a minimum 6 m-wide) • Being a maximum 600 m from a public road (unless agreed otherwise) • Provided as a right of way or public access easement • Signposted to indicate it is for emergency access	Continued from above.
		N/A	N/A		
		A3.7 Fire service access routes (perimeter roads)		Not applicable.	
		N/A	N/A		
		A3.8 Firebreak width		Once development is progressed within the site, in accordance with the Shire of Serpentine Jarrahdale's fire break notice (or as specified by the Shire of Serpentine Jarrahdale in accordance with Section 33 of the *Bush Fires Act 1954*), firebreaks are unlikely to be required if landholdings are managed clear of all flammable matter to a height of no greater than 150 mm.	
		Yes	N/A		

Table 4: Summary of bushfire protection criteria and compliance statement (continued)

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 4: Water	To ensure water is available to the subdivision, development or land use to enable people, property, and infrastructure to be defended from bushfire.	A4.1 Reticulated areas		Bushfire events in this area are responded to by a network of metropolitan career Fire and Rescue Service stations and the State Emergency Services (SES) as required. Fire response services require ready access to and adequate water supply during bushfire emergencies. The site will connect with the reticulated water supply network. Fire hydrants installed by the proponent will meet the specifications of Water Corporation (Design Standard DS 63) and DFES. Fire hydrants on non-residential land are generally required to be spaced no greater than 100 m from other hydrants. Commercial development will also be subject to onsite hydrant requirements as specified by the National Construction Code.	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 4: Water given it will connect with the reticulated water supply network and appropriate hydrants will be provided.
		Yes	N/A		
		A4.2 Non-reticulated areas		Not applicable.	
		N/A	N/A		
		A4.3 Individual lots within non-reticulated areas (only for use if creating one additional lot and cannot be applied cumulatively)		Not applicable.	
		N/A	N/A		

5.1 Additional management strategies

5.1.1 Future approval considerations

The BAL assessment within this document is considered to be a conservative assessment of potential bushfire risk posed to future habitable buildings within the site based on the assumptions outlined in **Section 3**.

Following the creation of lot titles, a building licence will be required to construct any new habitable buildings. Where Class 1, 2, 3 or 10a buildings are proposed this BMP and the predicted BAL ratings (see **Figure 5**) can be used to inform the construction requirements for future buildings provided none of the vegetation assumptions within this BMP (i.e. **Figure 3**) are different to that outlined.

5.1.2 Landscape management

5.1.2.1 Within the site/proponent landholding

Where indicated in **Figure 6**, areas will be managed to achieve low threat in accordance with Section 2.2.2.3 of AS 3959 and the principles of the asset protection zone requirements outlined in Element 2, Schedule 1 of Appendix Four of the Guidelines (WAPC and DFES 2017) (or as agreed with the Shire of Serpentine Jarrahdale). An excerpt of the requirements is provided in **Appendix C**.

The management of these areas will be the responsibility of the proponent or future landowners/tenants.

This will be particularly relevant for temporary grassland hazards south of Lot 3, where grasses taller than 100 mm may be present during the stages of the development. Management of this area (until vegetation is permanently removed) will largely be associated with the regular mowing/slashing of grass fuels to less than 100 mm in height.

5.1.2.2 Surrounding the site

<u>Within local roads</u>

The local roads (i.e. Robertson Road) will be designed and/or maintained to achieve low threat vegetation in accordance with Section 2.2.3.2 of AS 3959, as shown in **Figure 3**, and will be the responsibility of the proponent initially and following handover, long term the Shire of Serpentine Jarrahdale. Management of the local roads within the site is likely to include (but is not limited to):

- Regular mowing/slashing of grass/turf to less than 100 mm in height (where present).
- Irrigation of grass and garden beds (where required).
- Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.).
- Low pruning of trees (branches below 2 m in height removed where appropriate).
- Application/replacement of ground/surface covers such as mulch or non-flammable materials as required.

For existing public road reserves, particularly South Western Highway, it is assumed that these areas will be maintained (where applicable) in accordance with existing maintenance regimes.

Private landholdings

Where indicated as a low threat in **Figure 3**, it is assumed that the landholdings surrounding the site will be managed by the applicable landowners in accordance with the Shire of Serpentine Jarrahdale's fire break notice (as published) and/or in accordance with existing maintenance regimes.

Where indicated as classified vegetation in **Figure 3**, these areas have been assumed to remain a bushfire hazard in the long-term.

5.1.3 Shire of Serpentine Jarrahdale Fire Break Notice

The Shire of Serpentine Jarrahdale releases a fire break notice annually (or as required) to provide a framework for bushfire management within the Shire. The Shire of Serpentine Jarrahdale is able to enforce this order in accordance with Section 33(1) of the *Bush Fires Act 1954* and landowners will need to ensure compliance with the fire break notice, as published, or any directions provided by the Shire of Serpentine Jarrahdale.

Following development for commercial purposes, it is likely that landholdings will be required to have all long grass, weeds, etc., slashed, mowed or trimmed down by other means to a height no greater than 150 mm across the entire property.

In particular, all properties that are subject to a bushfire management plan as a result of subdivision approval, development approval or a building permit, must comply with the requirements of such plans. This BMP has specified that land associated with the site will be managed to a low threat standard in the long-term.

5.1.4 Vulnerable or high-risk land uses

No vulnerable or high-risk land uses, as defined under SPP 3.7, are proposed within the site as part of the subdivision (or development application assessed as part of this BMP). Therefore, the requirements of policy measure 6.6 within SPP 3.7 are not applicable.

If any high-risk or vulnerable land uses are proposed in the future (i.e. for the 'remainder of Lot 128', shown in **Appendix A**), the requirements of policy measure 6.6 of SPP 3.7 will need to be addressed, including the assessment of bushfire risk and/or the preparation of an emergency evacuation plan (for vulnerable land uses) or risk management plan (for high-risk land uses).

Currently, it is possible for all proposed lots to be located in an area with appropriate vehicle access to support emergency evacuation and for BAL-29 or less to be achieved at habitable buildings, enabling the requirements of SPP 3.7 to be satisfied.

5.1.5 Public education and preparedness

Community bushfire safety is a shared responsibility between individuals, the community, government and fire agencies. DFES has an extensive Community Bushfire Education Program including a range of publications, a website and Bushfire Ready Groups. The DFES website (https://www.dfes.wa.gov.au/bushfire/prepare/) provides a range of materials to help the community prepare for and survive the bushfire season.

The Shire of Serpentine Jarrahdale provides bushfire safety advice to residents available from their website https://www.sjshire.wa.gov.au/community/fire-and-emergency-management/firebreaks-and-fire-control.aspx. Qualified consultants also offer bushfire safety advice and relevant services to residents and businesses in high-risk areas in addition that that provided in this BMP.

In the case of a bushfire in the area, advice would be provided businesses by DFES, the Department of Biodiversity Conservation and Attractions (DBCA) and/or the Shire of Serpentine Jarrahdale on any specific recommendations with regard to responding to the bushfire, including evacuation if required.

6 Responsibilities for Implementation and Management of Bushfire Measures

Table 5 outlines the future responsibilities of the proponent (developer), future landowners and the Shire of Serpentine Jarrahdale associated with implementing this BMP with reference to ongoing bushfire risk mitigation measures for existing land uses (through compliance with the Shire of Serpentine Jarrahdale fire control notice) or future mitigation measures to be accommodated as part of the development process. These responsibilities will need to be considered as part of the subsequent development and implementation process.

Table 5: Responsibilities for the implementation of this BMP

Management action	Timing
Developer - subdivision	
The landscaped areas within the Robertson Road reserve should be designed, implemented and maintained to achieve a low threat standard in accordance with Section 2.2.3.2 of AS 3959. Ongoing management is likely to include (but is not limited to): • Irrigation of grass and garden beds (where required) • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.) • Low pruning of trees. • Application of ground/surface covers such as mulch or non-flammable materials as required. • Regular mowing/slashing of grass to less than 100mm in height.	As part of subdivision and development, and ongoing as required during the developer maintenance period.
Where indicated in **Figure 6**, areas are to be maintained as an APZ to achieve low threat in accordance with Section 2.2.3.2 of AS 3959, and Element 2, Schedule 1 of Appendix Four of the Guidelines (WAPC and DFES 2017) (or as agreed with the Shire of Serpentine Jarrahdale). Management of this area will include (but is not limited to): • Regular mowing/slashing of grass to less than 150 mm in height (where present). • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.). • Application/replacement of ground/surface covers such as mulch or non-flammable materials as required. This will be particularly relevant for temporary grassland hazards south of Lot 3, that may be present due to the staging of development.	As part of subdivision, and ongoing until development progresses within the remainder of Lot 128
Install Robertson Road (including the temporary turn around area to support staged development) to the standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) or as agreed with the Shire of Serpentine Jarrahdale.	To support the clearance of new lot titles (noting Robertson Road does not have to be fully constructed all in one go)
If required, based on discussions with the Shire of Serpentine Jarrahdale and Main Roads, until the public road network associated with development to the south of the site is progressed, install an emergency access way connecting Robertson Road to South Western Highway with a trafficable surface and to the standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) or as agreed with the Shire of Serpentine Jarrahdale.	To support the clearance of new lot titles
Reticulated water supply and hydrants to be installed as per standard Water Corporation requirements, unless otherwise agreed.	To support the clearance of new lot titles.
Certify BAL ratings for all lots designated as bushfire prone within the *Map of Bush Fire Prone Areas* at the time titles are created, based on the BAL Contour Plan (**Figure 5**) and/or in accordance with a BAL assessment if the site conditions are different.	To support the clearance of lot titles.

Table 5: Responsibilities for the implementation of this BMP (continued)

Management action	Timing
Developer – subdivision (continued)	
For each new lot created within areas exposed to a BAL rating exceeding BAL-LOW, lodge a Section 165 Notification on the Certificate of Title in order to alert purchasers and successors in title of the existence of the overarching BMP and the requirements associated with meeting AS 3959 construction standards. This should be based on the outcomes of the BAL certification process.	To support the clearance of new lot titles.
Make a copy of the BMP and BAL certification/assessment available to each lot owner within a designated bushfire prone area.	During the lot sale process, and ongoing as required.
Developer – development application	
The landscaped areas within the proponent's landholding should be designed, implemented and maintained to achieve a low threat standard in accordance with Section 2.2.3.2 of AS 3959. Ongoing management is likely to include (but is not limited to): • Irrigation of grass and garden beds (where required) • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.) • Low pruning of trees. • Application of ground/surface covers such as mulch or non-flammable materials as required. • Regular mowing/slashing of grass to less than 100mm in height.	As part of development and ongoing as required during the developer maintenance period.
Ensuring all habitable buildings are located in an area subject to a BAL rating of BAL-29 or less	To support development approval and/or as part of building design and construction
Where Class 1, 2, 3 or 10a buildings are proposed to be constructed, these should comply with the construction requirements in AS 3959 based on the highest BAL rating impacting the building.	To support development approval and/or as part of building design and construction
Property owner/occupier	
Maintain landscaped areas within the site to be maintained to achieve a low threat standard in accordance with Section 2.2.3.2 of AS 3959. Ongoing management is likely to include (but is not limited to): • Irrigation of grass and garden beds (where required) • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.) • Low pruning of trees. • Application of ground/surface covers such as mulch or non-flammable materials as required. • Regular mowing/slashing of grass to less than 150mm in height.	Ongoing as required.
Ensuring that their property complies with the Shire of Serpentine Jarrahdale fire control notice/s as published and/or in accordance with directions given by the local government. This includes maintaining the entire lot to a low threat standard until developed.	Ongoing, as required.
Ensuring fire hydrants are accessible at all times.	Ongoing, as required.

Table 5: Responsibilities for the implementation of this BMP (continued)

Management action	Timing
Shire of Serpentine Jarrahdale	
Providing fire prevention and preparedness advice to landowners upon request, and the latest Shire of Serpentine Jarrahdale fire control notice.	Ongoing, as required
Maintain all road reserves identified as a low threat that is under their management to a low threat standard in accordance with Section 2.2.3.2 of AS 3959, where required/applicable in accordance with approved designs and/or existing maintenance regimes.	Ongoing, as required
Monitoring vegetation fuel loads in public reserves and liaising with relevant stakeholders to maintain fuel loads at minimal fuel levels, where required/applicable.	Ongoing, as required
Maintaining public road reserves under their management to appropriate standards, where required/applicable.	Ongoing, as required
Monitoring compliance with the Shire of Serpentine Jarrahdale fire control notice and enforcing requirements as required.	Ongoing, as required
Main Roads Western Australia	
Maintain all road reserves identified as a low threat that is under their management to a low threat standard in accordance with Section 2.2.3.2 of AS 3959, where required/applicable in accordance with approved designs and/or existing maintenance regimes.	Ongoing, as required
Water Corporation	
The Water Corporation is responsible for the ongoing maintenance and repair of water hydrants.	Ongoing, as required.

7 Applicant Declaration

7.1 Accreditation

This BMP has been prepared by Emerge Associates who have been providing bushfire risk management advice for more than seven years, undertaking detailed bushfire assessments (and associated approvals) to support the land use development industry.

Anthony Rowe has reviewed this BMP and is a Fire Protection Association of Australia (FPAA) Level 3 Bushfire Planning and Design (BPAD) accredited practitioner (BPAD no. 36690) with over ten years' experience and is supported by a number of Emerge team members who have undertaken BPAD Level 1 and Level 2 training and are in the processing of gaining formal accreditation.

7.2 Declaration

I declare that the information provided is true and correct to the best of my knowledge.

Signature:

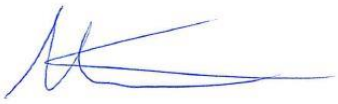
Name: Anthony Rowe

Company: Emerge Associates/Envision Bushfire Protection

Date: 05/05/2022

BPAD Accreditation: Level 3 BPAD no. 36690

Signature:



Name: Kirsten Knox

Company: Emerge Associates

Date: 05/05/2022

8 References

8.1 General references

Department of Planning, Lands and Heritage (DPLH) 2019, Position Statement: Planning in bushfire prone areas - Demonstrating Element 1: Location and Element 2: Siting and design, Western Australian Planning Commission.

Emerge Associates 2019, Bushfire Management Plan - Portion Lot 128 South Western Highway, Byford, EP19-002(01)--001 HPB, Version 1.

Gray and Lewis 2014, Local Structure Plan - Lots 1, 3 and 128 South Western Highway, Byford.

Landform Research 2010, Flora and Vegetation Assessment - Lots 1, 3 and 128 South Western Highway, Byford.

Standards Australia 2018, AS 3959:2018 Construction of buildings in bushfire-prone areas, Sydney.

Western Australian Planning Commission (WAPC) 2015, State Planning Policy 3.7 Planning in Bushfire Prone Areas, Perth.

Western Australian Planning Commission and Department of Fire and Emergency Services (WAPC and DFES) 2017, Guidelines for Planning in Bushfire Prone Areas Version 1.3, Western Australia. December 2017.

8.2 Online references

Landgate 2019, *Locate V5,* viewed May 2022, <https://maps.slip.wa.gov.au/landgate/locate/>

Office of Bushfire Risk Management (OBRM) 2021, *Map of Bush Fire Prone Areas*, viewed May 2022, https://maps.slip.wa.gov.au/landgate/bushfireprone/

Figures

Figure 1: Site Plan and Topographic Contours

Project: Bushfire Management Plan
Portion Lot 128 South Western Highway, Byford
Client: Parsons Management Group Pty Ltd

Plan Number:
EP19-002(02)--F10
Drawn: GAR
Date: 14/01/2021
Checked: HPB
Approved: KK
Date: 22/01/2021

N

0 50 100 150
Metres
Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

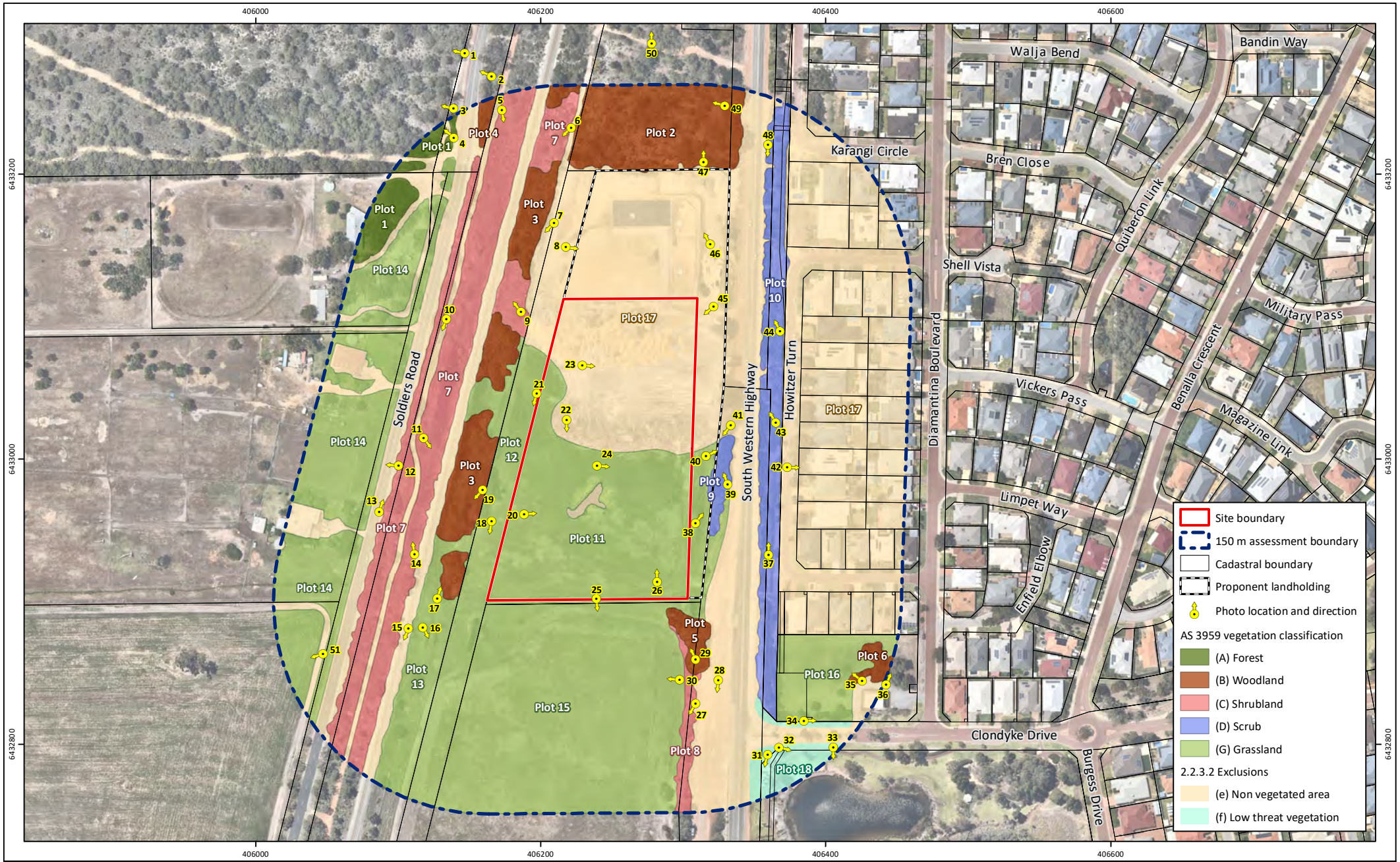


Figure 2: Existing Site Conditons - AS 3959 Vegetation Classification

Project: Bushfire Management Plan
Portion Lot 128 South Western Highway, Byford
Client: Parsons Management Group Pty Ltd

Plan Number:
EP19-002(02)--F11
Drawn: GAR
Date: 14/01/2021
Checked: HPB
Approved: KK
Date: 22/01/2021

N

0 50 100 150
Metres
Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

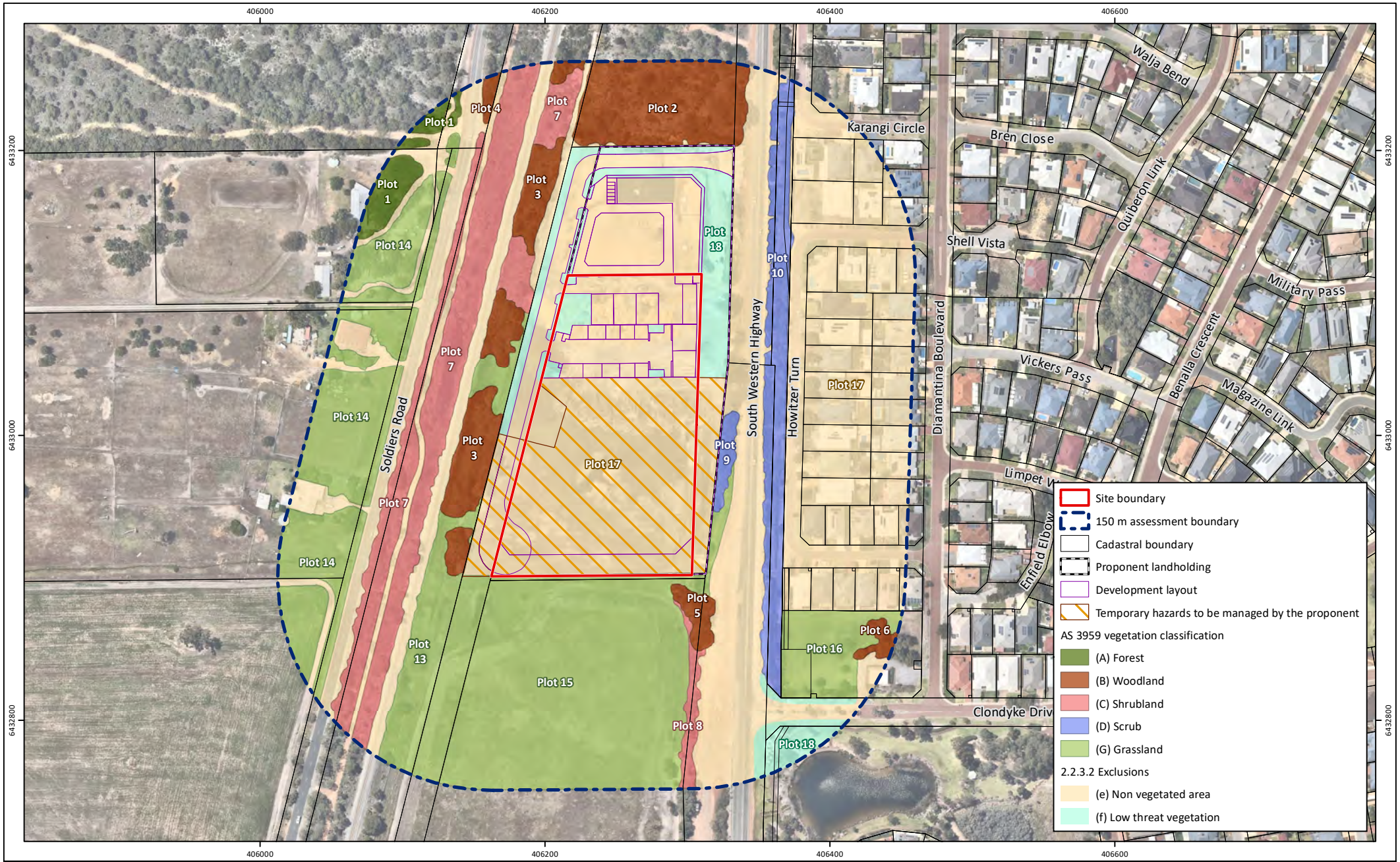


Figure 3: Post Development Site Conditons - AS 3959 Vegetation Classification

Project: Bushfire Management Plan
Portion Lot 128 South Western Highway, Byford
Client: Parsons Management Group Pty Ltd

Plan Number:
EP19-002(02)--F12a
Drawn: GAR
Date: 06/05/2022
Checked: KK
Approved: KK
Date: 06/05/2022

N

0 50 100 150
Metres
Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

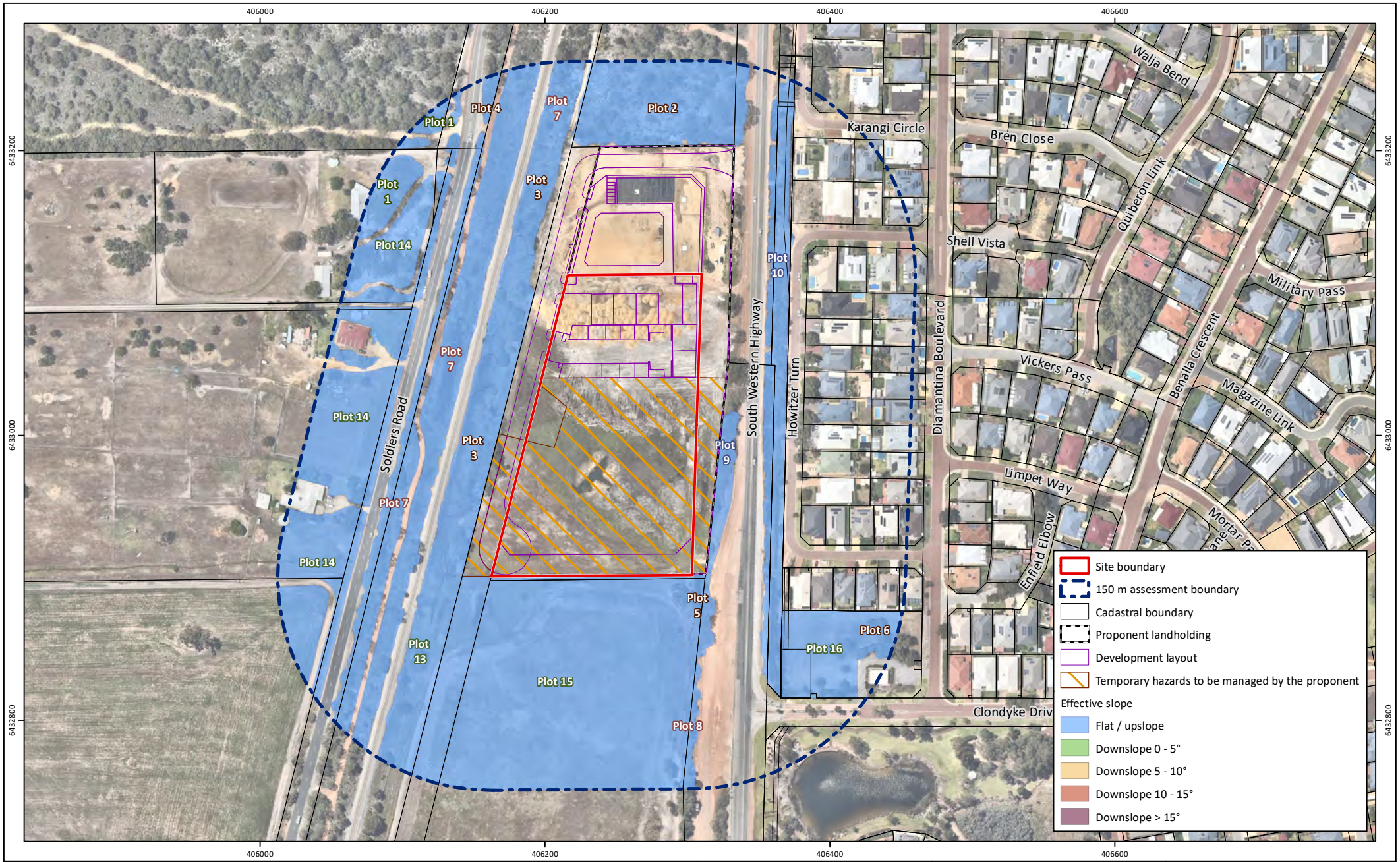


Figure 4: Post Development Site Conditons - Effective Slope

Project: Bushfire Management Plan
Portion Lot 128 South Western Highway, Byford
Client: Parsons Management Group Pty Ltd

