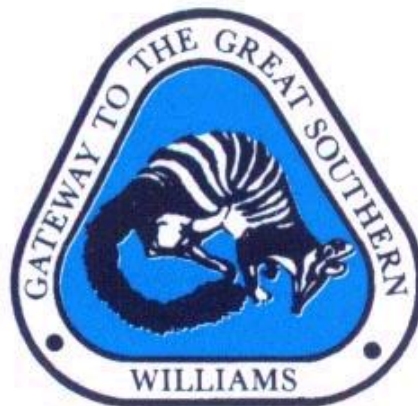



SHIRE OF WILLIAMS

Appendix 3 to CEO Report

Item 8.2.7 – Proposed Amendment 19 - Shire of Williams Town Planning Scheme No 2



**FOR THE ORDINARY MEETING
TO BE HELD ON
WEDNESDAY 20 APRIL 2022**



SHIRE OF WILLIAMS

Town Planning Scheme No. 2

Amendment No. 19

Lot 889 Albany Highway,
Williams



Harley Dykstra[®]

PLANNING & SURVEY SOLUTIONS





DOCUMENT CONTROL

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Prepared for: Williams Service Centre Pty Ltd
Prepared by: MK
Reviewed by: DM

Date: 4 April 2022
Job No: 21520
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APPENDIX D	Local Water Management Strategy

Planning and Development Act 2005

**RESOLUTION TO ADOPT
AMENDMENT TO LOCAL PLANNING SCHEME**

Shire of Williams
Town Planning Scheme No. 2

~~Amendment No. 17~~ **Amendment 19**

RESOLVED that the Council, in pursuance of section 75 of the *Planning and Development Act 2005*, amend the above local planning scheme by:

- (i) Amending Town Planning Scheme No. 2 to introduce the 'Service Commercial' zone.
- (ii) Re-zoning Lot 889 Albany Highway, Williams, from a 'Rural' zone to an 'Industrial' and 'Service Commercial' zone in accordance with the Scheme Amendment map.

The Amendment is complex under the provisions of the *Planning and Development (Local Planning Scheme) Regulations 2015* for the following reasons:

1. The Amendment is for a use of land not specifically referred to in the Town Planning Scheme No. 2.
2. The Amendment would not result in any significant environmental, social, economic or governance impacts on land in the Scheme area.

TPI Comment: The reasons for a complex amendment needs to be amended to reflect Council resolution

Dated this.....day of.....20...

.....
Chief Executive Officer



1 INTRODUCTION

This Local Planning Scheme Amendment, submitted on behalf of Williams Service Centre Pty Ltd, proposes to amend the Shire of Williams Town Planning Scheme No. 2 (TPS 2) to include the 'Service Commercial' zone and rezone Lot 889 Albany Highway, Williams, from 'Rural' to 'Service Commercial' and 'Industrial' per the concept subdivision plan at **Appendix A** of this document. To complement this application, detailed reporting has been conducted for Lot 889 including:

Appendix B – Traffic Review note (Cardno)

Appendix C – Bushfire Management Plan (Envision Bushfire Protection)

Appendix D - Local Water Management Strategy (Bayley Environmental Services)

The purpose of the proposed Industrial zone is to facilitate industrial development in the Shire of Williams and to cater for a range of quality industrial developments that will be integrated with the existing Industrial zone at the southern edge of the Williams townsite.

The purpose of the Service Commercial zone is to accommodate commercial activities which require good vehicle access and allow for a range of wholesales, showrooms, trade and services which are not generally appropriate in the town centre.

The layout of the proposed rezoning has been designed to contribute positively toward both the visitor experience for those entering Williams, and improved industry and economic outcomes for the Williams townsite and surrounding areas. Further, the diversified land use provides a proactive response to the current economic and employment environments of the local area.

The proposed rezoning will facilitate the establishment of a new land development opportunity within the district; a composite Industrial and Service Commercial precinct that seeks to satisfy the unmet needs of the businesses in the area. The Industrial and Service Commercial zones will be strategically located within proximity to the Williams townsite and the Albany Highway.



2 BACKGROUND AND SITE CONTEXT

2.1 Property Location and Characteristics

Lot 889 comprises an area of 17.2575 ha. The subject site is located on the eastern side of Albany Highway, approximately 1km south of the Williams town centre and 275m from the Williams townsite boundary, which extends to Narrogin Road.

In prior to preparing this Scheme Amendment application, a preliminary submission was presented to Council by the proponent for the information of decision makers and to offer opportunity for input prior to the formal application process. Comments received from this process are enclosed at **Appendix E**.

TPI Comment: Appendix E missing from document

An Aerial Locality Plan is included at **Figure 1**.



Figure 1 – Location Plan



The subject site is adjoined by Industrial zoned land to the north and east, which resulted from Scheme Amendment 16. A Zoning Plan depicting the subject site in the context of existing zonings within and surrounding the townsite, is shown at **Figure 2**.

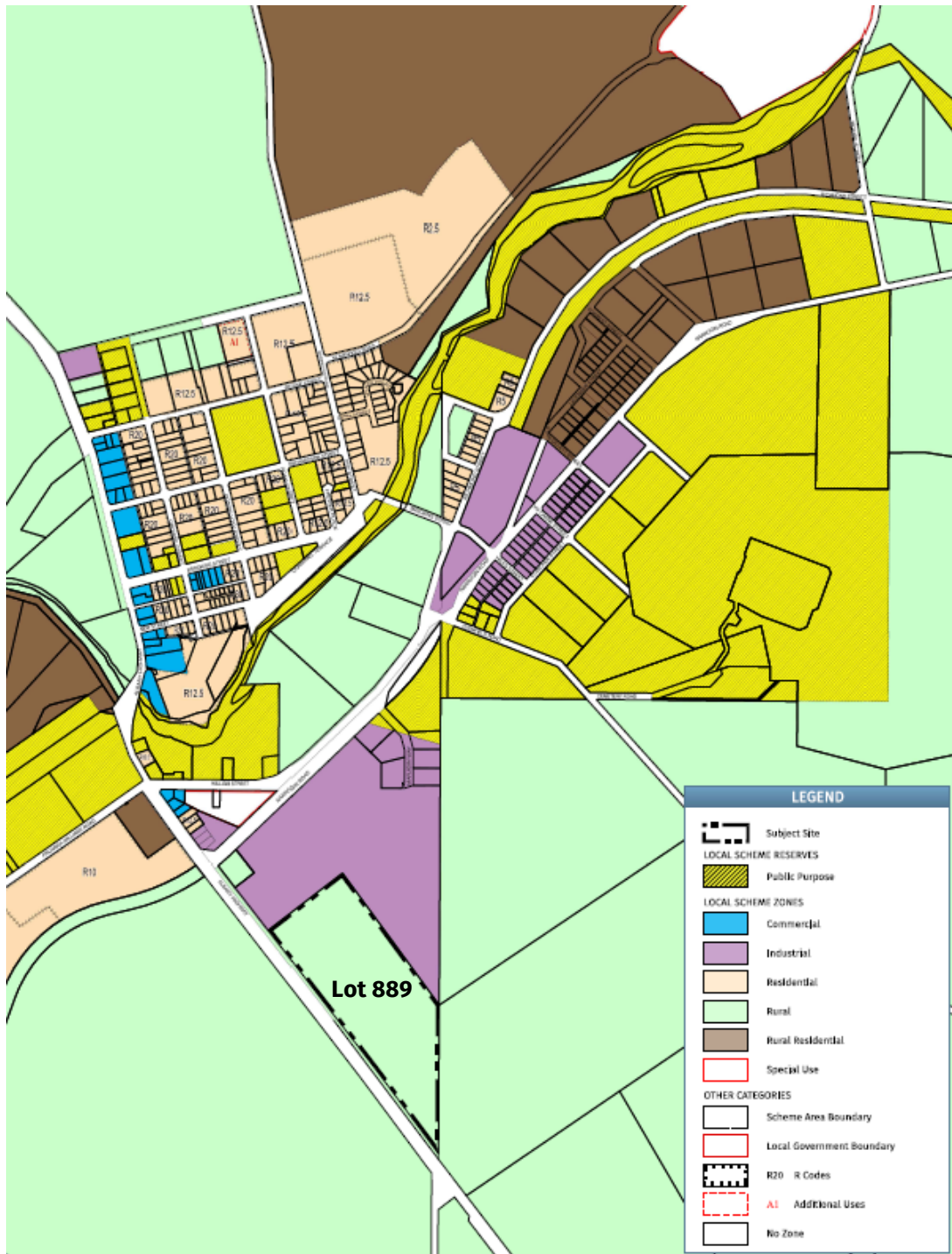


Figure 2 – Location and Zoning Plan



2.2 Property Details

The property details for Lot 889 are as follows:

LOT NUMBER:	DEPOSITED PLAN:	VOLUME/FOLIO:	LOT AREA:	REGISTERED PROPRIETOR:
889	416835	2984/755	17.2575ha	Williams Service Centre Pty Ltd

2.3 Land Use

Lot 889 currently hosts minimal farming infrastructure which was previously utilised when the site hosted agricultural uses. The site is characterised by grazing and cropping paddocks. An aerial image depicting Lot 889 is at **Figure 3**, below.



Figure 3 – Aerial image of Lot 889

Development consent issued by the Shire of Williams (Shire reference 10.60.15) for a service station in the north western corner of Lot 889 improves the site. The footprint for the approved service station is demonstrated in **Figure 4**. This service station approval was subject to an amendment to the consent in April 2021. Council delegation approved this modification of the consent. Currently, construction of the approved service station has not yet commenced.

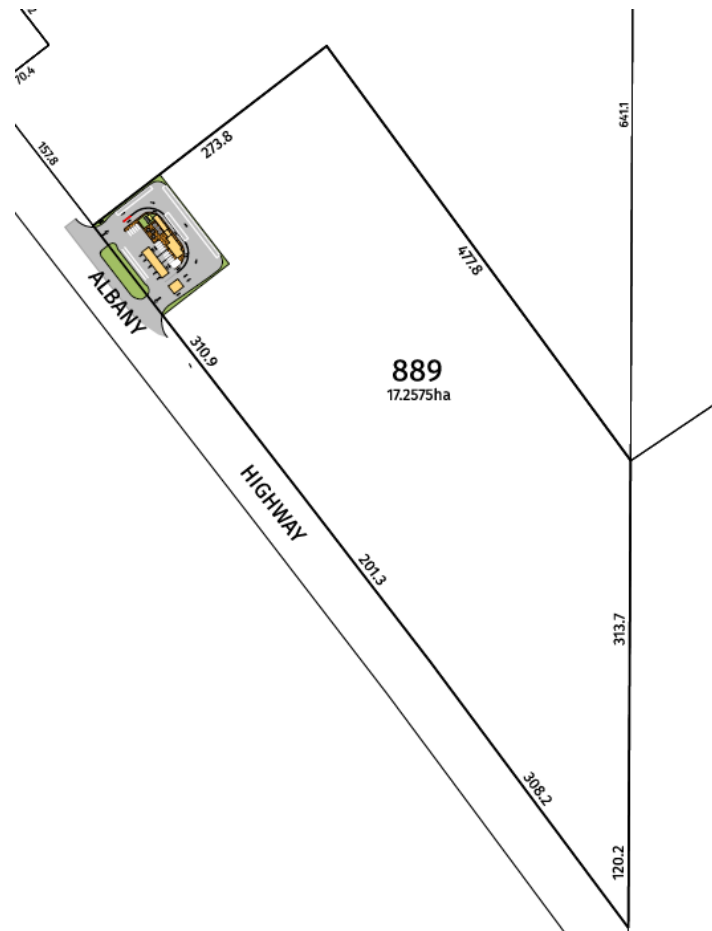


Figure 4 – footprint of approved Service Station at Lot 889

2.4 Surrounding Land Use

Lot 889 is bound by 'Industrial' land to the north, which has been partially subdivided and developed by businesses. Existing uses within this area include an Agricultural Supplies store, an Automotive Mechanic and an Agricultural Machinery Repair workshop.

This site was rezoned by Amendment 16 to the Shire of Williams Town Planning Scheme No. 2 in 2010 by the Shire of Williams. *Attachment 3: Preliminary (draft) Subdivision Plan* of the approved amendment document demonstrates intention for Marjidin Way to be extended through to Lot 889 (demonstrated at **Figure 5**, overleaf). This road link has been incorporated into the concept development plan for Lot 889 (see **Appendix A**), to improve connectivity between the precinct and the neighbouring land use.

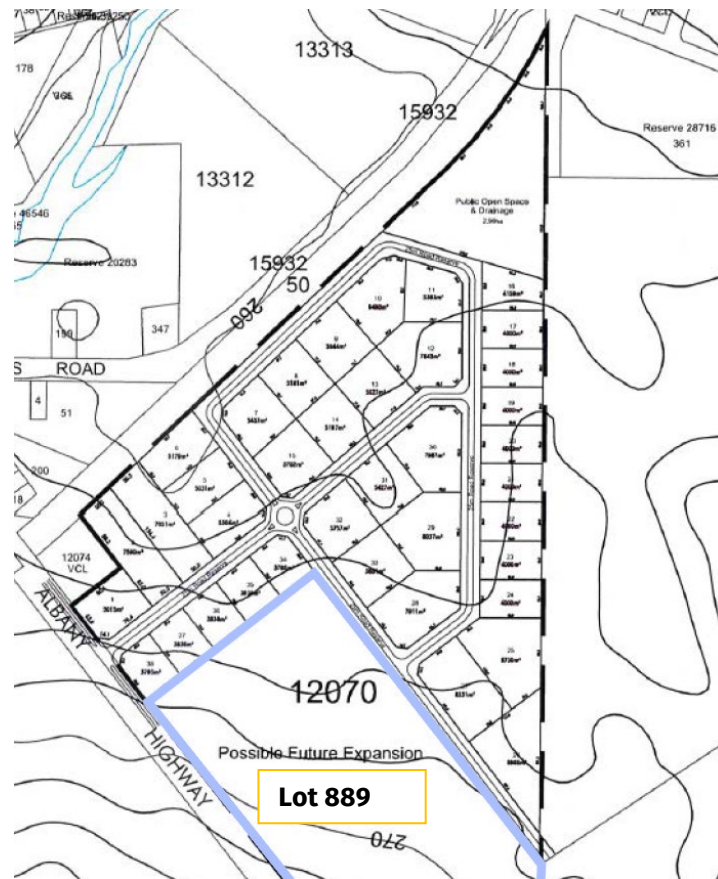
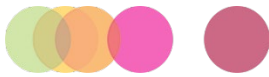


Figure 5 – Excerpt of subdivision design for Industrial Lot 9000.

Land immediately east of Lot 889 is used for agricultural purposes, per its zoning. No impact on the existing agricultural use is expected as a result of the proposed rezoning.

Lot 889 is adjoined by the Albany Highway along its southern boundary. The Traffic Review prepared by Cardno at **Appendix B** of this document demonstrates the ability of Albany Highway to safely host the proposed zones.

Land on the opposite side of the Albany Highway to Lot 889 is used for agricultural purposes, consistent with the Rural zoning of the lot.

As is demonstrated above, the proposed rezoning has been sited to complement the neighbouring Industrial land to the north and utilise access to the Albany Highway, while having negligible impacts upon the neighbouring rural lots.

2.5 Topography

Lot 889 is characterised by gentle slopes, which range in height from around 277m AHD in the southern corner down to 268m AHD at the northern corner of the site. This change in height occurs over a distance of approximately 850m, and therefore the slope is very gradual at approximately 2% over most of the site.



2.6 Soil and landform

The Soil Landscape Mapping – Systems (DPIRD-064) identifies the within the ‘Dellyanine System’ with typically ‘Undulating rises and low hills on granite, in the southern zone of rejuvenated drainage. Grey sandy duplex (shallow and deep), sandy gravel and red deep sandy duplex. Wanoo-Sheoak woodland’.

A review of the Department of Water and Environmental Regulation’s Acid Sulphate Soil mapping indicates the site is not located within an area of risk of ASS occurring within 3m of the natural surface.

There is one waterbody at the lot; a dam located in the southern corner of the site.



3 PLANNING FRAMEWORK

The following section will justify the proposed rezoning from the Rural to Service Commercial and Industrial zones in the Shire of Williams Town Planning Scheme No. 2.

3.1 State Planning Framework

3.1.1 State Planning Framework

The purpose of State Planning Policy 1 (SPP 1) is to bring together the State and Regional policies that apply to land use and development in Western Australia and to establish the general principles for land use planning and development in Western Australia. SPP 1 states *'the primary aim of planning is to provide for the sustainable use and development of land'*. It goes on to quantify this through identifying and expanding upon the five key principles that further define this statement, being environment, community, economy, infrastructure and regional development.

The proposed amendment is consistent with the principles of SPP 1, as evidenced by the following:

- The proposed rezoning will not negatively impact upon environmental assets, as is evidenced through this report and the supporting documents of this application.
- The proposed Service Commercial and Industrial zones represent a diversification of community resources and therefore contribute toward accessibility of resources in the Shire of Williams for the betterment of the community.
- The proposed rezoning will facilitate trade, investment, innovation, employment and community betterment through providing for a precinct which will both increase the number of businesses in the area while supporting existing businesses. Therefore, the proposed rezoning will contribute toward the economic growth of the Shire of Williams.
- The proposed rezoning includes the provision of infrastructure which will promote the development of the area. The Traffic Review prepared by Cardno demonstrates that the current Albany Highway network is capable to accommodate the proposed rezoning and any subsequent development.
- The proposed rezoning represents regional development as it will improve avenues for the generation of the local and regional economy by providing a Service Commercial and Industrial precinct. This rezoning will promote increased employment options in the Williams area, while supporting existing industries by improving access to related goods and services.

The proposed Scheme Amendment is consistent with the objectives of SPP 1.

3.1.2 Planning in Rural Areas

State Planning Policy 2.5 (SPP 2.5) provides the overarching objectives and policy statements for land use planning for rural and rural settlement development.

Part 5.11 of SPP 2.5 details *'Regional Facilities'* policy. The proposed rezoning represents a type of regional facility as the rezoning will host facilities which will service the regional catchment of the Roe and Wheatbelt regions. Below is justification for the proposed rezoning in line with Part 5.11 Regional Facilities of SPP 2.5.

(a) Facilities should be located on a main road or on a road that is of suitable standard and treatment, to accommodate significant increase in traffic volumes

The proposed rezoning of Rural land is based on the Albany Highway, and therefore has access to a suitable regionally significant road to host relevant freight tasks.



<p><i>and freight tasks which may be generated by the proposal;</i></p>	
<p><i>(b) Facilities should contain or satisfactorily manage potential environmental (including water resources), noise, amenity and air quality impacts on the landholding without affecting nearby rural land uses;</i></p>	<p>As is demonstrated within this report and the ancillary specialist reports, the rezoning of Lot 889 will have limited environmental, acoustic, amenity and air quality impacts, and it is expected that the proposed rezoning will not affect nearby rural land uses.</p>
<p><i>(c) Facilities should not be visually dominant within key viewsheds, and should be visually compatible with surrounding land uses and development; and,</i></p>	<p>The proposed rezoning will not result in any key facilities being developed. Any future development resulting from the rezoning will need to comply with relevant local and state planning instruments, and therefore any resulting developments will be visually compatible with surrounding land uses and development.</p>
<p><i>(d) Facilities should be provided with essential services commensurate with the intended land use.</i></p>	<p>Lot 889 is capable of supporting development associated with the proposed zones of Service Commercial and Industry. This is demonstrated in the expert reports at the Appendices of this report.</p>

The above table demonstrates that the proposed rezoning of Rural land will remain consistent with SPP 2.5 part 5.11. It is expected that proposed rezoning and subsequent development will enhance the provision of services for the Shire of Williams and the extended Roe and Wheatbelt regions.

3.1.3 Rural Planning Guidelines

State Planning Policy 2.5 Rural Planning Guidelines (SPP 2.5 Guidelines) detail that there is generally preference that *rural land should be retained for existing and future rural land uses* (SPP 2.5 Guidelines; 11). The proposed rezoning therefore represents variation to the general provisions of SPP 2.5. The following points are provided in response to the provisions at Part 6.1 of SPP 2.5 Guidelines to assist decision-making agencies in determining this rezoning application.

- Variation to SPP 2.5 is required in order to undertake the proposed rezoning. The proposed land use will complement the general agriculture industries in the Shire and surrounding region.
Lot 889 comprises 17.2575ha, which is generally considered a scale consistent with Rural living or Rural smallholdings zone per SPP 2.5 Definitions. Therefore, the capacity for Lot 889 to be operated as a conventional, productive Rural lot is limited. Considering this, the proposed land use provides an avenue for lot 889 to complement the existing Rural land uses, rather than being a redundant Rural lot due to its scale.
- Variation from SPP 2.5 is sought in order to rezone a Rural zone to Service Commercial and Industry zones. This variation seeks to maximise the benefit that Lot 889 can provide to the Williams townsite and extended Roe and Wheatbelt regions. This variation is considered a



site specific variation due to the unique characteristics of Lot 889; high proportion of rural pursuits in the surrounding Shire and region, close proximity to the Albany Highway, Industrial zoned land to the north and inadequate sizing of Lot 889 to accommodate conventional Rural pursuits.

- The proposed variation to SPP 2.5 will have positive implications for the Shire of Williams Local Government area. Currently, there are limited employment options for residents of the Shire of Williams. The proposed variation and consequential development will provide for improved and diversified employment options in the area. Further, the proposed rezoning will host business which will complement the surrounding Rural uses. This will also promote more visitors to Williams which will further generate the local economy and benefit existing businesses.
- Variation to SPP 2.5 is justified within this report and the supporting specialist reports. Statistical data has been provided to justify the proposed variation at Part 4.1 of this report.

As is demonstrated in the comments above, the proposed rezoning is generally consistent with the SPP 2.5 Guidelines. While the proposed rezoning represents variation to SPP 2.5, the above justification demonstrates that variation is for the benefit of the local government area and extended region, while the current capacity for Lot 889 to be used for conventional rural purposes is limited due to its scale.

3.1.4 Road and Rail Noise

State Planning Policy 5.4 Road and Rail Noise (SPP 5.4) determines controls on land use and setbacks requirements for noise-sensitive land uses, major roads and railway infrastructure. Part 4.1.3 of SPP 5.4 defines Noise-sensitive land-use and/or development to be:

'Generally determined by land-uses or development as zoned by a local planning scheme or structure plan that is occupied or designed for occupation or use for residential purposes (including dwellings, residential buildings or short stay accommodation), caravan park, camping group, educational establishment, childcare premises, hospital, nursing home, corrective institution; or place of worship.'

As the proposed rezoning will not permit land uses considered noise-sensitive under SPP 5.4, no further assessment under SPP 5.4 is required as part of this rezoning application.

3.1.5 Wheatbelt Development Commission Strategic Plan 2020 – 2023

The Wheatbelt Development Commission Strategic Plan 2020 – 2023 (WDCSP) sets guidelines for the economic development of the Wheatbelt region. The five strategic priorities for the Wheatbelt region are identified as follows:

- Enabling infrastructure
- Diversifying the economic base
- Sustainable landscapes and communities
- Entrepreneurship and innovation
- Organisational excellence

These strategic priorities are to be achieved by intersecting with the strategic themes for regional development in WA. The proposed rezoning represents an opportunity for the State of Western Australia to contribute to the economic development of the Wheatbelt region.

Demonstration of the proposed rezoning's achievement of the strategic priorities outlined above are outlined in the following table:



<p>Enabling infrastructure</p>	<p><i>Advocate for forward thinking infrastructure solutions to grow the Wheatbelt's economy, to ensure that water, power, transport and digital capacity solutions are aligned with our community's long term needs</i></p>	<p>The proposed rezoning will result in an innovative development which will improve the resilience of the Wheatbelt's economy by centralising opportunity for businesses which complement the primary production sectors in the region. This will contribute toward the growing agglomeration of primary production opportunities in the Wheatbelt region which is being fostered by the areas' elements of competitive advantage.</p>
<p>Diversifying the economic base</p>	<p><i>Champion new economic opportunities for our region; support investment that adds long term value to the region's economy; facilitate diversification of our business sectors and support opportunities for skill development; empower Aboriginal business development; facilitate private investment; and optimise Government expenditure into the region.</i></p>	<p>The proposed rezoning represents a diversification of the region's business with opportunity for skill development in translatable trades of the region. The rezoning is a private investment into the infrastructure of the Wheatbelt region.</p>
<p>Sustainable landscapes and communities</p>	<p><i>Recognise the impact of changing climate conditions to the region's communities, businesses and landscapes. Support development opportunities that acknowledge the environmental conditions and create sustainable communities.</i></p>	<p>The proposed rezoning presents opportunity for specialised business who are centred on climate-resilient agricultural solutions to be based in the Wheatbelt region, and therefore the proposed development contributes toward sustainable communities in the Wheatbelt region.</p>
<p>Entrepreneurship and innovation</p>	<p><i>Facilitate future-focused economic opportunities to support local entrepreneurs, business leaders and key industries to collaborate and harness innovation unlocking shared business potential and strengthening existing industries.</i></p>	<p>It is expected that the proposed rezoning will result in an industry hub which promotes cross-industry collaboration to facilitate innovative outcomes for the agricultural and complementary industries, and therefore strengthen the integrity of existing industries.</p>
<p>Organisational excellence</p>	<p><i>Demonstrate commitment to sound governance, diversity and inclusion, be recognised for our regional leadership to attract investment and facilitate economic development.</i></p>	<p>The proposed rezoning can assist the Wheatbelt Development Commission to attract investment and facilitate economic development.</p>

Considering the justification above, the proposed rezoning represents an opportunity for the strategic priorities of the WDCSP to come to fruition for the benefit of the whole region.