Plan Number:
EP19-002(02)--F13a
Drawn: GAR
Date: 06/05/2022
Checked: KK
Approved: KK
Date: 06/05/2022

N

0 50 100 150
Metres
Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

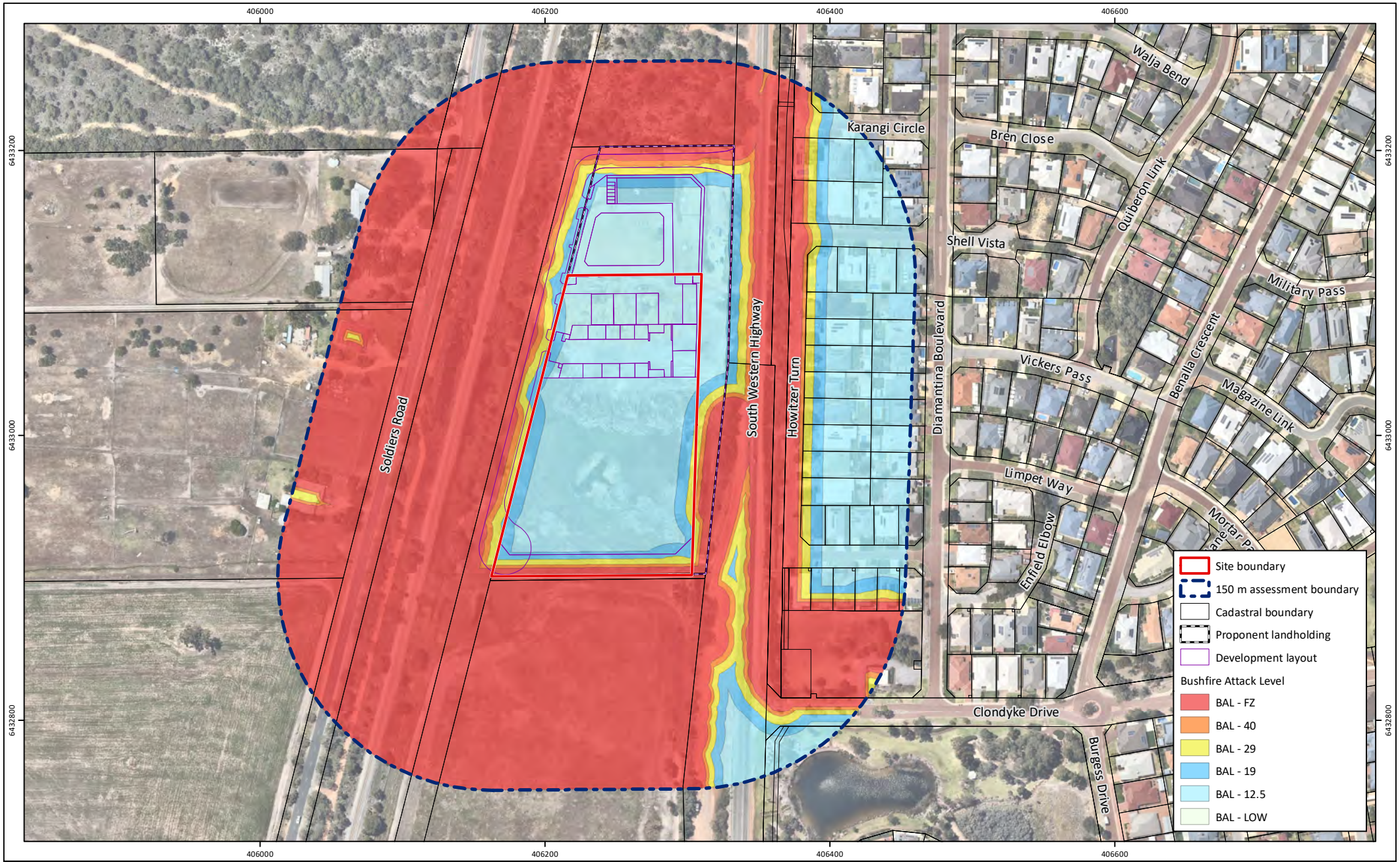


Figure 5: Bushfire Attack Level Contours

Project: Bushfire Management Plan
Portion Lot 128 South Western Highway, Byford
Client: Parsons Management Group Pty Ltd

Plan Number:
EP19-002(02)--F14a
Drawn: GAR
Date: 06/05/2022
Checked: KK
Approved: KK
Date: 06/05/2022

N

0 50 100 150
Metres
Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

Management requirements:

- Where indicated, areas will be managed to 'low threat' in accordance with Section 2.2.3.2 of AS 3959 and the asset protection zone requirements outlined within Schedule 1 of the Guidelines for Planning in Bushfire Prone Areas (WAPC &DFES 2017). This will be the responsibility of the proponent or future landowners/tenants. Robertson Road reserve will be maintained by the Shire of Serpentine Jarrahdale following the two year (or as agreed) developer maintenance period.

- As part of staged development the proponent will be required to construct and maintain (for the period agreed with the Shire of Serpentine Jarrahdale) a temporary cul-de-sac until the public road network is constructed, including the connection to Orton Road.

- Site boundary
- 150 m assessment boundary
- Cadastral boundary
- Proponent
- Development layout
- Temporary hazards to be managed by the proponent
- Future extension of Orton
- To be maintained to an APZ
- Driving
- Temporary turn-around

Figure 6: Spatial Representation Plan

Project: Bushfire Management Plan
Portion Lot 128 South Western Highway, Byford
Client: Parsons Management Group Pty Ltd

Plan Number:
EP19-002(02)--F15a
Drawn: GAR
Date: 06/05/2022
Checked: KK
Approved: KK
Date: 06/05/2022

N

0 50 100 150
Metres
Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

emerge ASSOCIATES

Appendix A

Proposed development plan (Urbanism 2022)


N
SOLDIERS ROAD
RAILWAY
ROBERTSON ROAD
SOUTH WESTERN HWY
HOWITZER TURN
Lot 1
5,945m²
Lot 2
3,388m²
Lot 3
3,913m²
Remainder Lot 128
1,7409ha
(Future Development)
Cleared and finished as APZ and Emergency Muster Point
Future Orton Road (15m Reserve)
BYFORD INDUSTRIAL PARK
Development Concept for Stage 1 (National Storage) and Stage 2 (Automasters and Mixed-Use Industrial Units)
0m 10m 20m 50m
Scale (A3) 1 : 1,000
All dimensions are approximate and subject to final survey.
Urbanism
PO Box 1804
Subiaco WA 6904
Mob: 0420 961 581
corey@urbanism.com.au
www.urbanism.com.au

Appendix B

Additional photographs

Table B1: Additional photo points organised by plot, as shown within Figure 2

Plot 2-6	
AS 3959 classification (Figure 2): Woodland (Class B)	
 *Photo location 17: woodland vegetation with the railway reserve (Plot 3), looking north.*	 *Photo location 19: woodland vegetation within the railway reserve (Plot 3), looking north.*
 *Photo location 36: woodland vegetation within landholdings to the east of the site (Plot 6), looking north.*	 *Photo location 47: woodland vegetation within landholdings to the north of the site (Plot 2), looking north.*
Plot 7, 8	
AS 3959 classification (Figure 2): Shrubland (Class C)	
 *Photo location 9: shrubland vegetation within the railway reserve (Plot 7), looking north-west.*	 *Photo location 14: shrubland vegetation associated with Plot 7, looking north.*

Table B1: Additional photo points organised by plot, as shown within Figure 2 (continued)

Plot 11, 12	
AS 3959 classification (Figure 2): Grassland (Class G)	
 *Photo location 24: grassland vegetation within the central portion of the site, looking east.*	 *Photo location 26: grassland vegetation within the southern portion of the site, looking north.*
Plot 13 - 16	
AS 3959 classification (Figure 2): Grassland (Class G)	
 *Photo location 35: grassland vegetation to the east of the site (Plot 16), looking north-west.*	 *Photo location 51: grassland vegetation (Plot 14), looking west. Evidence of regular slashing observed, though grass longer than 100 mm.*
Plot 17	
AS 3959 classification (Figure 2): Non-vegetated (e)	
 *Photo location 10: non-vegetated areas (access track) within the Perth – Bunbury railway reserve, looking south.*	 *Photo lcoation 23: non-vegetated areas within the site, looking east.*

Table B1: Additional photo points organised by plot, as shown within Figure 2 (continued)

Plot 18	
AS 3959 classification (Figure 2): Non-vegetated (e)	
 *Photo location 28: existing non-vegetated areas (roadside rest area) to the east of the site, looking south.*	 *Photo location 45: non-vegetated areas within the site, looking south-west.*
 *Photo location 46: areas of bare mineral earth within the northern portion of the proponent landholding , looking north-west.*	 *Photo location 53: South Western Highway and cleared shoulders, looking south.*

Appendix C

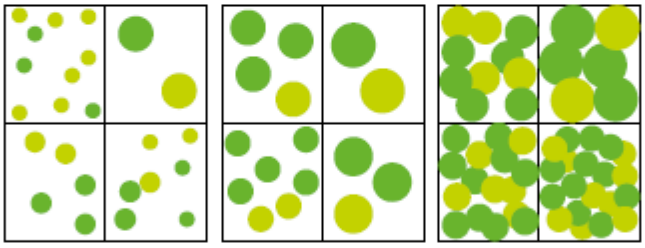
Excerpt of Schedule 1 of the Guidelines for Planning in Bushfire Prone Areas (WAPC and DFES 2017) – Asset protection zone standards

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

- **Fences:** within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- **Objects:** within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.
- **Fine Fuel load:** combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
- **Trees (> 5 metres in height):** trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy.

Figure 18: Tree canopy cover – ranging from 15 to 70 per cent at maturity



- **Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m² in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height):** can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.
- **Grass:** should be managed to maintain a height of 100 millimetres or less.

Plate C1: Excerpt from 'Schedule 1: Standards for Asset Protection Zones' as outlined within Appendix Four of the Guidelines (WAPC & DFES 2017).

TRANSPORT IMPACT STATEMENT

Lot 128 South Western Highway, Stage 2

Byford

May 2022

Rev C

kctt

HISTORY AND STATUS OF THE DOCUMENT

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
Rev A	24.12.2020	M Kleyweg	M Kleyweg	24.12.2020	Issued for Review
Rev B	16.04.2021	M Kleyweg	M Kleyweg	19.04.2021	Proposed layout amended
Rev C	19.05.2022	M Kleyweg	M Kleyweg	20.05.2022	Proposed layout amended

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Revision	Date of issue	Quantity	Issued to
Rev A	25.12.2020	1 (PDF)	Corey Verwey (Urbanism)
Rev B	19.04.2021	1 (PDF)	Corey Verwey (Urbanism)
Rev C	20.05.2022	1 (PDF)	Corey Verwey

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Document Version	KC00900.000_R01_ Rev C

Table of Contents

Appendices

1. Executive Summary

Site Context

- The subject site is located on a vacant portion of Lot 128 South Western Highway which is to be subdivided.
- The proposed development is a standalone development application for Stage 2 (Lots 2 & 3) of Lot 128 development; however, it forms part of Local Structure Plan - Lots 1, 3 & 128 South Western Highway, Byford.
- Lots 2 & 3 land uses include automotive Repair, office, light industry, warehouse and showrooms.

Technical Findings

- With 359 vehicular trips per day and 47 vehicular trips in the peak hour, the developments on Lot 2 & 3 as standalone land uses would have moderate impact on the surrounding road as per WAPC Guidelines.
- Since some of the traffic generated by the structure plan area will be using the same access/egress points, KCTT have done a robust calculation of the traffic generation of the entire LSP in order to determine the total impact on the surrounding road network.
- Modelling details and results of the traffic impact and levels of service are presented in Appendix 4 - SIDRA Intersection Analysis.

Relationship with Policies

- The plans for the proposed developments on Lots 2 & 3 show adequate parking facilities to cater for the expected parking demand on site in accordance with the Shire of Serpentine-Jarrahdale local planning scheme.
  Lot 2 will have parking bays in front of all Light Industry units and the Vehicle Repair building.
  Lot 3 will have parking bays in front of each proposed unit. Two sets of tandem bays are provided in front of the showroom units. It is recommended to designate tandem bays for staff members.
- Building Code of Australia ACROD Provision – The plans for the proposed development show one ACROD bay for each lot as per the set-out requirements.
- KCTT reviewed the layout for the proposed development and conclude that car parking bays dimensions and aisle widths are compliant with the Australian Standard AS 2890.1 and AS 2890.6.
- The plans for the proposed developments on Lots 2 & 3 show provision of bicycle parking spaces complying with set out requirements.

In summary the proposed changes to the surrounding road network can accommodate the expected traffic from the subject site and the remainder of the LSP area.

2. Transport Impact Statement

Note: This document is copyright to KCTT (trading as KC Traffic and Transport Pty Ltd). The information provided in this TIS report has been developed by KCTT over a period of years and has been presented in accordance with the requirements of a number of our clients. The information in this report is therefore intended to be commercial in confidence and is not to be shared with external parties at any time, unless a Director of KCTT provides written authorisation that the document may be shared at a specific time to a specific party, or parties. The terms and conditions associated with the receipt of this material is that it is not shared or distributed without our express, and written consent.

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2.1 Location

Lot Number	128 (Stage 2 – Lots 2 & 3)
Road Name	South Western Highway
Suburb	Byford
Description of Site	The subject site is located on a vacant portion of Lot 128 South Western Highway which is to be subdivided. The proposed development is a standalone development application for Stage 2 of Lot 128; however, it forms part of Local Structure Plan - Lots 1, 3 & 128 South Western Highway, Byford.

2.2 Technical Literature Used

Local Government Authority	Shire of Serpentine-Jarrahdale
Type of Development	Mixed Use
Are the R-Codes referenced?	NO
Is the NSW RTA Guide to Traffic Generating Developments Version 2.2 October 2002 (referenced to determine trip generation / attraction rates for various land uses) referenced?	YES
Which WAPC Transport Impact Assessment Guideline should be referenced?	Volume 4 - Individual Developments Volume 5 - Technical Guidance
Are there applicable LGA schemes for this type of development?	YES
If YES, Nominate:	
Name and Number of Scheme	Local Planning Scheme No. 2 Draft Local Planning Scheme No. 3
Are Austroads documents referenced?	YES
Is the Perth Transport Plan for 3.5 million and Beyond referenced?	YES

2.3 Land Uses

Are there any existing Land Uses	NO
Proposed Land Uses	
Nominate land use type and yield	**Lot 2** – Vehicle Repair and 3 Light Industry Tenancies • Vehicle Workshop = 367.05 m^2 (276.52 m^2 NLA) • Office = 81.47 m^2 (77.12m^2 NLA) • Light Industry Units = 1,036.43 m^2 (1,012.5m^2 NLA) **Lot 3** - Parsons Group Mixed-Use Industrial Units • Light Industry/ Showroom (2 units) = 584 m^2 • Warehouse (5 units) = 618 m^2 • Light Industry (5 units) = 458 m^2
Are the proposed land uses complimentary with the surrounding land-uses?	YES

2.4 Additional information

The proposed commercial development on Lots 2 & 3 (under Lot 128 South Western Highway) is a standalone development application. However, it should be noted that the proposed development is a part of the Local Structure Plan - Lots 1, 3 & 128 South Western Highway, Byford which is to be developed partially.

Since the traffic generated by the structure plan area will be using the same access/egress points, KCTT developed a robust assumption of the yields in order to determine the impact on the surrounding road network.

Stage 1 (Lot 1) is currently under construction and it is expected to be operational in 2021. Stage 2 (Lots 2&3) will be developed almost concurrently. Construction of Lot 3 - Mixed-Use Industrial Units was expected to commence January 2022 and are planned to be completed by December 2022. Stage 3 i.e., the remainder of Lot 128 area is expected to be developed by 2023 while the rest of the LSP area is expected to be completed by 2031.

LSP partial developments timeframes and land uses are indicative only. The following table outlines the assumed land uses and yields used in Section 2.11. for the traffic generation calculations:

LSP stages	Yields**	Operational by **
Stage 1 - Lot 1	Self-Storage facility = 7,622m^2 GFA	Mid 2021
Stage 2 - Lot 2	• Vehicle Workshop = 367.05 m^2 • Office = 81.47 m^2 • Light Industry Units = 1,036.43 m^2	End of 2022
Stage 2 - Lot 3	• Showrooms = 584 m^2 • Warehouse = 501 m^2 • Light Industry = 366 m^2	End of 2022
Stage 3 - Remainder of Lot 128	Light industry ≈ 17,409 m^2 area = 5,223 m^2 GFA *	2023
Stage 4	Light industry ≈ 18,200 m^2 area = 5,460 GFA *	2031
Stage 5	Light industry ≈ 19,900 m^2 area = 5,970 GFA *	2031
Stage 6	Light industry ≈ 17,100 m^2 area = 4,104 GFA *	2031

*Note * - 30% site area is assumed for the value of GFA.*

*Note ** - Land Uses and Timeframes for stages are indicative only. Assumptions were based on the information received from the client and the approved LSP.*

Changes to the external transport network

Perth and Peel 3.5 million	*" Extending the Armadale rail line to Byford – with the station being located to integrate with Byford and surrounding localities"* *" Byford–Cardup–Mundijong network* *Additional linkages will be provided between road networks proposed in the existing Byford and Mundijong district structure plans and will include extension of Doley Road and realignment of the southern portion of Malarkey Road.* *Some refinement of east-west connections may be appropriate, including westward extension of Norman Road to connect to Bishop Road."*
Cardup Business Park	*" Extensive transport assessment completed by Main Roads WA for the region shows the proposed Tonkin Highway extension along the Hopkinson Road alignment and connection to this corridor via Orton Road. No through connection between South Western Highway and Tonkin Highway is shown in the model. Instead, traffic is shown travelling along Cardup Siding Road from South Western Highway, then along Bett Road or Soldiers Road to Tonkin Highway - to the south via Bishop Road or north via Orton Road."*
Byford Town Centre	*" Thomas Road, Abernethy Road and Orton Road are to be widening to accommodate stormwater in accordance with the Byford Urban Stormwater Management Strategy. The Structure Plan requires the final width of Abernethy Road to be 30 metres unless otherwise determined at the local structure plan stage.* *The future construction of Abernethy Road should include measures to provide an amenity buffer to the residential land uses on the south side of Abernethy Road. Such measures could include dense landscaping, appropriate fencing or bunding. Abernethy Road/Tonkin Highway may interact by means of a grade separation. The general location of Abernethy Road is shown as number 12 on the Structure Plan."*
Mundijong Whitby DSP	*" The Primary Distributor network that includes South Western Highway, and future Tonkin Highway extension, is operated and maintained under the jurisdiction of MRWA, the Shire manages the remaining local roads.* *The Tonkin Highway extension to Orton Road and ultimately to South Western Highway will have a major impact on the transport options for Mundijong/Whitby."*
Additional information	The extension of Orton Road has been approved through the adoption of the Byford District Structure Plan on 16 November 2020. The road is planned as a 31m road reserve, of which 15m of this road reserve width will fall onto Lot 128. Concept or detail design of this road extension has not yet commenced. It is envisaged that Orton Road will intersect with the South Western Highway in a roundabout. The level crossing is envisaged for the rail crossing. It is assumed that construction will begin beyond 2031.

2.5 Local Road Network Information

How many roads front the subject site?	One

Name of Roads Fronting Subject Site / Road Classification and Description:

Road 1

Road Name	**South Western Highway**
Number of Lanes	two way, one lane each direction, undivided
Road Reservation Width	varies 30m-60m
Road Pavement Width	9m
Classification	Rural Highway / Primary Distributor
Speed Limit	varies 60kph – 110kph
Bus Route	YES
If YES Nominate Bus Routes	251, 252, 253
On-street parking	NO

Name of Other Roads within 400m radius of site, or roads likely to take increased traffic due to the development:

Road 1

Road Name	**Cardup Siding Road**
Number of Lanes	two way, one lane each direction, undivided
Road Reservation Width	20m
Road Pavement Width	6.5m
Classification	Urban Local Road / Access Road
Speed Limit	60kph
Bus Route	YES
If YES Nominate Bus Routes	252, 253
On-street parking	NO

Road 2

Road Name	**Soldiers Road**
Number of Lanes	two way, one lane each direction, undivided
Road Reservation Width	20m
Road Pavement Width	7m
Classification	Rural Local Road / Regional Distributor
Speed Limit	varies 60kph - 80kph
Bus Route	YES
If YES Nominate Bus Routes	252, 253
On-street parking	NO

2.6 Traffic Volumes

Road Name	Location of Traffic Count	Vehicles Per Day (VPD)	Vehicles per Peak Hour (VPH)		Heavy Vehicle %	Date of Traffic Count	*If older than 3 years multiply with a growth of 2% per annum rate to the year of 2021*
			AM Peak Time - AM Peak VPH	PM Peak Time - PM Peak VPH	*If HV count is Not Available, are HV likely to be in higher volumes than generally expected?*		
South Western Highway	South of Abernethy Road	15,383	08:00 – 1,346	15:00 – 1,359	11.3%	2021/ 2022	-
	South of Nettleton Road	11,447	08:00 – 959	15:00 – 1,137	18.0%	2020/ 2021	-
	South of Kiln Road	6,910	08:00 – 577	15:15 – 671	23.3%	2020/ 2021	-
Nettleton Road	East of South Western Highway	1,947	11:30 – 148	15:00 – 171	11.3%	2017/ 2018	2,107
Abernethy Road	East of Soldiers Road	12,519	08:15 – 912	15:00 – 1,149	*N/A - HV not likely to be in higher volumes than generally expected*	2017/ 2018	13,551
Soldiers Road	300m North of Karbro Drive*	3,226	8:00 - 361	15:00 - 343	6.2%	Feb 2019	3,356
	Between Karbo Drive & Bishop Road*	3,012	10:00 - 219	15:00 - 247	10.8%	Dec 2020	3,072
	790m north of Cardup Siding Road*	2,676	08:00 - 281	15:00 - 294	*N/A - HV not likely to be in higher volumes than generally expected*	Nov 2017	2,897
	North of Cardup Siding Road*	N/A	07:00 - 117	15:00 - 326	*N/A - HV not likely to be in higher volumes than generally expected*	Aug 2018	N/A
	South of Cardup Siding Road*	N/A	07:00 - 152	15:00 - 340	*N/A - HV not likely to be in higher volumes than generally expected*	Aug 2018	N/A
Cardup Siding Road	Cardup Siding Road - Eastern end*	2,563	8:00 - 172	15:00 - 222	12.1%	Dec 2020	2,614
	West of Soldiers Road*	N/A	07:00 - 82	15:00 - 58	*N/A - HV not likely to be in higher volumes than generally expected*	Aug 2018	N/A
	East of Soldiers Road*	N/A	07:00 - 127	15:00 - 228	*N/A - HV not likely to be in higher volumes than generally expected*	Aug 2018	N/A

*Note * - KCTT have received these traffic counts from the Shire of Serpentine Jarrahdale*

The data presented in the table above are the most recent available traffic counts sourced from MRWA Traffic Map and relevant local government authority at the time of writing this report.

2.7 Vehicular Crash Information

Is Crash Data Available on Main Roads WA website?	YES
If YES, nominate important survey locations:	
Location 1	South Western Highway SLK [9.6-10.45]
Location 2	Intersection of South Western Highway & Cardup Siding Road
Period of crash data collection	01/01/2016 - 31/12/2020

Road / Intersection Name	SLK	Road Hierarchy	Speed Limit	Crash Statistics			
				No of KSI Crashes	No of Medical Attention Crashes	No of PDO Major Crashes	No of PDO Minor Crashes
South Western Highway	9.6-10.45	Primary Distributor	60kph – 100kph	0	1	1	0
No of MVKT Travelled at Location			≈10,000 VPD*365*5 years*0.85 km = 15.51 MVKT				
KSI Crash Rate			0 KSI crashes / 15.51 MVKT = 0 KSI crashes/MVKT				
All Crash Rate			2 crashes / 15.51 MVKT = 0.13 crashes/MVKT				
Comparison with Crash Density and Crash Rate Statistics			0.13 crashes/MVKT is lower than the network average of 0.42 crashes/MVKT				
Intersection of South Western Highway & Cardup Siding Road	10.45	Primary Distributor / Access Road	80kph / 60kph	0	1	2	0
No of MVKT Travelled at Location			≈11,500 VPD*365*5 years*0.3 km = 6.3 MVKT				
KSI Crash Rate			0 KSI crashes / 6.3 MVKT = 0 KSI crashes/MVKT				
All Crash Rate			3 crashes / 6.3 MVKT = 0.58 crashes/MVKT				
Comparison with Crash Density and Crash Rate Statistics			0.47 crashes/MVKT is lower than the network average of 0.98 crashes/MVKT				

The following tables shows the Crash Density and Crash Rates on Metropolitan Local and Regional Roads as obtained from Main Roads WA on the 13th May 2020 by email request:

Crash Density and Crash Rate on Metropolitan State Roads Network only

	All Crashes		Serious Injury Crashes (Fatal+Hospital)	
	Average Annual Crash Density (All Crashes/KM)	Average Annual Crash Rate (All Crashes/MVKT)	Average Annual Crash Density (Ser. Inj. Crashes/KM)	Average Annual Crash Rate (Ser. Inj. Crashes/MVKT)
Metro State Road - Midblock	22.39	0.42	0.87	0.02
Metro State Road - All	52.67	0.98	1.68	0.03

Note: Based on 5-years data for the period 2015 to 2019.

2.8 Vehicular Parking

Local Government	Shire of Serpentine-Jarrahdale
Local Government Document Utilised	Town Planning Scheme No. 2 Draft Local Planning Scheme No. 3

The Shire of Serpentine-Jarrahdale adopted a new draft Local Planning Scheme No3 to replace Town Planning Scheme No. 2 with redefined parking standards.
The description of parking rates below is selected between the two schemes to adequately cater for the expected parking demand of the subject site.

Description of Parking Requirements in accordance with Scheme:

Town Planning Scheme No. 2:

- *" Industry Light- 1 space per 50 square metres gross leasable area*
- *Showroom - 1 space per 60 square metres gross leasable area*
- *Office - 1 space per 40 square metres gross leasable area with a minimum of 2 spaces for each office unit*
- *Warehouse - 1 space per 100 square metres gross leasable area"*

Draft Local Planning Scheme No. 3:

- *" Motor Vehicle Repair - 1 bay per 50m² NLA and 1 bay per employee**

**1 bay per employee means 1 bay for each of the maximum number of employees on the premises at any given time."*

Calculation of Parking

Land Use	Requirements	Yield	Total Parking
Lot 2			
Automotive Repair	*1 space / 50 m² GLA +* *1 space / employee*	276.52 m² max 5 staff	11
Office	*1 space / 40 m² GLA (min 2)*	77.12 m²	2
Light Industry – 3 units	*1 space / 50 m² GLA*	1,012.56 m²	21
		Total parking required – Lot 2	**34**
Lot 3			
Light Industry/ Showroom (2 units)	*1 space / 60 m² GLA*	584 m²	9.7
Warehouse (5 units)	*1 space / 100 m² GLA*	618 m²	6.2
Light Industry (5 units)	*1 space / 50 m² GLA*	458 m²	9.2
		Total parking required – Lot 3	**25**

Total Volume of Parking Provided	**Lot 2**	**32**
	Lot 3	**37**
	Proposed on street parking on Robertson Road	**9**

Justification

The plans for the proposed developments on Lots 2 & 3 provide adequate parking facilities to cater for the expected parking demand on site.

Lot 2 will provide 32 parking bays on-site with 3 on-street parking bays located at the lot boundary with Robertson Road, meeting the requirements of 34 parking bays.

Lot 3 will have parking bays in front of each proposed unit. Two tandem bays are provided in front of each of the showroom units. It is recommended to designate tandem bays for staff members.

2.9 Compliance with AS2890.1:2004 and AS2890.6

Number of Parking Bays on-site	Lot 2 – 32 parking bays Lot 3 – 37 parking bays
Are Austroads documents referenced?	YES
If YES, Nominate:	• Australian/New Zealand Standard, Parking facilities, Part 1: Off-street car parking - AS 2890.1 • Australian/New Zealand Standard, Parking facilities, Part 6: Off-street parking for people with disabilities - AS2890.6
Proposed development User Class	• User Class 1A (Residential, domestic and employee parking) • User Class 2 (Long-term city and town centre parking, sports facilities, entertainment centres, hotels, motels, airport visitors (generally medium-term parking)) • User Class 4 (Parking for people with disabilities)

AS2890.1:2004 Off-street car parking AS2890.6 Off-street parking for people with disabilities						
Parking Bay Type	Parking Bay Length		Parking Bay Width		Aisle Width	
	Required	Proposed	Required	Proposed	Required	Proposed
All bays at 90°	5.4m	5.4m-5.5m	2.5m	2.5m	5.8m	min 6.0m
ACROD Parking	5.4m	5.4m-5.5m	2.4m–ACROD 2.4m–shared space	2.5m	5.8m	min 6.0m

Name other requirements in the AS2890.1:2004 document.	Single-sided aisles	increased by 300 mm	√
	Blind aisle	extended by a minimum of 1 m	√
	Reversing bay	provided	√

Does the parking area meet the requirements set in AS 2890.1 and AS 2890.6? KCTT reviewed the layout for the proposed development and conclude that car parking bays dimensions and aisle width are compliant with the Australian Standard AS 2890.1 and AS 2890.6.

Have Vehicle Swept Paths been checked for Parking? YES

If YES, provide description of performance:

The plan for the proposed developments on Lot 2 and 3 has been checked with a B99 Passenger Vehicle 5.2m and Service Vehicle 8.8m.

B99 Passenger Vehicle 5.2m can safely navigate the parking areas. There are no navigability issues found.

Service Vehicle 8.8m can access the loading areas and safely make a turnaround within the proposed parking. It should be noted that the service vehicle would have to use the proposed tandem bays on Lot 3 to make the turnaround. It is suggested that deliveries are organised outside of developments' hours of operation.

For swept path drawings and recommendations refer to Appendix 3.

2.10 Bicycle Parking

Local Government	Shire of Serpentine-Jarrahdale
Local Government Document Utilised	Town Planning Scheme No. 2 Draft Local Planning Scheme No. 3

The Shire of Serpentine-Jarrahdale adopted a new draft Local Planning Scheme No3 to replace Town Planning Scheme No. 2. The current scheme does not offer bicycle parking rates, therefore the LSP No 3 rates have been adopted

Description of Parking Requirements in accordance with Scheme:

- *Bulky goods showroom - 1 bay per 750m².*
- *Office*
  - *Staff: 1 bay per 200m²*
  - *Visitors: 1 bay per 750m²*
- *Warehouse/Storage - 1 bay per 2,000m²*

Parking Requirement in accordance with regulatory documents

Land Use	Requirements	Yield	Total Parking
Lot 2			
Automotive Repair	*N/A*	276.52 m²	0
Office	*Staff: 1 bay / 200m²*	77.12 m²	0.4
	Visitors: 1 bay / 750m²		0.1
Light Industry	*1 bay / 2,000m²*	1,012.5 m²	0.5
		Total parking required – Lot 2	**1**
Lot 3			
Light Industry/ Showroom (2 units)	*1 bay / 750m²*	584 m²	0.8
Warehouse (5 units)	*1 bay / 2,000m²*	618 m²	0.3
Light Industry (5 units)	*1 bay / 2,000m²*	458 m²	0.2
		Total parking required – Lot 3	**2**

Total Volume of Parking Provided	**Lot 2**	**4 racks**
	Lot 3	**6 racks**

Justification

The plans for the proposed developments on Lots 2 & 3 show provision of bicycle parking spaces complying with set out requirements.

2.11 ACROD Parking

Class of Building	Class 7b - for storage, or display of goods or produce for sale by wholesale Class 8 - a laboratory, or a building in which a handicraft or process for the production, assembling, altering, repairing, packing, finishing, or cleaning of goods or produce is carried on for trade, sale, or gain
Does this building class require specific provision of ACROD Parking?	YES
Reference Document Utilised	Building Code of Australia

Description of Parking Requirements:

Class 7b — 1 space for every 100 carparking spaces or part thereof.

Class 8 — 1 space for every 100 carparking spaces or part thereof.

Parking Requirement in accordance with regulatory documents

Land Use	Requirements	Yield	Total Parking
Lot 2	*1 space for every 100 carparking spaces or part thereof*	32	**1**
Lot 3	*1 space for every 100 carparking spaces or part thereof*	37	**1**

Total Volume of Parking Provided	**Lot 2**	**1 ACROD bay**
	Lot 3	**1 ACROD bay**

Justification

The plans for the proposed development show one ACROD bay for each lot as per the set-out requirements.

2.12 Delivery and Service Vehicles

Guideline Document used as reference	NSW RTA Guide to Traffic Generating Developments

Requirements

Wholesale, Industrial (< 8,000m2 GFA) - 1 space per 800m2

Parking Requirement in accordance with regulatory documents

Land Use	Minimum Requirements	Yield	Total Parking
Lot 2	*1 space per 800m2*	1,403 m^2	**2**
Lot 3	*1 space per 800m2*	1,451 m^2	**2**

Total Volume of Parking Provided	**Lot 2**	**3 loading zones** (1 per Light industry Unit)
	Lot 3	**12 loading zones** (1 per unit)

Justification

Having in mind the proposed land uses, the provided number of loading areas is expected to be cater for the service vehicle parking requirements.

2.13 Calculation of Development Generated / Attracted Trips

What are the likely hours of operation?	08:00 - 17:00
What are the likely peak hours of operation?	AM Peak 08:00 - 09:00 PM Peak 16:00 - 17:00
Do the development generated peaks coincide with existing road network peaks?	YES – AM peak
Guideline Document Used	**WAPC Transport Assessment Guidelines for Developments**
Rates from above document:	***Retail (Non-food):*** • *AM peak hour vehicle trips = 1.25 per 100 m^2 GFA 80% IN / 20% OUT.* • *PM peak hour vehicle trips = 4 per 100 m^2 GFA 50% IN / 50% OUT.* The WAPC Transport Impact Assessment Guidelines do offer daily traffic generation rates. KCTT has therefore developed a VPD value applying the reverse principal to VPH, with the assumption that PM peak value is 10% of the daily generated traffic. This means the proposed land use is likely to generate up to 40 VPD/100m^2 GFA.
Guideline Document Used	**NSW RTA Guide to Traffic Generating Developments**
Rates from above document:	***Office and commercial:*** • *Daily vehicle trips = 10 per 100 m^2 GFA* • *PM peak hour vehicle trips = 2 per 100 m^2 GFA* ***Factories (Industry) :*** • *Daily vehicle trips = 5 per 100 m^2 GFA* • *PM peak hour vehicle trips = 1 per 100 m^2 GFA* ***Warehouses:*** • *Daily vehicle trips = 4 per 100m^2 GFA* • *AM peak hour vehicle trips = 0.5 per 100m^2 GFA* *An 80%IN / 20%OUT has been assumed for the AM Peak and 20%IN / 80%OUT has been assumed for the PM Peak*

Land Use Type	Rate above	Yield	Daily Traffic Generation	Peak Hour Traffic Generation
Lot 1 Self-Storage facility	*N/A**	7,869m^2	212	24
Stage 1 – Total Traffic			**212**	**24**
Lot 2				
Light Industry/ Automotive Repair	*Daily - 5 VPD/100m^2 GFA* *Peak - 1 VPH/100m^2 GFA*	1,403 m^2	70	14
Office	*Daily - 10 VPD/100m^2 GFA* *Peak - 2 VPH/100m^2 GFA*	81 m^2	8	2
		Total traffic – Lot 2	**78**	**16**
Lot 3				
Light Industry/Showroom (2 units)	*Daily - 40 VPD/100m^2 GFA* *Peak - 4 VPH/100m^2 GFA*	584 m^2	234	23
Warehouse (5 units)	*Daily - 4 VPD/100m^2 GFA* *Peak - 0.5 VPH/100m^2 GFA*	618 m^2	25	3
Light Industry (5 units)	*Daily - 5 VPD/100m^2 GFA* *Peak - 1 VPH/100m^2 GFA*	458 m^2	23	5
		Total traffic – Lot 3	**281**	**31**
Light Industry Stage 3	*Daily - 5 VPD/100m^2 GFA* *Peak - 1 VPH/100m^2 GFA*	5,223m^2 GFA **	261	52
Light Industry Stages 4-6	*Daily - 5 VPD/100m^2 GFA* *Peak - 1 VPH/100m^2 GFA*	15,534m^2 GFA**	777	155
Stage 2 – Total Traffic		**Lot 2 and Lot 3**	**359**	**47**
Stages 3-6 – Total Traffic			**1,038**	**208**
Total Traffic from LSP - Lots 1, 3 & 128 South Western Highway, Byford			**1,609**	**279**

*Note * - As calculated in the approved Transport Impact Statement for Stage 1 - KC00900.000 Lot 128 South Western Highway dated September 2019 undertaken by KCTT.*

*Note ** - Land Uses and Timeframes for stages are indicative only. Assumptions were based on the information received from the client and the approved LSP.*

TOTAL 2022 – Stages 1 & 2	**571**	**71**
TOTAL 2023 – Stages 1-3 (inclusive of the subject site)	**833**	**123**
TOTAL 2031 – all stages (inclusive of the subject site)	**1,608**	**279**

Does the site have existing trip generation / attraction?	NO
What is the total impact of the new proposed development?	With 359 vehicular trips per day and 47 vehicular trips in the peak hour, the developments on Lot 2 & 3 as standalone land uses would have moderate impact on the surrounding road as per WAPC Guidelines. The entire LSP area would have high impact as per WAPC classification. As shown in Appendix 4 – SIDRA Intersection analysis proposed changes to the surrounding road network can accommodate the expected traffic from the subject site and the remainder of the LSP area. The future Orton Road extension is expected to alleviate any issues on the Road 01 - South Western Highway extension (with

a desirable conversion to a LILO after extension completion)

2.14 Traffic Flow Distribution

At the time of writing the report, Robertson Road is planned to be constructed from the proposed Lots 2 & 3 to the intersection with South Western Highway north of Lot 1.

This is considered a temporary solution as it is planned that Robertson Road will be extended to the north and the road connection with South Western Highway will be renamed. For the purposes of this report the road section between Robertson Road and South Western Highway is named Road 01.

However, as the timeframe for the Robertson Road extension to the north is currently unknown KCTT assumed the scenario in which this will not take place before 2031. It is expected Robertson Road extension to the south would be timed to suit the construction of the proposed stages. Once more information becomes available, traffic can be redistributed to suit new conditions.

Additonally, Orton Road will extend to South Western Highway south of Lot 3. Timeframe for this extension is currently unknown, however, for the purposes of this analysis it is assumed it will take place beyond 2031.

Stage 1&2 – year 2022	
Route 1	
Provide details for Route No 1	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the north
Percentage of Vehicular Movements via Route No 1	70% Stage 1 – 148 VPD / 17 VPH Stage 2 *(subject site)* – 251 VPD / 33 VPH Stages 1&2 *(inclusive of the subject site)* – 399 VPD / 50 VPH
Route 2	
Provide details for Route No 2	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the south
Percentage of Vehicular Movements via Route No 2	30% Stage 1 – 64 VPD / 7 VPH Stage 2 *(subject site)* – 108 VPD / 14 VPH Stages 1&2 *(inclusive of the subject site)* – 172 VPD / 21 VPH
Stage 1-3 – year 2023	
Route 1	
Provide details for Route No 1	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the north
Percentage of Vehicular Movements via Route No 1	70%Stages 1-3 *(inclusive of the subject site)* – 583 VPD / 86 VPH
Route 2	
Provide details for Route No 2	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the south
Percentage of Vehicular Movements via Route No 2	30% Stages 1-3 *(inclusive of the subject site)* – 250 VPD / 37 VPH

All stages – year 2031	
Route 1	
Provide details for Route No 1	To/from the north
Percentage of Vehicular Movements via Route No 1	70% (1,125 VPD / 195 VPH): • 30% (483 VPD / 84 VPH) via Road 01 and South Western Highway • 40% (642 VPD / 111 VPH) via Robertson Road, Cardup Siding Road and South Western Highway
Route 2	
Provide details for Route No 2	To/from the south
Percentage of Vehicular Movements via Route No 2	25% (402 VPD / 70 VPH): • 6.5% (104 VPD / 19 VPH) via Robertson Road > Road 01 > South Western Highway • 15% (241 VPD / 42 VPH) via Robertson Road > Cardup Siding Road > South Western Highway • 3.5% (57 VPD / 9 VPH) via Robertson Road > Cardup Siding Road > Soldiers Road
Route 3	
Provide details for Route No 3	To/from the west
Percentage of Vehicular Movements via Route No 3	5% (81 VPD / 14 VPH) via Robertson Road and Cardup Siding Road

2.15 Vehicle Crossover Requirements

Are vehicle crossovers required onto existing road networks?	YES
How many existing crossovers?	None
How many proposed crossovers?	2 crossovers: • Lot 2 crossover on to Robertson Road – 8m • Lot 3 crossover on to Robertson Road – 8m
Are sightlines adequate?	Since Robertson Road is expected to be classified as Access Road with a speed limit of 50km/h a desirable 5s gap sight distance of 69m and a minimum of stopping sight distance of 45m is warranted. The desirable 69m sight distance can be achieved at both proposed crossovers. Sight triangles of 2.0x2.5m should be provided at crossovers for pedestrian sightlines.
How close are proposed crossovers to existing intersections?	Approximately 250m from the proposed intersection of Road 01 and South Western Highway
Does this meet existing standards?	YES
Justification	

According to AS/NZS 2890.1:2004 Parking facilities Part 1: Off-street car parking a driveway should be located a minimum 6m from the intersection curve. Therefore, both proposed crossovers are in accordance with the set-out requirements.

Are auxiliary lanes warranted?	YES – both left turn and right turn deceleration lane will be provided on the intersection of South Western Highway and Robertson Road as part of Local Structure Plan - Lots 1, 3 & 128 South Western Highway, Byford.
Additional information	The Bushfire Management Report identified the need for a second emergency access to the highway. This would mean informal vehicle access could be achieved to South Western Highway. Having in mind that this access would be used rarely in extreme emergency situation it should not present an issue.

2.16 Public Transport Accessibility

How many bus routes are within 400 metres of the subject site?	3
How many rail routes are within 800 metres of the subject site?	None

Bus Route	Description	Peak Frequency	Off-Peak Frequency
251	Armadale Station – Byford via South Western Highway	4 times a day	3 times a day on Saturdays *No Sunday & Public Holidays service*
252	Armadale Station – Mundijong via Byford	30 minutes	3 times a day *No Sunday & Public Holidays service*
253	Armadale Station – Jarrahdale via Byford & Mundijong	4 times a day	once a day *No Sunday & Public Holidays service*

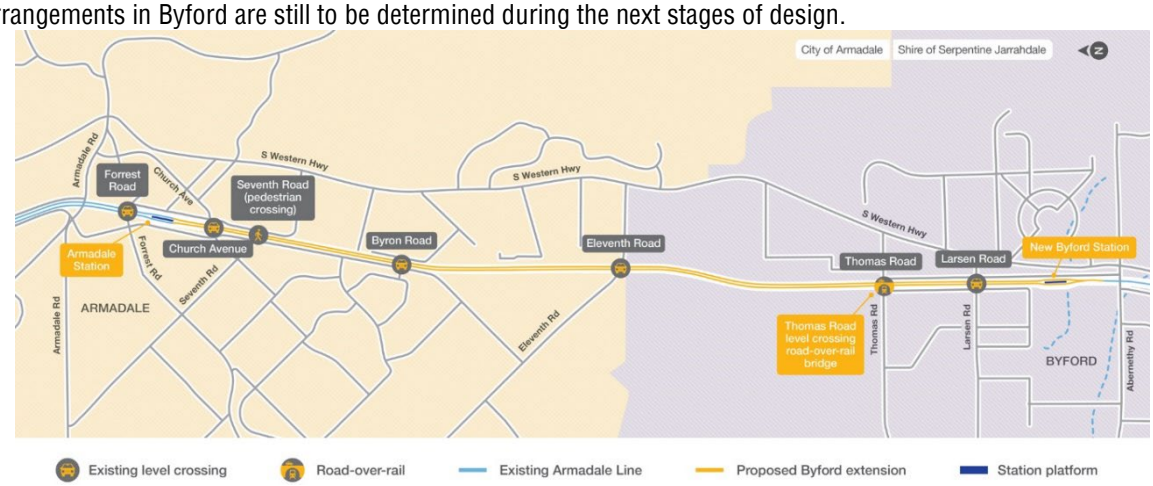
Walk Score Rating for Accessibility to Public Transport

26 | Some Transit. A few nearby public transportation options.

Is the development in a Greenfields area? YES

In recent years the surrounding area has undergone a major transformation from generally rural to sub-urban area. It is expected that as urban development continues that the local bus services will be extended. There is a possible future bus route planned to run through Soldiers Road and Turner Road west of the development.

Byford Train Station is currently located approximately 1km to the north of the subject site serviced by Australind regional rail service. Byford Rail Extension METRONET project includes construction of a new ground level Byford Station within the future Byford Town Centre, approximately 400 metres north of Abernethy Road, Byford. To improve safety and connections in the area, and improve traffic flow, the Thomas Road level crossing will be reconfigured to a road-overrail bridge. Options are still being considered for the other existing level crossings. The regional Australind rail service will continue to stop at Armadale Station using a new dedicated platform. Final arrangements in Byford are still to be determined during the next stages of design.



2.17 Pedestrian Infrastructure

Describe existing local pedestrian infrastructure within a 400m radius of the site:

Classification	Road Name
Unclassified pedestrian path	Diamantina Boulevard, Barraberry Way, Cowara Way, Jandu Street, Walja Bend, Bren Close, Quilberon Link, Vickers Pass, Benalla Crescent, Magazine Link, Mortar Pass, Clondyke Drive
Does the site have existing pedestrian facilities	NO
Does the site propose to improve pedestrian facilities?	YES – pedestrian path is proposed on Robertson Road. The footpath will for the time being remain unconnected to the regional footpaths and only serve to link the street parking with the entries of the development along Robinson Road.

What is the Walk Score Rating?

10 | Car-Dependent. Almost all errands require a car.

2.18 Cyclist Infrastructure

Are there any PBN Routes within an 800m radius of the subject site?	NO
Are there any PBN Routes within a 400m radius of the subject site?	NO
Does the site have existing cyclist facilities?	NO
Does the site propose to improve cyclist facilities?	YES - The plans for the proposed developments on Lots 2 & 3 show provision of bicycle parking spaces complying with set out requirements.