3.1.6 State Planning Policy 3.7 Planning for Bushfire Prone Land

State Planning Policy 3.7 was adopted in December 2015 and is intended to implement effective, risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure.



Figure 7 – Bushfire mapping at Lot 889

A portion of Lot 889, demonstrated in Figure 7, above, is identified as being bushfire prone land in the Department of Fire and Emergency Services mapping. A Bushfire Management Plan for Lot 889 is enclosed at **Appendix C** to complement this rezoning application.

3.2 Local Planning Frameworks

3.2.1 Shire of Williams Local Planning Strategy

Investigation has found no Shire of Williams Local Planning Strategy. Justification under the Shire of Williams Town Planning Scheme No. 2 and the Shire of Williams Strategic Community Plan 2017-2023 has been provided below.

3.2.2 Shire of Williams Town Planning Scheme No. 2

The Shire of Williams Town Planning Scheme No. 2 (TPS 2) was originally gazetted in 1994. The proposed rezoning to Industrial and Service Commercial zones are to be consistent with the existing provisions of TPS 2.

Currently, the capacity for Lot 889 to be used for conventional rural purposes is limited due to the scale of the site. The proponent of the land is seeking to proactively rezone the site in order to capitalise on the unique characteristics of Lot 889, being its proximity to Albany Highway and



neighbouring Industrial zone, to improve economic outcomes for the Shire of Williams and extended Roe and Wheatbelt regions.

3.2.3 Industrial

The proposed Industrial zone is to be consistent with the existing Industrial zoning objectives and land uses prescribed in TPS 2.

3.2.4 Service Commercial

Service Commercial zone is not currently included in TPS 2. This proposed scheme amendment also proposes the inclusion of the Service Commercial zone in TPS 2. Proposed provisions of the Service Commercial zone are at part 3 of this report. It is anticipated that the proposed Service Commercial zone will be consistent with the provisions detailed at Part 4.2 of this report.

The proposed rezoning will result in uses consistent with the provisions of TPS 2. Where no provisions exist in the case of the Service Commercial zone, the provisions outlined at Part 4.2 of this report which are in accordance with the *Planning and Development (Local Planning Schemes) Regulations 2015*. The provisions at Part 4.2 of this report have been developed in collaboration with Shire of William's staff.

3.2.5 Shire of Williams Strategic Community Plan 2017 – 2032

The Shire of Williams Strategic Community Plan 2017 – 2032 (SCP) aligns the community's visions and aspirations for the future of Williams to strategic objectives to 2032. As the Shire of Williams has no Local Planning Strategy to measure the proposed rezoning against, the following demonstration of consistency between the proposed rezoning and the community's aspirations for Williams to 2032 will instead be used.

Economic Outcome 1 identified in the SCP describes *Develop infrastructure and investment that is sustainable and an ongoing legacy to the Shire*, with Economic Development point 1.1 being:

Develop and promote the Marjidin Industrial Estate to offer affordable and appropriately serviced lots (SCP, 21).

The Industrial land immediately north of Lot 889 is the Marjidin Industrial Estate. The proposed rezoning represents an extension of this precinct and a reinvigoration of the project with private sector support, which will value-add to the existing Shire input and assist the project to gain traction.

Community comments from the SCP demonstrate significant resident and Shire support for the promotion of industry and business in the area. The SCP identifies:

With forward planning around infrastructure to support economic development, the Shire is well placed to continue to attract new residents and businesses that can value-add to the local agriculture industry as well as expand into other existing industries such as service and support industries for the agricultural area (SCP, 19).

The proposed rezoning represents an embodiment of this comment from the Shire, as the proposed Industrial and Service Commercial zones will host development which is complementary to the dominant agricultural sector of the area, while expanding the capacity for service and support industries for the agricultural sector to grow.

Overall, the proposed rezoning is consistent with the objectives outlined by constituents and the Shire in the SCP.



4 PROPOSED REZONING

4.1 Proposal Summary

This Scheme Amendment seeks to include the Service Commercial zone in the Shire of Williams' Town Planning Scheme No. 2 and rezone Lot 889 Albany Highway from 'Rural' to 'Service Commercial' and 'Industry' zones. Proposed distribution of these two zones and indicative lot configuration is indicated on the Concept Subdivision Plan at **Appendix A** of this document. For clarity, an excerpt of this plan is demonstrated below (**Figure 6**).



Figure 6 – Concept Subdivision plan



Comments provided by Shire CEO Geoff McKeown after the Council Forum Session in September 2021 indicate that Council '*Generally supports the concept of a Service Commercial and Industrial Zone on Lot 889 Albany Highway which would be subject to the lodgement of a more detailed scheme amendment*'.

Australian Bureau of Statistic (2016) data indicates that more than 35% of the Shire of William's workforce is employed in the grain – sheep or cattle, sheep farming or 'other' grain growing industries. Considering this high proportion of staff working in the primary sector, the proposed rezoning will allow for a precinct of complementary Service Commercial and Industrial uses to ensure these industries are protected and fostered into the future.

Community consultation conducted for the Shire of Williams in 2017 found that residents requested the Shire to:

Support industry, business and development success (Shire of Williams Strategic Community Plan 2017-2032; 12).

Further comments from residents in terms of the local economy highlights that constituents are eager for Williams to diversify its economic base and attract business to the area. The Albany Highway was highlighted to be an asset to achieve these outcomes, and the proposed development represents an opportunity for the Shire to capitalise on the asset of the Albany Highway to work toward the aspirations of the community.

The extended Roe region has consistently high levels of employment in primary production, with 27.3% (2016) of the population being directly employed in this sector (idProfile). The proposed Service Commercial and Industrial precinct in Williams has capacity to cater for the extended region and ensure the existing dominant sector of primary production is supported into the future.

4.2 Service Commercial Zone

The current Shire of Williams Town Planning Scheme No. 2 (TPS 2) was originally gazetted in 1994. At the time of gazettal, the zoning of Service Commercial was seldom used in the State of Western Australia.

Currently TPS 2 includes provisions for a Commercial zone. This zone does not encompass the scope of development anticipated for the proposed Service Commercial portion of Lot 889. Notably, clause 4.7.2.a of TPS 2 describes:

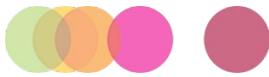
Commercial activity within the town is presently conducted on a low-key basis and there is not a considerable degree of demand for additional facilities.

The proposed Service Commercial use is to be of a scale too large to be incorporated into the town centre of Williams, and therefore the proposed use at Lot 889 is not consistent with the Commercial zoning within TPS 2.

In order to update this particular aspect of the existing scheme to be consistent with zones included in the *Planning and Development (Local Planning Schemes) Regulations 2015*, this scheme amendment proposes the inclusion of the Service Commercial zone in TPS 2 at Part IV – Zone Development Controls clause 4.1, and Table 1 of the TPS 2.

To be consistent with the *Planning and Development (Local Planning Schemes) Regulations 2015*, the following objectives should be included in TPS 2 part 4.6 Regulatory Controls:

(5) **Service Commercial:-**



- (a) All development shall comply with the following standards and requirements –

Minimum lot size: 3,000m²

Setbacks -

- (i) Primary street front setback: 4 metres;
 - (ii) Secondary street setback: 2 metres;
 - (iii) Side/Rear: as determined by the local government; or
 - (iv) The minimum setback between a building and any boundary shared with an adjacent lot zoned Residential shall be 3 metres or half the height of the wall facing that boundary, whichever is greater.
- (b) No use of the area between the street alignment and the front building setback line shall be permitted other than for planting or for pedestrian and vehicular circulation and vehicle parking in accordance with the provisions of this Scheme, except that an area up to 25 percent of the building setback area may be used for trade display purposes with the approval of the local government.
- (c) Floor space restrictions:
- a. Minimum net lettable area (nla) of 200m² per lot (including a strata or survey strata lot) applies for bulky goods showroom uses.
 - b. Maximum net lettable area (nla) of 200m² per lot, strata lot or survey strata scheme, applies for office uses (exclusive of 'incidental' office uses).
- (d) Landscaping shall be provided along any Highway frontage with a minimum width of 1 metre from the Highway street boundary excluding any crossovers.
- (e) Suitable manoeuvring space shall be provided so that all vehicles can enter and exit the site in a forward gear. The local government may require lodgement of a truck movement plan as part of any development application.
- (f) Adequate hardstand constructed off-street parking shall be provided on site, together with adequate parking space for customers and visitors as required by the local government. The local government shall also require adequate space for parking, loading and unloading of trade vehicles to be provided on site.
- (g) Vehicular access and building orientation are to be consistent with the approved Local Development Plan.
- (h) The use of zincume or reflective materials is not permitted for construction of new buildings.

For clarification, Part 5(c) detailed above is a floor space restriction directly detailed in the Template Scheme document. It is expected that these floor space restrictions will ensure dense development is constructed in this area. Further, limitations on the amount of office space permitted per lot will discourage office buildings from being constructed in the area.

To be consistent with the *Planning and Development (Local Planning Schemes) Regulations 2015*, the following objectives should be included in TPS 2 part 4.7:

- (5) *Service Commercial Zone –*

The objectives of the Service Commercial zone are:

- (a) *To accommodate commercial activities which, because of the nature of the business, require good vehicular access and/or large sites.*
- (b) *To provide for a range of wholesale sales, showrooms, trades 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.*

The following uses are to be added to Table 1 of TPS 2:



		Service Commercial
1	Abattoir	X
2	Aged or dependent persons dwelling	X
3	Caretaker's dwelling	AA
4	Civic building	AA
5	Club premises	AA
6	Consulting rooms	P
7	Education establishment	AA
8	Fuel depot	X
9	Grouped dwelling	X
10	Holiday cabins or chalets	X
11	Home occupation	X
12	Hotel	X
13	Industry - cottage	AA
14	Industry - extractive	X
15	Industry - general	X
16	Industry - light	AA
17	Industry - noxious	X
18	Industry - rural	X
19	Motel	AA
20	Office	AA
21	Public recreation	AA
22	Public utility	AA
23	Public worship - place of	AA
24	Residential building	X
25	Restaurant	X
26	Rural pursuit	X
27	Service station	AA
28	Shop	AA
29	Single house	X
30	Transport depot	AA

Change to AA use

Overall, the current zones included in TPS 2 represent zonings which have historically been relevant, however exclude more specialised zones which can improve the Williams townsite and Shire. The proposed inclusion of the Service Commercial zone to TPS 2 will result in improved opportunity for business and industry which complement the agricultural operations in the area. The Service Commercial zone objectives demonstrated above are in accordance with the provisions of the Service Commercial Zone demonstrated in the *Planning and Development (Local Planning Schemes) Regulations 2015*.

4.3 Land Use and Planning Controls

The proposed Service Commercial and Industrial zones are to be controlled by the relevant zone provisions of TPS 2 and relevant state planning instruments. Should this application be granted approval, these further planning instruments will control both subdivision and development at the subject site.



4.4 Environmental and Servicing Considerations

4.4.1 Land Capability Overview

This report provides an overview of expert assessments undertaken regarding Land capability. The preceding sections include detail from sub-consultants justifying the capability of Lot 889 to host the proposed development.

4.4.2 Vegetation

Lot 889 is characterised by pasture over the majority of the site, with few individual trees being located at the far northern and far southern boundaries of the site. One dam is currently located in the southern portion of Lot 889.

4.4.3 Servicing

Lot 889 has frontage to Albany Highway. The site has access to the electricity network via the Albany Highway reserve. Lot 889 does not have currently access to reticulated water or sewer networks.

It is expected, that the reticulated water on Albany Highway the north of the site will be extended to service future lots subject to this rezoning. Discussion between the proponent and relevant water agencies has begun to this end.

4.4.4 Effluent Disposal

The Government Sewerage Policy was released in 2019 and establishes the Western Australian Government's position on the provision of sewerage services in the State through the planning and development of land. In instances where reticulated sewerage cannot be provided, it adopts a best practice approach to the provision of on-site sewage treatment and disposal.

Wastewater management will require onsite solutions due to lack of existing or potential connections to a reticulated scheme. The site is not defined under the draft policy as a sewage sensitive area.

A Site and Soil Evaluation is addressed within the Local Water Management Strategy at **Appendix D** of this report to assist the Shire of Williams in determining this rezoning application.

4.4.5 Local Water Management

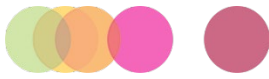
A Local Water Management Strategy (LWMS) has been prepared by Bayley Environmental Services and is attached at **Appendix D** of this report to assist the Shire of Williams in determining this rezoning application.

The LMMS details the objectives for sustainable water use, on-site effluent disposal, stormwater drainage management, groundwater management, landscaping and construction works.

4.4.6 Landscape Assessment

The area surrounding Lot 889 along the Albany Highway is characterised by large Rural lots. Lot 889 is located around 250m south of Narrogin Road, which is considered the boundary of the Williams townsite. The landscape of this area is gently sloped with pasture on either side of the Albany Highway.

Considering the Industrial zone of neighbouring Lot 9000, any large scale developments resulting from the proposed rezoning will be consistent with what is already permitted at Lot 9000. The



proposed rezoning represents consolidation of Industrial precinct at Williams and will result in an overall limited impact upon residents and visitors to the Shire.

4.4.7 Noise Assessment

Any land use at Lot 889 will need to comply with relevant noise regulation and legislation. Potential acoustic output of any individual Industrial or Service Commercial uses will need to be described in the relevant development application processes.

4.4.8 Traffic Management

A Traffic Review has been prepared by Cardno to complement this rezoning application and is at **Appendix B** of this report. The Traffic Review relates directly to Lot 889 and identifies that the Albany Highway is able to host the proposed rezoning and subsequent subdivision.



5 CONCLUSION

Approval is respectfully sought from the Shire of Williams and the Western Australian Planning Commission for the Scheme Amendment detailed within this report, which seeks to include Service Commercial zoning in TPS 2, and rezone Lot 889 Albany Highway, Williams.

The information contained within this report demonstrates that the scheme amendment proposed for TPS 2 is an appropriate outcome; consistent with the regulations, key local and state strategic planning documents and contributes toward the orderly and proper planning of the Williams locality and will contribute to achieving the desired economic development outcomes in both the Roe region and the Williams Local Government Area.

Planning and Development Act 2005

**RESOLUTION TO AMEND
AMENDMENT TO LOCAL PLANNING SCHEME**

Shire of Williams
Town Planning Scheme No. 2

~~Amendment No. 17~~ **Amendment No 19**

RESOLVED that the local government, pursuant to section 75 of the *Planning and Development Act 2005*, amend the above Local Planning Scheme by:

(i) Amending Part IV Clause 4.6(5) to include the 'Service Commercial' zone with the following provisions:

(5) **Service Commercial:-**

(a) All development shall comply with the following standards and requirements –

Minimum lot size: 3,000m²

Setbacks -

- (v) Primary street front setback: 4 metres;
- (vi) Secondary street setback: 2 metres;
- (vii) Side/Rear: as determined by the local government; or
- (viii) The minimum setback between a building and any boundary shared with an adjacent lot zoned Residential shall be 3 metres or half the height of the wall facing that boundary, whichever is greater.

(b) No use of the area between the street alignment and the front building setback line shall be permitted other than for planting or for pedestrian and vehicular circulation and vehicle parking in accordance with the provisions of this Scheme, except that an area up to 25 percent of the building setback area may be used for trade display purposes with the approval of the local government.

(c) Floor space restrictions:

- a. Minimum net lettable area (nla) of 200m² per lot (including a strata or survey strata lot) applies for bulky goods showroom uses.
- b. Maximum net lettable area (nla) of 200m² per lot, strata lot or survey strata scheme, applies for office uses (exclusive of 'incidental' office uses).

(d) Landscaping shall be provided along any Highway frontage with a minimum width of 1 metre from the Highway street boundary excluding any crossovers.

(e) Suitable manoeuvring space shall be provided so that all vehicles can enter and exit the site in a forward gear. The local government may require lodgement of a truck movement plan as part of any development application.

(f) Adequate hardstand constructed off-street parking shall be provided on site, together with adequate parking space for customers and visitors as required by the local government. The local government shall also require adequate space for parking, loading and unloading of trade vehicles to be provided on site.

(g) Vehicular access and building orientation are to be consistent with the approved Local Development Plan.

(h) The use of zincume or reflective materials is not permitted for construction of new buildings.

TPI Comment:
1. Numbering is incorrect . Should be (i) to (iv);
2. Recommended modification to 5 (a)(i)
3. Update to reflect Council resolution

- (ii) Amending Clause 4.7(5) to include the 'Service Commercial' zone with the following provisions:

(5) *Service Commercial Zone –*

The objectives of the Service Commercial zone are:

- (a) *To accommodate commercial activities which, because of the nature of the business, require good vehicular access and/or large sites.*
 (b) *To provide for a range of wholesale sales, showrooms, trades 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.*

- (iii) Amending Table 1 – Zoning Table to include the following Service Commercial provisions:

		Service Commercial
1	Abattoir	X
2	Aged or dependent persons dwelling	X
3	Caretaker's dwelling	AA
4	Civic building	AA
5	Club premises	AA
6	Consulting rooms	P
7	Education establishment	AA
8	Fuel depot	X
9	Grouped dwelling	X
10	Holiday cabins or chalets	X
11	Home occupation	X
12	Hotel	X
13	Industry – cottage	AA
14	Industry – extractive	X
15	Industry – general	X
16	Industry – light	AA
17	Industry – noxious	X
18	Industry – rural	X
19	Motel	AA
20	Office	AA
21	Public recreation	AA
22	Public utility	AA
23	Public worship – place of	AA
24	Residential building	X
25	Restaurant	AA
26	Rural pursuit	X
27	Service station	AA
28	Shop	AA
29	Single house	X
30	Transport depot	AA

Shire modified Table to list restaurant as AA use

- (iv) Re-zoning Lot 889 Albany Highway, Williams, from a 'Rural' zone to an 'Industrial' and 'Service Commercial' zone in accordance with the Scheme Amendment map.

- ~~(v) Amending the Scheme map accordingly.~~

TPI Comment: Point (v) should be deleted as it is covered under Point (iv) above.

The Amendment is complex under the provisions of the *Planning and Development (Local Planning Scheme) Regulations 2015* for the following reasons:

1. The Amendment is for a use of land not specifically referred to in the Town Planning Scheme No. 2.
2. The Amendment would not result in any significant environmental, social, economic or governance impacts on land in the Scheme area.

TPI Comment: Needs to reflect Council resolution for complex amendment





SHIRE OF WILLIAMS

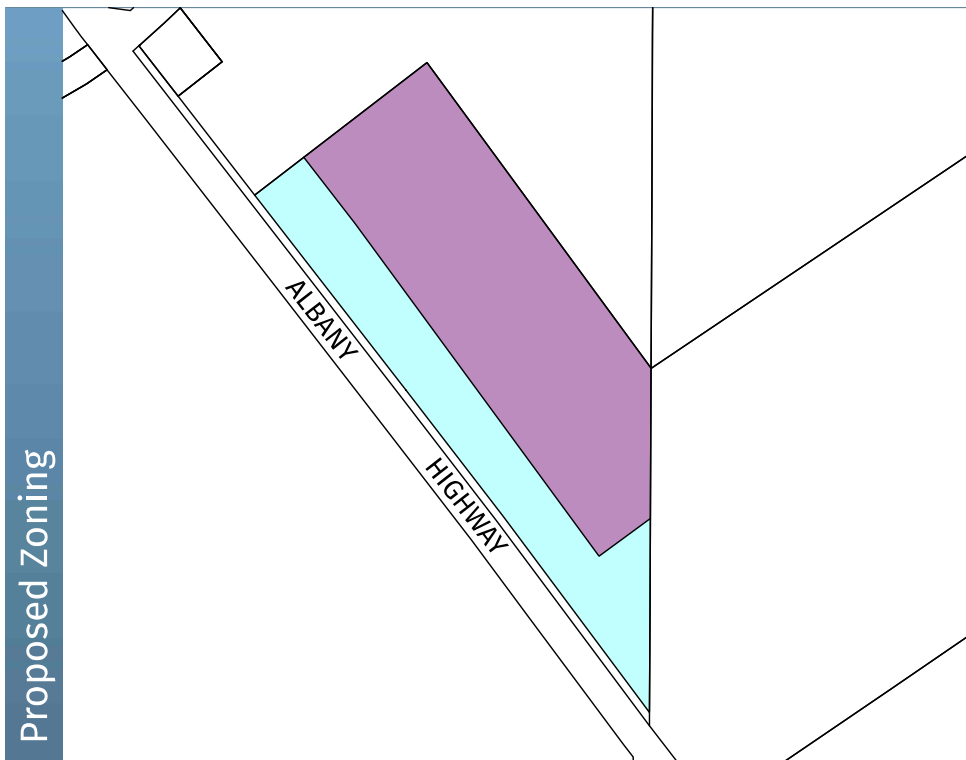
Town Planning Scheme No. 2

Amendment No. 19


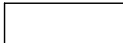


LOCAL SCHEME ZONES

-  Industrial
-  Residential
-  Rural
-  Service Commercial



OTHER CATEGORIES

-  R20 R Codes
-  No Zone

COUNCIL ADOPTION

This Complex Amendment was adopted by resolution of the Council of the Shire of Williams at the Ordinary Meeting of the Council held on the _____ day of _____, 20____

SHIRE PRESIDENT

CHIEF EXECUTIVE OFFICER

COUNCIL RESOLUTION TO ADVERTISE

by resolution of the Council of the Shire of Williams at the Ordinary of the Council held on the _____ day of _____, 20____, proceed to advertise this Amendment.