2.19 Site-Specific Issues and Proposed Remedial Measures

How many site-specific issues need to be discussed?	1
Site-Specific Issue No 1	**Traffic impact**
Remedial Measure / Response	With 359 vehicular trips per day and 47 vehicular trips in the peak hour, the developments on Lot 2 & 3 as standalone land uses would have moderate impact on the surrounding road as per WAPC Guidelines. The entire LSP area would have high impact as per WAPC classification. As shown in Appendix 4 – SIDRA Intersection analysis proposed changes to the surrounding road network can accommodate the expected traffic from the subject site and the remainder of the LSP area. The future Orton Road extension is expected to alleviate any issues on the Road 01 - South Western Highway extension (with a desirable conversion to a LILO after extension completion)

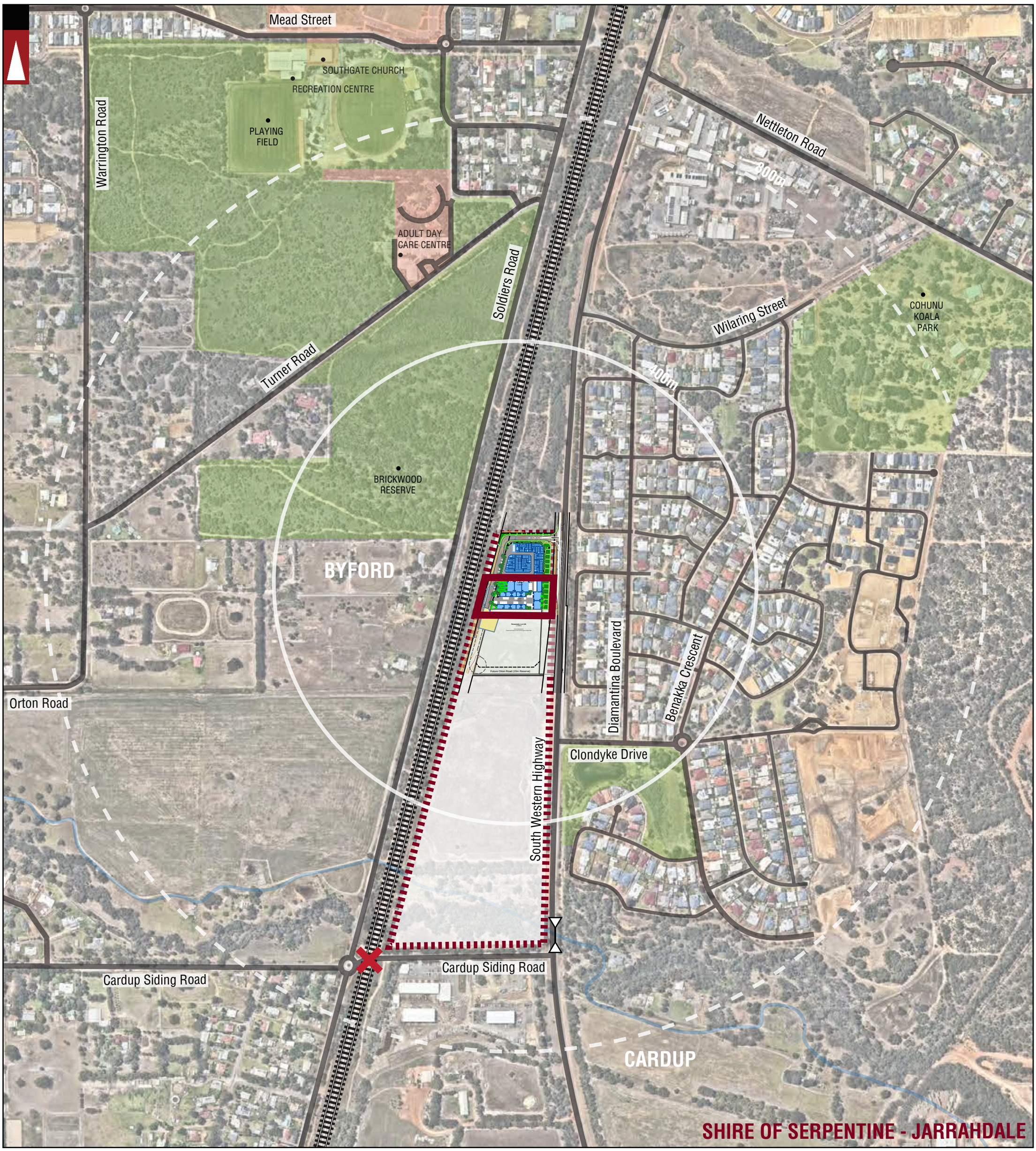
Appendix 1

The Layout of the Proposed Development


N
SOLDIERS ROAD
RAILWAY
ROBERTSON ROAD
SOUTH WESTERN HWY
HOWITZER TURN
Lot 1
5,945m²
Lot 2
3,388m²
Lot 3
3,913m²
Remainder Lot 128
1,7409ha
(Future Development)
Cleared and finished as APZ and Emergency Muster Point
Future Orton Road (15m Reserve)
BYFORD INDUSTRIAL PARK
Development Concept for Stage 1 (National Storage) and Stage 2 (Automasters and Mixed-Use Industrial Units)
0m 10m 20m 50m
Scale (A3) 1 : 1,000
All dimensions are approximate and subject to final survey.
Urbanism
PO Box 1804
Subiaco WA 6904
Mob: 0420 961 581
corey@urbanism.com.au
www.urbanism.com.au

Appendix 2

Transport Planning and Traffic Plans



PARKS AND RECREATION	ROAD	STAGE 2 BOUNDARY	
WATERWAYS	Hay Street STREET NAME	LSP BOUNDARY	
PUBLIC PURPOSE	RAILWAY	DISTANCE FROM LOCATION	
RAILWAY CROSSING	BRIDGE	BYFORD SUBURB	
	SHIRE OF SERPENTINE JARRAHDALE LOCAL GOVERNMENT NAME		

LEGEND

No	DATE	AMENDMENT
C	19-05-2022	INFORMATION UPDATED
B	15-04-2021	INFORMATION UPDATED
A	15-12-2020	ISSUED FOR REVIEW

PROJECT: LOT 128 SOUTH WESTERN HIGHWAY, STAGE 2 BYFORD

TITLE: LOCALITY PLAN - 800M RADIUS

DRAWING NUMBER: KC00900.000_ S01

DRAWN BY: N.M.

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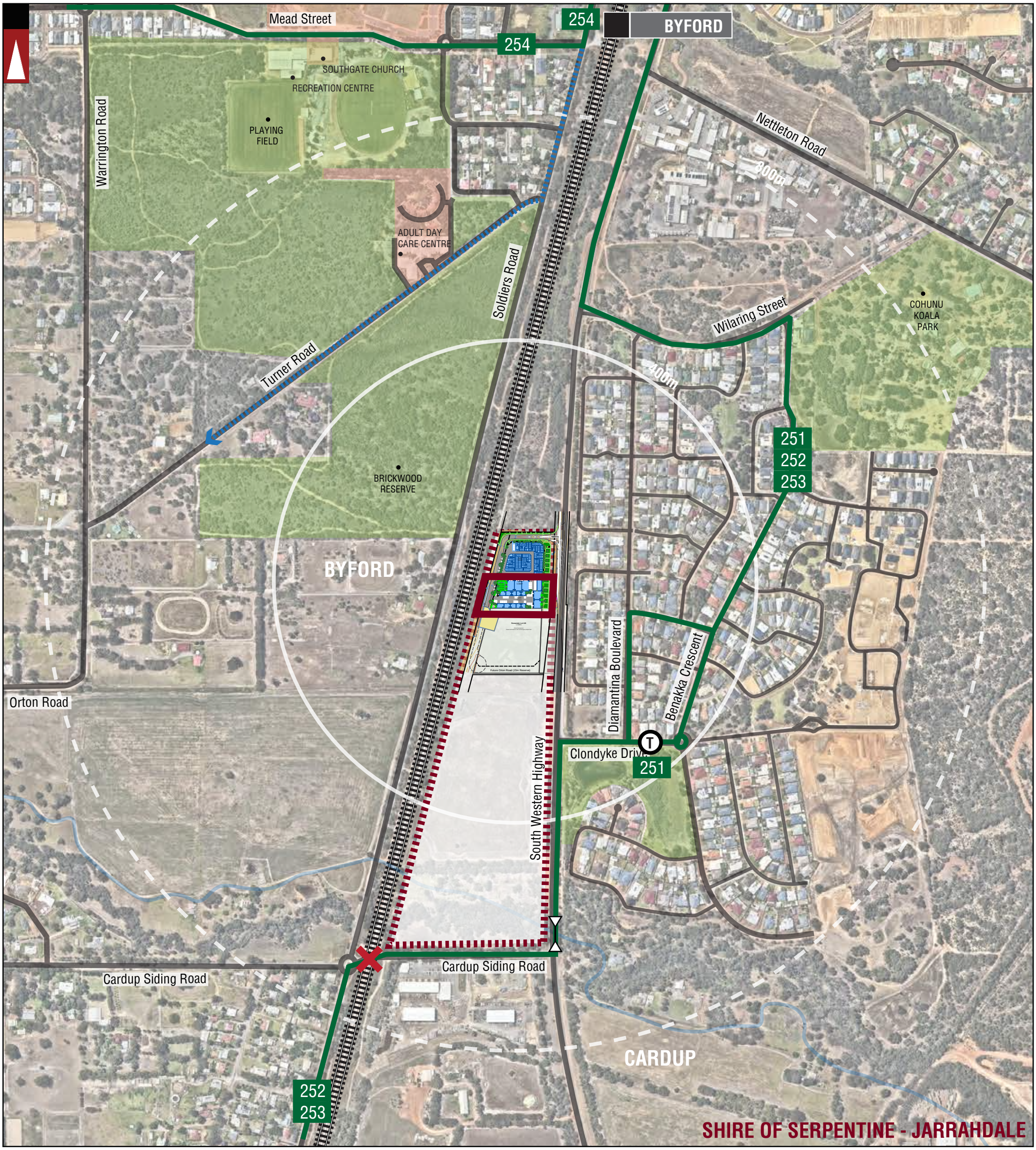

PARKS AND RECREATION	ROAD	STAGE 2 BOUNDARY	251 BUS ROUTE NUMBER	251 ARMADALE STATION - BYFORD (VIA SOUTH WESTERN HIGHWAY)
WATERWAYS	Hay Street STREET NAME	LSP BOUNDARY	BUS ROUTES	252 ARMADALE STATION - MUNDIJONG (VIA BYFORD)
PUBLIC PURPOSE	RAILWAY	DISTANCE FROM LOCATION	PROPOSED BUS ROUTES	253 ARMADALE STATION - JARRAHDALE (VIA BYFORD & MUNDIJONG)
RAILWAY CROSSING	BRIDGE	BYFORD SUBURB	BUS TERMINUS	
	SHIRE OF SERPENTINE JARRAHDALE LOCAL GOVERNMENT NAME		TRAIN STATION	

LEGEND

No	DATE	AMENDMENT
C	19-05-2022	INFORMATION UPDATED
B	15-04-2021	INFORMATION UPDATED
A	15-12-2020	ISSUED FOR REVIEW

PROJECT: LOT 128 SOUTH WESTERN HIGHWAY, STAGE 2 BYFORD

TITLE: PUBLIC TRANSPORT PLAN - 800M RADIUS

DRAWING NUMBER: KC00900.000_ S03

DRAWN BY: N.M.

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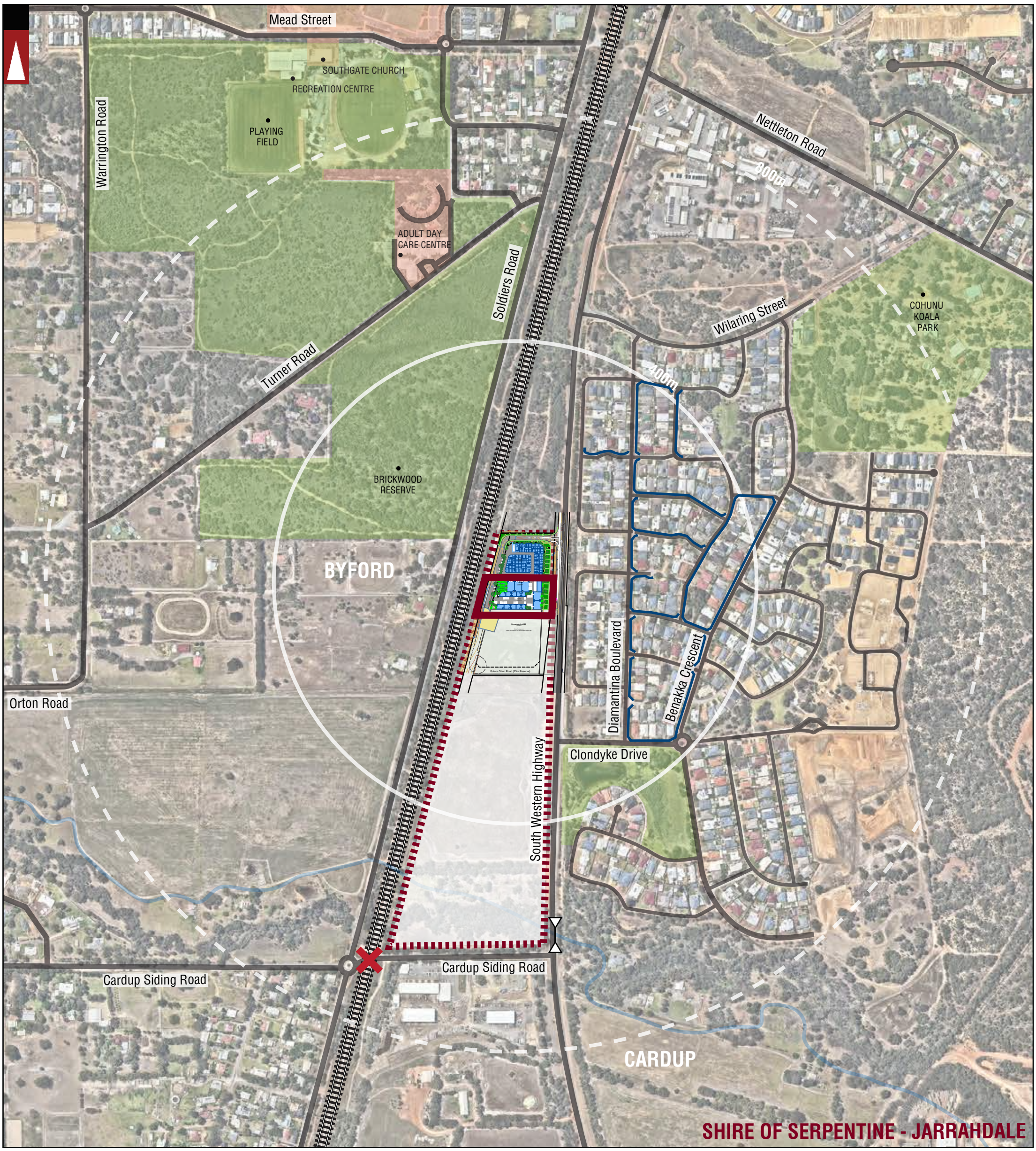

PARKS AND RECREATION	ROAD	STAGE 2 BOUNDARY	PEDESTRIAN PATH
WATERWAYS	Hay Street STREET NAME	LSP BOUNDARY	
PUBLIC PURPOSE	RAILWAY	DISTANCE FROM LOCATION	
RAILWAY CROSSING	BRIDGE	BYFORD SUBURB	
	SHIRE OF SERPENTINE JARRAHDALE LOCAL GOVERNMENT NAME		

LEGEND

No	DATE	AMENDMENT
C	19-05-2022	INFORMATION UPDATED
B	15-04-2021	INFORMATION UPDATED
A	15-12-2020	ISSUED FOR REVIEW

PROJECT: LOT 128 SOUTH WESTERN HIGHWAY, STAGE 2 BYFORD

TITLE: PEDESTRIAN PATHS PLAN - 800M RADIUS

DRAWING NUMBER: KC00900.000_ S04

DRAWN BY: N.M.

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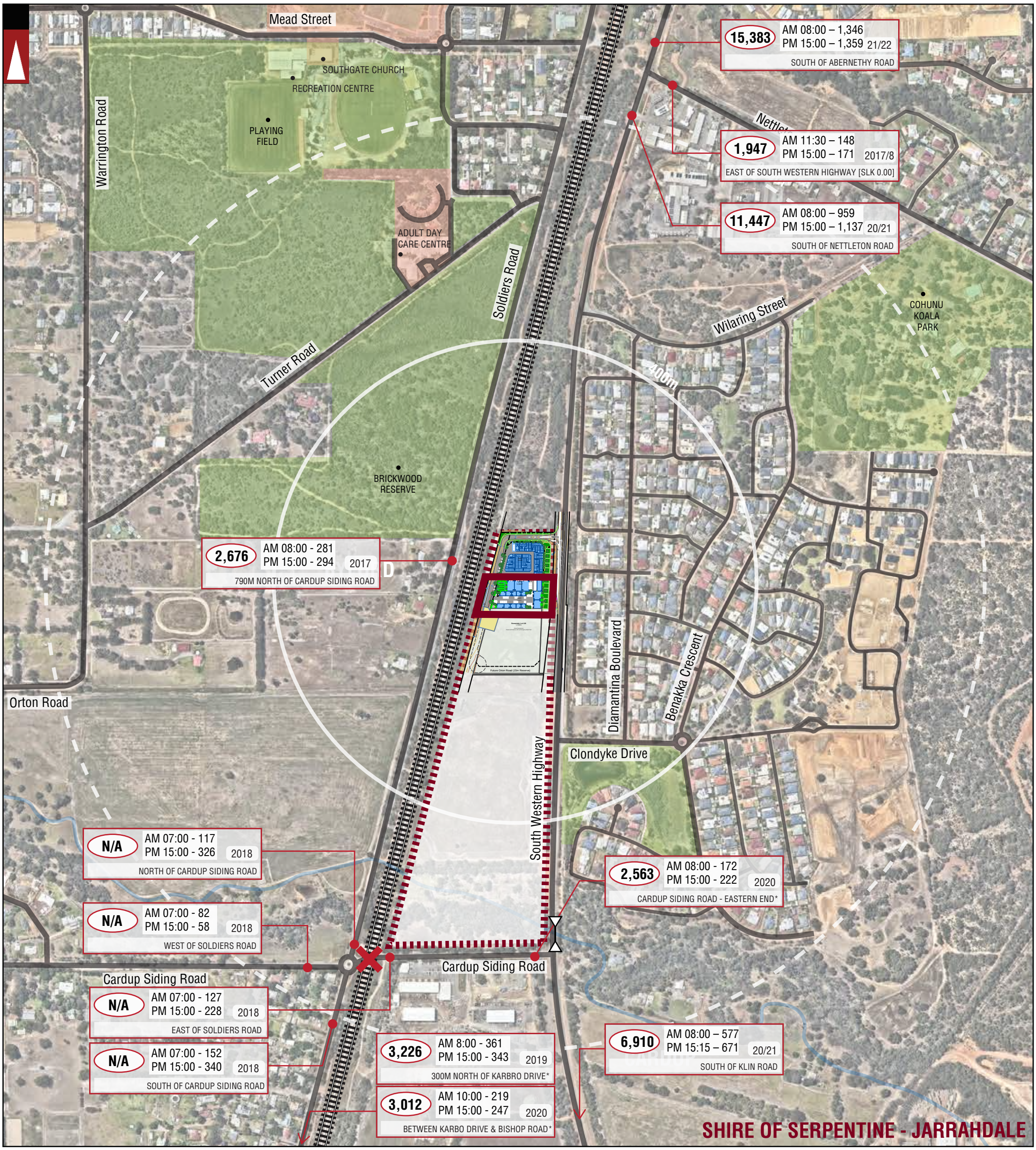

LEGEND

PARKS AND RECREATION	
WATERWAYS	
PUBLIC PURPOSE	
RAILWAY CROSSING	
ROAD	
Hay Street	STREET NAME
RAILWAY	
BRIDGE	
SHIRE OF SERPENTINE JARRAHDALE	LOCAL GOVERNMENT NAME
STAGE 2 BOUNDARY	
LSP BOUNDARY	
DISTANCE FROM LOCATION	
BYFORD	SUBURB
5,512	NUMBER OF VEHICLES PER DAY
AM 1145 – 381 PM 1630 – 480	NUMBER OF VEHICLES PER AM PEAK HOUR NUMBER OF VEHICLES PER PM PEAK HOUR
2014	YEAR
EAST OF MILLS ROAD	LOCATION

No	DATE	AMENDMENT
C	19-05-2022	INFORMATION UPDATED
B	15-04-2021	INFORMATION UPDATED
A	15-12-2020	ISSUED FOR REVIEW

PROJECT: LOT 128 SOUTH WESTERN HIGHWAY, STAGE 2 BYFORD

TITLE: EXISTING TRAFFIC COUNTS - 800M RADIUS

DRAWING NUMBER: KC00900.000_ S05

DRAWN BY: N.M.

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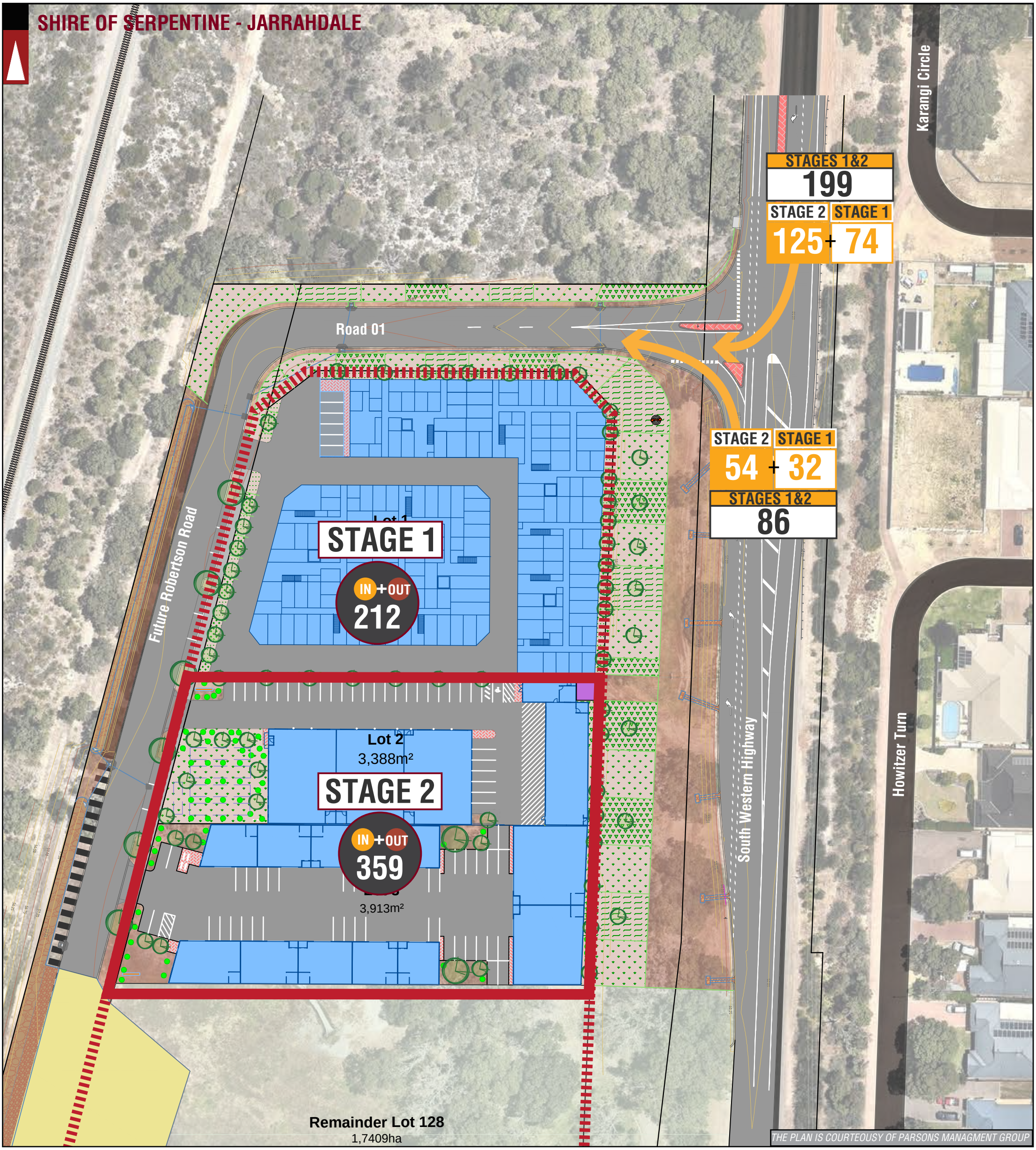

LOCATION BOUNDARY

Lewis Road — ROAD NAME

IN + OUT 484 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT

TRAFFIC FLOW IN DIRECTION

17 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT - STAGE 2 - IN DIRECTION

17 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT - STAGE 1 - IN DIRECTION

17 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT - STAGES 1&2 - IN DIRECTION

NOTE:

Traffic volumes shown account for the expected traffic in 2022 for both Stage 1 and the subject site i.e.Stage 2 - Lots 2 & 3 under Lot 128 South Western Highway.

Stage 1 traffic shown as calculated in the approved Transport Impact Statement for Stage 1 - KC00900.000 Lot 128 South Western Highway dated September 2019 undertaken by KCTT.

For details about the LSP traffic distribution refer to the report and traffic modelling in Appendix 4.

LEGEND

No	DATE	AMENDMENT
D	19-05-2022	PROPOSED LAYOUT AMENDED
C	15-04-2021	PROPOSED LAYOUT AMENDED
B	21-12-2020	ISSUED FOR REVIEW
A	15-12-2020	ISSUED FOR REVIEW

PROJECT: LOT 128 SOUTH WESTERN HIGHWAY, STAGE 2 BYFORD

TITLE: TRAFFIC FLOW DIAGRAM - DAILY

DRAWING NUMBER: KC00900.000_ S06

DRAWN BY: N.M.

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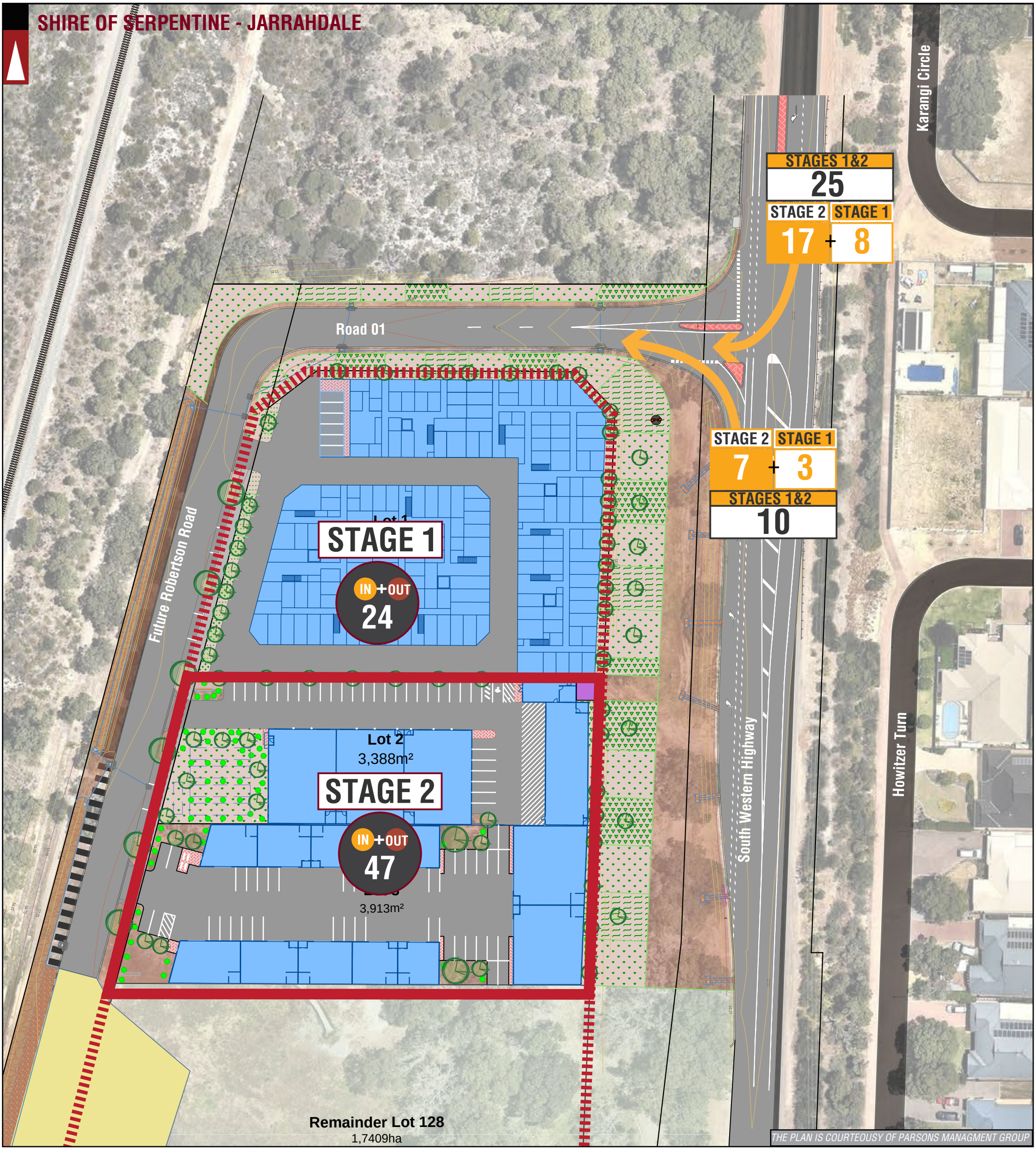

LOCATION BOUNDARY

Lewis Road — ROAD NAME

IN + OUT 484 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT

TRAFFIC FLOW IN DIRECTION

17 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT - STAGE 2 - IN DIRECTION

17 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT - STAGE 1 - IN DIRECTION

17 — TOTAL EXPECTED TRAFFIC GENERATION FROM THE SUBJECT DEVELOPMENT - STAGES 1&2 - IN DIRECTION

NOTE:

Traffic volumes shown account for the expected traffic in 2022 for both Stage 1 and the subject site i.e.Stage 2 - Lots 2 & 3 under Lot 128 South Western Highway.

Stage 1 traffic shown as calculated in the approved Transport Impact Statement for Stage 1 - KC00900.000 Lot 128 South Western Highway dated September 2019 undertaken by KCTT.

For details about the LSP traffic distribution refer to the report and traffic modelling in Appendix 4.

LEGEND

No	DATE	AMENDMENT
D	19-05-2022	PROPOSED LAYOUT AMENDED
C	15-04-2021	PROPOSED LAYOUT AMENDED
B	21-12-2020	ISSUED FOR REVIEW
A	15-12-2020	ISSUED FOR REVIEW

PROJECT: LOT 128 SOUTH WESTERN HIGHWAY, STAGE 2 BYFORD

TITLE: TRAFFIC FLOW DIAGRAM - PEAK HOUR

DRAWING NUMBER: KC00900.000_ S07

DRAWN BY: N.M.

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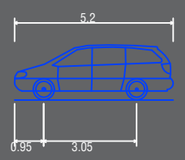
Appendix 3

Vehicle Turning Circle Plan



Passenger vehicle (5.2 m)	
Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	6.300m

- Lot boundary
- Wheel Path (Forward Vehicle Motion)
- Vehicle Chasis Envelope (Forward Vehicle Motion)
- Wheel Path (Reverse Vehicle Motion)
- Vehicle Chasis Envelope (Reverse Vehicle Motion)

MANAGEMENT SYSTEMS REGISTERED TO ISO 9001

LEGEND

NO	DATE	AMENDMENT
C	18-05-2022	PROPOSED LAYOUT AMENDED
B	12-04-2021	PROPOSED LAYOUT AMENDED
A	22-12-2020	ISSUED FOR REVIEW

PROJECT:
Lot 128 South Western Highway Stage 2, Byford

TITLE:
Vehicle Turning Circle Plan - B99 Passenger Vehicle (5.2m)

DRAWING NUMBER:
KC00900.000_S20a

DRAWN BY:
N.M.

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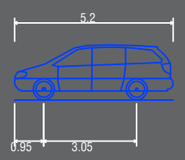


Passenger vehicle (5.2 m)	
Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	6.300m

- Lot boundary
- Wheel Path (Forward Vehicle Motion)
- Vehicle Chasis Envelope (Forward Vehicle Motion)
- Wheel Path (Reverse Vehicle Motion)
- Vehicle Chasis Envelope (Reverse Vehicle Motion)

MANAGEMENT SYSTEMS REGISTERED TO ISO 9001

LEGEND

NO	DATE	AMENDMENT
C	18-05-2022	PROPOSED LAYOUT AMENDED
B	12-04-2021	PROPOSED LAYOUT AMENDED
A	22-12-2020	ISSUED FOR REVIEW

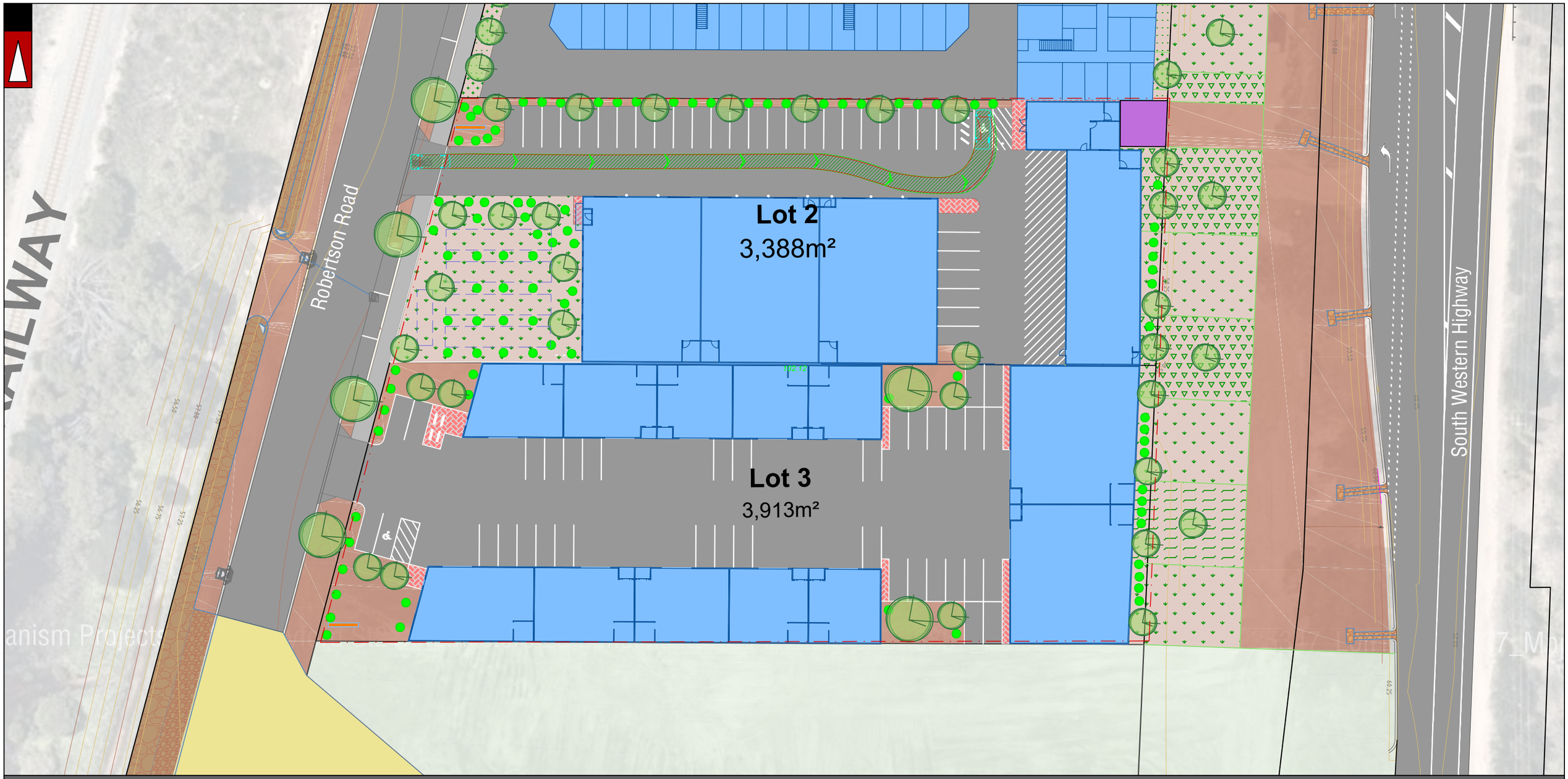
PROJECT:
Lot 128 South Western Highway Stage 2, Byford

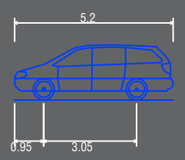
TITLE:
Vehicle Turning Circle Plan - B99 Passenger Vehicle (5.2m)

DRAWING NUMBER:
KC00900.000_S20b

DRAWN BY:
N.M.

Civil & Traffic Engineering Consultants
Suite 7 No 10 Whipple Street Balcatta WA 6021
PH: 08 9441 2700
WEB: www.kctt.com.au





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Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.804m
Min Body Ground Clearance	0.295m
Track Width	1.840m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	6.300m

- Lot boundary
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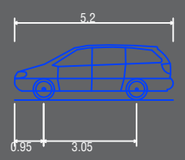

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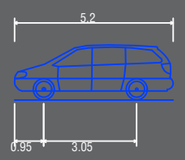

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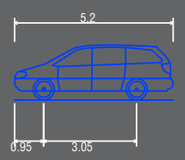

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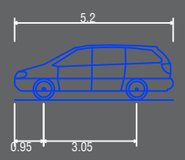

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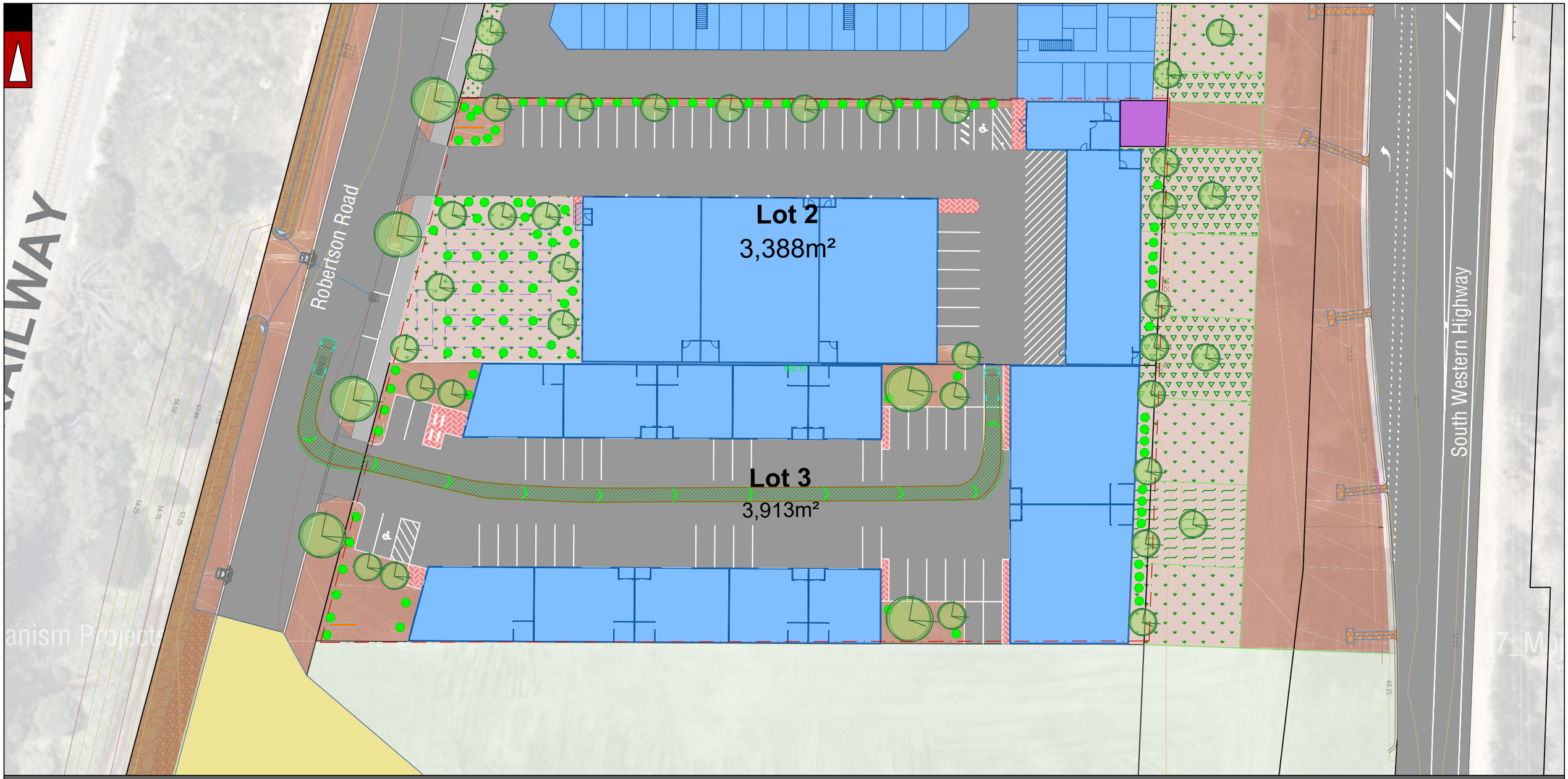

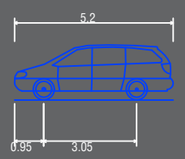

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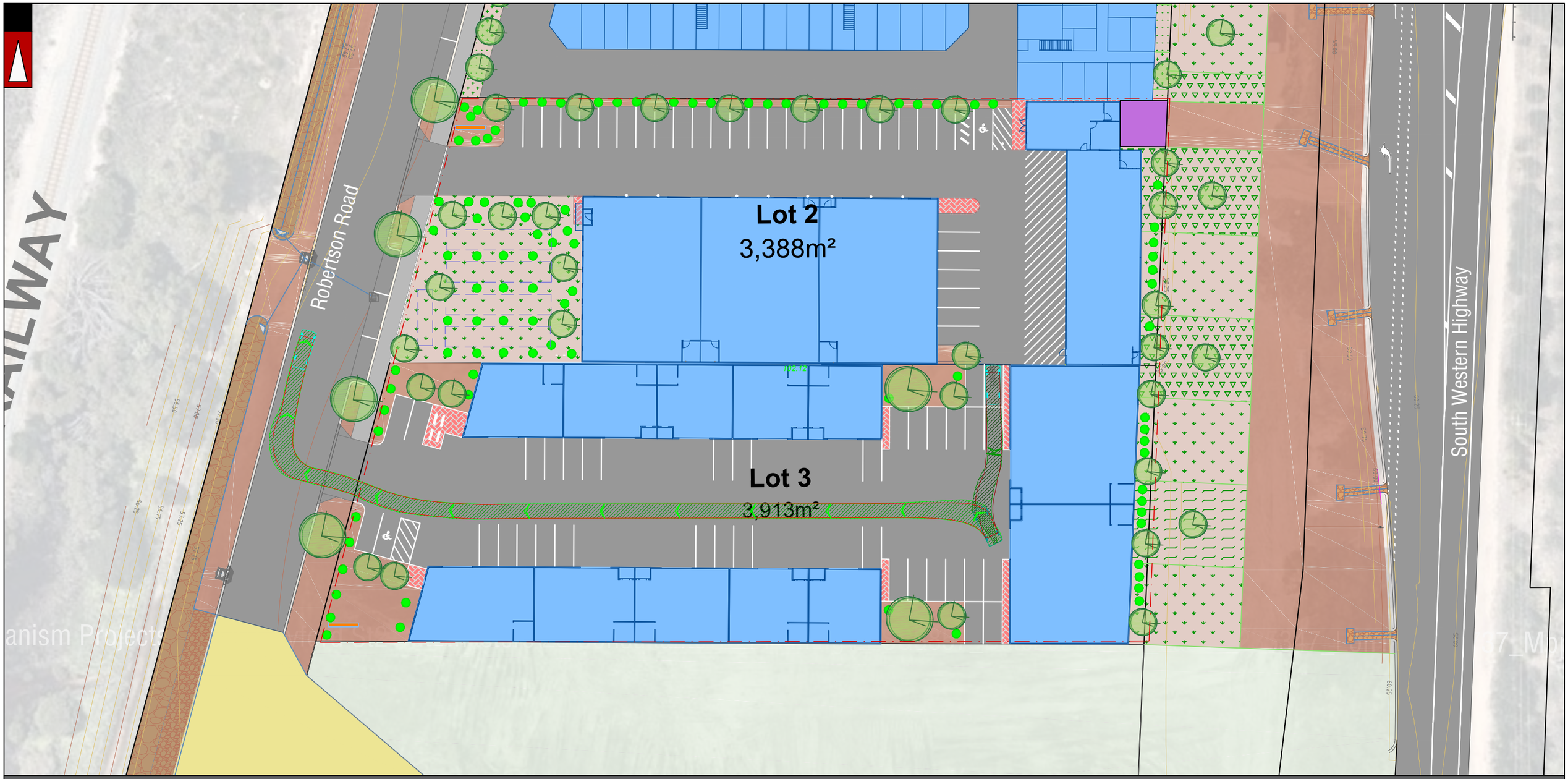

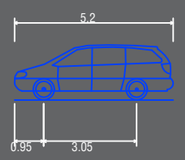

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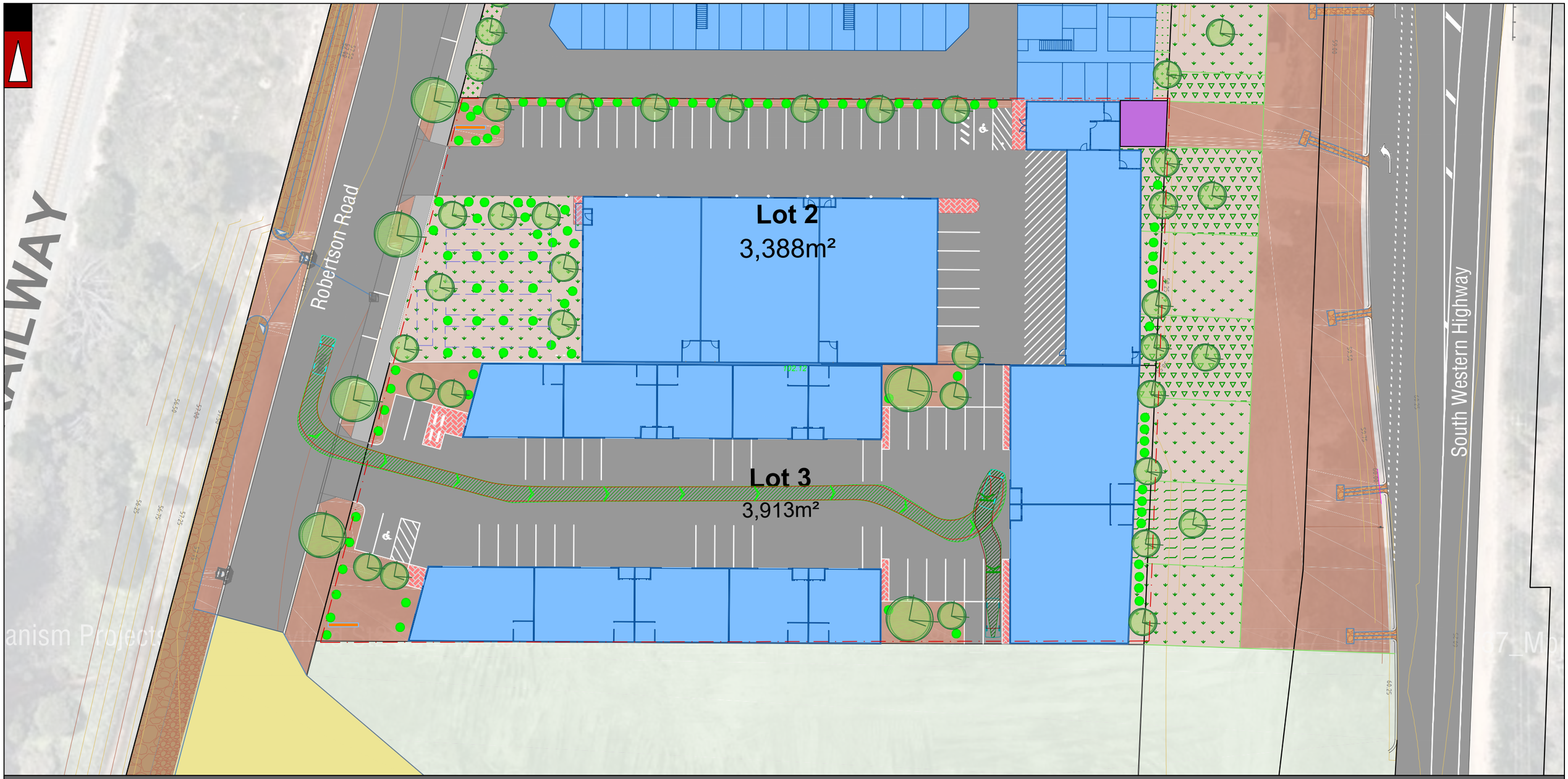

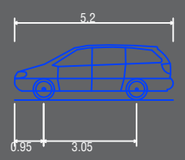

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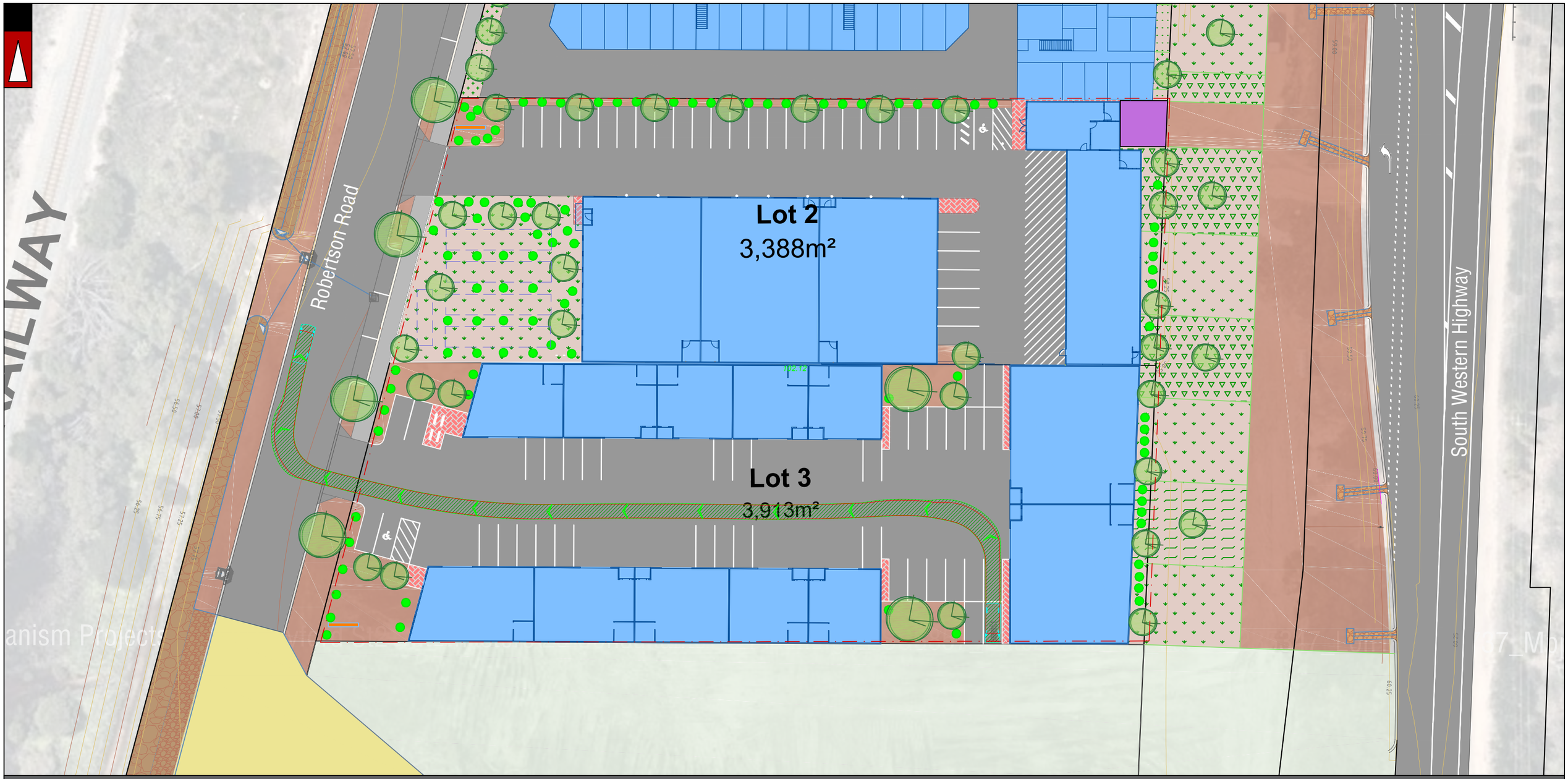