SHIRE PRESIDENT

CHIEF EXECUTIVE OFFICER

COUNCIL RECOMMENDATION

This Amendment is recommended for _____ by resolution of the Shire of Williams at the Ordinary of the Council held on the _____ day of _____, 20____ and the Common Seal of the Shire of Williams was hereunto affixed by the authority of a resolution of the Council in the presence of:



SHIRE PRESIDENT

CHIEF EXECUTIVE OFFICER

WAPC ENDORSEMENT (r.63)

DELEGATED UNDER S.16
OF THE P&D ACT 2005

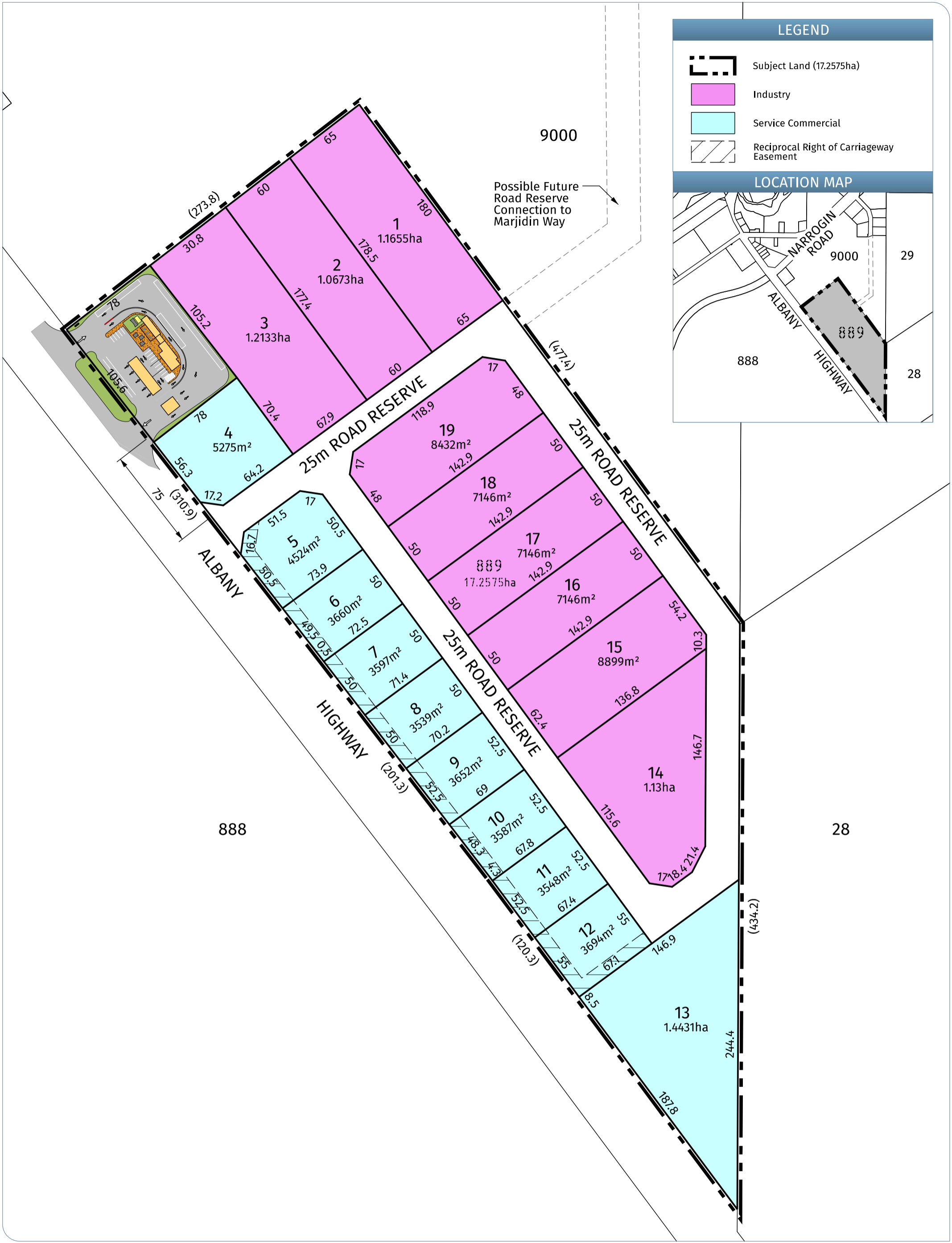
DATE

APPROVAL GRANTED

MINISTER FOR PLANNING

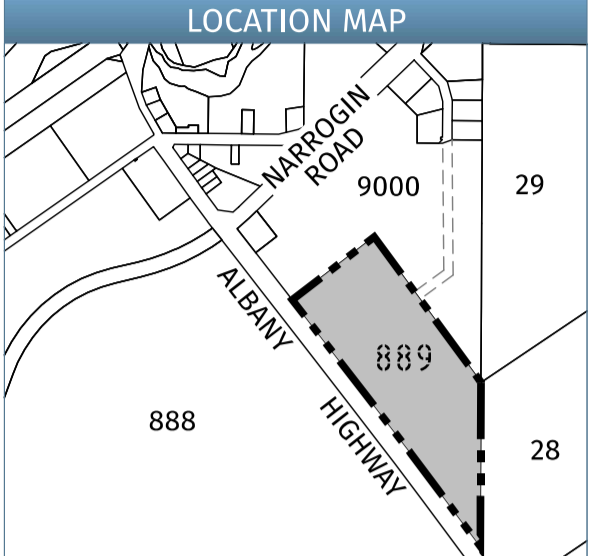
DATE

APPENDIX A | CONCEPT SUBDIVISION PLAN



LEGEND

- Subject Land (17.2575ha)
- Industry
- Service Commercial
- Reciprocal Right of Carriageway Easement



CONCEPT SUBDIVISION PLAN

Lot 889 on DP 416835 Albany Highway, WILLIAMS

Plan No. | 21520-14
 Date | 04/10/21
 Drawn | NP
 Checked | DM
 Revision | A

BUNBURY OFFICE:
 21 Spencer Street,
 BUNBURY WA 6230
 T: 08 9792 6000
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ALBANY | BUNBURY | BUSSELTON | FORRESTDALE | PERTH

Scale | 1:2500@A3

0 20m 40m 60m

NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

Harley Dykstra
 PLANNING & SURVEY SOLUTIONS

APPENDIX B | TRAFFIC IMPACT ASSESSMENT

Title	High Level Traffic Review – Lot 229 Albany Highway, Williams	Client	Saracen Properties
Project Number	CW1171600	Date	18/12/2021
Author	Edmond Hoang	Reviewer	Sam Laybutt
Status	For Issue (Rev B)	Discipline	Traffic and Transport

1 Introduction

Cardno has been commissioned by Saracen Properties to provide a high-level traffic review of the proposed industrial subdivision located at Lot 889 Albany Highway, Williams.

The scope of the tech memo is as follows:

- > Conduct a high level traffic generation for the development.
- > Outline of the function and layout of the proposed roads and intersections within the development.
- > Conduct an intersection turning warrant assessment to provide an initial indication of the intersection form.
- > Discussion regarding the indicative speed zoning including justification based on the Speed Zoning Policy and Application Guidelines.

1.1 Proposed Development

An indicative development layout is shown in **Figure 1-1**, comprising the following:

- > Service Commercial – approximately 4.9 Ha – intended to cater for businesses that have smaller footprints and desire frontage/exposure to Albany Highway passing traffic.
- > Industrial – approximately 8.5 Ha – intended to cater for businesses that require larger footprints and for which exposure or frontage to Albany Highway is not necessary.

Development is likely to occur firstly on the parcels towards the northern end of the Site, and gradually extending southward over time.

Figure 1-1 Site Layout



Source: Harley Dykstra

2 Proposed Road Network and Accesses

An indicative road network for the subdivision is shown in **Figure 2-1**, with the following key features:

- > Internal roads are planned with 25m road reserves, suitable for accommodating heavy vehicles up to RAV 7.
- > Access to Albany Highway is located near the northern end of the Site, approximately 75m to the south of the approved service station crossover. This intersection location is intended to support the full development of the Site, and facilitate a potential connection to Marjidin Way.
- > Direct access to Albany Highway from individual lots would not be permitted. Servicing of these lots would be via the internal road network, with an easement or other form of reciprocal access arrangement implemented to provide for light vehicle access through car parking areas located on the Albany Highway frontage.

The location of the proposed Albany Highway intersections has been considered in light of subdivision access and circulation needs, in conjunction with existing road network constraints (e.g. vertical alignment of Albany Highway and location of existing rural crossovers).

The northern access to Albany Highway is intended to enable a possible extension of Marjidin Way through Lot 9000 and the subject site to Albany Highway. This extension would improve accessibility for the existing industrial lots on Marjidin Way, and resolve the limitations to RAV7 access of the existing intersection of Narrogin Road and Marjidin Way.

Figure 2-1 Development Internal Road Network



Source: Harley Dykstra

3 Traffic Generation

The development traffic generation for the industrial and service commercial component is estimated based on using rates agreed by DPLH and MRWA for general industrial estates in Metropolitan Perth and major regional centres. These rates have then been reduced by 50% to reflect that the location of the development within a rural townsite (Williams) with much lower trip generation potential than Metropolitan and major regional centres.

Table 3-1 Trip Generation Rates

Land Use	AM Peak Hour	PM Peak Hour	Daily
Industrial/Service Commercial	4 trips per Ha	4 trips per Ha	40 trips per Ha

Table 3-2 Trip Distribution

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Industrial/Service Commercial	65%	35%	24%	76%	50%	50%

Table 3-3 Total Traffic Generated by the Development

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Industrial/Service Commercial	35	19	13	41	269	269
TOTAL	54		54		538	

Based on the above, the development is estimated to generate 54 trips in both the AM and PM Peak Hours and up to 538 trips daily.

4 Swept Path Assessment

A preliminary swept path assessment was conducted for a RAV 7 vehicle as shown in **Figure 4-1** with a higher quality diagram provided in **Appendix A**. For the purpose of this assessment, the 25m road reserve is divided into the following components:

- > 10m roadway.
- > 7.5m verges on both sides of the roadway.

Figure 4-1 Swept Path Diagram for a RAV & Vehicle



The swept path assessment shows that there will be sufficient space within the road reserve to accommodate a RAV 7 vehicle subject to detailed design of the roadway and verges.

5 Intersection Turning Warrants

To determine the turn movement treatments at the two main access points along Albany Highway, the Main Roads intersection warrants tool was used. For the purpose of this assessment, the following assumptions were used:

- > Based on existing traffic volumes, the network peak period is Midday which does not coincide with the development peak period which occurs during the morning and afternoon. Therefore, in order to assess the peak period turning warrants, the following process was undertaken to estimate the development traffic during the midday peak.
 - A review of traffic map data was undertaken to find a traffic profile which matches the anticipated function of the of the proposed development. For this case, the profile from the traffic count conducted along Quill Way in Henderson was used as this road functions only as an access to a large industrial area, with no through traffic component.
 - By comparing the ratio of traffic volumes on Quill Way between the AM and Midday Peak Hours, it was determined that development traffic volumes during the Midday Peak Hour are approximately 39% lower than the volumes in the AM Peak Hour.
 - Using the above assumption, the development generated traffic for the AM Peak Hour was reduced by 39% to estimate the traffic during the midday peak.
- > The potential road link to Marjidin Way has not been considered, meaning all development traffic will use the intersections along Albany Highway to access/egress the Site.
- > It is assumed that heavy vehicle volumes for the proposed development is approximately 10% of the total development traffic.
- > The assumed inbound traffic distribution is shown in the **Figure 5-1** below.

Figure 5-1 Indicative Inbound Traffic Distribution

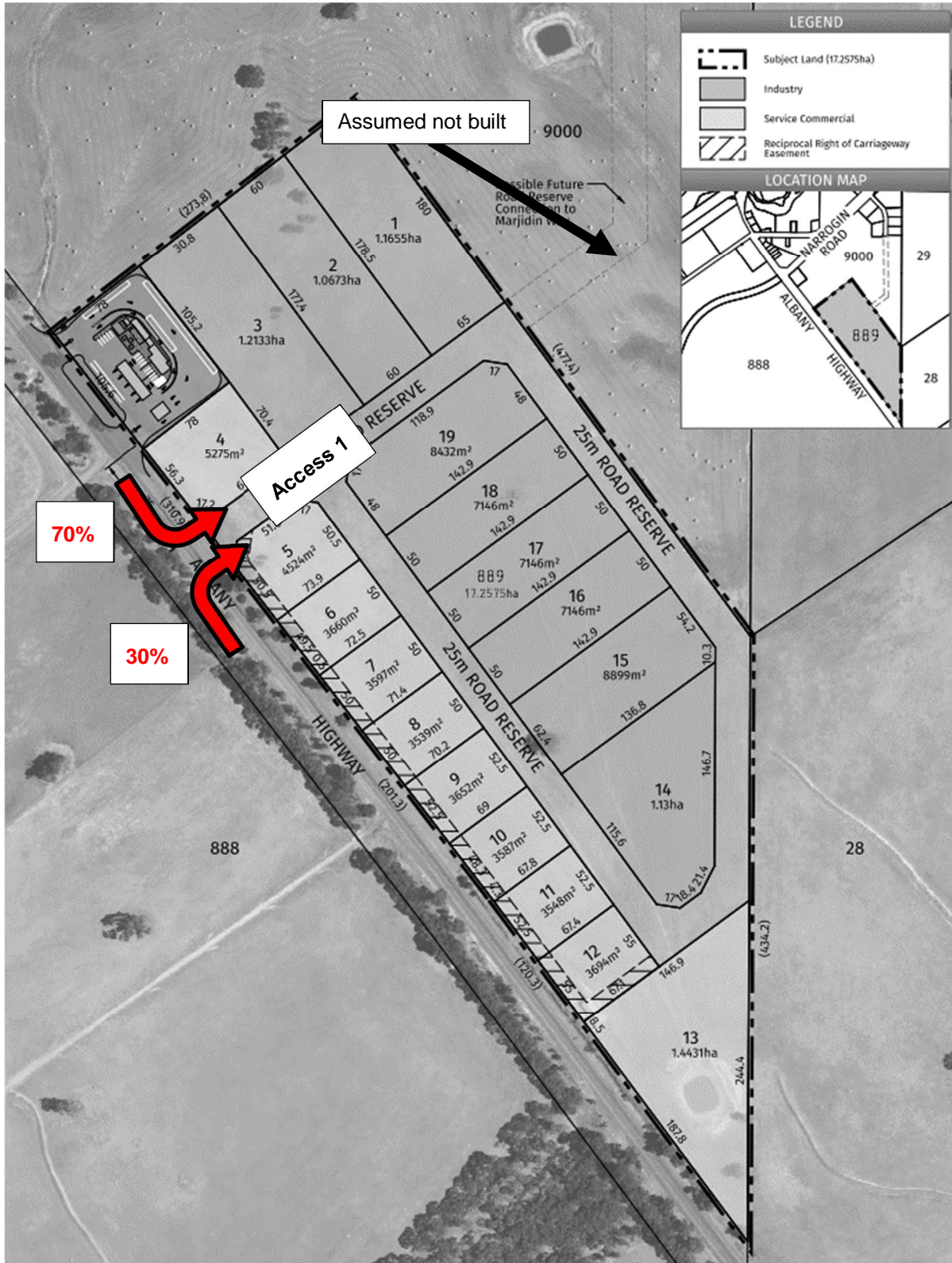


Figure 5-2 and Figure 5-3 shows the turn warrant assessment for Access 1 during the AM peak and midday peak.

Figure 5-2 Turning Warrants Assessment for Access 1 (AM Peak)

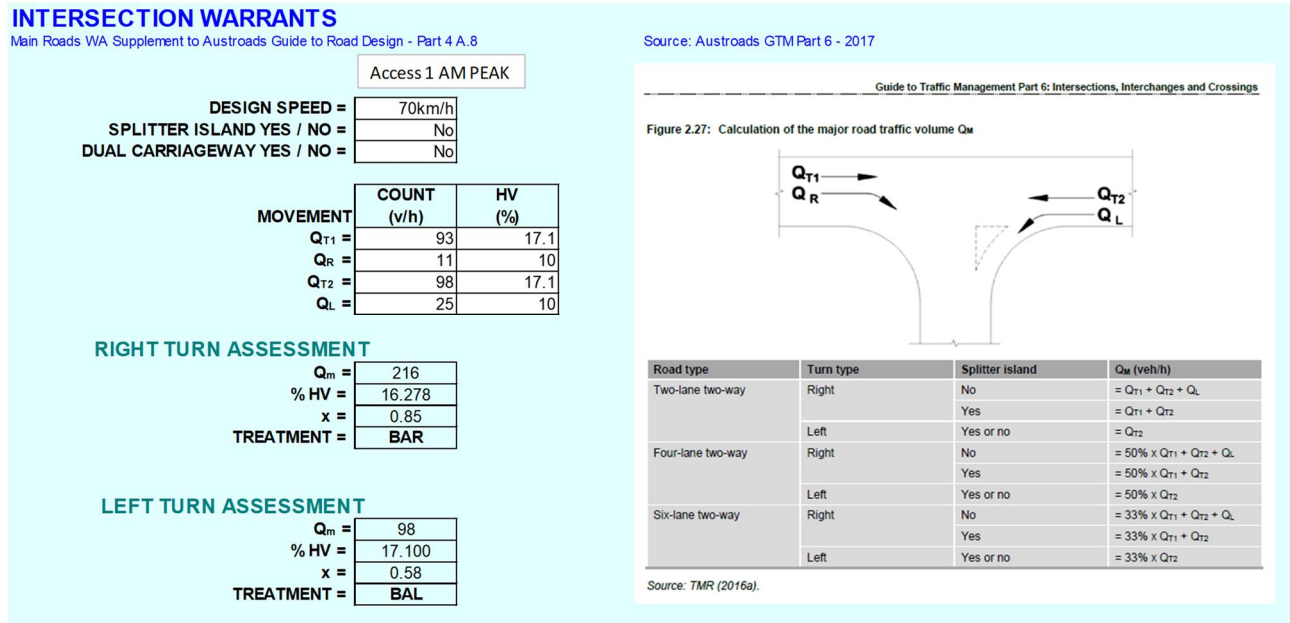
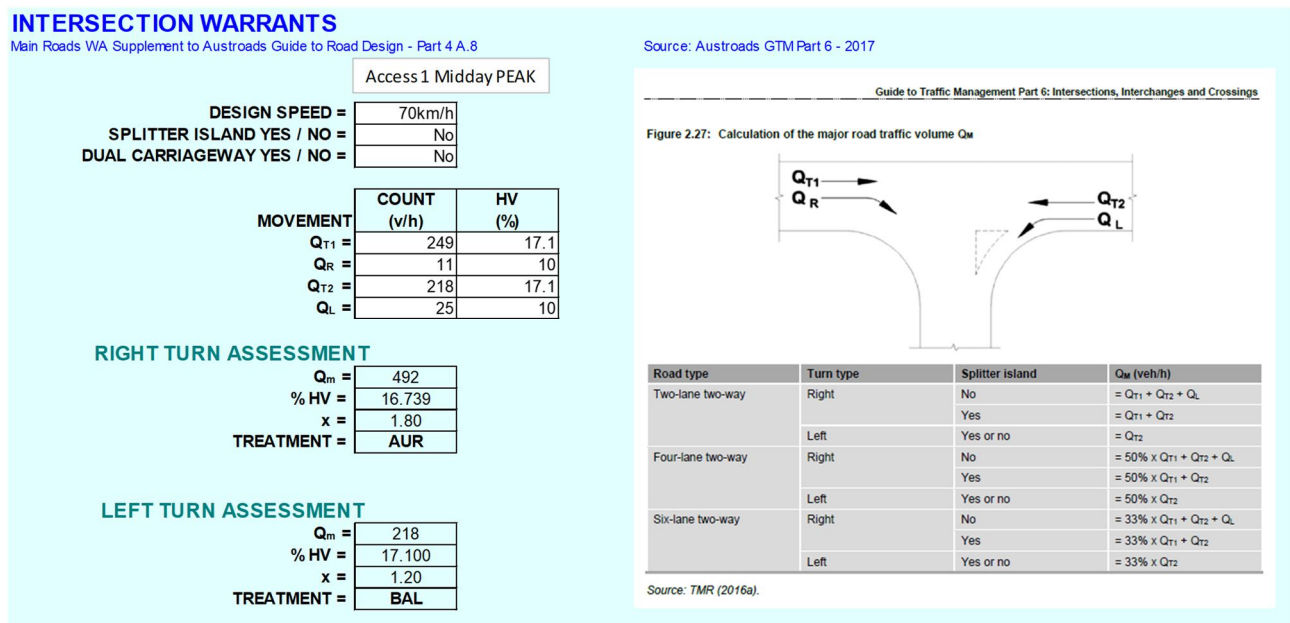


Figure 5-3 Turning Warrants Assessment Access 1 (Midday Peak)



Based on the worst-case assessment (midday peak), BAL and AUR treatments would be required at Access 1.

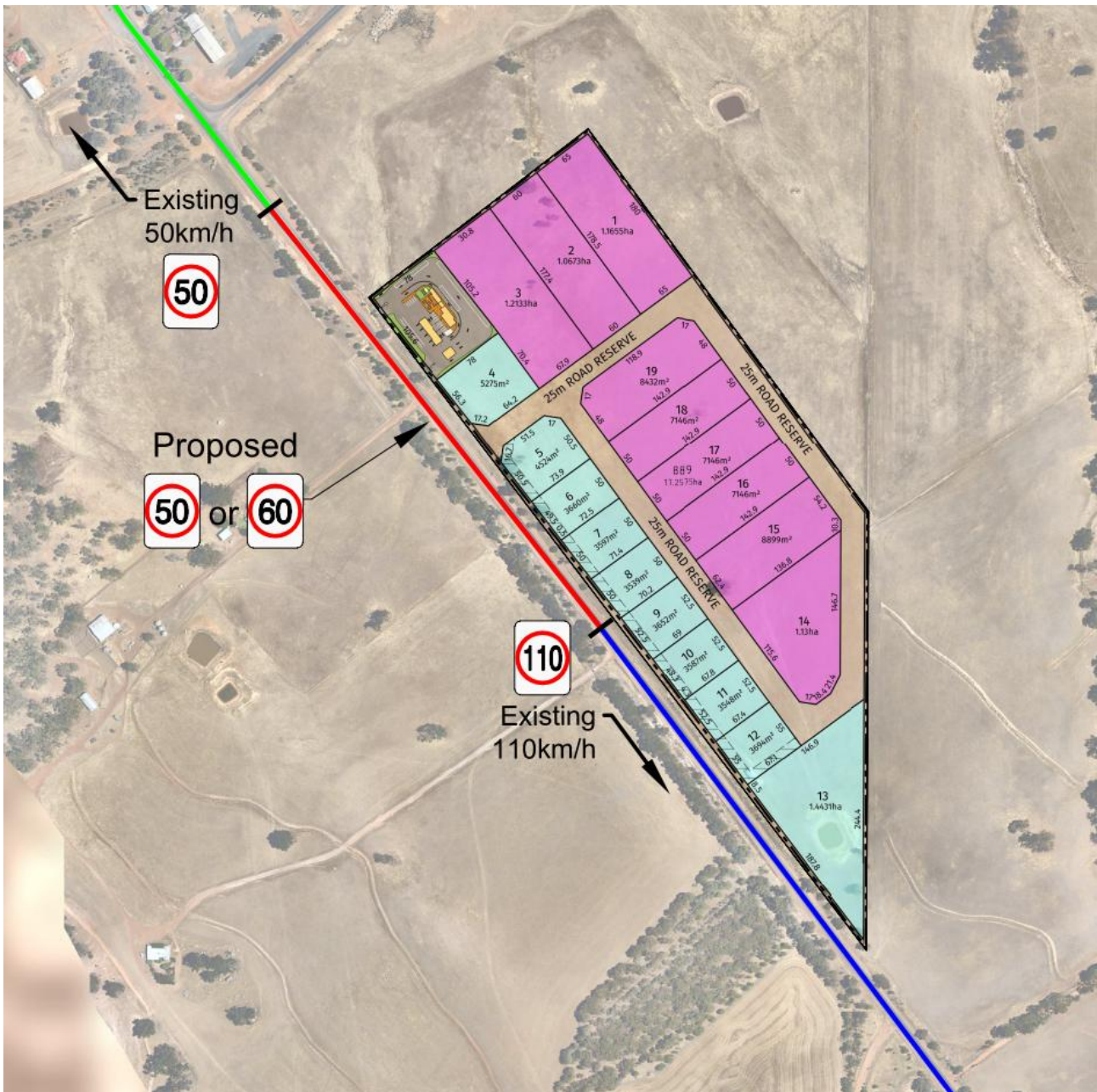
6 Speed Zoning

6.1 Proposed Speed Zoning

Consideration has been given to the proposed speed environment on Albany Highway following development of the subject site, to inform intersection form and function.

Proposed speed zoning is shown in **Figure 6-1** below.

Figure 6-1 Full Development Indicative Speed Zoning



6.2 Rationale

Development of the subject site will extend the extent of urban/townsite development along this section of Albany Highway, changing the Place Function from Moderate/Low to High/Moderate. In accordance with the *Main Roads WA Speed Zoning Policy and Application Guidelines (May 2021)*, an indicative speed environment of 50km/h to 60km/h is considered suitable.

The extent of the 50-60km/h speed zone will depend on final speed zoning assessment by Main Roads and will take into account the extent of roadside development, turning movements and other relevant factors.

As per Section 5.3 of the *Main Roads WA Speed Zoning Policy and Application Guidelines*, the speed limit transition would be located at a point of clear visual transition from rural to urban type development – i.e. on the approach to the first significant roadside development and/or Access 1, depending on the eventual development layout.

The finer details of speed zoning would be developed further in consultation with the Shire of Williams and Main Roads Western Australia through the development process.

Figure 6-2 Target Speed Ranges based on the Movement and Place Framework for Primary and Regional Distributor Roads

Primary and Regional Distributor Roadways					
Primary /Regional Distributor	Highest	Town Centre street and areas	Distributor Roads in Activity Centres/Town centres with high Place values	40-60	Proposed Place Function
Primary /Regional Distributor	High	Urbanised areas	Primary Distributors with direct access in urban areas	50-70	
Primary /Regional Distributor	Moderate	Urbanised areas	Primary Distributors in urban or semi-urban areas	60-80	Existing Place Function
Primary /Regional Distributor	Low	Rural Roads	Rural roads not compliant with current design standards (e.g. winding roads, rural roads with high demonstrated risk factors)	80-100	
Primary /Regional Distributor	Low to Lowest	Urban Freeways/Highways and Rural Roads	High standard urban freeways and highways. May be applied on undivided rural roads.	80-110	
Primary /Regional Distributor	Lowest	High Standard Freeways/Highways and Rural Highways	Default speed limit for roads in non built-up areas.	110	

Source: *Main Roads WA Speed Zoning Policy and Application Guidelines (May 2021)*,

APPENDIX C | BUSHFIRE MANAGEMENT PLAN

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address:

Site visit: Yes No

Date of site visit (if applicable): Day Month Year

Report author or reviewer:

WA BPAD accreditation level (please circle):

Not accredited Level 1 BAL assessor Level 2 practitioner Level 3 practitioner

If accredited please provide the following.

BPAD accreditation number: Accreditation expiry: Month Year

Bushfire management plan version number:

Bushfire management plan date: Day Month Year

Client/business name:

	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?		
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the bushfire protection criteria elements)?		

Is the proposal any of the following (see SPP 3.7 for definitions)?	Yes	No
Unavoidable development (in BAL-40 or BAL-FZ)		
Strategic planning proposal (including rezoning applications)		
High risk land-use		
Vulnerable land-use		

None of the above

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author or reviewer



Date

Bushfire Management Plan

Lot 889 Albany Highway Williams

January 2022



LIMITATIONS STATEMENT

This Bushfire Management Plan ('BMP') has been prepared to support a Scheme amendment to rezone land at Lot 889 Albany Highway Williams (**the Site**) for the purpose of commercial and industrial land use. The site is located within the Shire of Williams.