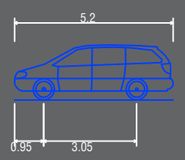

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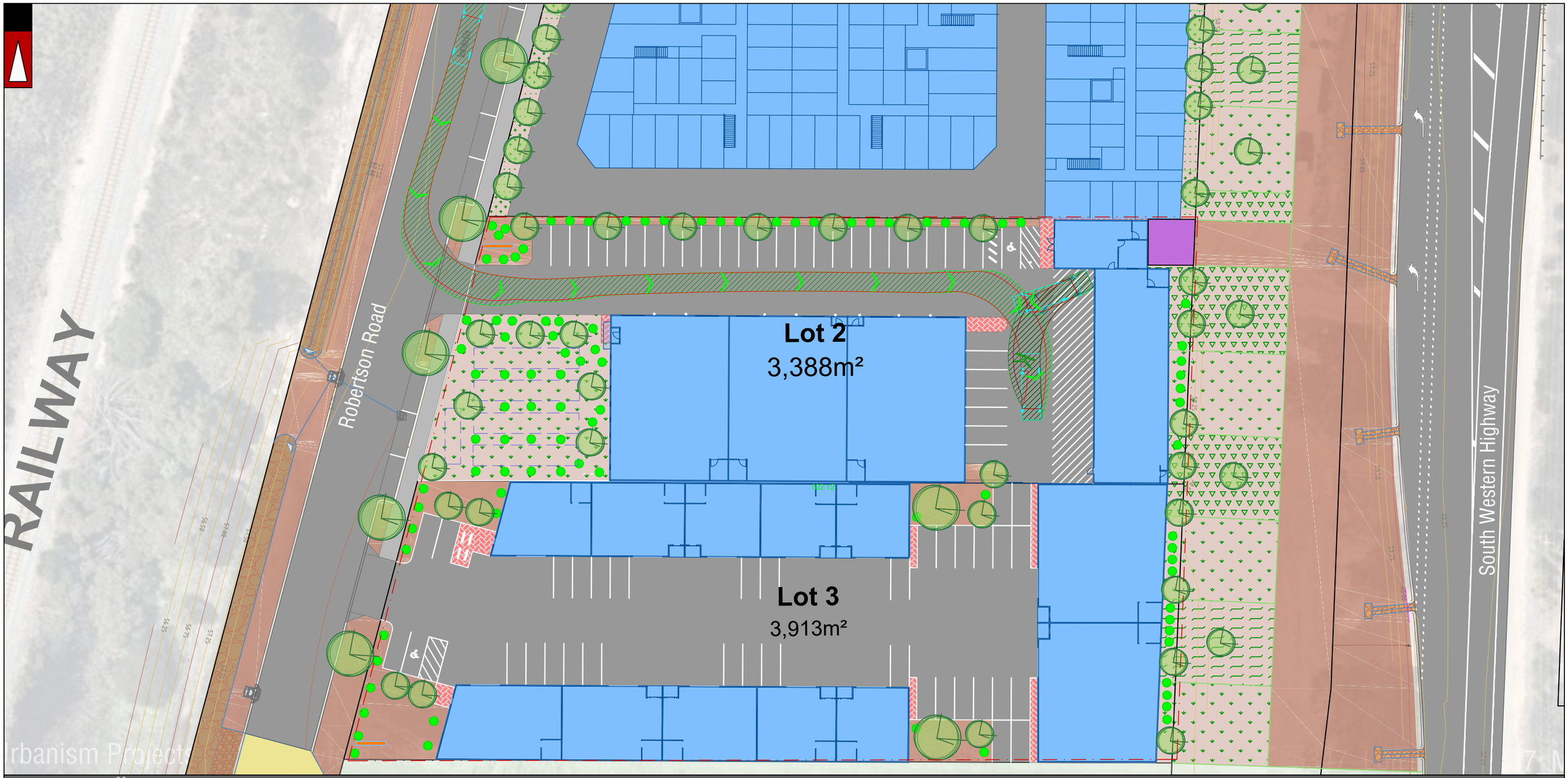

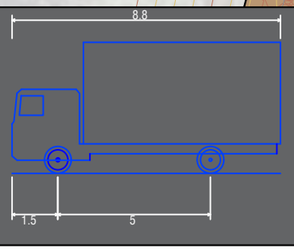

Service Vehicle (8.8 m)	
Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.427m
Track Width	2.500m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	12.500m

- Lot boundary
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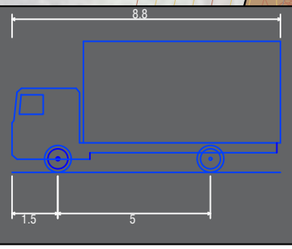
RAILWAY

Robertson Road

South Western Highway

Lot 2
3,388m²

Lot 3
3,913m²



Service Vehicle (8.8 m)	
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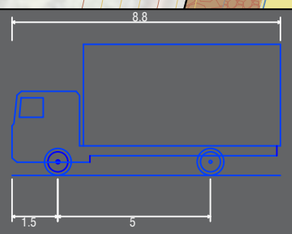

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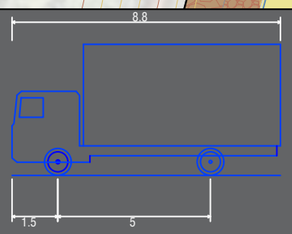

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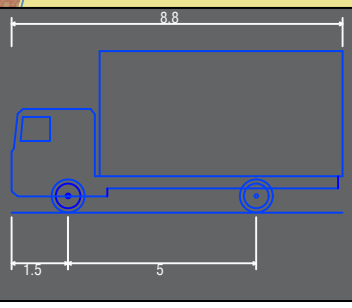

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Appendix 4

SIDRA Intersection Analysis

Table of Contents

List of Figures

1. Introduction

This short report provides details on the SIDRA Analysis conducted to support the findings of the report KC00900.000_R01_Rev B for the Stage 2. The following intersections have been modelled in the AM and PM peak hours for the assessment years of 2021 (existing intersections), 2023 and 2031 (for all intersection):

- M01 - South Western Highway / Road 01
- M02 - South Western Highway / Cardup Siding Road
- M03 - Soldiers Road / Cardup Siding Road

The dimensions of the existing intersection elements have been scaled from aerial imagery which was obtained through our commercial arrangement with Nearmap and through publicly available Intramaps. These images are suitable for use in concept drafting applications with a level of accuracy to within +/- 10 centimetres.

2. Traffic Generation and Distribution Analysis

Modelling assumptions	The proponent has provided KCTT with information suggesting that 3 partial developments of LSP Pinebrook will be developed by 2023. The proponent will construct a section of Robertson Road to the proposed Road 01 by the time of the proposed development commencement. Given there is no information on timeframe for Robertson Road connection to South Western Highway to the north, KCTT have assumed that this connection does not exist in 2023 and 2031 assessment years, as a worst-case scenario.	
Proposed development's analysed peak times:	AM peak	PM peak
	08:00 - 09:00	**16:00 - 17:00**
Stage 1&2 – year 2022		
Route 1		
Provide details for Route No 1	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the north	
Percentage of Vehicular Movements via Route No 1	70% Stage 1 – 148 VPD / 17 VPH Stage 2 *(subject site)* – 240 VPD / 29 VPH Stages 1&2 *(inclusive of the subject site)* – 388 VPD / 46 VPH	
Route 2		
Provide details for Route No 2	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the south	
Percentage of Vehicular Movements via Route No 2	30% Stage 1 – 64 VPD / 7 VPH Stage 2 *(subject site)* – 108 VPD / 14 VPH Stages 1&2 *(inclusive of the subject site)* – 172 VPD / 21 VPH	
Stage 1-3 – year 2023		

Route 1	
Provide details for Route No 1	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the north
Percentage of Vehicular Movements via Route No 1	70%Stages 1-3 *(inclusive of the subject site)* – 583 VPD / 86 VPH
Route 2	
Provide details for Route No 2	Access / Egress from / to Robertson Road > Road 01 > South Western Highway to the south
Percentage of Vehicular Movements via Route No 2	30% Stages 1-3 *(inclusive of the subject site)* – 250 VPD / 37 VPH
All stages – year 2031	
Route 1	
Provide details for Route No 1	To/from the north
Percentage of Vehicular Movements via Route No 1	70% (1,125 VPD / 195 VPH): • 30% (483 VPD / 84 VPH) via Road 01 and South Western Highway • 40% (642 VPD / 111 VPH) via Robertson Road, Cardup Siding Road and South Western Highway
Route 2	
Provide details for Route No 2	To/from the south
Percentage of Vehicular Movements via Route No 2	25% (402 VPD / 70 VPH): • 6.5% (104 VPD / 19 VPH) via Robertson Road > Road 01 > South Western Highway • 15% (241 VPD / 42 VPH) via Robertson Road > Cardup Siding Road > South Western Highway • 3.5% (57 VPD / 9 VPH) via Robertson Road > Cardup Siding Road > Soldiers Road
Route 3	
Provide details for Route No 3	To/from the west
Percentage of Vehicular Movements via Route No 3	5% (81 VPD / 14 VPH) via Robertson Road and Cardup Siding Road

3. Traffic Volumes

Nominate the source(s) for obtaining the traffic data	MRWA website reporting centre; Shire of Serpentine-Jarrahdale
Nominate the assessment year(s)	2021 - for existing intersections; 2023 and 2031 - all intersections The assessment years of 2023 and 2031 were taken from the Cardup Business Park - Transport Impact Assessment Report (by Cardno - April 2014). The above document suggests these years as interim and ultimate scenario with 50% and 100% development completed respectively. KCTT have utilised Interim Scenario turning movements shown in this document for intersections M02 and M03 with adjusting factors applied. The document states that approximately 22,000 VPD at South Western Highway, 6,500 VPD on Soldiers Road and 2,600 on Cardup Siding Road are expected in 2023. Since the latest traffic counts suggest that approximately 8,700 vehicles travel on this section of the South Western Highway, KCTT believe that it is highly unlikely volumes will reach the above numbers in the 5-year period, given it would take for traffic to grow over 20% annually to reach these volumes in 2023. Therefore, following factors have been applied to the turning movements shown in Cardup Business Park - Proposed Local Structure Plan - Traffic Impact Assessment - April 2014, Page 21 - Interim Scenario (2023) Traffic Flow Model Output: • 0.5 and 0.75 factors to the South Western Highway through movements for 2023 and 2031 respectively • 0.75 and 1.0 factors to Cardup Siding Road and Soldiers Road all turning movements for 2023 and 2031 respectively. Refer to below section for the turning movements used in SIDRA models.
Annual traffic growth rate used for analysis	2% for estimating volumes to derive volumes anticipated in 2021. The turning movements used in SIDRA models (above factors applied to the Cardup Business Park TIA turning movements) correspond to approximately 6% annual growth rate for estimating volumes in 2023 and 2031. This can also be considered as an optimistic scenario, given South Western Highway volumes have shown a decline from 2014 to 2018 (South of Nettleton Road - 9,186 VPD in 2014 and 10,197 VPD in 2017 as opposed to 8,370 VPD in 2018). However, since the entire surrounding area is still expected to go through significant changes, KCTT believe that a 6% annual growth rate will provide a useful insight into future traffic volumes at the subject intersections.

Road Name	Location of Traffic Count	Vehicles Per Day (VPD)	Vehicles per Peak Hour (VPH)**				Heavy Vehicle %	Year	
			AM Peak Time	AM Peak VPH	PM Peak VPH	PM Peak Time	*If HV count is Not Available, are HV likely to be in higher volumes than generally expected?*	Date of Traffic Count	*If older than 3 years multiply with a growth rate to the year of 2021*
South Western Highway	South of Nettleton Road	11,447	08:00 – 959		15:00 – 1,137		18.0%	2020/ 2021	-
	South of Nettleton Road	11,447	08:00 – 959		15:00 – 1,137		18.0%	2020/ 2021	-
Soldiers Road	300m North of Karbro Drive*	3,226	08:00 – 361		16:00 – 259		6.2%	Feb 2019	3,356
	South of Cardup Siding Road*	N/A	07:00 – 142		16:00 – 242		*N/A - HV not likely to be in higher volumes than generally expected*	Aug 2018	N/A
	North of Cardup Siding Road*	N/A	07:00 – 117		16:00 – 142		*N/A - HV not likely to be in higher volumes than generally expected*	Aug 2018	N/A
Cardup Siding Road	West of Soldiers Road*	N/A	07:00 – 127		16:00 – 85		*N/A - HV not likely to be in higher volumes than generally expected*	Aug 2018	N/A
	Cardup Siding Road - Eastern end*	2,563	08:00 – 172		16:00 – 219		12.1%	Dec 2020	2,614

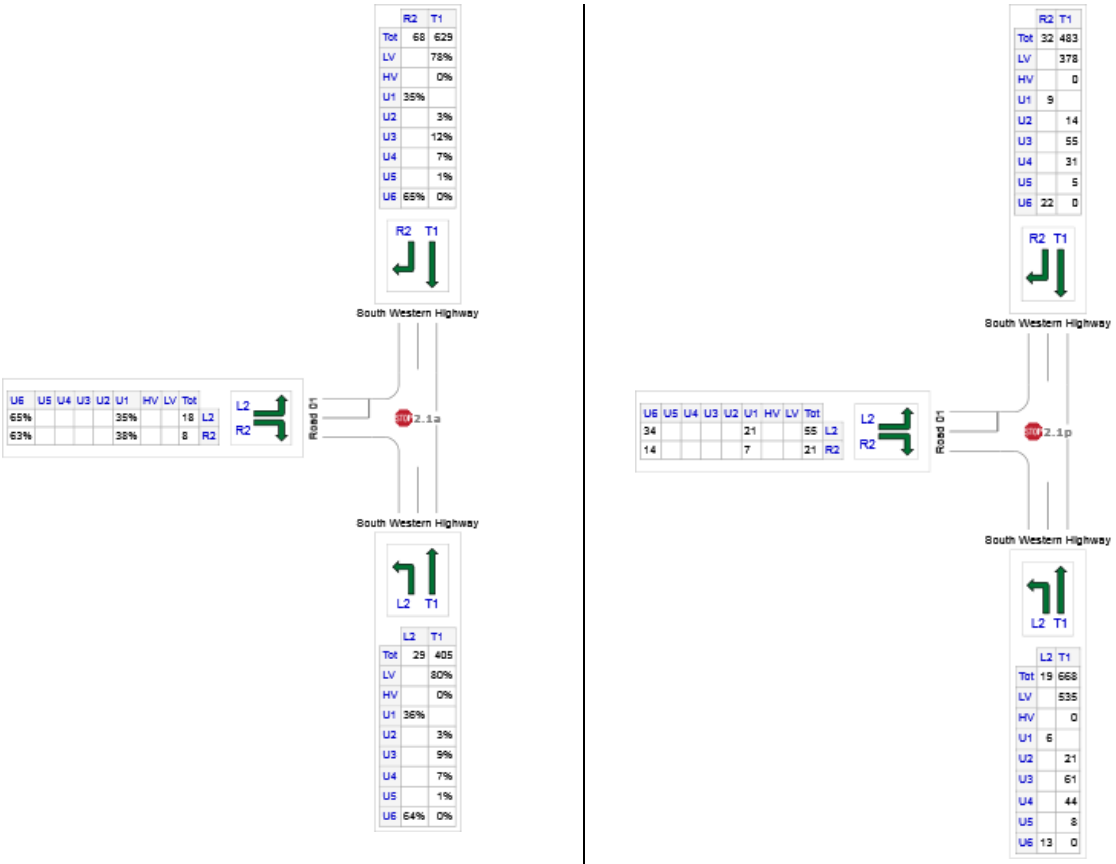
Note ** - KCTT have received these traffic counts from Shire of Serpentine-Jarrahdale*

Note ***- Where available development peak volumes (AM peak 08:00 - 09:00 / PM peak 16:00 - 17:00) used instead of network peak volumes.*

4. Demand Flows

Below are extracts from KCTT SIDRA models, showing demand flows with percentages for following user classes:

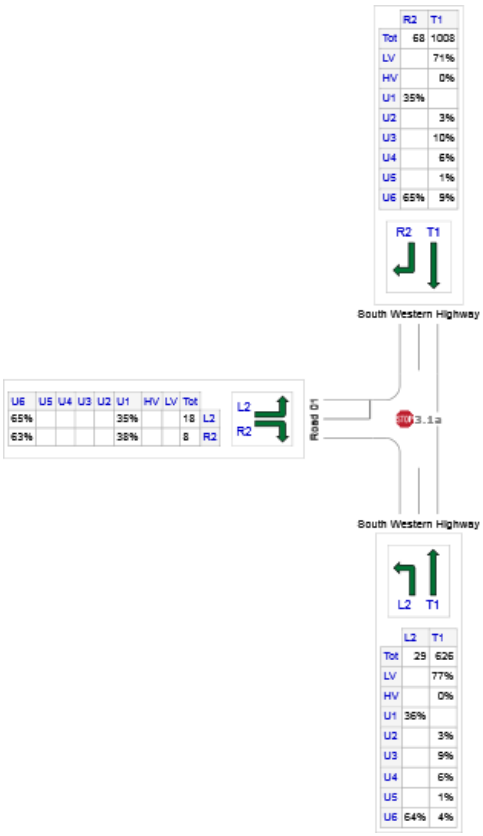
- U1 - Proposed development generated traffic (Stage 2)
- U2 - Austroads Class 2
- U3 - Austroads Class 3-5
- U4 - Austroads Class 6-9
- U5 - Austroads Class 10-11
- U6 - LSP Pinebrook stages other than Stage 2 (Stages 1 and 3 for 2023; All stages other than Stage 2 for 2031)



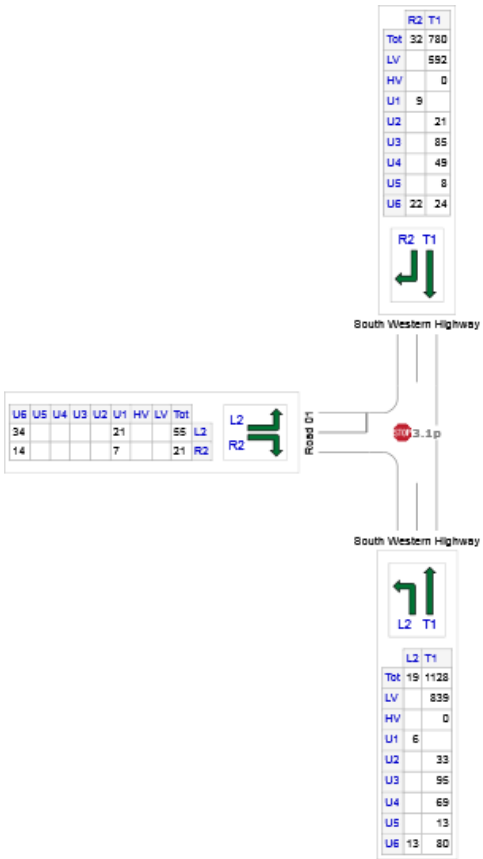
AM Peak

PM Peak

Figure 1 – South Western Highway / Road 01 - Demand Flows - 2023

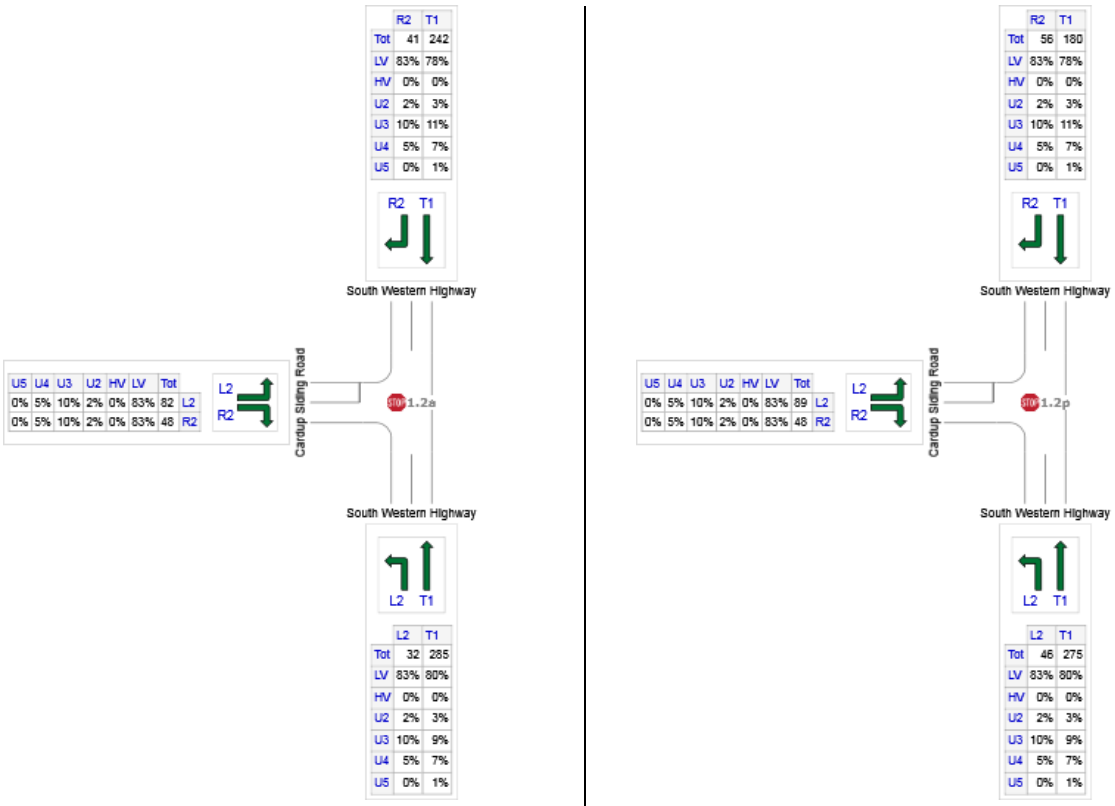


AM Peak



PM Peak

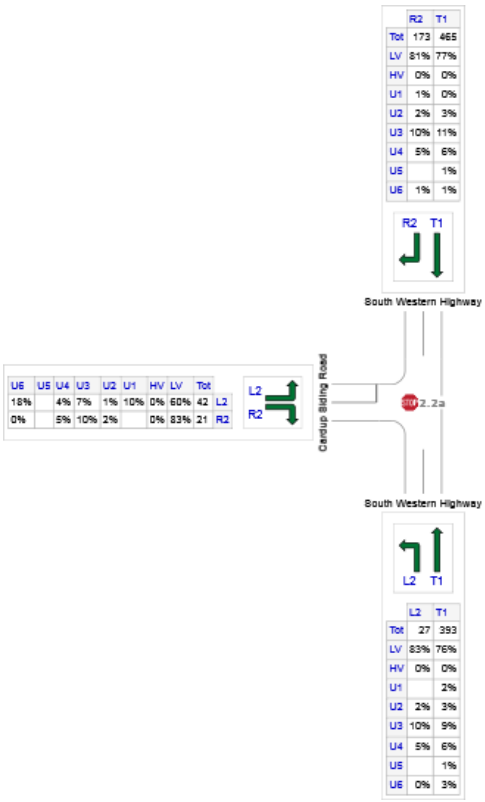
Figure 2 – South Western Highway / Road 01 - Demand Flows - 2031



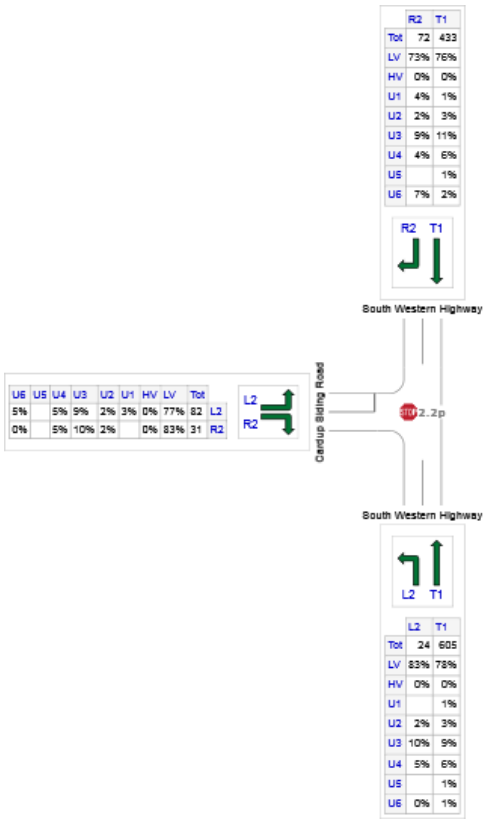
AM Peak

PM Peak

Figure 3 – South Western Highway / Cardup Siding Road - Demand Flows - 2021

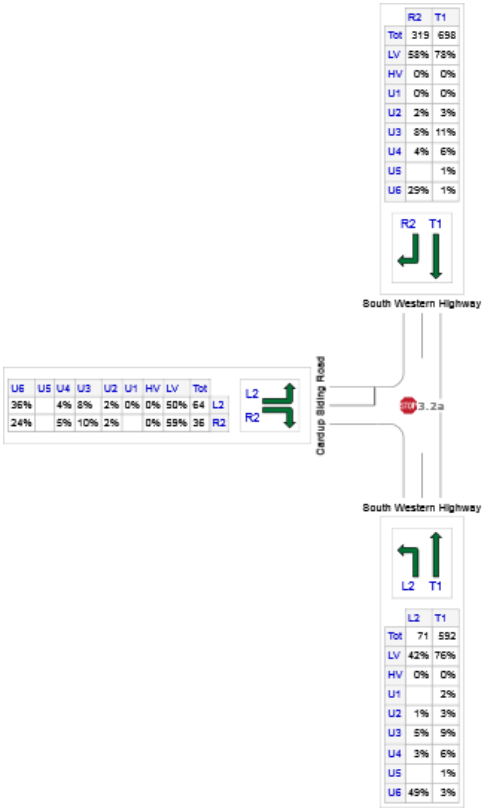


AM Peak

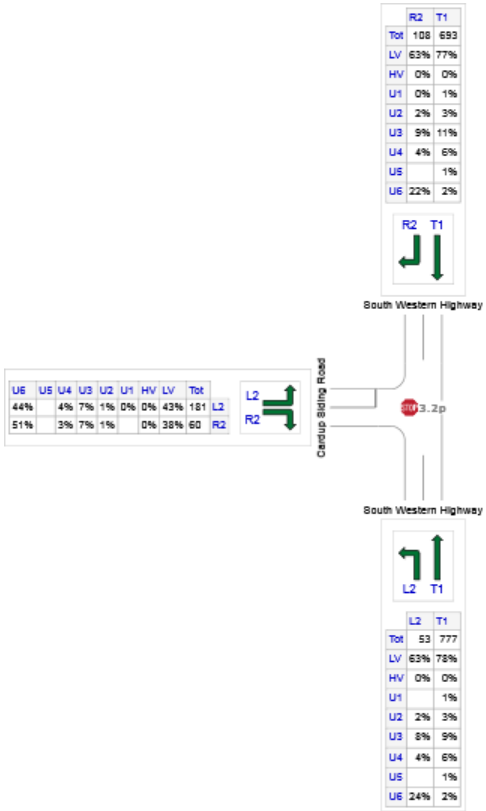


PM Peak

Figure 4 – South Western Highway / Cardup Siding Road - Demand Flows - 2023

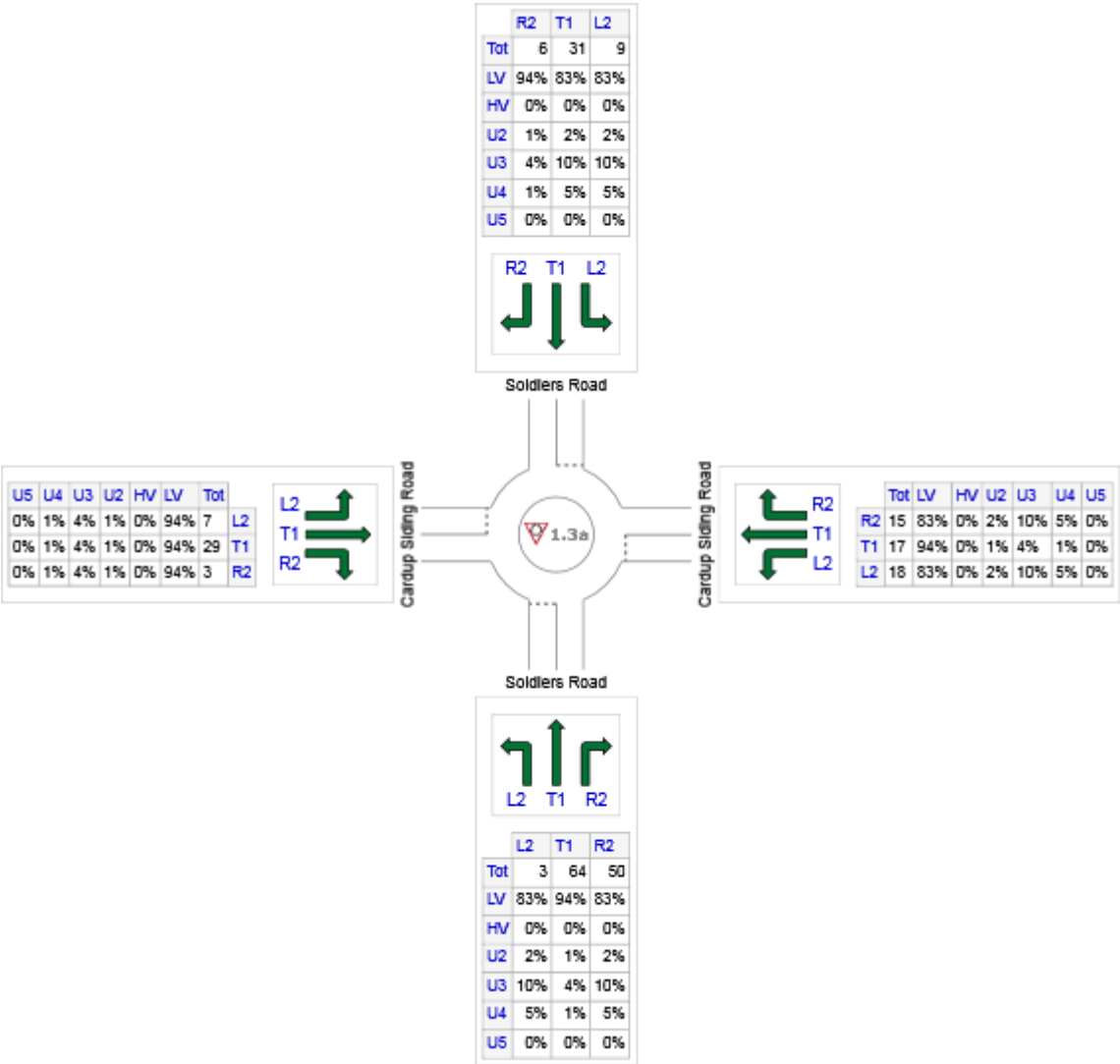


AM Peak



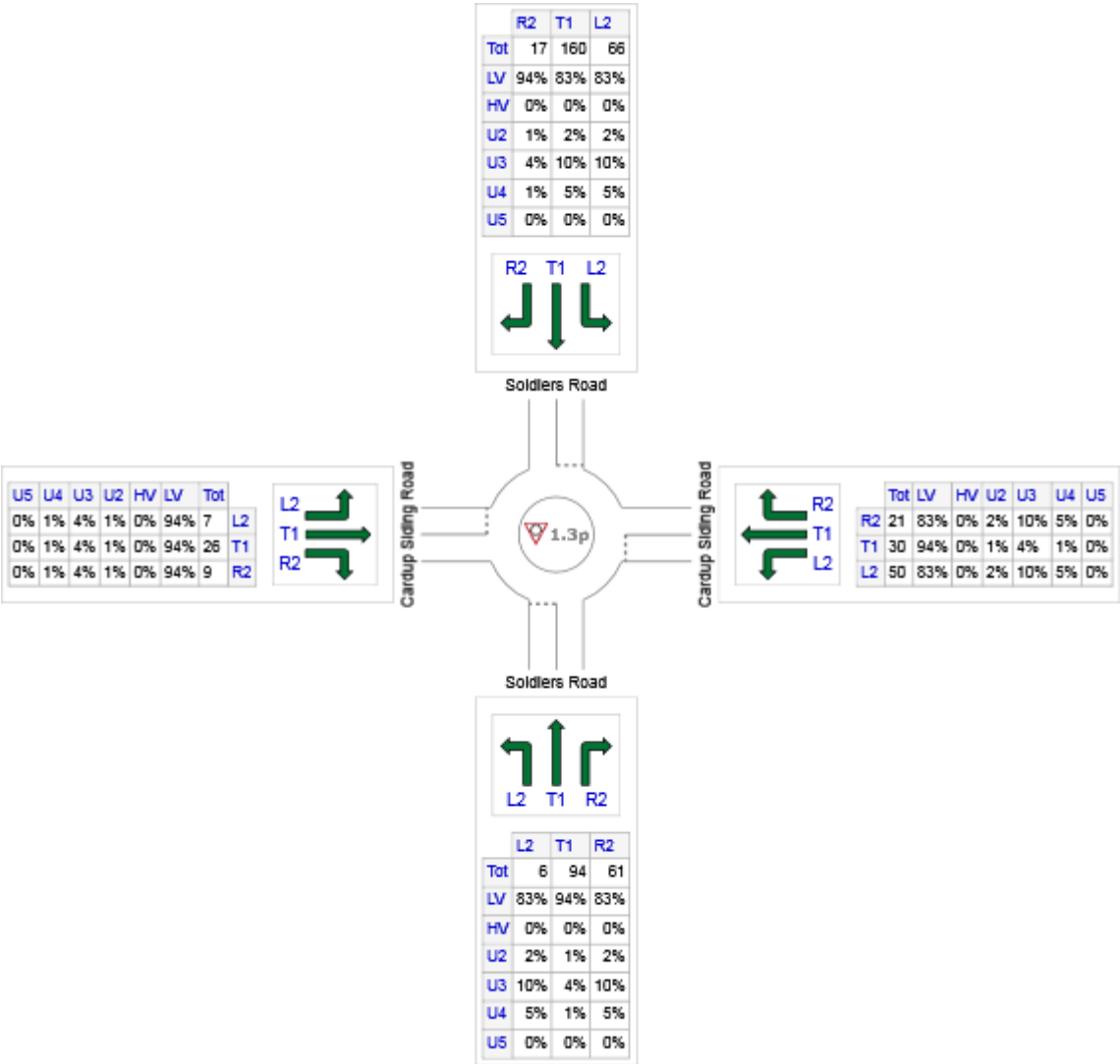
PM Peak

Figure 5 – South Western Highway / Cardup Siding Road - Demand Flows - 2031



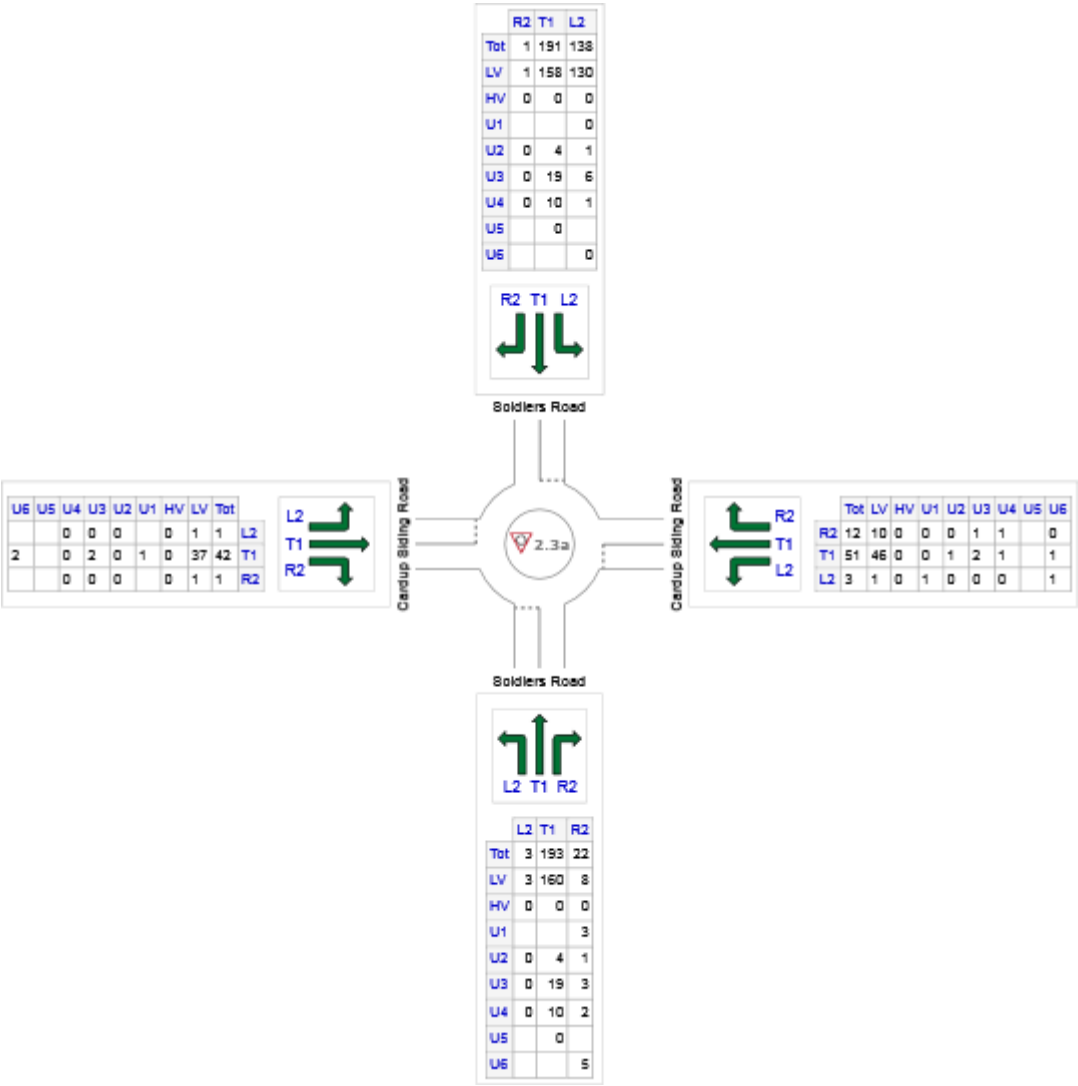
AM Peak

Figure 6 – Soldiers Road / Cardup Siding Road - Demand Flows - 2021



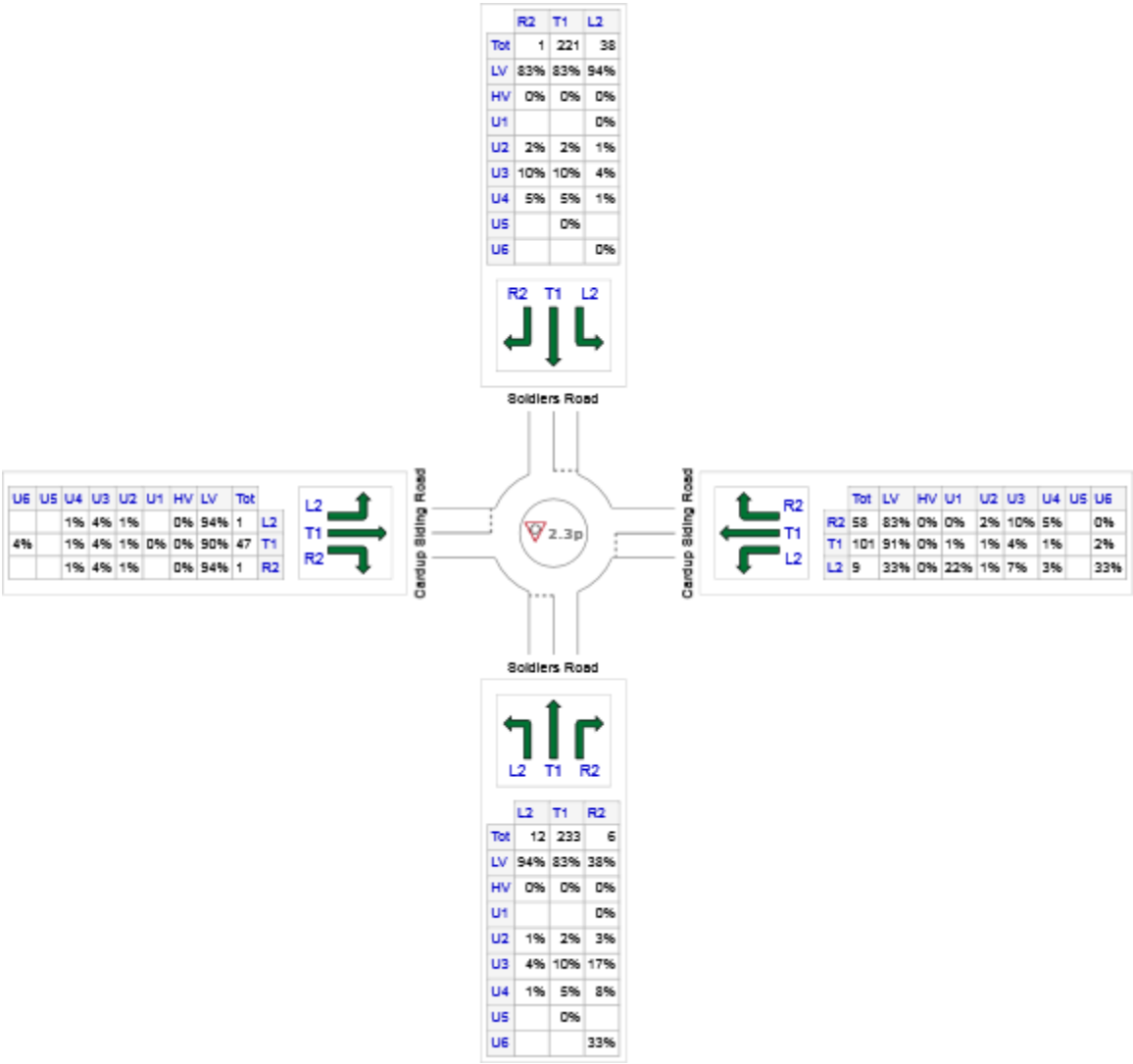
PM Peak

Figure 7 – Soldiers Road / Cardup Siding Road - Demand Flows - 2020



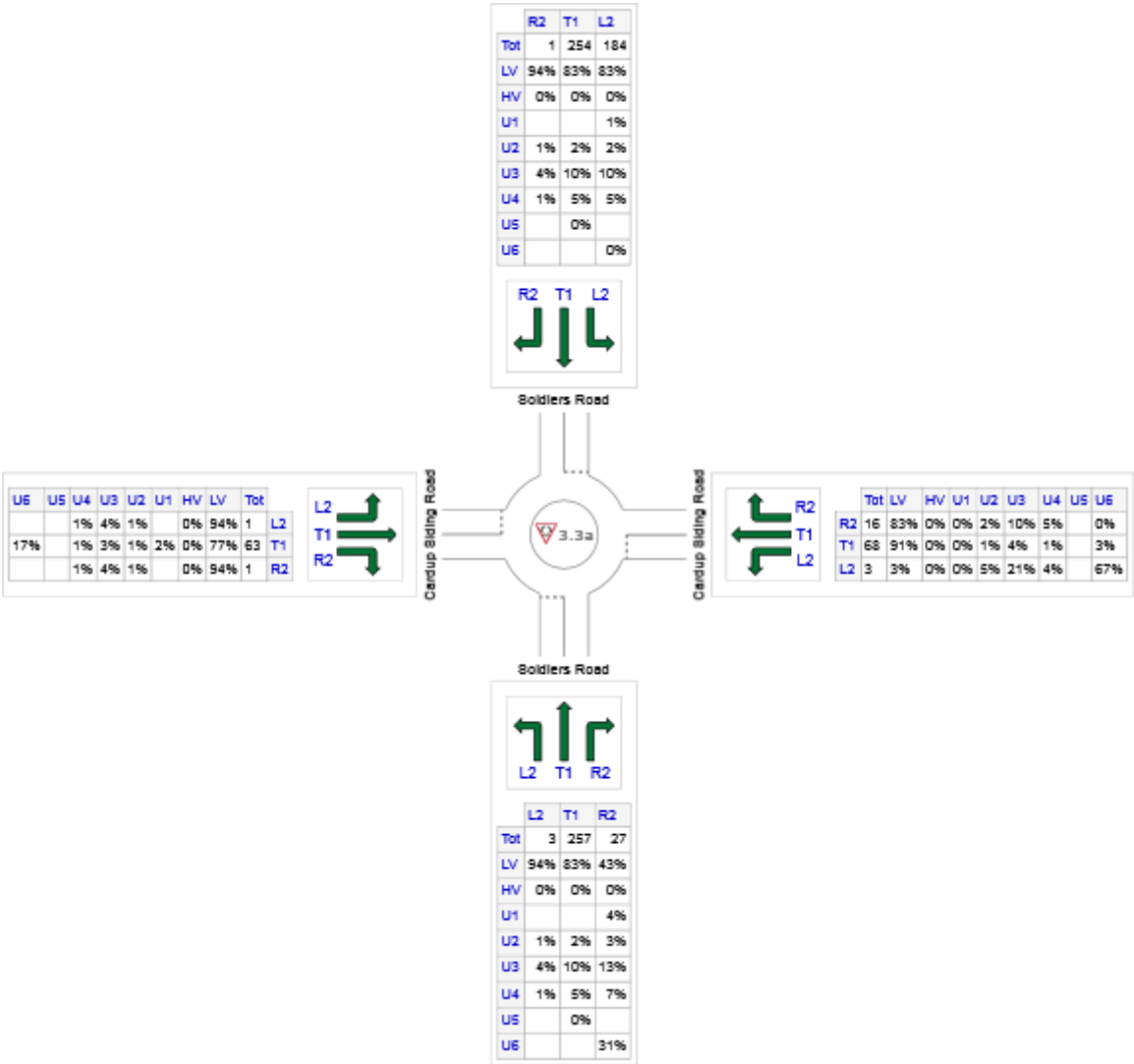
AM Peak

Figure 8 – Soldiers Road / Cardup Siding Road - Demand Flows - 2023



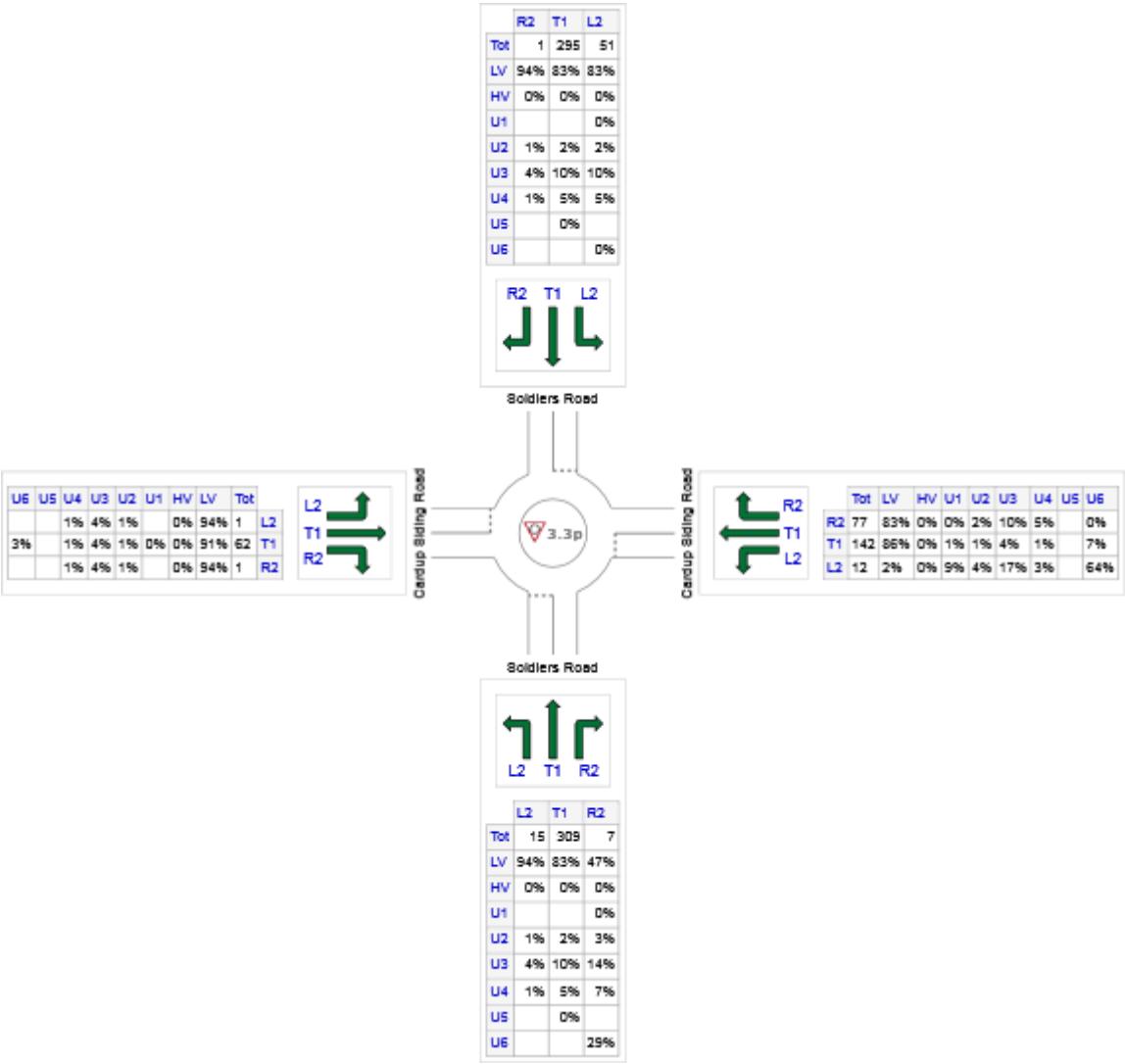
PM Peak

Figure 9 – Soldiers Road / Cardup Siding Road - Demand Flows - 2023



AM Peak

Figure 10 – Soldiers Road / Cardup Siding Road - Demand Flows - 2031



PM Peak

Figure 11 – Soldiers Road / Cardup Siding Road - Demand Flows - 2031

5. Summary of Results

Nominate the analysed intersections and intersection controls	M01. South Western Highway - Road 01; Stop Sign Intersection M02. South Western Highway - Cardup Siding Road; Stop Sign Intersection M03. Soldiers Road - Cardup Siding Road; Roundabout
Describe the models analysed in SIDRA	The existing intersections were modelled as seen on the latest aerial imagery for assessment in 2021 and 2023. Left turn deceleration lane was added to Cardup Siding Road (northbound to South Western Highway) to help with alleviating impact of the growing through traffic on South Western Highway in 2031 model. The proposed intersection of Road 01 /South Western Highway was modelled as per received plans for the proposed development. These plans include right and left-turn deceleration lanes from South Western Highway onto Road 01. For 2031 model, a short-left turn is proposed on Road 01.
Describe the Level of Service and Delay results	M01. South Western Highway - Road 01. The intersection is expected to operate at a satisfactory LOS in both peak times in 2023 and 2031. LOS F is expected in 2031 PM peak at the Road 01 approach to South Western Highway. The expected maximum queue length of 10.5m is not concerning as it equates to a maximum of 2 cars in the queue. However, due to the high traffic volume on SWH, there are higher delays (approximately 139s) on this right-turn lane of this approach. The Orton Road extension is expected to alleviate this issue (expected roundabout). When this is completed, the intersection of Road 01 and SWH should be restricted to Left In / Left Out. M02. South Western Highway - Cardup Siding Road. The intersection is expected to operate at a satisfactory LOS in 2021 and 2023 peak times. Model for 2031 shows LOS F at the right-turn lane from Cardup Siding Road to South Western Highway. This is mostly due to high through traffic volumes on SWH. However, the maximum queue is expected to be up to 17m which equates to approximately 3 vehicles. This is not a concerning queue in the network peak hour. It should be noted that no traffic from the Stage 2 proposed development is expected to make this right-turn. Therefore, the proposed development will not have any negative impact on this intersection. M03. Soldiers Road - Cardup Siding Road. The intersection is expected to operate at a satisfactory LOS A in all assessment years. No issues are expected in any scenario.
Conclusion	KCTT believe that the proposed development will not have a significant negative impact on the surrounding road network. There are some poor LOS results in 2031 PM peak on Road 01 approach (right turn onto South Western Highway). However, with the Orton Road extension completed (expected roundabout with South Western Highway), it is expected that this intersection will be downgraded to a LILO intersection. Therefore, there will be no issues with the mentioned right-turn onto South Western Highway. It should be noted that South Western Highway through lanes will operate without any delays, and turn lanes with LOS A or LOS B. Therefore, the entire Pinebrook LSP will not have a negative impact on this important arterial road.