Envision Bushfire Protection

ABN: 90958370365

PO Box 7209 SHENTON PARK WA 6008

P: 0428 066 147

Email: admin@envisionbp.com.au

Version Control

Lot 889 Albany Highway Williams			
Version	Date	Author	
V1	23 December 2021	Anthony Rowe	submission
V2	14 January 2022	Anthony Rowe	Submission – reticulated water is available to the site

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Disclaimer

In undertaking this work, the authors have made every effort to accurately apply the available information at the time of writing following the instructions of the regulatory authorities and applying best practice as described by the Fire Protection Association Australia. Any conclusions drawn or recommendations made in the report are made in good faith, and the consultants take no responsibility for how this information and the report are subsequently used.

Envision Bushfire Protection accepts no liability for a third party's use of, or reliance upon, this specific report.

Envision Bushfire Protection accepts no liability for the inaction of the owner to provide or maintain the bushfire protection measures identified in this report. Vegetation is dynamic, building materials may distort, and the accumulation and the location of flammable materials near the building may affect the potential for damage or loss of a building to occur.

Failure to maintain the property and/or building to these standards may compromise an insurance policy if currently covering any of your assets or those of any third party that may be consequentially affected due such failure. If not insured, and if you are seeking insurance, this report may not influence the decision of any insurer not to offer cover.

Importantly the measures contained in this report cannot guarantee human safety or an absence of harm or that the building will not be damaged or would survive a bushfire event on every occasion. This is due to the unpredictable nature of fire behaviour (knowledge in this field continues to develop) and the unpredictable nature of extreme weather conditions.

Scope of this report

Envision Bushfire Protection has been engaged to provide expert bushfire safety and planning advice.

The scope of the advice has been to assess the proposal Scheme amendment for capability of the subsequent development to achieve compliance with the policy measures described in State Planning Policy 3.7. This is described in a Bushfire Management Plan and prepared with regard to the Department of Planning Lands and Heritage template, and in this instance the lot lay out is known.

The investigations and mitigation measures identified in the BMP, has, in turn, formed the basis for the preparation of a Bushfire Emergency Evacuation Plan.

Client relationship

I was engaged to provide expert bushfire safety and planning advice. My relationship with the client is a standard commercial contract, and no private, personal, or other matter has influenced the content of the BMP or my findings.

STATEMENT OF CONFORMITY – PLANNING AND DEVELOPMENT ACT 2005



Anthony Rowe Level 3 - BPAD36690

Principal



The signatory declares that this Bushfire Management Plan meets the requirements of State Planning Policy 3.7 and the Guidelines for Planning in Bushfire Prone Areas V1.4.

SUMMARY

This BMP has been prepared to support a Scheme amendment to rezone land at Lot 889 Albany Highway Williams (**the Site**) (**the site**).

The site is located within the Shire of Williams, 1 km south of the Williams township, and is partially (southern extent) within the State map of Bushfire Prone Areas (OBRM October 2021) requiring development demonstrate compliance with State Planning Policy 3.7.

In this instance the lot layout is known, and the outcome of the Scheme amendment can be assessed for compliance with SPP 3.7. and the Bushfire Protection Criteria (Appendix 4) described in the *Guidelines for Planning in Bushfire Prone Areas v1.4*.

The Policy Intent for SPP 3.7, is to implement effective **risk based** land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure. SPP 3.7 utilises AS3959:2018 to determine the level of risk and the Bushfire Protection Criteria represents the commensurate risk treatments.

This BMP in this instance, because the layout is known, has been prepared in accordance with the WAPC *BMP template to support a BAL Contour assessment for structure plans where the lot layout is known and subdivision applications* and the *Model Subdivision Conditions Schedule May 2020*.

This BMP follows the heading structure and the investigations of the WAPC template. Further detail to the summary provided below is provided at the referred sections in the report.

1. Proposal details (addressed in Section 1)

The proposed Scheme amendment and subdivision of Lot 889 Albany Highway Williams (17.3 ha) will create 20 additional lots (commercial/industrial) ranging in size from 3550m² to 1.2ha

The site is presently a rural lot, grassland used for pasture, and is clear of trees.

Access to the site is from Albany Highway.

The site has approval from Water Corporation for a reticulated water supply.

Nature of Land use

The proposal is a Scheme amendment to facilitate a subdivision to create 20 lots from Lot 889 Albany (17.3 ha) of Lot 889 to create an additional 20 lots to be used for commercial purposes.

A lot (balance lot) is proposed as a service station. The lot is located at the north west corner of the site, outside of the area identified by the Bushfire Prone Area map. The location of the service station, based on site assessment, is also within a BAL ranging from BAL 12.5 to BAL Low.

2. Environmental considerations (addressed in Section 2)

A review of the ecological data does not identify the site as containing any threatened fauna and flora.

The site therefore presents no restriction upon the implementation of bushfire protection measures.

3. Bushfire assessment results (addressed in Section 3)

A Bushfire Attack Level assessment following Method 1 AS 3959:2018, and the DPLH *Visual guide for bushfire risk assessment in Western Australia*, and using an FFDI of 80, has been undertaken.

A present vegetation assessment has been shown at Figure 4 together with an expected post development assessment reflected in the BAL Contour Plan (figure 5).

4. Identification of bushfire hazard issues (addressed in Section 4)

The prevailing afternoon summer winds (recorded at the nearest weather station Narrogin) are from the south and south east.

The site is within an area 5 km that is most level and historically cleared for agricultural production and used for pasture. There are few isolated pockets of Forest.

The site may be impacted by a grass fire rather than by ember attack from a distant fire that is characteristic of a close proximity to forest.

Grassland fires are fast moving and intense, but the impacts can be mitigated by disrupting the continuity of bushfire fuel to restrict the spread of fire, and through construction standards.

A review of fire history indicated a likelihood greater than 10 years (unlikely). The consequence, having considered treatments (Asset Protection Zone construction standard and proximity of emergency services) is minor. The Risk level for development at the site is classed as low.

5. Compliance with the Bushfire Protection Criteria

The intended outcome of the Scheme amendment was assessed for compliance with the bushfire criteria (SPP3.7 measures 6.2, 6.4, and 6.7 and the applicable criteria for a subdivision provided in Appendix 4 *Guidelines for planning in bushfire prone areas v1.4*).

Element 1 (location) and (cl 6.7 SPP 3.7)

Element 1 of the Bushfire Protection Criteria is applicable to strategic level documents for determining suitable areas for development and encourages the avoidance of areas of extreme bushfire hazard level area, such as those surrounded by contiguous forest.

The locality to the site is predominantly grassland, which is a Moderate Bushfire Hazard Level.

The proposed subdivision will be compliant with Element 1.

Element 2 (siting and design) and (cl 6.7 SPP 3.7)

The BAL Assessment and Bushfire Management Plan has assumed the adjoining land is unmanaged grassland.

Figure 5 illustrates that each lot can accommodate the building envelope within BAL 29. It is recommended that the placement of buildings be governed by a restriction on title from placing a building within BAL 40 -FZ.

All lots are to be maintained as low threat, expected to be primarily hardstand and buildings. Only the lots with a perimeter boundary including the service station lot and lots 1, 2, 3 and 13 are affected.

Element 3 Vehicle Access

The site has a single access from Albany Highway and a loop road servicing the proposed lots. The loop road is mostly a perimeter road except for the service station lot and lots 1, 2, 3 and 13. A Fire Service Access Route is proposed for these lots.

The internal road is to be a public road constructed to the Shire specification and vested to the Shire. Whilst the road is a single access, because all lots are to be maintained as low threat, and the external classification is grassland the road is through low and moderate bushfire hazard level, which is an exception to the requirement for a through road. It is however recommended that an emergency accessway be provided between Lot 12 and 13 and onto Albany Highway.

The arrangement satisfies the intent of Element 3

Element 4 Water

The site has access to a reticulated water supply. Hydrants are to be installed in the proposed road (public) in accordance with the Water Corporation Standard No. 63.

5.1 Additional Bushfire Management Strategies (addressed in section 5.2)

Additional management strategies are matters not directly addressed by the Bushfire Protection Criteria.

No further risk treatment strategies have been identified further to the treatments provided in meeting the intent of the Bushfire Protection Criteria.

5.2 Spatial representation of the bushfire management strategies (Figure EX 1)

The key features demonstrating compliance with the bushfire protection measures are identified on the *Spatial representation of the bushfire management strategies*.

These illustrated actions follow the *Responsibilities for implementation and management of the bushfire measures*.

6. Responsibilities for Implementation and Management of the Bushfire Measures

The Responsibilities for Implementation and Management of the Bushfire Measures are listed in section 6 of the report and are to be followed in the subdivision.

The Scheme amendment will guide the subsequent subdivision. The following instructions (Subdivision Requirements) are provided for guidance of the subdivision.

Only specific site measures have been identified. Routine items that apply to all development within a bushfire protection area are assumed to be addressed at the subdivision, i.e. notification pursuant to Section 165 that the land is within a bushfire prone area.

The key features demonstrating compliance with the bushfire protection measures are identified on the Spatial representation of the bushfire management strategies to be followed in the subdivision.

EX1: Spatial representation of the proposed risk management strategies







Notes

1. No buildings are to be constructed within BAL 40 BAL FZ
2. All lots are to be established and maintained in a low threat condition consistent with AS3959:2018 cl. 2.2.3.2 (e) and (f).
3. All roads are to be constructed to the technical requirements described in Table 6 Column 1 to be vested to the Shire.
4. An Emergency Access Way between lot 12 and 13 is to be constructed connecting to Albany Highway to be vested to the Shire
5. Firebreaks are to be installed on the inside of the perimeter of each lot following the requirements of the Shire Firebreak Notice.
6. A Fire Service Access Route is to be provided around the inside perimeter, former Lots 1,2 and 3. Gates are to be provided between properties at the perimeter to permit continuous access of fire service vehicles.

Notifications

"This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan Additional planning and building requirements may apply to development on this land"

Legend

-  Site Boundary
-  Emergency access Way
-  Public Road Access
-  Fire Service Access Route

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1. PROPOSAL DETAILS

Introduction

Envision Bushfire Protection has been commissioned to prepare a Bushfire Management Plan, for Scheme Amendment to facilitate a subdivision at Lot 889 Albany Highway Williams (the site 17 .3 ha), to create 20 commercial/industrial lots ranging from 3550m² to 1.2ha.

The site is located within the Shire of Williams and zoned Rural. The location in context to the Perth urban area is shown on Plate 1. The site is 152 km south east of the Peth CBD.

The subject land is partially within a declared bushfire prone area (OBRM September 2019) shown on Plate 2. Accordingly, State Planning Policy 3.7 *Planning in bushfire prone areas* (SPP 3.7) and the *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines v1.4) are relevant planning assessment considerations.

In accordance with SPP 3.7, the planning authority in determining an application in a declared bushfire prone area must be satisfied the proposal is consistent with the Policy intent, **to implement effective risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure.**

This BMP has been prepared following the

- FPA methodology and template for the preparation of a Bushfire Attack Level (BAL) assessment.
- BMP template to support a Bushfire Hazard Level (BHL) assessment for strategic planning proposals
- BMP template to support a BAL Contour assessment for structure plans where lot layout is known and subdivision applications.
- Guidelines for Planning in Bushfire Pone Areas Version 1.4 (the Guidelines v.1.4)
- The WAPC Model Subdivision Conditions April 2020.

Purpose of this Plan

The purpose of this Bushfire Management Plan (BMP) is to demonstrate the resulting subdivision from the Scheme amendment can achieve compliance with the bushfire protection measures described in SPP 3.7 and the Bushfire Protection Criteria in the Guidelines.

The BMP will therefore assess the bushfire hazards within and nearby the site and any potential restrictions that may apply to the Acceptable Bushfire Protection measures or alternative solutions (performance principle) to achieve the intent of the bushfire protection measure.

The purpose of this report is to demonstrate the capability of the resultant lots to accommodate the proposed development to achieve the SPP 3.7 Policy Intent, to place primacy upon human life, and reduce the impact of bushfire on property and infrastructure.

As a Scheme amendment the outcome is to provide guidance for the future subdivision.

Site and Proposal Description

The proposal is to divide Lot 889, presently an open rural lot (pasture). The arrangement is illustrated at Plate 3.

Address	Lot 889 Albany Highway Williams
Local Government Area	Shire of Williams
Local Planning Scheme Zone	Shire of Williams TPS No. 2 Rural
Bushfire Season	30 November - 31 May
Development proposal	The proposal is a Scheme amendment to facilitate a subdivision to create 20 lots from Lot 889 Albany (17.3 ha)
Land description site	The site is flat, historically cleared for agriculture purposes, now pasture grass.

Existing buildings Topography Site Vegetation	<p>The site and its surrounding area rises gently 1-3⁰ from the site.</p> <p>There are no topographical features nearby that are expected to be influential upon the fire behaviour within the area of the site.</p>			
Adjoining Land-uses	North	East	South	West
	Pasture grassland	Pasture grassland,	Pasture grassland	Albany Highway road side vegetation. Pasture grassland
Road Access	The site is accessed from Albany Highway			
Nearest Town Centre	The nearest town centre is Williams			
Water supply	The site does not have access to a reticulated water supply			
Tele communications	The site is within the Telstra network.			
Emergency services	<ul style="list-style-type: none"> Williams Volunteer Fire & Rescue 22A Brooking St, Williams (1.4 km) 			
Minor Development	Not applicable			
Unavoidable development	Not applicable			
Vulnerable Development	Not applicable			
High-risk land use	Not applicable			

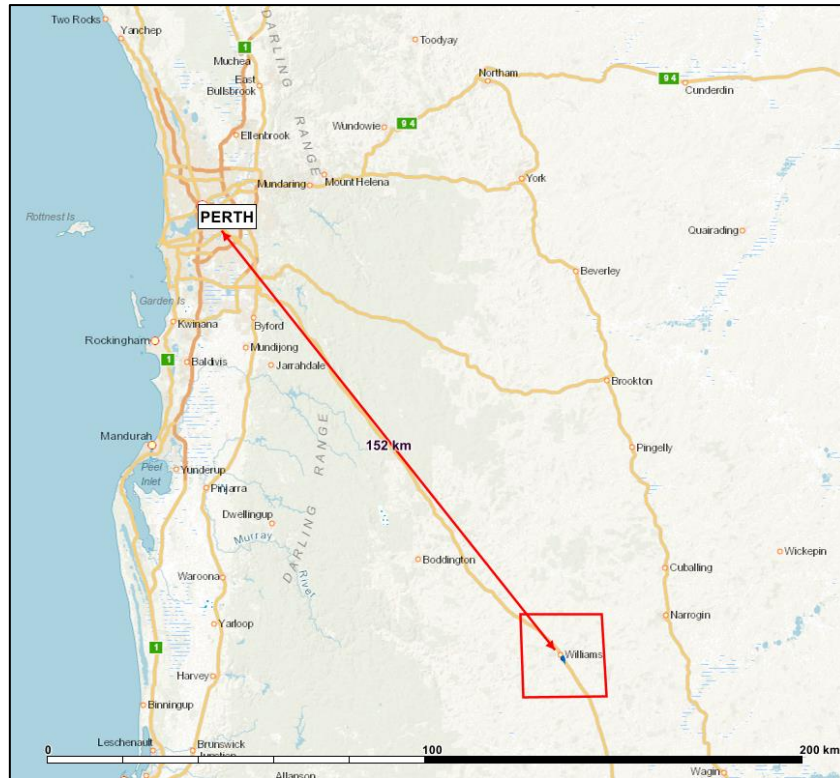


Plate 1: Site in Locality



Plate 2: OBRM Bushfire Prone Area (Pink area)

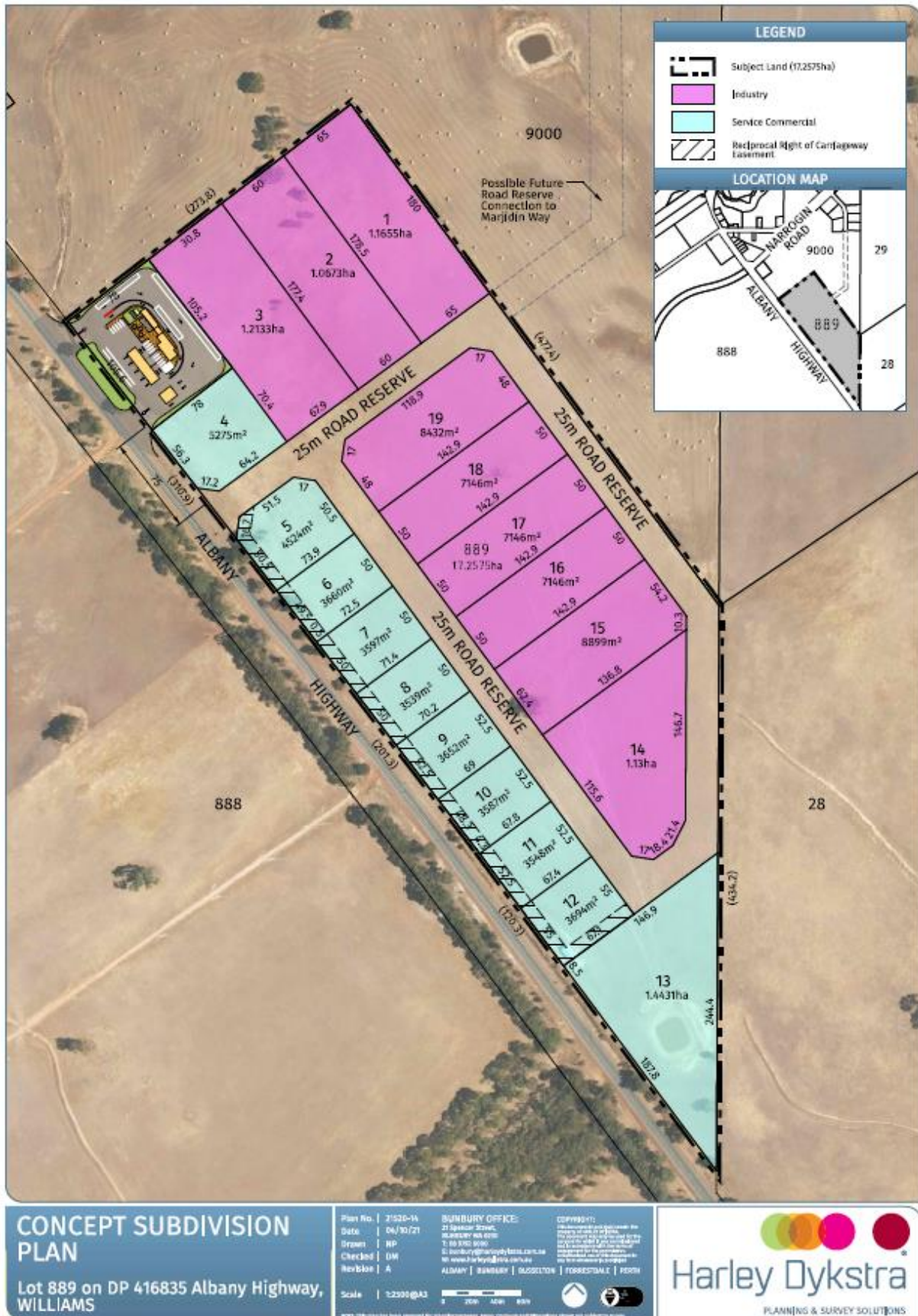


Plate 3: Plan of subdivision

1.1 Regulatory Compliance Requirements

The applicable considerations from SPP 3.7 are relevant to a subdivision following a Scheme amendment for commercial and industrial purposes. For this purpose, the provisions relevant to compliance of a subdivision have been identified.

Planning and Development Act 2005 - SPP 3.7

On 7 December 2015, the State Government introduced by Gazette, a state map of Bushfire Prone Areas by order under the *Fire and Emergency Services Act 1998* and introduced development controls in Bushfire Prone Areas through the *Planning and Development Act 2005*. These controls were authorised by State Planning Policy 3.7 (Planning in Bushfire Prone Areas) and regulations introduced under Part 10A Schedule 2 of the *Planning and Development (Local Planning Scheme) Regulations 2015*. SPP 3.7 is further assisted by the *Guidelines for Planning in Bushfire Prone Areas v1.4 (updated December 2021)*.

Planning and Development (Local Planning Schemes) Amendment Regulations 2015 (Schedule 2)

Subdivisions are approved by the West Australian Planning Commission on assessment by the local government based on appropriate planning principles.

State Planning Policy 3.7 Planning in Bushfire prone areas.

The State Planning Policy, Regulations, and Guidelines now form the foundation for fire risk management planning in WA at a community and land development level. The Policy Intent of SPP 3.7 is ***to preserve life and reduce the impact of bushfire on property and infrastructure.***

Section 4 of SPP 3.7 provides the policy is to be read in conjunction with the Local Planning Schemes Amendment Regulations 2015, supplementary provisions of a scheme (if present), the supporting Guidelines and the Australian Standard AS3959.

Applicable clauses from SPP 3.7, addressing subdivisions include:

SPP 6.2: A development application within a bushfire prone area has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval.

SPP 6.4: The information required to accompany subdivision applications is to include a BAL contour Map, the identification of any hazard resulting from the BAL Contour Map and an assessment against the bushfire protection criteria that demonstrates the capability of the subsequent development to comply with the Policy Intent. *In this instance the subdivision can provide a developable area (BAL 29) on each lot, illustrated on Figure 5.*

SPP 6.6. In areas where BAL-12.5 to BAL-29 applies: Subdivision and development applications for vulnerable or high-risk land uses in areas between BAL-12.5 to BAL-29 will not be supported unless they are accompanied by a Bushfire Management Plan jointly endorsed by the relevant local government and the State authority for emergency services. Subdivision applications should make provision for emergency evacuation. Development applications should include an emergency evacuation plan for proposed occupants and/or a risk management plan for any flammable on-site hazards

The subdivision will facilitate the development of a lot for use as a service station. The lot is outside of the bushfire prone area. Notwithstanding this, it adjoins grassland and has been included in the BAL Assessment. The Assessment has identified the development site for the service station is within an area between BAL-12.5 and BAL Low. The Service Station proposal therefore is not captured by the additional consideration described in SPP 3.7, cl.6.6.

SPP 6.7: A development that will result in the introduction or intensification of development or land use in an area that has or will, on completion, have an extreme BHL and/or BAL-40 or BAL-FZ will not be supported. *In this instance the proposed subdivision can demonstrate a developable area, BAL 29 is available on each lot; refer to Figure 5.*

SPP 6.11: Precautionary Principle if a landowner/proponent cannot satisfy the performance principles of the relevant policy measures (intent) through either the acceptable solutions outlined in the Guidelines, or through the alternative solutions (Performance Principle) the application may not be approved. *The proposal can achieve compliance with the Element 3 Access, Acceptable Solutions; see section 5 of this report.*

Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design

The Position Statement is to be read in conjunction with SPP 3.7 and is intended to separate the considerations for Element 1 (strategic documents for the identification of suitable future development areas – avoiding an extreme bushfire hazard level) and Element 2 (responding to the present risk in a development applications).

Bushfires Act 1954

Section 33 of the *Bushfires Act 1954* recognises the responsibility of all landowners to prevent the spread of bushfire. The Shire of Williams issues a Firebreak Notice annually. The Shire can issue a notice upon the landowner to act as and when specified in the notice with respect to anything which is upon the land, and which in the opinion of the local government or its duly authorised officer, is, or is likely, to be conducive to the outbreak of a bushfire or the spread or extension of a bushfire.

An owner who fails to comply with a notice is guilty of an offence (Penalty: \$5,000). The local government may in addition carry out the required works of the notice and recover the costs incurred by application to a Court.

Individual lot owners will rely upon the management of the neighbouring land through the Bush Fires Act 1954, until the land is developed.

Environment Protection Act 1986 and Environmental Protection (clearing native vegetation) Regulation 2004

It is an offence to clear native vegetation without the authority of a permit or an exemption. The act of clearing native vegetation, requires a permit from either the Department of Water and Environmental Regulation (DWER) or the Department of Mines, Industry Regulation and Safety (DMIRS), unless an exemption applies.

Exemptions include:

Environment Protection Act 1986

- Clearing required by local government Section 33 *Bushfire Act 1954*.
- **Clearing in accordance with the terms of a subdivision approval.**
- Clearing in accordance with a permit under the *Bushfires Act 1954* (prescribed burning) and clearing by a bushfire control officer.

Environmental Protection (clearing native vegetation) Regulation 2004 (exemptions do not apply in Environmentally Sensitive Areas, and clearing > than 5ha)

<https://www.der.wa.gov.au/your-environment/environmentally-sensitive-areas>

- Clearing to the extent necessary to construct an approved building.
- Clearing that is for fire hazard reduction burning.
- Clearing to maintain an area cleared in the last ten years.

(WA) Biodiversity Conservation Act 2016 and Bio-diversity Conservation Regulations 2018

The *Biodiversity Conservation Act, 2016*, replaces the *Wildlife Conservation Act, 1950*, and the *Sandalwood Act, 1929*, it became operational with the *Bio-diversity Conservation Regulations 2018*, on 1 January 2019.

The Act provides for listing species, threatened ecological communities (TECs), key threatening processes, and critical habitats. It introduces criteria for listing species 'endangered', 'critically endangered' or 'vulnerable,' to align with the Environment Conservation and Biodiversity Conservation Act 1999 (Cth).

The *Biodiversity Conservation Act 2016* recognises that activities approved under the *Environment Protection Act 1986* do not require further approval include clearing of native vegetation that is either exempt or done under the authority of a clearing permit or done in accordance with an implementation decision under Part IV of the *Environment Protection Act 1986*.

Commonwealth Environment Protection Biodiversity Conservation Act 1999

The Commonwealth Environment Protection Biodiversity Conservation Act 1999 provides for the protection of matters of national environmental significance. National environment law does not generally regulate fire prevention measures taken by state and territory governments, but no specific exemptions are provided.

In this instance the land has been historically cleared and used for pasture.

2. ENVIRONMENTAL CONSIDERATIONS

2.1 Native Vegetation – Modification and Clearing

A fundamental consideration in the assessment of development under SPP 3.7 is to avoid instances where bushfire risk management measures would conflict with or be limited by other biodiversity management measures.

In accordance with the Department of Planning Lands and Heritage template (BMP template to support a BAL Contour Assessment) a review of the listed databases has been undertaken as part of this assessment to identify whether restrictions or other specific considerations may apply that would affect the implementation of any bushfire protection initiatives that may otherwise be identified.

A fundamental consideration in the assessment of development under SPP 3.7 is to avoid instances where bushfire risk management measures would conflict with or be limited by other biodiversity management measures.

In accordance with the Department of Planning Lands and Heritage template (Bushfire Management Plan template to support a BAL Contour Assessment) a review of the listed databases (table 1) has been undertaken as part of this assessment to identify whether restrictions or other specific considerations may apply that would affect the implementation of any bushfire protection initiatives that may otherwise be identified.

Table 1

Is the land affected by:	Yes/No	Comment		
Conservation Wetland or buffer (DBCA-019 DBCA-017)	No	The site is not identified as a Conservation Wetland		
RAMSAR Wetland (DBCA-010)	No	The site is not identified as RAMSAR Wetland.		
Threatened and Priority Flora (DBCA-036)	No	No threatened priority flora communities are identified within the site		
Threatened and Priority Fauna (DBCA-037)	No	No threatened priority fauna communities are identified within the site		
Threatened Ecological Communities (DBCA-038)	No	No threatened ecological communities are identified within the site		
Bush Forever (COP-071)	No	The site does not occupy an area identified as Bush Forever		
Environmentally Sensitive Area (DWER-046)	No	The site is not identified as an Environmentally Sensitive Area		
Regionally Significant Natural Areas (DWER-070)	No	No Regionally Significant Natural Areas are identified on the site		
Conservation Covenant (DPIRD-023)	No	Not applicable		
Does the proposal require the removal of restricted vegetation?		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Yes</td> <td style="text-align: center;">No</td> </tr> </table>	Yes	No
Yes	No			

Native Vegetation – Modification and Clearing

The site has been historically cleared of native vegetation and used for pasture. It is presently grassland slashed to 100-300 mm.

A review of the ecological data identified the site contains no ecological assets.

Re-Vegetation/Landscape Plans

No revegetation plans are associated with the proposal.

Measures are to be provided to ensure the land will remain a moderate bushfire hazard level, so as not to increase the threat of a bushfire.

3. BUSHFIRE ASSESSMENT

3.1 Bushfire Attack Level Assessment (Inputs)

The following assessment has applied the methodologies described in AS3959-2018, the Guidelines, and has used the Fire Protection Association Australia accredited practitioner methodology for the preparation of Bushfire Attack Level (BAL) assessments.

All vegetation within 150 m (context) of the site has been classified following Clause 2.2.3 (AS 3959 -2018) to determine the predominant vegetation affecting the behaviour at the locality. The Bushfire Attack Level is determined by the **predominant** vegetation within 100 m of the site boundary (for a subdivision), or around the external face of a habitable building.

The classifications of vegetation used in AS3959:2018 are based on foliage cover, measured as a percentage of a hectare and by the fuel (vegetation) height.

Foliage cover: *The portion of the ground that would be shaded by foliage when the sun is shining directly overhead, expressed as a percentage for each stratum or identifiable layer of vegetation*

AS 3959:2018

Layer/ Stratum	Description	Hazard
Bark	Tight/fine – course/ribbon	Spotting and ember attack potential
Canopy	Trees taller than 6 m	Influences the flame height
Elevated fuel	Trees and Shrubs up to 6 m	Influences the flame height
Near surface	Grasses and shrubs taller than 100 mm and up to 2 m	Influences the rate of spread
Surface	On ground material, leaves, twigs, bark	Influences the rate of spread

From CFA (Vic) Overall fuel assessment guide 2010

AS 3959:2018 prescribes six categories of Bushfire Attack Level (BAL): BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40, and BAL-FZ. In addition, BAL-FZ describes only performance solutions where the separation from classified vegetation (on completion) is less than 10 m. The BAL level is used for determining the siting of development (to be less than BAL-40) and in turn the construction standard that is equivalent to the BAL at the proposed building location.

This assessment has followed the guidance of AS3959:2018. This includes:

- A recognition of excluded vegetation types described at cl.2.2.3.2 (e) and (f), but the underlying vegetation should still be classed e.g. an orchard may be excluded but not the grassland within it.
- A separate plot is applied if there is a variation in the slope greater than 5.0°
- For various vegetation classes a representation that is less than 10%, does not constitute the predominant class. Foliage cover referred to in AS3859:2018 for various classes is based on the foliage cover for that class as a percentage of a ha. (shadow cast is not representative of foliage cover).
- The measurement point and the most influential vegetation class (presenting the highest BAL at the building) is used for the determination of the BAL at the building (Figure 2.2 AS3959:2018).
- Consideration of the predominant vegetation is to consider the likelihood of regeneration.
- Orchards, and single tree rows (planted in a row less than 10 m wide) is determined by underlying the near surface fuel.

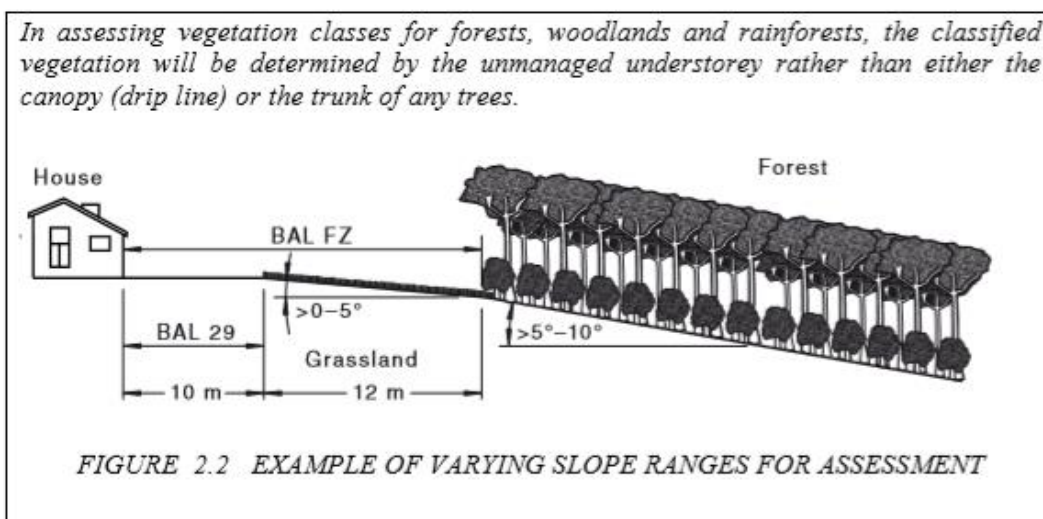


Plate 5: Effective Slope and measurement taken from AS3959:2018

Effective slope under each vegetation plot was assessed in accordance with the methodology detailed in AS 3959-2018 Construction of buildings in bushfire prone areas (AS 3959) (Standards Australia, 2018 Bushfire Fuels). Slope data was measured on site and cross referenced with Landgate elevation data.

Photo evidence Site Assessment & Site Plans

The assessment of this site / development was undertaken on 6 December 2021 by a BPAD Accredited Practitioner for the purpose of determining the Bushfire Attack Level in accordance with AS 3959 - 2018 Simplified Procedure (Method 1).

Figure 1: Location



- Site boundary
- 150 m assessment area
- 100 m assessment area

Assessment Date: 06/12/2021
 Prepared: Anthony Rowe
 Accreditation Level: BPAD L3
 Accreditation Number: 36690
 Accreditation Expiry: Dec 2021
 FPAA FIRE MAP 2021
 GADA 1994 MGA Zone 50

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Figure 2: Topography

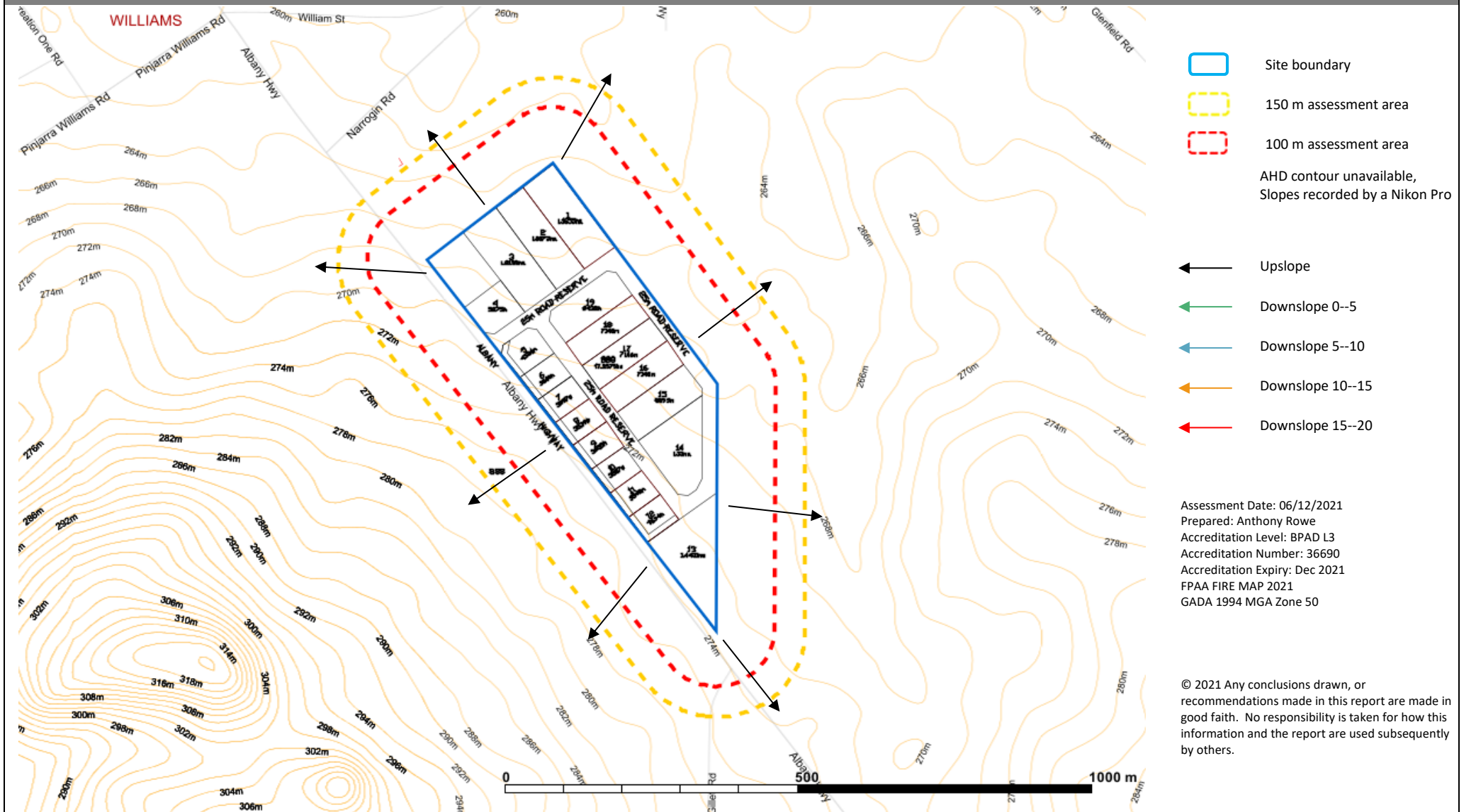
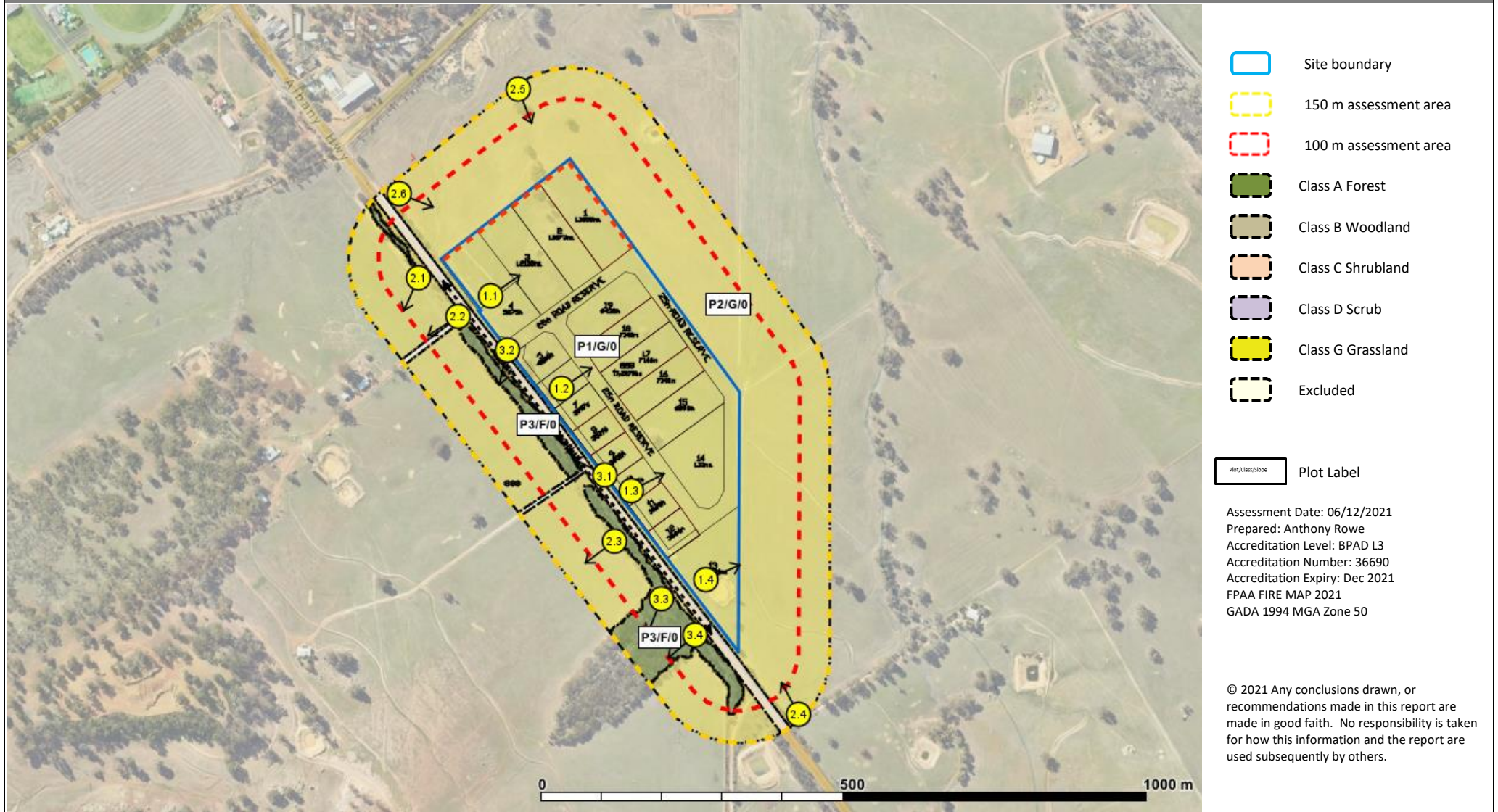


Figure 3: Vegetation Classification



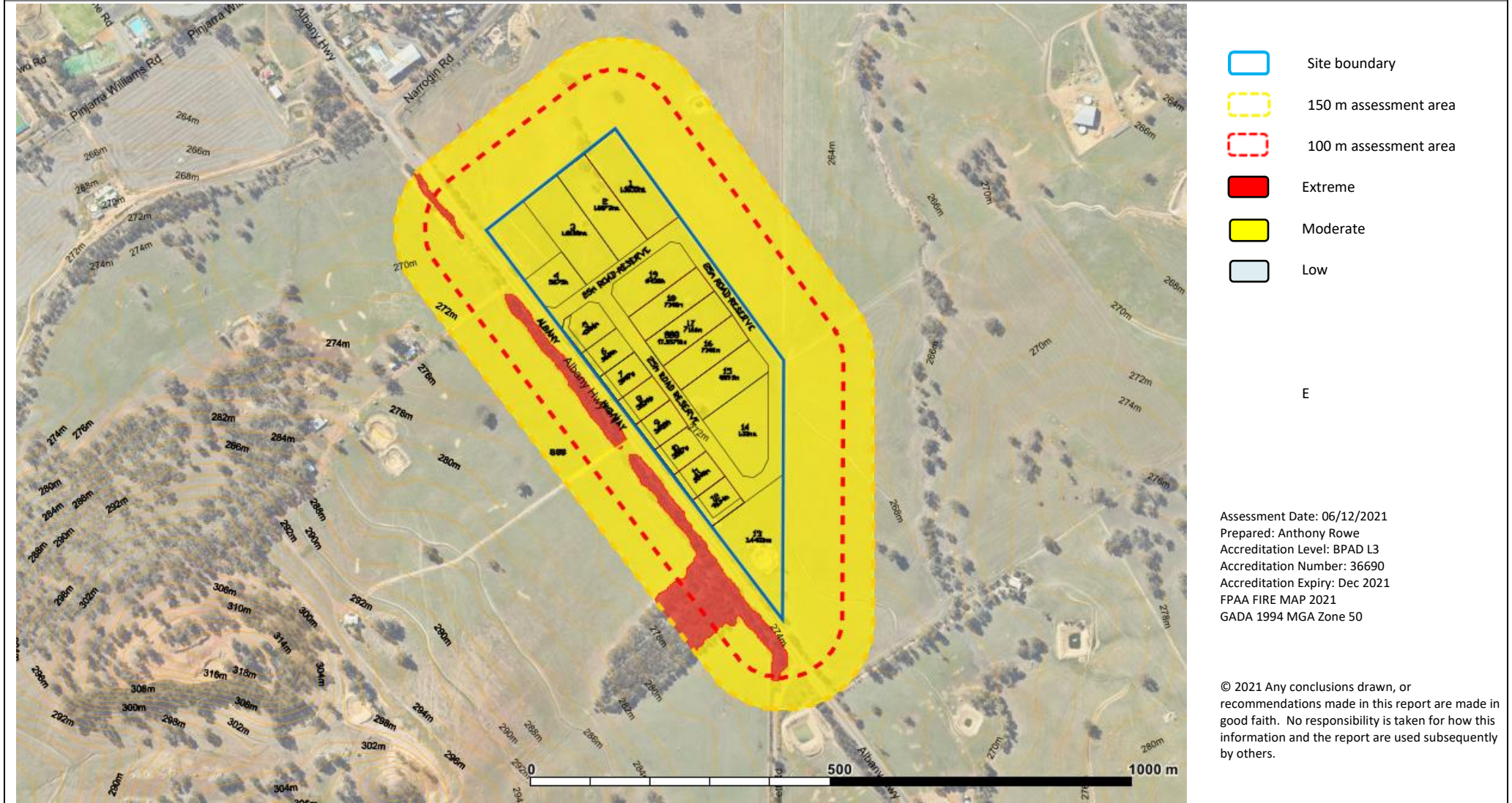
- Site boundary
- 150 m assessment area
- 100 m assessment area
- Class A Forest
- Class B Woodland
- Class C Shrubland
- Class D Scrub
- Class G Grassland
- Excluded


Plot/Class/Slope Plot Label


Assessment Date: 06/12/2021
 Prepared: Anthony Rowe
 Accreditation Level: BPAD L3
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Figure 4: Bushfire Hazared Level





PLOT: 1					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Open herbfield G-27			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface	Elevated	Bark	
Low		✓	✓	✓	
Moderate	✓				
High					
Very High					
Extreme					
Post development					
To be displaced by buildings and hardstand Excluded 2.2.3.2(e)					
					
			PHOTO ID: 1.1 Comment:		


PLOT: 1					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface	Elevated	Bark	
Low		✓	✓	✓	
Moderate	✓				
High					
Very High					
Extreme					
Post development					
To be displaced by buildings and hardstand Excluded 2.2.3.2(e)					
					
			PHOTO ID: 1.2		


PLOT: 1					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface	Elevated	Bark	
Low		✓	✓	✓	
Moderate	✓				
High					
Very High					
Extreme					
Post development					
To be displaced by buildings and hardstand Excluded 2.2.3.2(e)					
					
			PHOTO ID: 1.3		


PLOT: 1					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface	Elevated	Bark	
Low		✓	✓	✓	
Moderate	✓				
High					
Very High					
Extreme					
Post development					
To be displaced by buildings and hardstand Excluded 2.2.3.2(e)					
					
			PHOTO ID: 1.4		


PLOT: 2					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface			
Low	✓				
Moderate		✓			
High				✓	
Very High			✓		
Extreme					
Post development					
Unchanged					
			PHOTO ID: 2.1		


PLOT: 2					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface			
Low	✓				
Moderate		✓			
High				✓	
Very High			✓		
Extreme					
Post development					
Unchanged					
			PHOTO ID: 2.2		


PLOT: 2					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface			
Low	✓				
Moderate		✓			
High				✓	
Very High			✓		
Extreme					
Post development					
Unchanged					
			PHOTO ID: 2.3 Extending Grassland beyond roadside vegetation		


PLOT: 2					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface			
Low	✓				
Moderate		✓			
High				✓	
Very High			✓		
Extreme					
Post development					
Unchanged					
			PHOTO ID: 2.4		


PLOT: 2					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface			
Low	✓				
Moderate		✓			
High				✓	
Very High			✓		
Extreme					
Post development					
Unchanged					
			PHOTO ID: 2.5		

PLOT: 2					
Vegetation Classification			Vegetation Description (AS3959)		
Class G Grassland – Sown pasture G-26			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface			
Low	✓				
Moderate		✓			
High				✓	
Very High			✓		
Extreme					
Post development					
Unchanged					
			PHOTO ID: 2.6		

PLOT: 3							
Vegetation Classification			Vegetation Description (AS3959)				
Class A Forest - Low open forest A-04			Trees 10 m - 30 m high; 10% - 30% foliage cover dominated by eucalypts and/or callistris with a prominent grassy understorey. May contain isolated shrubs.				
Slope							
Flat							
Observation/Justification for classification							
Fuel Hazard	Surface	Near surface				Elevated	Bark
Low	✓	✓					
Moderate							✓
High						✓	
Very High							
Extreme							
Post development							
Unchanged							
							
PHOTO ID: 3.1 Comment:							

PLOT: 3							
Vegetation Classification			Vegetation Description (AS3959)				
Class A Forest - Low open forest A-04			Trees 10 m - 30 m high; 10% - 30% foliage cover dominated by eucalypts and/or callistris with a prominent grassy understorey. May contain isolated shrubs.				
Slope							
Flat							
Observation/Justification for classification							
Fuel Hazard	Surface	Near surface				Elevated	Bark
Low	✓	✓					
Moderate							✓
High						✓	
Very High							
Extreme							
Post development							
Unchanged							
							
PHOTO ID: 3.2 Comment:							

PLOT: 3					
Vegetation Classification			Vegetation Description (AS3959)		
Class A Forest - Low open forest A-04			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface	Elevated	Bark	
Low		✓	✓	✓	
Moderate	✓				
High					
Very High					
Extreme					
Post development					
Unchanged					
					
			PHOTO ID: 3.3 Comment:		