A summary of the results of the SIDRA analysis are shown on the following pages. For purposes of clarity, we will provide

intersection summaries below. The full SIDRA output report can be provided on request.

Note - SIDRA graphic is not an accurate representation of the intersection geometry. It is a simplified tool and its main purpose is to roughly illustrate main intersection elements. The graphic might show median breaks where there are none in reality, oversized splitter islands and central islands for roundabouts etc. The graphic representation does not influence the calculations nor any other output.*

6. SIDRA Intersection Analysis – Output

6.1 M01 South Western Highway / Road 01

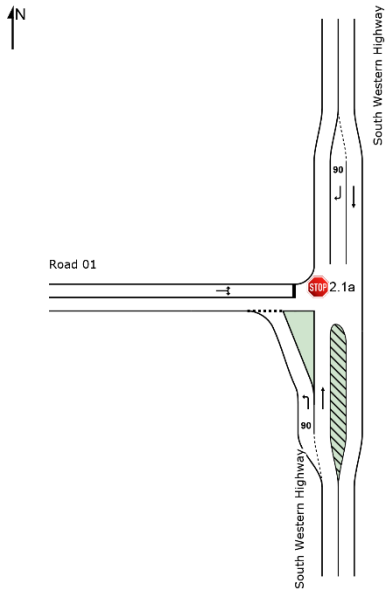


Figure 12 – South Western Highway / Road 01 – year 2023 - proposed configuration

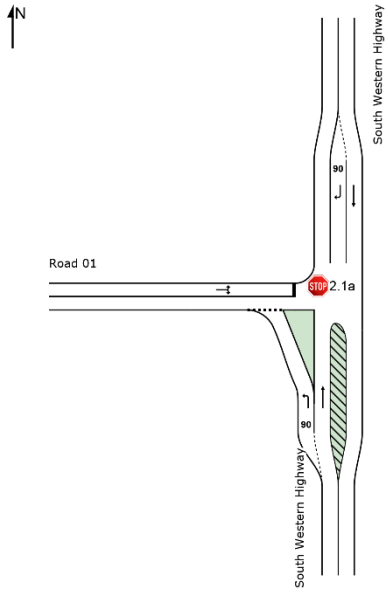


Figure 13 – South Western Highway / Road 01 – year 2031 - proposed configuration

6.1.1 2.1a South Western Highway / Road 01 – 2023 AM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	29	0.0	1546	0.019	100	7.5	LOS A	0.1	0.5	Short	90	0.0	NA
Lane 2	405	16.7	1553	0.261	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	435	15.6		0.261		0.6	LOS A	0.1	0.5				
North: South Western Highway													
Lane 1	629	19.1	1518	0.415	100	0.1	LOS A	0.0	0.0	Full	480	0.0	0.0
Lane 2	68	0.0	1582	0.043	100	7.9	LOS A	0.2	1.5	Short	90	0.0	NA
Approach	698	17.2		0.415		0.9	NA	0.2	1.5				
West: Road 01													
Lane 1	26	0.0	602	0.044	100	11.8	LOS B	0.1	1.0	Full	100	0.0	0.0
Approach	26	0.0		0.044		11.8	LOS B	0.1	1.0				
Intersection	1159	16.2		0.415		1.0	NA	0.2	1.5				

Figure 14 – LOS Table (Model 2.1a South Western Highway / Road 01 – 2023 AM)

6.1.2 2.1p South Western Highway / Road 01 – 2023 PM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	19	0.0	1595	0.012	100	7.4	LOS A	0.0	0.3	Short	90	0.0	NA
Lane 2	668	16.9	1548	0.432	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	687	16.4		0.432		0.3	LOS A	0.0	0.3				
North: South Western Highway													
Lane 1	483	18.9	1521	0.318	100	0.1	LOS A	0.0	0.0	Full	480	0.0	0.0
Lane 2	32	0.0	1090	0.029	100	9.3	LOS A	0.1	0.9	Short	90	0.0	NA
Approach	515	17.7		0.318		0.6	NA	0.1	0.9				
West: Road 01													
Lane 1	76	0.0	491	0.154	100	13.8	LOS B	0.5	3.7	Full	100	0.0	0.0
Approach	76	0.0		0.154		13.8	LOS B	0.5	3.7				
Intersection	1278	16.0		0.432		1.3	NA	0.5	3.7				

Figure 15 – LOS Table (Model 2.1p South Western Highway / Road 01 – 2023 PM)

6.1.3 3.1a South Western Highway / Road 01 – 2031 AM

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	29	0.0	1546	0.019	100	7.5	LOS A	0.1	0.5	Short	90	0.0	NA
Lane 2	626	16.1	1565	0.400	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	656	15.4		0.400		0.4	LOS A	0.1	0.5				
North: South Western Highway													
Lane 1	1008	16.9	1555	0.648	100	0.3	LOS A	0.0	0.0	Full	480	0.0	0.0
Lane 2	68	0.0	1173	0.058	100	9.2	LOS A	0.3	1.9	Short	90	0.0	NA
Approach	1077	15.8		0.648		0.9	NA	0.3	1.9				
West: Road 01													
Lane 1	18	0.0	810	0.022	100	10.7	LOS B	0.1	0.6	Short	60	0.0	NA
Lane 2	8	0.0	78	0.108	100	48.6	LOS E	0.3	2.0	Full	100	0.0	0.0
Approach	26	0.0		0.108		22.8	LOS C	0.3	2.0				
Intersection	1759	15.4		0.648		1.0	NA	0.3	2.0				

Figure 16 – LOS Table (Model 3.1a South Western Highway / Road 01 – 2031 AM)

6.1.4 3.1p South Western Highway / Road 01 – 2031 PM

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	19	0.0	1595	0.012	100	7.4	LOS A	0.0	0.3	Short	90	0.0	NA
Lane 2	1128	15.7	1573	0.718	100	0.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	1147	15.4		0.718		0.6	LOS A	0.0	0.3				
North: South Western Highway													
Lane 1	780	18.3	1533	0.509	100	0.2	LOS A	0.0	0.0	Full	480	0.0	0.0
Lane 2	32	0.0	396	0.080	100	16.4	LOS C	0.3	2.0	Short	90	0.0	NA
Approach	812	17.6		0.509		0.8	NA	0.3	2.0				
West: Road 01													
Lane 1	55	0.0	231	0.237	100	24.8	LOS C	0.8	5.5	Short	60	0.0	NA
Lane 2	21	0.0	38	0.560	100	138.9	LOS F	1.5	10.5	Full	100	0.0	0.0
Approach	76	0.0		0.560		56.5	LOS F	1.5	10.5				
Intersection	2035	15.7		0.718		2.7	NA	1.5	10.5				

Figure 17 – LOS Table (Model 3.1p South Western Highway / Road 01 – 2031 PM)

6.2 M02 South Western Highway / Cardup Siding Road

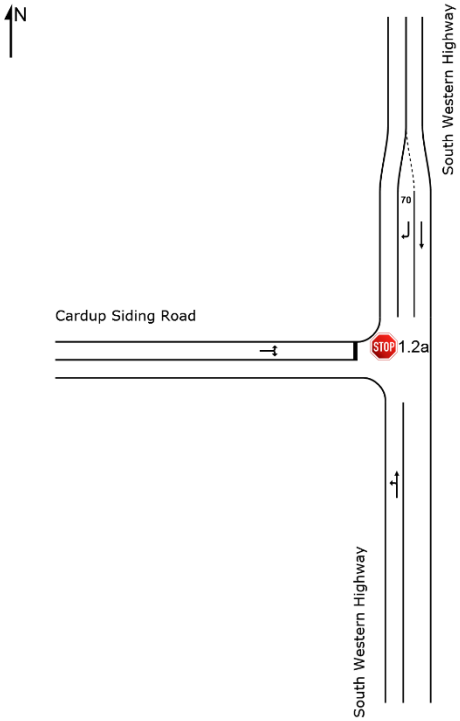


Figure 18 – South Western Highway / Cardup Siding Road - years 2021 and 2023 - current configuration

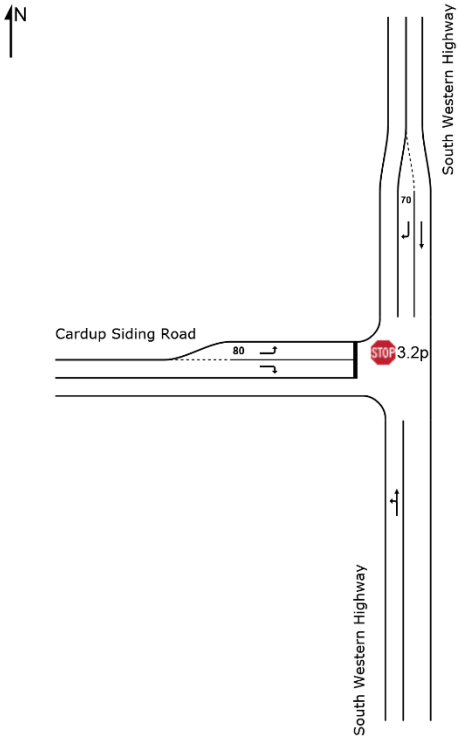


Figure 19 – South Western Highway / Cardup Siding Road - year 2031 - proposed configuration

6.2.1 1.2a South Western Highway / Cardup Siding Road – 2021 AM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	317	16.7	1523	0.208	100	0.8	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	317	16.7		0.208		0.8	NA	0.0	0.0				
North: South Western Highway													
Lane 1	242	18.9	1473	0.165	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	41	15.0	1535	0.027	100	8.1	LOS A	0.1	1.2	Short	70	0.0	NA
Approach	284	18.3		0.165		1.2	NA	0.1	1.2				
West: Cardup Siding Road													
Lane 1	130	15.0	842	0.154	100	11.1	LOS B	0.6	5.2	Full	400	0.0	0.0
Approach	130	15.0		0.154		11.1	LOS B	0.6	5.2				
Intersection	731	17.0		0.208		2.8	NA	0.6	5.2				

Figure 20 – LOS Table (Model 1.2a South Western Highway / Cardup Siding Road – 2021 AM)

6.2.2 1.2p South Western Highway / Cardup Siding Road – 2021 PM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	321	16.6	1523	0.211	100	1.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	321	16.6		0.211		1.1	NA	0.0	0.0				
North: South Western Highway													
Lane 1	180	18.9	1475	0.122	100	0.0	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	56	15.0	1529	0.037	100	8.1	LOS A	0.2	1.6	Short	70	0.0	NA
Approach	236	18.0		0.122		1.9	NA	0.2	1.6				
West: Cardup Siding Road													
Lane 1	137	15.0	893	0.154	100	10.9	LOS B	0.6	5.3	Full	400	0.0	0.0
Approach	137	15.0		0.154		10.9	LOS B	0.6	5.3				
Intersection	694	16.8		0.211		3.3	NA	0.6	5.3				

Figure 21 – LOS Table (Model 1.2p South Western Highway / Cardup Siding Road – 2021 PM)

6.2.3 2.2a South Western Highway / Cardup Siding Road – 2023 AM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	420	16.1	1538	0.273	100	0.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	420	16.1		0.273		0.5	NA	0.0	0.0				
North: South Western Highway													
Lane 1	465	18.7	1475	0.315	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	173	14.7	1347	0.128	100	8.7	LOS A	0.7	5.7	Short	70	0.0	NA
Approach	638	17.6		0.315		2.4	NA	0.7	5.7				
West: Cardup Siding Road													
Lane 1	63	12.3	553	0.114	100	13.5	LOS B	0.4	3.3	Full	400	0.0	0.0
Approach	63	12.3		0.114		13.5	LOS B	0.4	3.3				
Intersection	1121	16.7		0.315		2.3	NA	0.7	5.7				

Figure 22 – LOS Table (Model 2.2a South Western Highway / Cardup Siding Road – 2023 AM)

6.2.4 2.2p South Western Highway / Cardup Siding Road – 2023 PM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	629	16.5	1531	0.411	100	0.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	629	16.5		0.411		0.4	NA	0.0	0.0				
North: South Western Highway													
Lane 1	433	18.3	1482	0.292	100	0.1	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	72	13.2	989	0.072	100	9.9	LOS A	0.3	2.8	Short	70	0.0	NA
Approach	504	17.6		0.292		1.5	NA	0.3	2.8				
West: Cardup Siding Road													
Lane 1	113	14.2	453	0.249	100	16.3	LOS C	0.9	8.1	Full	400	0.0	0.0
Approach	113	14.2		0.249		16.3	LOS C	0.9	8.1				
Intersection	1246	16.7		0.411		2.3	NA	0.9	8.1				

Figure 23 – LOS Table (Model 2.2p South Western Highway / Cardup Siding Road – 2023 PM)

6.2.5 3.2a South Western Highway / Cardup Siding Road – 2031 AM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	662	15.1	1556	0.426	100	0.9	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	662	15.1		0.426		0.9	NA	0.0	0.0				
North: South Western Highway													
Lane 1	698	18.0	1488	0.469	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	319	11.7	964	0.331	100	11.0	LOS B	1.9	15.8	Short	70	0.0	NA
Approach	1017	16.0		0.469		3.6	NA	1.9	15.8				
West: Cardup Siding Road													
Lane 1	64	12.7	735	0.087	100	12.5	LOS B	0.3	2.9	Short	80	0.0	NA
Lane 2	36	15.6	89	0.402	100	56.2	LOS F	1.2	10.4	Full	400	0.0	0.0
Approach	100	13.7		0.402		28.1	LOS D	1.2	10.4				
Intersection	1779	15.5		0.469		4.0	NA	1.9	15.8				

Figure 24 – LOS Table (Model 3.2a South Western Highway / Cardup Siding Road – 2031 AM)

6.2.6 3.2p South Western Highway / Cardup Siding Road – 2031 PM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: South Western Highway													
Lane 1	829	16.1	1538	0.539	100	0.7	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	829	16.1		0.539		0.7	NA	0.0	0.0				
North: South Western Highway													
Lane 1	693	17.6	1498	0.462	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Lane 2	108	12.8	678	0.160	100	12.3	LOS B	0.7	5.7	Short	70	0.0	NA
Approach	801	17.0		0.462		1.8	NA	0.7	5.7				
West: Cardup Siding Road													
Lane 1	181	11.1	510	0.355	100	17.1	LOS C	1.6	13.4	Short	80	0.0	NA
Lane 2	60	10.0	94	0.637	100	66.9	LOS F	2.1	17.1	Full	400	0.0	0.0
Approach	241	10.8		0.637		29.5	LOS D	2.1	17.1				
Intersection	1872	15.8		0.637		4.9	NA	2.1	17.1				

Figure 25 – LOS Table (Model 3.2p South Western Highway / Cardup Siding Road – 2031 PM)

6.3 M03 Soldiers Road / Cardup Siding Road

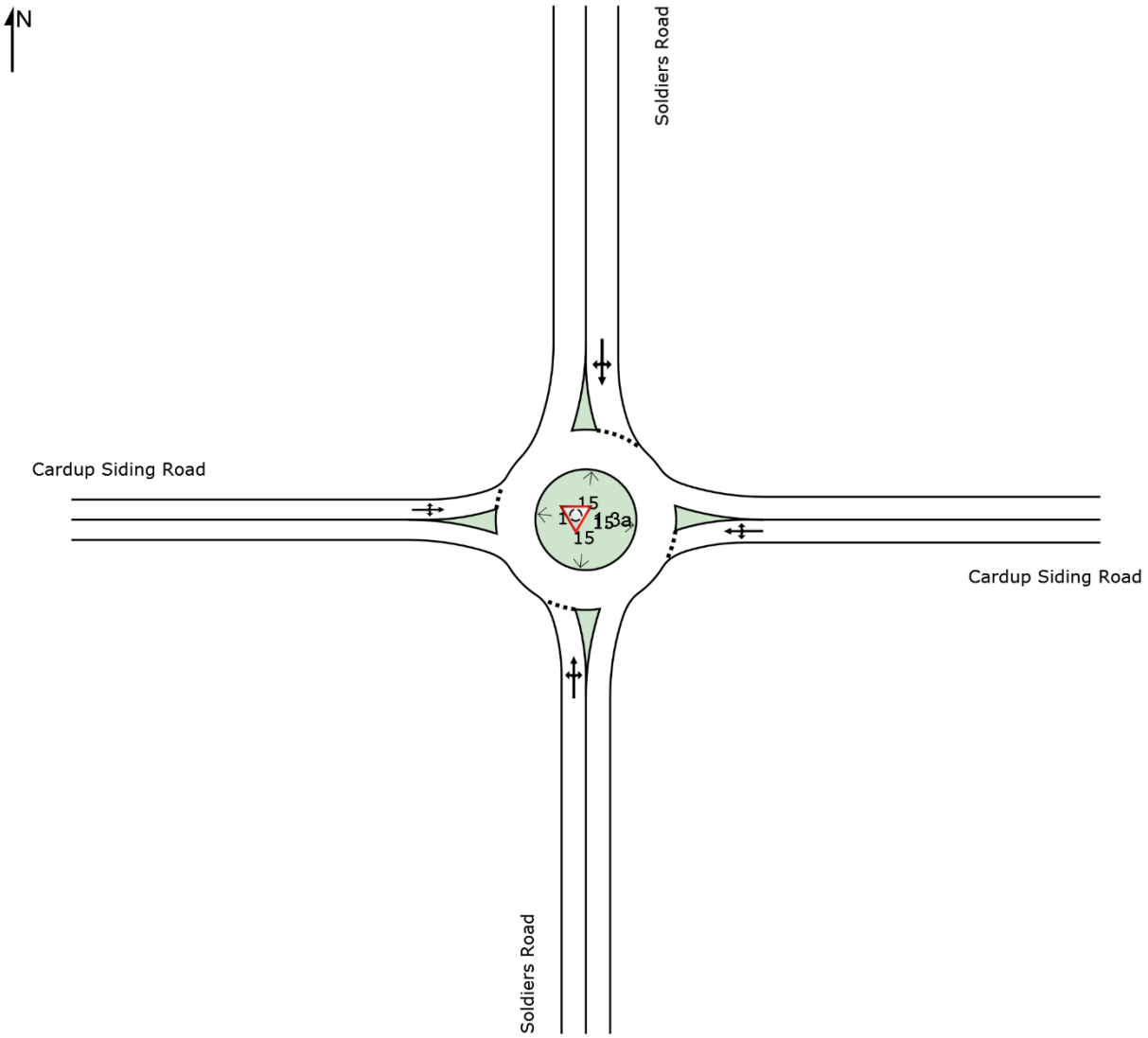


Figure 26 – Soldiers Road / Cardup Siding Road - years 2021, 2023 and 2031 - current configuration

6.3.1 1.3a Soldiers Road / Cardup Siding Road – 2021 AM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Soldiers Road													
Lane 1 d	117	9.6	1292	0.091	100	6.3	LOS A	0.5	3.7	Full	250	0.0	0.0
Approach	117	9.6		0.091		6.3	LOS A	0.5	3.7				
East: Cardup Siding Road													
Lane 1 d	49	11.6	1206	0.041	100	5.8	LOS A	0.2	1.6	Full	400	0.0	0.0
Approach	49	11.6		0.041		5.8	LOS A	0.2	1.6				
North: Soldiers Road													
Lane 1 d	46	13.8	1138	0.040	100	7.2	LOS A	0.2	1.3	Full	500	0.0	0.0
Approach	46	13.8		0.040		7.2	LOS A	0.2	1.3				
West: Cardup Siding Road													
Lane 1 d	39	5.0	1105	0.035	100	5.6	LOS A	0.2	1.5	Full	160	0.0	0.0
Approach	39	5.0		0.035		5.6	LOS A	0.2	1.5				
Intersection	251	10.0		0.091		6.3	LOS A	0.5	3.7				

Figure 27 – LOS Table (Model 1.3a Soldiers Road / Cardup Siding Road – 2021 AM)

6.3.2 1.3p Soldiers Road / Cardup Siding Road – 2021 PM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Soldiers Road													
Lane 1 d	161	9.2	1226	0.131	100	6.4	LOS A	0.8	5.8	Full	250	0.0	0.0
Approach	161	9.2		0.131		6.4	LOS A	0.8	5.8				
East: Cardup Siding Road													
Lane 1 d	102	12.0	1015	0.100	100	6.6	LOS A	0.6	4.2	Full	400	0.0	0.0
Approach	102	12.0		0.100		6.6	LOS A	0.6	4.2				
North: Soldiers Road													
Lane 1 d	242	14.3	1183	0.205	100	7.1	LOS A	0.9	7.8	Full	500	0.0	0.0
Approach	242	14.3		0.205		7.1	LOS A	0.9	7.8				
West: Cardup Siding Road													
Lane 1 d	41	5.0	1045	0.040	100	6.4	LOS A	0.2	1.7	Full	160	0.0	0.0
Approach	41	5.0		0.040		6.4	LOS A	0.2	1.7				
Intersection	546	11.7		0.205		6.7	LOS A	0.9	7.8				

Figure 28 – LOS Table (Model 1.3p Soldiers Road / Cardup Siding Road – 2021 PM)

6.3.3 2.3a Soldiers Road / Cardup Siding Road – 2023 AM

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Soldiers Road													
Lane 1 d	218	15.7	1194	0.182	100	5.3	LOS A	1.1	9.7	Full	250	0.0	0.0
Approach	218	15.7		0.182		5.3	LOS A	1.1	9.7				
East: Cardup Siding Road													
Lane 1 d	65	6.9	1029	0.063	100	6.4	LOS A	0.3	2.5	Full	400	0.0	0.0
Approach	65	6.9		0.063		6.4	LOS A	0.3	2.5				
North: Soldiers Road													
Lane 1 d	329	10.8	1280	0.257	100	6.5	LOS A	1.3	10.7	Full	500	0.0	0.0
Approach	329	10.8		0.257		6.5	LOS A	1.3	10.7				
West: Cardup Siding Road													
Lane 1 d	44	4.6	983	0.045	100	6.2	LOS A	0.3	1.9	Full	160	0.0	0.0
Approach	44	4.6		0.045		6.2	LOS A	0.3	1.9				
Intersection	657	11.6		0.257		6.1	LOS A	1.3	10.7				

Figure 29 – LOS Table (Model 2.3a Soldiers Road / Cardup Siding Road – 2023 AM)

6.3.4 2.3p Soldiers Road / Cardup Siding Road – 2023 PM

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Soldiers Road													
Lane 1 d	251	14.8	1016	0.246	100	5.9	LOS A	1.6	13.7	Full	250	0.0	0.0
Approach	251	14.8		0.246		5.9	LOS A	1.6	13.7				
East: Cardup Siding Road													
Lane 1 d	168	8.7	987	0.171	100	7.6	LOS A	1.0	7.3	Full	400	0.0	0.0
Approach	168	8.7		0.171		7.6	LOS A	1.0	7.3				
North: Soldiers Road													
Lane 1 d	260	13.5	1257	0.207	100	6.7	LOS A	1.1	9.0	Full	500	0.0	0.0
Approach	260	13.5		0.207		6.7	LOS A	1.1	9.0				
West: Cardup Siding Road													
Lane 1 d	49	4.8	902	0.055	100	6.7	LOS A	0.3	2.4	Full	160	0.0	0.0
Approach	49	4.8		0.055		6.7	LOS A	0.3	2.4				
Intersection	728	12.2		0.246		6.6	LOS A	1.6	13.7				

Figure 30 – LOS Table (Model 2.3p Soldiers Road / Cardup Siding Road – 2023 PM)

6.3.5 3.3a Soldiers Road / Cardup Siding Road – 2031 AM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Soldiers Road													
Lane 1 d	287	15.3	1160	0.248	100	5.5	LOS A	1.7	14.2	Full	250	0.0	0.0
Approach	287	15.3		0.248		5.5	LOS A	1.7	14.2				
East: Cardup Siding Road													
Lane 1 d	87	7.6	952	0.092	100	7.0	LOS A	0.5	3.8	Full	400	0.0	0.0
Approach	87	7.6		0.092		7.0	LOS A	0.5	3.8				
North: Soldiers Road													
Lane 1 d	439	14.9	1229	0.357	100	6.8	LOS A	2.1	17.1	Full	500	0.0	0.0
Approach	439	14.9		0.357		6.8	LOS A	2.1	17.1				
West: Cardup Siding Road													
Lane 1 d	65	4.3	903	0.072	100	6.8	LOS A	0.4	3.1	Full	160	0.0	0.0
Approach	65	4.3		0.072		6.8	LOS A	0.4	3.1				
Intersection	879	13.5		0.357		6.4	LOS A	2.1	17.1				

Figure 31 – LOS Table (Model 3.3a Soldiers Road / Cardup Siding Road – 2031 AM)

6.3.6 3.3p Soldiers Road / Cardup Siding Road – 2031 PM

Lane Use and Performance													
	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Soldiers Road													
Lane 1 d	332	14.7	943	0.351	100	6.6	LOS A	2.5	21.3	Full	250	0.0	0.0
Approach	332	14.7		0.351		6.6	LOS A	2.5	21.3				
East: Cardup Siding Road													
Lane 1 d	231	9.0	908	0.254	100	8.3	LOS A	1.6	11.7	Full	400	0.0	0.0
Approach	231	9.0		0.254		8.3	LOS A	1.6	11.7				
North: Soldiers Road													
Lane 1 d	346	15.0	1233	0.281	100	6.8	LOS A	1.6	13.6	Full	500	0.0	0.0
Approach	346	15.0		0.281		6.8	LOS A	1.6	13.6				
West: Cardup Siding Road													
Lane 1 d	64	5.0	801	0.080	100	7.6	LOS A	0.5	3.6	Full	160	0.0	0.0
Approach	64	5.0		0.080		7.6	LOS A	0.5	3.6				
Intersection	973	12.8		0.351		7.1	LOS A	2.5	21.3				

Figure 32 – LOS Table (Model 3.3p Soldiers Road / Cardup Siding Road – 2031 PM)