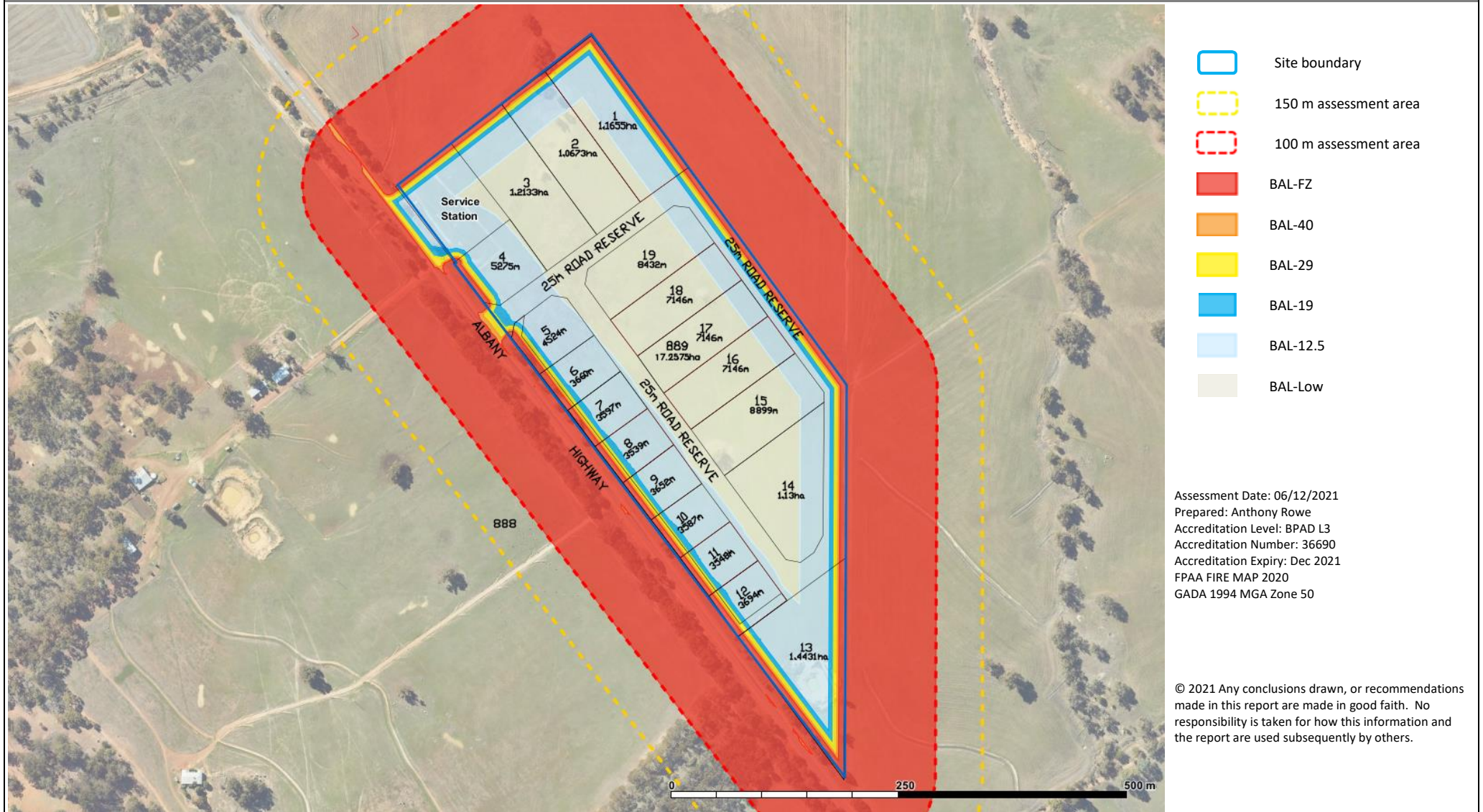
PLOT: 3					
Vegetation Classification			Vegetation Description (AS3959)		
Class A Forest - Low open forest A-04			All forms (except tussock moorlands) including situations with shrubs and trees if the overstorey foliage cover is less than 10%. Includes pasture and cropland.		
Slope					
Flat					
Observation/Justification for classification					
Fuel Hazard	Surface	Near surface	Elevated	Bark	
Low		✓	✓	✓	
Moderate	✓				
High					
Very High					
Extreme					
Post development					
Unchanged					
					
			PHOTO ID: 3.4 Comment:		

POTENTIAL BUSHFIRE IMPACT - Outputs

In accordance with SPP 3.7, a BAL Contour Map has been prepared to illustrate the potential radiant heat impacts and associated BAL ratings for the assessment area after the development is completed (Figure 5a).

Plot	Vegetation classification	Effective slope (degrees)	Separation Distance (AS 3959:2018 Table 2.5)	BAL
3	Forest	Flat	< 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
1 and 2	Grassland	Flat	< 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

Figure 5: BAL contour plan



3.2 Indicative Bushfire Attack Level (Outputs) Method 1

The Indicative Bushfire Attack Level (highest BAL) for the site / proposed development is based upon the conditions and classified vegetation present at the time of completion. It represents the potential to implement the bushfire protection measures.

4. IDENTIFICATION OF BUSHFIRE HAZARD ISSUES

Risk

Sustainable fire combustion depends upon the availability of fuel, oxygen, and heat. Removal of any one of the three aspects will extinguish or not sustain a fire. Fuel management, the management of vegetation, is the most practical means of control.

Bushfire behaviour, as it increases in intensity and speed of travel, can exceed human control measures and when this occurs the risk to humans and property increases. Bushfire behaviour is a result of climate, topography, and the availability of bushfire fuel (vegetation).

- Climate (drought and season) & weather (temperature, humidity, wind, atmospheric instability).

Wind

Bushfires are influenced by the wind direction and the speed. The wind direction generally determines the direction of the fire and wind speed, along with ground slope, generally determines the speed a fire will travel over ground. As wind strength increases it increases the availability of oxygen allowing the fire intensity to increase.

Atmospheric conditions determine the potential for the uplift of embers and particles that can be distributed by the prevailing wind direction well ahead of the fire, up to 9 km, to create spot fires that can advance the location of the fire front.

Fire Danger Index FDI

FDI is an indicator of potential fire intensity and behaviour based upon weather conditions; temperature, humidity, and wind speed, together with climate measures, drought factor representing the dryness of the ground fuels.

The FDI is an indicator of the potential for house loss and fatalities.

The FDI is used as a basis for determining the required design performance of a building.

- Topography (slope of the ground, aspect) – fire travels faster uphill, and in some conditions may determine the direction of the fire. The landform can also channel and increase the windspeed at a locality and create turbulence. It is measured as 0.0° or in downslope increments of 5.0° .
- Vegetation (horizontal and vertical structure, flammability, mass, and availability). Measured as a vegetation classification, or an exclusion, in AS 3959 (Method 1). The arrangement of fuel has a greater effect upon the **intensity** of a fire than just its mass; its exposure to oxygen is referred to as its availability in a bushfire. The available fuel represents a potential fire intensity measured in tonnes per ha. For this reason the predominant vegetation as an expectation of fire intensity is used, rather than a determination based upon a minor proportion of exceptional vegetation; that may either under or overestimate the bushfire intensity. The potential for revegetation is also to be considered in context to the likely future use of the land, where there is potential to introduce an extreme bushfire hazard level.

Risk Evaluation

Factors affecting bushfire behaviour depend upon the fuel (size, quantity, type, moisture, and its distribution), weather conditions (temperature, humidity, wind speed, and atmospheric stability) and the topography (slope aspect and interaction with wind). These factors affect the speed of the fire, the flame height, the spotting behaviour/burning embers, and intensity. Fires travel faster, and the flame length is closer to the ground traveling uphill. The speed of a fire doubles for every 10 degrees upslope increases.

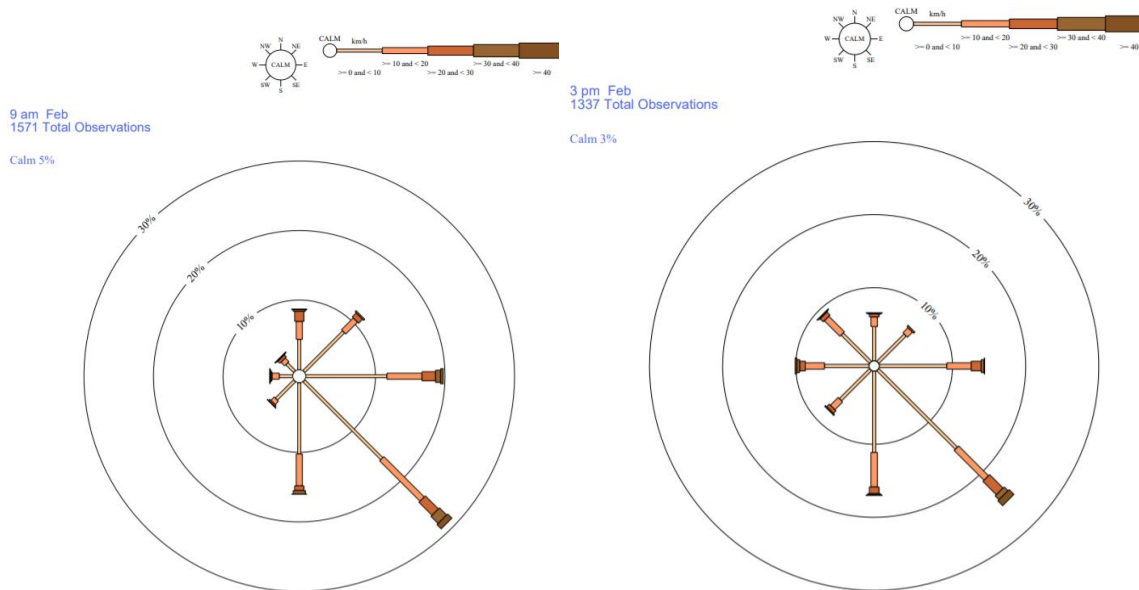


Plate 6: Narrogin

The site is within an area (5 km) that is level and historically cleared for agricultural production and used for pasture.

The site is adjoined by grassland in all directions.

The prevailing afternoon summer afternoon winds are from the south and south east

The perimeter of the site may be impacted by a grass fire rather than by ember attack due to a lack of forest within 5 km.

Grass fires are fast moving and intense, but the impacts can be mitigated by disrupting the continuity of bushfire fuel, to restrict the spread of fire, and through construction standards.

Road access to the site is from Albany Highway from the north or south. A fire from the south or south east would permit evacuation to the north, but a fire can come from any direction; Albany Highway will permit evacuation in the opposite direction from an approaching fire.

There are no hydrant or community water sources identified near to the site (within 2 km).

Risk rating (comparing NERAG 2020)

A review of the DBCA records of fire history in the area illustrates the likelihood is greater than 10 years and therefore classed as ‘unlikely’. Notwithstanding the fire history the presence of fuel and the effect of human interaction means that a fire is possible and reflective of a classification of ‘likely’.

The consequence is considered minor having regard to nature of the bushfire attack (grass), and reliable risk treatments including that the lots are large affording a separation zone from any perimeter grassland. No building will be located closer to the perimeter than would achieve BAL 29 at the building, and routine commercial construction measures are generally resistant to a grassland fire intensity and BAL 29. The anticipated consequence, assuming the Asset Protection Zone and the building construction is maintained to the specified performance level, is minor.

The overall risk level is classed as ‘medium’ requiring ongoing risk treatment measures i.e. the Asset Protection Zone (kept free of flammable material) and the building construction is maintained to the specified performance level (flammable attachments avoided and no gaps allowed that to go unrectified; such as through the distortion of aging external materials.

5. BUSHFIRE PROTECTION MEASURES

5.1 State Planning Policy 3.7 - Planning in Bushfire Prone Areas (SPP 3.7)

The relevant provisions of SPP 3.7 applies a Scheme amendment guiding a subdivision are listed below. It lists the overarching level Objectives (risk objectives) which in turn are satisfied by the risk treatment reflected in the 4 Elements of the bushfire protection criteria.

SPP 3.7 Objectives

Policy Measure 5 contains the objectives of SPP 3.7. The following demonstrates how the proposed development meets each of the objectives.

Objective 1: Avoid any increase in the threat of bushfire to people, property, and infrastructure. The preservation of life and management of bushfire impact is paramount.

The resulting development will displace a moderate bushfire hazard level (grassland) with a moderate bushfire hazard level.

Objective 2: Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.

The site has been identified to be subject to an event likelihood, classed as unlikely (>10 years) and of minor consequence due to applicability of routine and reliable risk treatment measures.

Objective 3: Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.

The site may be subject to grassland fire at its perimeter, the outcome of the Scheme amendment, the site is expected to be low threat when fully developed. Appropriate risk treatments include a separation distance, Asset Protection Zone from the perimeter, maintenance of land as low threat, and building construction commensurate to the BAL level.

Objective 4: Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.

The subdivision does not require modification of any regulated vegetation for the additional lots.

5.2 Guidelines for Planning in Bushfire Prone Areas Version 1.4 (the Guidelines)

The Guidelines apply to development applications located within designated bushfire prone areas. The Guidelines provide supporting information for implementation of SPP 3.7. Specifically, they provide the Bushfire Protection Criteria to be addressed for all applications.

5.2.1 Bushfire Protection Criteria

The bushfire risk mitigation strategies detailed in (Table 2 below) are designed to comply with the Bushfire Protection Criteria detailed in Guidelines for Planning in Bushfire Prone Areas v1.4 (the Guidelines) Appendix 4 (WAPC, 2021).

Where discrepancy occurs between State and local bushfire planning provisions the higher standard of mitigation has been selected.

For each of the elements listed within Appendix 4 of the Guidelines for Planning in bushfire-prone areas, the 'intent' must be achieved either by the proposal meeting the acceptable solutions; or where these acceptable solutions cannot be fully met, then by a performance-based solution that can achieve the 'intent.'

Table 2: Bushfire Protection Criteria assessment.

Appendix 4 in the Guidelines for Planning in Bushfire Prone Areas v.1.4 now assigns provisions to certain stages within the planning process, Strategic Plans, Structure Plan and subdivision, development application (dwelling or other). Those applicable to Strategic Planning, and subdivision applications have been addressed.

✓	Acceptable solution provided (External risk control)	✓	An Acceptable Solution by conditioned (Internal risk treatment)
N/A	Not Applicable	P	Performance Principle solution see 5.2

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies
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 strategic planning proposal, subdivision, and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL-29 or below.	✓		The adjoining area is predominantly grassland, and a moderate Bushfire Hazard Level. The Scheme amendment will facilitate development within a Moderate Bushfire Hazard Level area. <u>Development Response</u> Compliance is acknowledged

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies
<p>Element 2: Siting and Design</p> <p>To ensure that the siting and design of development minimises the level of bushfire impact</p>	<p>A2.1 Asset Protection Zone</p> <p>Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:</p> <ul style="list-style-type: none"> • Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29) in all circumstances. • Location: the APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes). • Management: the APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones.' (see Schedule 1). 	<p>✓C</p>		<p>The Acceptable solution A2.1 requires that the (each) development site can achieve on completion a BAL not exceeding BAL-29.</p> <p>The lots are large and joined at the perimeter by grassland, which imposes only a small portion of the site to be excluded from development: an area within BAL 40-FZ.</p> <p>The lots are commercial lots expected to be developed as buildings and hardstand (Low threat).</p> <p>Until a lot is developed it will be maintained in a low threat condition with onsite grasses to be maintained at less than 100 mm.</p> <p><u>Development response</u></p> <p>A notice upon the title is to be provided that the land is subject to a BMP and building restrictions may apply to land where BAL 40-FZ applies.</p>

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies																																													
Element 3: Vehicular Access	<table border="1"> <thead> <tr> <th data-bbox="736 304 1122 416">TECHNICAL REQUIREMENTS</th> <th data-bbox="1122 304 1281 416">1 Public roads</th> <th data-bbox="1281 304 1440 416">2 Emergency access way¹</th> <th data-bbox="1440 304 1599 416">3 Fire service access route¹</th> <th data-bbox="1599 304 1758 416">4 Battle-axe and private driveways²</th> </tr> </thead> <tbody> <tr> <td data-bbox="736 416 1122 480">Minimum trafficable surface (metres)</td> <td data-bbox="1122 416 1281 480">In accordance with A3.1</td> <td data-bbox="1281 416 1440 480">6</td> <td data-bbox="1440 416 1599 480">6</td> <td data-bbox="1599 416 1758 480">4</td> </tr> <tr> <td data-bbox="736 480 1122 520">Minimum horizontal clearance (metres)</td> <td data-bbox="1122 480 1281 520">N/A</td> <td data-bbox="1281 480 1440 520">6</td> <td data-bbox="1440 480 1599 520">6</td> <td data-bbox="1599 480 1758 520">6</td> </tr> <tr> <td data-bbox="736 520 1122 560">Minimum vertical clearance (metres)</td> <td colspan="4" data-bbox="1122 520 1758 560">4.5</td> </tr> <tr> <td data-bbox="736 560 1122 600">Minimum weight capacity (tonnes)</td> <td colspan="4" data-bbox="1122 560 1758 600">15</td> </tr> <tr> <td data-bbox="736 600 1122 639">Maximum grade unsealed road³</td> <td data-bbox="1122 600 1281 759" rowspan="4">As outlined in the IPWEA Subdivision Guidelines</td> <td colspan="3" data-bbox="1281 600 1758 639">1:10 (10%)</td> </tr> <tr> <td data-bbox="736 639 1122 679">Maximum grade sealed road³</td> <td colspan="3" data-bbox="1281 639 1758 679">1:7 (14.3%)</td> </tr> <tr> <td data-bbox="736 679 1122 719">Maximum average grade sealed road</td> <td colspan="3" data-bbox="1281 679 1758 719">1:10 (10%)</td> </tr> <tr> <td data-bbox="736 719 1122 759">Minimum inner radius of road curves (metres)</td> <td colspan="3" data-bbox="1281 719 1758 759">8.5</td> </tr> </tbody> </table>	TECHNICAL REQUIREMENTS	1 Public roads	2 Emergency access way ¹	3 Fire service access route ¹	4 Battle-axe and private driveways ²	Minimum trafficable surface (metres)	In accordance with A3.1	6	6	4	Minimum horizontal clearance (metres)	N/A	6	6	6	Minimum vertical clearance (metres)	4.5				Minimum weight capacity (tonnes)	15				Maximum grade unsealed road ³	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)			Maximum grade sealed road ³	1:7 (14.3%)			Maximum average grade sealed road	1:10 (10%)			Minimum inner radius of road curves (metres)	8.5								
TECHNICAL REQUIREMENTS	1 Public roads	2 Emergency access way ¹	3 Fire service access route ¹	4 Battle-axe and private driveways ²																																													
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Maximum grade sealed road ³		1:7 (14.3%)																																															
Maximum average grade sealed road		1:10 (10%)																																															
Minimum inner radius of road curves (metres)		8.5																																															
To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event	A3.1 Public roads The minimum requirements under this acceptable solution are applicable to all proposed and existing public roads. Public roads are to meet the minimum technical requirements in Table 6, Column 1. The trafficable (carriageway/pavement) width is to be in accordance with the relevant class of road in the Local Government Guidelines for Subdivisional Development (IPWEA Subdivision Guidelines), Liveable Neighbourhoods, Austroad standards and/or any applicable standards for the local government area.	✓		Albany Highway is a public road that meets the minimum technical requirements in Table 6, Column 1. <u>Development Response</u> Compliance is acknowledged																																													

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies
	<p>A3.2a Multiple access routes</p> <p>Public road access is to be provided in two different directions to at least two different suitable destinations with an all-weather surface (two-way access). If the public road access to the subject site is via a no-through road which cannot be avoided due to demonstrated site constraints, the road access is to be a maximum of 200 metres from the subject lot(s) boundary to an intersection where two-way access is provided.</p> <p>The no-through road may exceed 200 metres if it is demonstrated that an alternative access, including an emergency access way, cannot be provided due to site constraints and the following requirements are met: the no-through road travels towards a suitable destination; and the balance of the no-through road, that is greater than 200 metres from the subject site, is wholly within BAL-LOW, or is within a residential built-out area</p>	✓		<p>Albany Highway is a through road providing access north and south - to at least two different suitable destinations.</p> <p>Of the additional lots created, only the service station lot is proposed to have a direct access onto Albany Highway.</p> <p>Th other lots are proposed to be serviced by a loop road from a single access to Albany Highway.</p> <p>The loop road will be through an area that will be wholly BAL Low as all sites will be low threat AS3959:2018 cl,2.2.3.2(e), building and paved surfaces. The arrangement is compliant with the Acceptable Solution exception to the provision of a through road.</p> <p>The preferred approach is to provide an Emergency Access Way for an alternate access onto Albany Highway, pending the support of Main Roads.</p> <p><u>Development Response</u></p> <p>The provision of an emergency access way is to be illustrated to provide an alternative emergency access onto Albany Highway.</p>
	<p>A3.2b Emergency access way</p> <p>Where it is demonstrated that A3.2a cannot be achieved due to site constraints, or where an alternative design option does not exist, an emergency access way can be considered as an acceptable solution. An emergency access way is to meet all the following requirements:</p> <ul style="list-style-type: none"> • requirements in Table 6, Column 2; provides a through connection to a public road; • be no more than 500 metres in length; and • must be signposted and if gated, gates must open the whole trafficable width and remain unlocked. 	✓		<p>An area has been identified as suitable to provide an Emergency Access Way at the southern extent of the site to provide a maximum separation between the access to Albany Highway. The Emergency Access Way would be 67 m long (one block deep)</p> <p><u>Development response</u></p> <p>The provision of an emergency access way is to be illustrated to provide an alternative emergency access onto Albany Highway to be constructed in compliance with Table 6, Column 2.</p>

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies
	<p>A3.3 Through-roads</p> <p>All public roads should be through-roads. No-through roads should be avoided and should only be considered as an acceptable solution where:</p> <ul style="list-style-type: none"> • it is demonstrated that no alternative road layout exists due to site constraints; and • the no-through road is a maximum length of 200 metres to an intersection providing two-way access, unless it satisfies the exemption provisions in A3.2a of this table. <p>A no-through road is to meet all the following requirements:</p> <ul style="list-style-type: none"> • requirements of a public road (Table 6, Column 1); and • turn-around area as shown in Figure 24 	✓		<p>See A3.2a.</p> <p>The internal road is to be vested as a public road and will be constructed following requirements of a public road (Table 6, Column 1)</p> <p><u>Development response</u></p> <p>To be identified as a condition of approval.</p>

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies
	<p>A3.4a Perimeter roads</p> <p>A perimeter road is a public road and should be provided for greenfield or infill development where 10 or more lots are being proposed (including as part of a staged subdivision) with the aim of:</p> <ul style="list-style-type: none"> • separating areas of classified vegetation under AS3959, which adjoin the subject site, from the proposed lot(s); and • removing the need for battle-axe lots that back onto areas of classified vegetation. A perimeter road is to meet the requirements contained in Table 6, Column 1. <p>A perimeter road may not be required where:</p> <ul style="list-style-type: none"> • the adjoining classified vegetation is Class G Grassland; lots are zoned for rural living or equivalent; • it is demonstrated that it cannot be provided due to site constraints; or • all lots have frontage to an existing public road 	✓		<p>The proposed subdivision is more than 10 additional lots. The majority of lots (16) will be within an area bound by a perimeter road that adjoins grassland.</p> <p>The remaining lots will be separated from classified vegetation (grassland) by a Fire Service Access Route.</p> <p><u>Development response</u></p> <p>To be identified as a condition of approval, the FSAR is to be constructed in accordance with Table 6, Column 3.</p>

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies
	<p>A3.4b Fire service access route</p> <p>Where proposed lots adjoin classified vegetation under AS3959, and a perimeter road is not required in accordance with A3.4a, a fire service access route can be considered as an acceptable solution to provide firefighter access, where access is not available, to the classified vegetation. A fire service access route is to meet all the following requirements:</p> <ul style="list-style-type: none"> • requirements in Table 6, Column 3; be through-routes with no dead-ends; linked to the internal road system at regular intervals, every 500 metres; • must be signposted; no further than 500 metres from a public road; • if gated, gates must open the required horizontal clearance and can be locked by the local government and/or emergency services, if keys are provided for each gate; and • turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres 	✓C		<p>A fire service access route (FSAR) is to be provided in accordance with v.1.4 by means of an easement across the lots 1, 2, 3 and the service station. Lot 13 is a single lot that adjoins classified vegetation but as an isolated lot it does not require a continuity of passage between lots, the classified vegetation can be accessed from within the one lot. The FSAR is to be maintained in private ownership, with the easement to be granted to the Shire for firefighting and emergency management purposes.</p> <p>No building are to be constructed within BAL 40, which is a dimension that can accommodate the FSAR.</p> <p>Gates are to be installed between properties to provide for continuous passage.</p> <p>The FSAR will be provided with continuity to the public road.</p> <p><u>Development response</u></p> <p>To be identified as a condition of approval and illustrated in Figure Ex1.</p> <p>The FSAR is to be constructed in accordance with Table 6, Column 3.</p>

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies										
	<p>A3.5 Battle-axe access legs</p> <p>Where it is demonstrated that a battle-axe cannot be avoided due to site constraints, it can be considered as an acceptable solution. There are no battle-axe technical requirements where the point the battle-axe access leg joins the effective area of the lot, is less than 50 metres from a public road in a reticulated area. In circumstances where the above condition is not met, or the battle-axe is in a non-reticulated water area, the battle-axe is to meet all the following requirements:</p> <ul style="list-style-type: none"> • requirements in Table 6, Column 4; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres). 	NA		No battle axe lots are proposed.										
Element 4: Water	<table border="1" data-bbox="725 892 1771 1161"> <thead> <tr> <th data-bbox="725 892 1072 938">PLANNING APPLICATION</th> <th data-bbox="1072 892 1771 938">NON-RETICULATED AREAS</th> </tr> </thead> <tbody> <tr> <td data-bbox="725 938 1072 976">Development application</td> <td data-bbox="1072 938 1771 976">10,000L per habitable building</td> </tr> <tr> <td data-bbox="725 976 1072 1038">Structure Plan / Subdivision: Creation of 1 additional lot</td> <td data-bbox="1072 976 1771 1038">10,000L per lot</td> </tr> <tr> <td data-bbox="725 1038 1072 1101">Structure Plan / Subdivision: Creation of 3 to 24 lots</td> <td data-bbox="1072 1038 1771 1101">10,000L tank per lot or 50,000L strategic water tank</td> </tr> <tr> <td data-bbox="725 1101 1072 1161">Structure Plan / Subdivision: Creation of 25 lots or more</td> <td data-bbox="1072 1101 1771 1161">50,000L per 25 lots or part thereof Provided as a strategic water tank(s) or 10,000L tank per lot</td> </tr> </tbody> </table>				PLANNING APPLICATION	NON-RETICULATED AREAS	Development application	10,000L per habitable building	Structure Plan / Subdivision: Creation of 1 additional lot	10,000L per lot	Structure Plan / Subdivision: Creation of 3 to 24 lots	10,000L tank per lot or 50,000L strategic water tank	Structure Plan / Subdivision: Creation of 25 lots or more	50,000L per 25 lots or part thereof Provided as a strategic water tank(s) or 10,000L tank per lot
PLANNING APPLICATION	NON-RETICULATED AREAS													
Development application	10,000L per habitable building													
Structure Plan / Subdivision: Creation of 1 additional lot	10,000L per lot													
Structure Plan / Subdivision: Creation of 3 to 24 lots	10,000L tank per lot or 50,000L strategic water tank													
Structure Plan / Subdivision: Creation of 25 lots or more	50,000L per 25 lots or part thereof Provided as a strategic water tank(s) or 10,000L tank per lot													
	A4.1 Identification of future water supply	N/A												

Bushfire Protection Criteria	Method of Compliance	AS	PP	Proposed Bushfire Management Strategies
<p>To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire</p>	<p>A4.2 Provision of water for firefighting purposes</p> <p>Where a reticulated water supply is existing or proposed, hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority. Where these specifications cannot be met, then the following applies:</p> <ul style="list-style-type: none"> • The provision of a water tank(s), in accordance with the requirements of Schedule 2; and • Where the provision of a strategic water tank(s) is applicable, then the following requirements apply: <ul style="list-style-type: none"> – land to be ceded free of cost to the local government for the placement of the tank(s); – the lot or road reserve where the tank is to be located is identified on the plan of subdivision; – tank capacity, construction, and fittings, provided in accordance with the requirements of Schedule 2; and – a strategic water tank is to be located no more than 10 minutes from the subject site (at legal road speeds). Where a subdivision includes an existing habitable building(s) that is to be retained, a water supply should be provided to this existing habitable building(s), in accordance with the requirements listed above. 	✓		<p>The Water Corporation has approved the extension of the mains supply to provide a reticulated water supply.</p> <p>The internal road is to be ceded as a public road. Hydrants are proposed to be provided within the public road in accordance with Water Corporation No 63 Water Reticulation Standard.</p> <p><u>Development response</u></p> <p>Compliance is acknowledged</p>
		N/A		

5.3 Additional Bushfire Management Strategies

The following additional management strategies are treatments in addition to the matters addressed in the Bushfire Protection Criteria. Note: WAPC model conditions are to be imposed by the WAPC at subdivision.

Table 3: WAPC Model Subdivision Conditions Schedule December 2020.

No.	Condition requirement - Summary	Applicability (to be identified by the WAPC on the approval)
F1	Implementation of the required bushfire management plan measures (certified by Bushfire Consultant)	Required
F2	Notification 165 PDA - land within a bushfire prone area > than BAL- Low (WAPC).	Required
F3	Restrictive covenant – 129BA Transfer of Land Act 1893 – restricting habitable buildings within areas identified as BAL-40 or BAL-Flame Zone. (Local Government)	Required for Lots at the west boundary adjacent to grassland.
F4	Bushfire access not for public access – easement under s.195 LAA. (Local Government)	Not required
F5	Public bushfire access – easement under s.195 and 196 LAA or right of way under s.152 PDA. (Local Government)	Required
F6	‘Right-of-carriageway’ bushfire access – easement under s.195 LAA. (Local Government)	Not required
F7	Reserve for strategic water supply for firefighting purposes	Not required, individual tankage provided

5.4 Spatial representation of the bushfire management strategies

Further to the assessment against the bushfire protection criteria, the key features demonstrating compliance should be represented spatially in the *Spatial representation of the bushfire management strategies*. It represents the required bushfire risk management measures that must be implemented and maintained.

The Spatial representation of the bushfire management strategies is provided in Figure EX1.

It illustrates the required Asset Protection Zone and developable areas are to be followed at subdivision.

6. RESPONSIBILITIES FOR IMPLEMENTATION AND MANAGEMENT OF THE BUSHFIRE MEASURES AT SUBDIVISION

The following are required to accompany the future planning applications to address the relevant SPP3.7 requirements as part of future bushfire management plans and lot design for the site

It provides an outline the responsibilities for ongoing bushfire work.

The key features demonstrating compliance with the bushfire protection measures are identified on the Spatial representation of the bushfire management strategies, to be followed in the subdivision.

Note: Commercial and industrial development are required to comply with the siting requirements, no greater than BAL-29, but are not required to comply with the bushfire construction standards described in AS3959:2018, which is only applicable to Class 1-3 and 10 a buildings. Routine fire construction requirements under the National Construction Code apply.

	Strategy	Implementation		Maintenance	
	Land-owner developer	Responsibility	Timeframe	Responsibility	Timeframe
1.	No habitable buildings are to be built within areas identified as BAL-40 or BAL-Flame Zone”.(Local Government)	Developer	To be clarified by Notice on the Deposited Plan prior to Title clearance	Landowner	Observed at site development
2.	All lots are to be established and maintained in a low threat condition consistent with AS3959:2018 cl. 2.2.3.2 (e) and (f). A Restrictive covenant pursuant to 129BA Transfer of Land Act 1893 is to be applied to each title to read as follows “The site(each individual lot) is to be maintained in a low threat condition consistent with AS3959:2018 cl. 2.2.3.2 (e) and (f).”	Developer	To be sighted on Deposited Plan prior to Title clearance	Landowner	Ongoing
3.	The road is to be constructed to incorporate the technical requirements described in Table 6 Column 1 within the technical specifications of the Shire, following the IPWEA subdivision Guidelines	Developer To construct the road for vesting to the Shire	To be established prior to Title clearance	Shire of Williams	Ongoing
4.	A 6 m wide emergency access way between proposed lot 12 and 13 , through to Albany Highway is to be provided. The provision of necessary access rights for the emergency access way is to be vested in the Crown under Section 152 of the Planning and Development Act 2005 and such land is to be ceded free of cost and without any payment or compensation by the Crown.	Developer EAW constructed technical requirements described in Table 6 Column 4 and agreed for acceptance by the Shire	To be established prior to Title clearance	Shire of Williams	Ongoing

	Strategy	Implementation		Maintenance	
		Responsibility	Timeframe	Responsibility	Timeframe
	Land-owner developer				
5.	<p>A Fire Service Access Route (FSAR) is to be provided by easement on the northern inside perimeter, of proposed lots 1, 2, and 3, and along the eastern inside perimeter on lot 3. Gates are to be provided between properties at the perimeter to permit continuous access of fire service vehicles.</p> <p>Easement(s) in accordance with Section 195 of the Land Administration Act 1997 specifying access rights for emergency fire purposes in favour of the Local Government and/or public authority are to be placed on the certificate(s) of title of the proposed lot(s) 1 ,2, 3, .</p> <p>Notice of this easement(s) is to be included on the diagram or plan of survey (deposited plan). The easement is to state as follows:</p> <p><i>"A 6 metre wide permanent emergency access way fire service vehicles on the inside of the northern lot boundary at lots 1 and 2 and the northern and eastern boundary of lot 3. Gates are to be provided between properties at the perimeter to permit continuous access of fire service vehicles."</i></p>	Developer	To be established prior to the issue of land titles	Individual landowner to maintain an unrestricted FSAR	Ongoing
6.	An Easement(s) in accordance with Section 195 of the Land Administration Act 1997 establishing a Fire Service Access Route to ensure accessibility for fire emergency services and not for use by the public.	Developer	To be sighted on Deposited Plan prior to Title clearance	Individual landowner Maintain an unrestricted FSAR	Ongoing
7.	Firebreaks are to be installed on the inside of the perimeter of each lot following the requirements of the Shire Firebreak Notice.	Developer	To be established prior to Title clearance	Individual landowner Maintain the Firebreak	Ongoing
8.	Hydrants are to be provided in accordance with distribution described in the Water Corporation No 63 Water Reticulation Standard.	Individual landowner Subject to the Development Approval	To be established prior to Title clearance	Shire of Williams	Ongoing

Strategy		Implementation		Maintenance	
Land-owner developer		Responsibility	Timeframe	Responsibility	Timeframe
9.	<p>A notification, pursuant to Section 165 of the <i>Planning and Development Act 2005</i>, is to be placed on the certificate(s) of title of the proposed lot(s) with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factor. Notice of this notification is to be included on the diagram or plan of survey (deposited plan).</p> <p>The notification is to state as follows:</p> <p><i>“This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan Subdivision of Lot 889 Albany Highway Williams. Additional planning and building requirements may apply to development on this land”</i></p> <p>(WAPC F2)</p>	Developer	To be sighted on Deposited Plan prior to Title clearance	Individual landowner awareness	Ongoing
Local Government					
10.	Maintaining public roads			Local Government	Ongoing
11.	Firefighting services and response			Local Government	Ongoing
12.	Fire Compliance Notice, and the condition of land (<i>Bush Fires Act 1954</i>)			Local Government	Ongoing
13.	Community education			Local Government	Ongoing

APPENDIX 1 –Shire Firebreak Notice



SHIRE OF WILLIAMS FIREBREAKS LOCAL LAW 2007 (as amended 2008)

FIREBREAKS LOCAL LAW 2007 (AS AMENDED 2008)
BUSH FIRES ACT 1954

HISTORY: Shire of Williams Firebreaks Local Laws

Date:	Detail: (i.e. Adoption and Gazettal of the Local Law)
20 th June 2007	Council Adopted the Local Law relating to Firebreaks
6 th July 2007	Local Law relating to Firebreaks gazetted
21 st May 2008	Council adopted the Firebreaks Amendment Local Law 2008
3 rd June 2008	Local Law relating to Firebreaks amendment gazetted

DOCUMENT CONTROL: Shire of Williams Firebreaks Local Laws

Version:	Local Law Document for Publishing:
June 2020	Consolidated Document including original Local Law

Disclaimer:

This version is an administrative version and while every attempt to ensure it is correct, only the Gazetted version as amended should be relied on. In particular, text boxes and notes in this version do not form part of the local law.

Bush Fire Act 1954
Shire of Williams
Firebreaks Local Law 2007 (as amended 2008)

Under the powers conferred by the *Bush Fires Act 1954* and all other powers enabling it, the Council of the Shire of Williams resolved on 20th June 2007 and 21st May 2008 to make the following local law and amendment:

1. Citation

This local law may be cited as the *Shire of Williams Firebreaks Local Law 2007*.

2. Commencement

This local law will come into operation on the fourteenth day after the day on which it is published in the *Government Gazette*.

3. Repeal

The Shire of Williams Local Laws relating to Firebreaks published in the *Government Gazette* on 24 October 1997 and the *Shire of Williams Firebreaks Amendment Local Laws 2001* published in the *Government Gazette* on 8 February 2002 are repealed.

4. Interpretation

In this local law unless the context otherwise requires —

“**Building protection zone**” means a low fuel area immediately surrounding a habitable building and is designed to minimise the likelihood of flame contact with other buildings, and must fulfil the following conditions:

- (i) bush fire fuels must be maintained below 10 centimetres in height;

(ii) trees and branches that may fall onto a house must be removed; and

(iii) lower branches of the remaining trees must be trimmed;

“District” means the whole local government area of the Shire of Williams;

“Firebreak” means ground from which flammable material is to be removed and on which no flammable material is permitted during the firebreak period;

“Firebreak period” means the period from 5th day of November to the 12th day of April in the following year within the district;

“Flammable material” means dead grass and timber, boxes, cartons, paper and any combustible material or rubbish, but does not include green standing trees, growing bushes and plants in gardens or lawns;

“Townsite land” means all the land within the boundaries of townsites in the district; and

“Rural land” means all the land not defined as townsites within the district.

5. Provision of firebreaks

All owners or occupiers of land within the district shall have firebreaks during the firebreak period of the dimensions prescribed in this local law.

6. Rural land

(1) During the conduct of any harvesting/straw baling operations, stone raking and slashing activities, an operational independent fire fighting unit containing not less than 750 litres of water with a motorised pump and at least 15 metres of 19 millimetres diameter hose is to be provided in the same paddock or within 50 metres of that paddock.

(2) All flammable material is to be removed from around buildings and stacks in hay and straw processing plants to a width of 20 metres.

7. Townsite land

(1) Where the area of land is 2,024 square metres (or half an acre) or less, all flammable material is to be removed except living standing trees.

- (2) Where the area of land exceeds 2,024 square metres (or half an acre), all flammable material likely to be conducive to an outbreak, spread or extension of fire is to be removed, and the grass is to be maintained to a height no greater than 10 centimetres.
- (3) All flammable material is to be removed from around buildings, fuel dumps and liquid fuel containers to a width of 20 metres.
- (4) All habitable buildings are to include a building protection zone of 20 metres in width.

8. Non compliance

Failure to comply with this local law shall be an offence and shall subject the offender to the penalties prescribed in the *Bush Fires Act 1954*.

Dated of this 20th day of June 2007.

The common seal of the Shire of Williams

Was affixed by authority of a resolution

of the council in the presence of:

J.E.S. Cowcher, Shire President

V. Eprio, Chief Executive Officer

APPENDIX 2 - APZ Guidelines

Guidelines for Planning in Bushfire Prone Areas v1.4

Schedule 1: Standards for Asset Protection Zones



ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	<ul style="list-style-type: none"> Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	<ul style="list-style-type: none"> Should be managed and removed on a regular basis to maintain a low threat state. Should be maintained at <2 tonnes per hectare (on average). Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	<ul style="list-style-type: none"> Trunks at maturity should be a minimum distance of six metres from all elevations of the building. Branches at maturity should not touch or overhang a building or powerline. Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. Canopy cover within the APZ should be <15 per cent of the total APZ area. Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.
<p>Figure 19: Tree canopy cover – ranging from 15 to 70 per cent at maturity</p>	
<p>The figure consists of three 2x2 grids of circles representing tree canopies. The first grid, labeled '15%', shows a sparse arrangement of small circles. The second grid, labeled '30%', shows a moderate density of medium-sized circles. The third grid, labeled '70%', shows a high density of large circles, with many overlapping, representing a continuous canopy.</p>	
Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	<ul style="list-style-type: none"> Should not be located under trees or within three metres of buildings. Should not be planted in clumps >5 square metres in area. Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	<ul style="list-style-type: none"> Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.



ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Grass	<ul style="list-style-type: none"> • Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	<ul style="list-style-type: none"> • Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	<ul style="list-style-type: none"> • Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

* Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes

APPENDIX 3 – Vehicle Access

Table 6: Vehicular access technical requirements

TECHNICAL REQUIREMENTS	1 Public roads	2 Emergency access way ¹	3 Fire service access route ¹	4 Battle-axe and private driveways ²
Minimum trafficable surface (metres)	In accordance with A3.1	6	6	4
Minimum horizontal clearance (metres)	N/A	6	6	6
Minimum vertical clearance (metres)	4.5			
Minimum weight capacity (tonnes)	15			
Maximum grade unsealed road ³	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum grade sealed road ³		1:7 (14.3%)		
Maximum average grade sealed road		1:10 (10%)		
Minimum inner radius of road curves (metres)		8.5		

Notes:

¹ To have crossfalls between 3 and 6%.

² Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

³ Dips must have no more than a 1 in 8 (12.5% -7.1 degree) entry and exit angle.

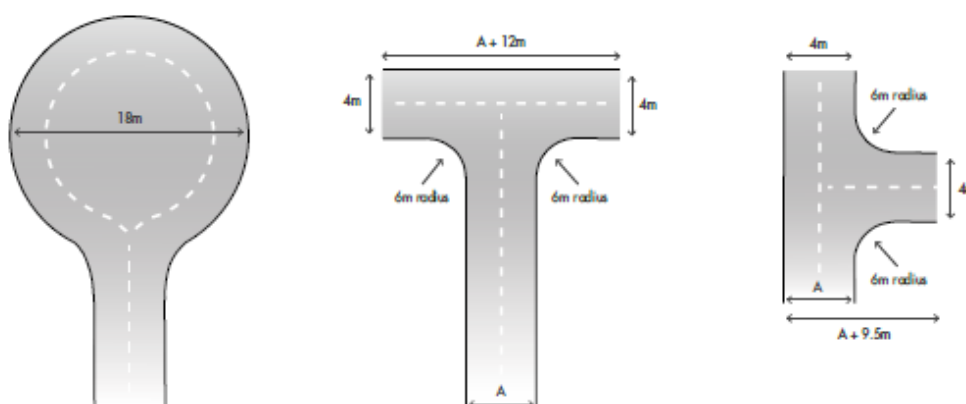


Figure 24: Turn-around area dimensions for a no-through road

Note:

- For private driveways exceeding 50 m in length
- For where no through road is available

APPENDIX 4 – References

GENERAL REFERENCES

SA Department of Environment and Natural Resources, Government of South Australia, 2012 *Overall Fuel Hazard Guide for South Australia*

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

Standards Australian and Standards New Zealand, *Australian Standard / New Zealand Standard ISO 31000:2018 Risk management – principles and guidelines*

Western Australian Planning Commission (WAPC) *Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design* November 2019

WA Department of Planning Land and Heritage 2016, *Visual Guide for bushfire risk assessment in Western Australia*

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

Western Australian Planning Commission (WAPC) 2021, *Guidelines for Planning in Bushfire Prone Areas Version 1.4*, Western Australia

Online references

Office of Bushfire Risk management (OBRM), Map of Bush Fire Prone Areas <
<https://maps.slip.wa.gov.au/landgate/bushfireprone/>>

APPENDIX D | LOCAL WATER MANAGEMENT STRATEGY

LOT 889 ALBANY HIGHWAY, WILLIAMS
LOCAL WATER MANAGEMENT STRATEGY

Prepared for

Saracen Properties Pty Ltd
342 Murray Street
PERTH WA 6000

Draft Report No. J21029
2 February 2022

BAYLEY ENVIRONMENTAL SERVICES
30 Thomas Street
SOUTH FREMANTLE WA 6162

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1.0 INTRODUCTION

1.1 The Proposed Development

Saracen Properties Pty Ltd is proposing to rezone and subdivide Lot 889 Albany Highway, Williams (the site) for light industrial and commercial use. Planning consultant Harley Dykstra has prepared a structure plan and conceptual plan of subdivision for the site. Figure 1 shows the proposed subdivision layout. Figure 2 shows an aerial view of the site and its surroundings.

Bayley Environmental Services was commissioned in September 2021 to undertake site investigations and to prepare a Local Water Management Strategy (LWMS) in support of the structure plan. Due to the apparent lack of significant environmental constraints to the proposal, it is considered that the requirement for an Environmental Assessment & Management Strategy (EAMS) report to support the rezoning may be satisfied by an expanded LWMS.

1.2 Relevant Policies and Guidelines

1.2.1 State Planning Policy 2.9

State Planning Policy 2.9: *Water Resources* (WAPC, 2006) lists the following key principles for total water cycle management:

- Consideration of all water sources (including wastewater) in water planning, maximising the value of water resources.
- Integration of water and land use planning.
- Sustainable and equitable use of all water sources, having consideration of the needs of all water users including the community, industry and the environment.
- Integration of water use and natural water processes.
- A whole-of-catchment integration of natural resource use and management.

SPP 2.9 also lists the following general objectives for water-sensitive urban design:

- to manage a water regime;
- to maintain and, where possible, enhance water quality;
- to encourage water conservation;
- to enhance water-related environmental values; and
- to enhance water-related recreational and cultural values.

Element 5 of *Liveable Neighbourhoods* Edition 3 (WAPC, 2004) identifies specific objectives and requirements for Urban Water Management. These are based on Best Planning Practices which are defined as the best practical approach for achieving water resource management objectives within an urban framework.

1.2.2 Better Urban Water Management

Better Urban Water Management (WAPC, 2008) sets out the following objectives for water sensitive urban design:

Water Conservation

- Consumption of 100kL/pp/yr including less than 40-60 kL/p/yr scheme water.

Water Quantity

- Ecological Protection – Maintain pre-development flow rates and volumes for the 1 year ARI event. Maintain or restore desirable environmental flows and/or hydrological cycles.
- Flood Management – Maintain pre-development flow rates and volumes for the 100 year ARI event.

Water Quality

- Maintain pre-development nutrient outputs (if known) or meet relevant water quality guidelines (e.g. ANZECC & ARMCANZ, 2000).
- Treat all runoff in the drainage network prior to discharge consistent with the Stormwater Management Manual.
- As compared to a development that does not actively manage stormwater quality, achieve:
 - at least 80% reduction of Total Suspended Solids;
 - at least 60% reduction of Total Phosphorus;
 - at least 45% reduction of Total Nitrogen; and
 - at least 70% reduction of gross pollutants.

Mosquitoes and Midges

- Design detention structures so that, between the months of November and May, stormwater is fully infiltrated within 96 hours.
- Design permanent water bodies (where accepted by DWER) to maximise predation of mosquito larvae by native fauna.

1.2.3 Government Sewerage Policy

The Government Sewerage Policy (2019) requires that all new subdivision and development should be deep-sewered unless it is exempt for one of several reasons. For exempt developments, the policy establishes minimum site capability requirements and, where appropriate, density limits. In these cases, on-site effluent disposal may be approved where the responsible authority is satisfied that:

- each lot is capable of accommodating on-site sewage disposal without endangering public health or the environment; and
- the minimum site requirements for on-site sewage disposal as set out in the Policy can be met.

The Policy designates certain areas as Sewage Sensitive Areas (SSAs), including land:

- within the coastal catchment of the Swan Estuary; and
- within 1km upgradient or 250m downgradient (or overall 1km where the groundwater gradient is unknown) of a significant wetland.

Approximately the eastern half of the site is within an SSA due to its proximity to Gingin Brook.

Additional restrictions and requirements apply to on-site effluent disposal in SSAs, including:

- a minimum lot size of one hectare (unless exempted on a case-by-case basis);
- minimum vertical separation of 1.5m from the discharge point of effluent disposal systems to the highest groundwater table level; and
- secondary effluent treatment systems with nutrient removal.

1.2.4 DoW Interim Guideline: Developing a Local Water Management Strategy

The DoW LWMS guideline was published in 2008 and sets out the DoW's preferred format and content for LWMS documents. The guideline expands on the LWMS guidance provided in *Better Urban Water Management* (2008).

This LWMS has been prepared in accordance with the principles set out in the DoW guideline.

1.2.5 Shire of Williams Town Planning Scheme No. 2

The Shire of Williams Town Planning Scheme No. 2 contains the following provisions relevant to industrial zoned land and this LWMS:

“(b) The first 5 metres of the [16.5m] front setback area shall be landscaped to the satisfaction of the local government. Council may require additional landscaping to

Albany Highway, adjacent residential or rural uses, or to screen a development where it is desirable to maintain a rural vista from major roads.

(c) Council may impose conditions on development requiring installation of a landscaped buffer as part of any new development.

(i) In determining any application for planning approval Council may have regard for matters such as suitable areas for on-site effluent disposal, the appearance and standard of development, the existing streetscape and character of surrounds, adequate on site turnaround areas for truck movements, landscaping, and parking.”

1.3 Scope of the LWMS

The scope of this LWMS is to:

- Document the existing environment on the site, in relation to soils, drainage, erosion, watercourses, groundwater and water-dependent ecosystems.
- Briefly describe the proposed development in relation to water management.
- Examine the capability of the site for on-site effluent disposal.
- Address relevant regulatory requirements and design criteria for water harvesting, setbacks to watercourses, groundwater management and drainage.
- Describe the strategies to be implemented for water conservation, watercourse protection, groundwater management and stormwater drainage.

This LWMS also includes relevant elements of an Environmental Assessment and Management Strategy (EAMS) in support of the Scheme amendment.

1.4 Design Objectives

Table 1.1 summarises the water-related design objectives for the site and the means by which they will be achieved in the LWMS and subsequent management plans.

Table 1.1 Design Objectives

<i>Design Aspect</i>	<i>Design Objective</i>	<i>How Objective is to be Achieved</i>
Water Conservation	Ensure efficient and sustainable use of water resources	Use water efficient fixtures. Use non-potable water for irrigation. Use water-efficient native species for landscaping. Irrigate landscape plantings only for 2 years.
Groundwater Management	Minimise impacts on groundwater level and flows Minimise impacts on groundwater quality	Treat runoff from minor storms in bioretention basins and swales.
Surface Water Management	Minimise impacts on surface water flow rates, volumes and quality	Retain and infiltrate runoff from 1-year ARI 1-hour storms in bioretention basins and swales. Detain runoff from larger storms and control release from lots and overall site to pre-development flow rates. Set effluent disposal facilities at least 100m back from natural waterways.

2.0 EXISTING ENVIRONMENT

2.1 Rainfall

Williams, like most of the south-west of WA, has a strongly seasonal rainfall, with most of the annual rain falling between May and September in association with winter cold fronts. Occasional heavy falls may occur from summer thunderstorms. The long-term average annual rainfall for Williams is 531mm, of which 73% falls between the months of May and September.

Figure 3 shows a rainfall occurrence chart for Williams. Table 2.1 shows rainfall intensity, frequency and duration for Williams.

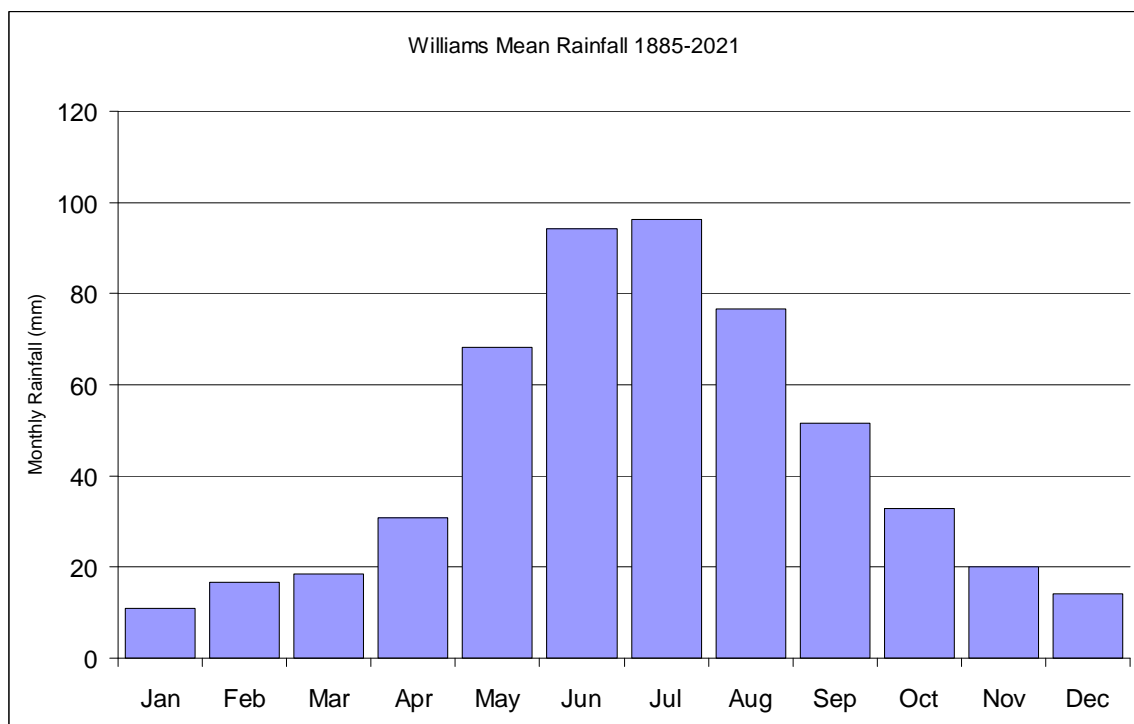


Figure 3 Williams Mean Rainfall (BoM, 2022)

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	1.44	1.62	2.26	2.76	3.31	4.13	4.85
2 min	2.52	2.85	3.97	4.81	5.70	6.95	7.98
3 min	3.36	3.80	5.29	6.43	7.63	9.36	10.8
4 min	4.04	4.56	6.37	7.75	9.23	11.4	13.2
5 min	4.61	5.20	7.27	8.86	10.6	13.1	15.3
10 min	6.62	7.45	10.4	12.7	15.3	19.2	22.5
15 min	7.94	8.94	12.5	15.3	18.3	23.0	27.1
20 min	8.95	10.1	14.1	17.2	20.6	25.9	30.4
25 min	9.79	11.0	15.4	18.8	22.5	28.2	33.1
30 min	10.5	11.8	16.5	20.1	24.1	30.1	35.3
45 min	12.2	13.7	19.2	23.4	28.0	34.8	40.6
1 hour	13.5	15.3	21.3	26.0	31.0	38.5	44.8
1.5 hour	15.6	17.6	24.6	30.0	35.9	44.4	51.6
2 hour	17.2	19.4	27.3	33.3	39.8	49.2	57.3
3 hour	19.7	22.3	31.5	38.5	46.1	57.2	66.7
4.5 hour	22.5	25.5	36.2	44.4	53.3	66.7	78.2
6 hour	24.7	28.0	39.8	49.0	59.1	74.4	87.7
9 hour	28.0	31.8	45.2	55.9	67.9	86.4	103
12 hour	30.5	34.5	49.2	61.1	74.4	95.5	115
18 hour	34.2	38.6	54.9	68.3	83.8	109	131
24 hour	37.0	41.6	58.8	73.4	90.2	118	143
30 hour	39.2	44.0	61.9	77.1	94.9	124	151
36 hour	41.1	46.0	64.4	80.1	98.5	129	158
48 hour	44.2	49.2	68.2	84.6	104	136	166
72 hour	49.1	54.3	74.1	90.9	111	143	174
96 hour	53.1	58.6	78.9	95.9	115	148	178
120 hour	56.8	62.6	83.5	100	120	151	181
144 hour	60.4	66.5	88.1	105	124	155	184
168 hour	64.0	70.5	92.8	110	128	159	187

Note:

The 50% AEP IFD **does not** correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.44 ARI.

* The 20% AEP IFD **does not** correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.48 ARI.

Table 2.1 Rainfall Intensity for Williams (BoM, 2022)

2.2 Physiography

2.2.1 Topography

The site lies on a gently undulating plain between low hills. The site slopes gently to the north and north-east, with elevation ranging from about 277m AHD at the southern corner to 268m AHD at the northern corner. The slope averages about 2% over most of the site. Figure 4 shows topographic contours over the site.

2.2.2 Land Units

The Department of Primary Industries and Regional Development (DPIRD) maps the site as part of the Dellyanine Land System. The western part is mapped as Noomling Subsystem (257DeNB): “Long gentle and undulating hillslopes and divides, with soils of colluvium over granite, gneiss and sometimes dolerite; grey and yellow/brown deep sandy duplexes, sandy gravels and shallow duplexes.”

The eastern part of the site is mapped as Biberkine Subsystem (257DeBK): “Valley floors and footslopes surrounded by gently undulating rises and low hills. Alluvium and colluvium/granite etc. Yellow brown sandy duplexes (mostly deep), wet and semi-wet soils (sometimes saline).”

Test pitting to 3m depth at ten locations across the site found a generally sandy to gravelly loam topsoil over clayey subsoils, which generally agreed with the DPIRD descriptions. Figure 4 shows the DPIRD mapping and the locations of the test pits. Appendix A shows soil logs from the test pits.

2.2.3 Soil Permeability

Constant-head permeability tests in accordance with AS1547:2012 at 0.5m depth at seven locations (Figure 4) found saturated hydraulic conductivities (Ks) ranging from 0.0005m/day to 1.3m/day, with an average Ks of 0.3m/day and a median of 0.14m/day. Appendix B shows the permeability test results.

The lowest permeabilities were recorded in the north-east and south-east of the site, possibly in association with the Biberkine land subsystem. AS1547:2012 recommends that special measures be employed for effluent disposal in soils with permeability less than 0.06m/day. Measures to address this constraint are discussed in Chapter 4.

For the purposes of preliminary drainage design, a Ks of 0.15m/day (50% of the average measured value), has been adopted.

2.2.4 Soil Category

Based on the test pit observations and the permeability test results, the soils on the site correspond to Categories 4 (well structured clay-loams) and 5 (weakly structured or massive light clays) as described in AS1547:2012.

2.2.5 Phosphorus Retention Index

Analysis of soil samples from 0.5m depth in six test pits (Figure 4) returned PRI values ranging from 40.4 to over 1,000, with an average of over 451 and a median of over 416. These very high PRI values mean that leaching of phosphorus and other ionic contaminants (such as heavy metals) from effluent disposal systems and drainage structures will be minimal.

2.2.6 Acid Sulphate Soils

The Department of Water & Environmental Regulation (DWER) does not map ASS occurrence over the Williams area. However, the site is elevated, with soils of terrestrial origin. No further consideration of ASS is proposed.

2.3 **Hydrology**

2.3.1 Groundwater

Groundwater occurs at depths from less than one metre to several metres across the site, probably perched above impermeable clay or granite. Groundwater was encountered in three bores on the site in October 2021. From this limited data, inferred groundwater contours across the site are shown on Figure 5.

2.3.2 Surface Drainage

There is no defined natural surface drainage on the site, although a slight north-trending depression at the northern end of the site may accumulate surface runoff under heavy rainfall conditions.

A small creekline flows north about 250m east of the site. An artificial drainage line flows north from about 30m west of the north-west corner of the site, carrying road runoff from Albany Highway.

Road drainage enters the site at a point about 100m from the southern corner, collecting runoff from a 530m section of Albany Highway and an upstream catchment of about 48ha to the south-west. Figure 5 shows the upstream catchment and the runoff paths around the site.

2.3.3 Water Resources

The site is not within a proclaimed groundwater or surface water catchment and no water allocations are in place. Water abstraction from non-artesian sources does not require licensing.

The availability of groundwater on the site is expected to be generally low and will vary from place to place depending on the depth to granite and the occurrence of sandy soil horizons. Test drilling will be required to determine groundwater availability on any particular lot.

2.3.4 Wetlands

There are no wetlands mapped or existing on the site.

2.4 **Water Quality**

No water quality information for the site or surroundings is available.

2.5 **Vegetation**

The site is cleared of native vegetation except for about 15 scattered mature Wandoo and Flooded Gum trees, as shown on Figure 6.

All trees on the site were located, inspected and photographed in October 2021, with the diameter, height, health and presence of hollows recorded. The results of the tree inspection are shown in Appendix C.

None of the trees on the site contained any hollows suitable for nesting by black cockatoos, and none were large enough to develop hollows suitable for black cockatoos in the foreseeable future.

2.6 **Fauna and Habitats**

2.6.1 Overview

The cleared site and surrounds offer little habitat for native fauna except for disturbance-tolerant birds.

2.6.2 Cockatoo Habitat

Bayley Environmental Services surveyed all of the trees on the site in October 2021 and found five trees larger than 0.5m dbh. All trees were photographed, located using a

handheld GPS and inspected for health and the presence of hollows and evidence of black cockatoo feeding. Appendix C shows the tree survey results.

One tree contained possible small hollows. No hollows or potential hollows of suitable size or configuration for black cockatoo nesting were observed. No evidence of black cockatoo feeding (e.g. chewed nuts) was observed.

It is concluded that the trees on the site offer minimal food resources and no potential nesting or roosting sites for black cockatoos.

2.7 Land Uses and Potential Contamination

The site has been cleared and used for cropping and/or broadacre grazing since at least 1996 (the date of the earliest Landgate aerial photography). There is no evidence on aerial photographs or on the ground of any intensive agriculture, structures or other potentially contaminating land uses. No further investigation of contamination is proposed.

3.0 WATER USE SUSTAINABILITY

3.1 Water Supply

The development will be supplied with potable water provided by the Water Corporation.

Groundwater for non-potable uses may be available from the surficial aquifer, although its quality and availability will need to be established by testing on individual lots. Dams may be feasible in some areas for non-potable supply. Rainwater tanks may be used as a supplementary supply.

3.2 Water Efficiency Measures

The design and installation of water wise initiatives such as rainwater tanks, grey water reuse systems and water efficient fixtures and fittings will be promoted as part of the marketing of the estate to ensure such initiatives can be implemented by purchasers.

Landscaping in road reserves and other public areas will utilise native species with low water demand. Irrigation, if employed, will be limited to the establishment phase, no more than two years after planting.

4.0 ON-SITE EFFLUENT DISPOSAL

4.1 Site Capability

The capability of the site to support on-site effluent disposal has been assessed against the criteria set out in AS1547:2012 and the Government Sewerage Policy 2019. Table 3.1 summarises the AS1547:2012 factors and the degree to which they are satisfied by the site.

Table 3.1 On-site Effluent Disposal Capability

<i>Factor (AS1547:2012 or GSP)</i>	<i>Criterion</i>	<i>Site Characteristics</i>	<i>Compliance</i>
Slope	<20%	1.5 – 2.5%	Complies
Groundwater depth	>0.6m below discharge point	0.84 – 5.72m bgl	Complies in part. Filling may be required in some areas.
Soil permeability (Ks)	>0.06 m/day	0.0005 – 1.3 m/day	Complies in part. Enlarged LAA required in some areas
Soil PRI	>15		Complies
Distance from surface watercourses and significant wetlands	>100m	125m from nearest point	Complies
Sewage sensitive areas and Public Drinking Water Source Areas	Special requirements apply	Not in SSA or PDWSA	Complies
Lot size	2,000m ² outside SSAs and PDWSAs	2.1ha minimum lot size	Complies
Inundation and flooding	No inundation in a 10% AEP rainfall event	Not susceptible to flooding	Complies

The Site & Soil Evaluation has shown that the site is generally suitable for on-site effluent disposal in accordance with the Government Sewerage Policy but that special measures will be necessary in some areas. These are discussed below.

4.2 Soil Permeability

Constant-head permeability tests at eight locations on the site found generally low permeability (Ks), ranging from 1.3m/day to an estimated 0.0005m/day.

Australian Standard AS1547:2012 supports effluent disposal by leach drains or irrigation without site modification on land with Ks of 0.06m/day or greater. Three of the test locations located in the north-east and east of the site were below the AS1547:2012 minimum standard for effluent disposal without special design.

Design measures potentially available to achieve sustainable effluent disposal on the site include:

- increasing the size of the land application area (LAA), either by increased leach drain length or expanded irrigation area;
- use of alternating leach drain systems to enable rejuvenation of the soil profile (already standard procedure for leach drains);
- use of evapotranspiration systems and vegetation uptake;
- mounding (inversion) of leach drains or irrigation area to focus infiltration in the more permeable topsoil (top 30cm);
- soil modification by deep ripping and gypsum addition to reduce dispersivity and improve permeability.

The Health Department of Western Australia (R. Theobald, 2022 pers. comm.) has advised that its preferred approach is to use a combination of measures as follows:

- enlarged land application areas (LAAs), with sizing based on the measured subsoil permeability in each area;
- use of flatbed leach drains with secondary treated effluent (e.g. ATUs);
- siting of LAAs to target the most capable part of each lot (in this case, generally the western end);
- partial inversion of leach drains to provide 0.6m clearance above low-permeability layers;
- manage site drainage to avoid saturation of LAAs; and
- limit trade waste generation and manage trade waste separately from domestic effluent.

The remainder of this document assumes the use of ATUs and flatbed leach drains.

The size and layout of lots in the areas with low permeability are conducive to the sizing and siting of LAAs to avoid low-permeability areas. Final sizing and siting of LAAs should be carried out on the basis of expected site population and further permeability testing on each lot.

4.3 Groundwater Separation

The GSP requires a minimum 0.6m clearance from the discharge point of effluent disposal systems to the highest groundwater table in loams and heavy soils outside of Sewage Sensitive Areas (SSAs) and Public Drinking Water Source Areas (PDWSAs). The depth necessary below ground depends upon the discharge depth and the height of the system. For flatbed leach drains, which discharge at a depth of 0.3m below ground, up to 0.1m of filling will be required to provide clearance to groundwater. However, in low-permeability areas the requirement to provide clearance above the low-permeability subsoil (about 0.3m) will increase the fill requirement to about 0.6m.

5.0 STORMWATER MANAGEMENT

5.1 Principles and Objectives

The stormwater management strategy aims to comply with the principles and objectives for stormwater management identified in the *Stormwater Management Manual for WA* (DoW, 2004) and *Better Urban Water Management* (WAPC, 2008).

Nutrient concentrations and loads in water leaving the site will be managed to comply with the long-term targets of the *Swan Canning Water Quality Improvement Plan* (SRT, 2009), as follows:

- Winter median TP concentration: 0.1 mg/L
- Winter median TN concentration: 1.0 mg/L
- Annual TP yield: 0.013 kg/ha
- Annual TN yield: 0.2 kg/ha.

The drainage system will be designed to maintain surface flow rates and volumes within and from the developed site at their pre-development levels. The drainage design presented here is conceptual and will be refined in the detailed subdivision designs.

The priorities for managing the various sizes of storm event will be:

- 1 year ARI Infiltrate all flows as close to the source as possible. Where infiltration is not feasible, detain runoff to maintain pre-development flow rates and volumes. Minimise export of nutrients and sediments.
- 5 year ARI Detain water prior to discharge. Maintain pre-development flow rates and volumes. Maintain amenity and serviceability. Prevent scouring and damage.
- 100 year ARI Maintain pre-development flow rates and volumes. Prevent flooding and damage.

5.2 Drainage Management System

5.2.1 Road Drainage

The internal roads will be contained within one drainage catchment in three segments. Runoff from storms up to 1 year ARI, 1 hour duration (about 15mm) will be captured and infiltrated in vegetated roadside bioretention swales on one or both sides of the roads. The swales will be nominally 0.5m to 0.8m deep and will be equipped with low (nominally 0.3m) weirs spaced and sized to retain and infiltrate the 1-year 1-hour storm.

Figure 7 shows the conceptual alignment of the roadside swales. Figure 8 shows conceptual cross-sections of the swales.

Calculations based on the Rational Method (Engineers Australia, 1987) suggest that 0.3m high weirs spaced between 14m and 37m apart will be sufficient to capture and infiltrate the 1-year 1-hour road runoff. Table 5.1 summarises the 1-year 1-hour flows and swale sizing. Appendix D shows the detailed runoff calculations.

5.2.2 Lot Drainage

Each lot will be equipped with a bioretention basin to capture and infiltrate the runoff from storms up to 1-year ARI, 1-hour duration (about 15mm). The basins will be nominally 0.6m deep with 1:4 sideslopes and will occupy between about 2.5% and 3.5% of the area of each lot.

The basins have been sized so as to limit the water depth in a 1-year 1-hour storm to 0.6m, in order to ensure that the basins drain in less than 96 hours in accordance with DWER recommendations to avoid creating mosquito breeding habitat.

The basins will also capture and detain the runoff from critical storms up to 100-year ARI so that runoff leaving the lots will be no greater than the pre-development rate. In the smaller lots, the 1-year basins will be large enough to retain the entire runoff from a critical 100-year ARI storm. In the larger lots, excess runoff will overflow from the basins to adjacent paddocks. It is expected that there will be no runoff from lots to the roadside swales in storms up to the 100-year ARI critical storm. Management of major storm runoff is discussed in more detail in Section 5.2.4.

5.2.3 External Catchment

An external catchment of 49ha south-west of the site drains into the site via the southern entrance. This catchment consists of mostly cleared paddocks and a 536m section of Albany Highway.

The roadside bioretention swales within the site have been sized to convey (but not detain or compensate) 100-year ARI critical flows from this external catchment.

5.2.4 Major Storm Drainage

Road runoff from major storms up to the critical 100-year ARI storm will overtop the weirs and flow along the roadside swales to where the road exits the site on the north-eastern boundary.

The roadside swales within the site will be sized to carry the critical 100-year ARI flow from all parts of the site and external catchments. The weirs will be sized to detain and compensate the offsite flows to no more than pre-development levels.

The internal road is intended to connect with an extension of an existing road within a subdivision off the Narrogin-Williams Road (Figure 7). If and when this road is constructed, overflow drainage will be carried via roadside swales down to the Narrogin-Williams Road and ultimately into the Williams River.

Until the connecting road is constructed, the major storm drainage will flow from the roadside swales into the adjoining farmland via a suitable protection structure to prevent erosion. Because this flow will have already been compensated to pre-development levels within the swales, it will not require detention at the exit point.

Table 5.1 summarises the pre-development and post-development flows from a critical 100-year ARI storm. Appendix D shows the runoff and swale sizing calculations.

All calculations are preliminary and will be subject to detailed design prior to construction.

Table 5.1 Flow Calculations and Swale Sizing

<i>Storm</i>	<i>Road Segment</i>	<i>Duration (Tc) (Minutes)</i>	<i>Pre-Dev Flow (L/s)</i>	<i>Post-Dev Flow (L/s)</i>	<i>Total Flow (m³)</i>	<i>Storage Required (m³)</i>	<i>Effective Storage Available (m³)</i>	<i>Flow Depth Over Weir (m)</i>	<i>Top Water Width (m)</i>
1 yr	A	60	0	39	139	139	140	0	2.8
	B	60	0	6	23	23	26	0	2.8
	C	60	0	15	53	15	55	0	2.8
100 yr	A	32.3	245	195	400	0	137.2	0.12	3.5
	B	4.6	95	94	26	0	25.2	0.06	2.8
	C	10.6	261	136	95	0	53.5	0.07	3.2
	Combined (A+B+C+Lots+ External)	76.2	1916	1983	9068	10.3	55.8	0.34	4.8

5.3 Surface Water Quality Management

The drainage system will be designed to maximise on-site retention of nitrogen and phosphorus. This will be achieved by:

- Infiltrating all road runoff from the first 15mm of rainfall in any storm in densely vegetated roadside bioretention swales.
- Infiltrating all lot runoff from the first 15mm of rainfall in any storm in densely vegetated bioretention basins.
- Conveying all road runoff from storms between 1-year and 100-year ARI in densely vegetated bioretention swales to allow suspended particles to be filtered out.

5.4 Maintenance

The drainage system has been designed to require minimal maintenance. The following will be required to ensure that the system continues to function as designed:

- Tending and maintenance of bioretention swales and basins to remove litter, control weeds and encourage the growth of native species.
- Pruning, mulching or removal of vegetation in the swales and basins as necessary to maintain ground fuel loads below 8 tonnes/ha.
- Removal of sediment from swales as necessary to maintain the storage capacity of the weirs. This is more likely to be necessary during initial site development works, and may be a reason for planting of the swales to be delayed for a year after the completion of site works to allow for a short-term sediment accumulation to be removed.

6.0 GROUNDWATER MANAGEMENT

6.1 Groundwater Levels

Groundwater occurs at depths from less than one metre to several metres across the site, probably perched above impermeable clay or granite.

Dewatering is not expected to be required during site development. Overall, development on the site is not expected to have any effect on groundwater levels.

6.2 Groundwater Quality

No groundwater quality information currently exists for the site.

The relationship between nutrient inputs and groundwater quality is complex, especially in the case of phosphorus, which travels through the soil profile as a “front” in a complex series of adsorption and desorption reactions. Nitrogen is subject to denitrification and mineralisation in the soil and groundwater. As a result, groundwater quality at the site at present will be a reflection of nutrient inputs over the last several decades, modified by soil hydrology and nutrient retention capacity.

The aim of nutrient management will be to limit nutrient inputs to the site so that nutrient outputs are minimised. Given the very high-PRI soils at the site, minimal phosphorus leaching to the groundwater is expected.

7.0 LANDSCAPING STRATEGY

The Shire of Williams Town Planning Scheme No. 2 requires that the first 5 metres of the front of each industrial lot be landscaped to the satisfaction of the local government. Council may also require additional landscaping to Albany Highway, adjacent residential or rural uses, or to screen a development where it is desirable to maintain a rural vista from major roads.

The Scheme provision implies a minimum landscaped area of between 250m² and 1,000m² for the lots in the subdivision. It is expected that these landscaped areas will form part or all of the land application area (LAA) for effluent disposal on most lots.

Landscaping of the site will focus on the use of species with low water demand. Plantings will include bioretention swales and basins, landscaping areas and street trees. The plantings will not be irrigated after the establishment phase. No turf grass will be planted.

Fertiliser use will be minimal. New tube stock plantings will be fertilised with slow-release nitrogen and phosphorus tablets on establishment and thereafter will be unfertilised.

The bioretention basins and swales will be densely planted with inundation-tolerant species including sedges and low shrubs in order to stabilise the basins and maximise their ability to take up nitrogen from the water.

The total area of public land to be planted, including swales and road verges, is estimated at approximately one hectare. If all of this area were planted simultaneously during the establishment phase, approximately 4.75 ML of water would be required to irrigate the new plantings for the first year. If the project area is developed two or more stages, the requirement for irrigation water will be spread out over a number of years, with only a small part of the total demand being required in any one year.

Water for irrigation of new plantings may be drawn from the existing dam on the site or from one or more bores installed for the purpose. On-site exploratory drilling and testing would be required to establish the availability of a groundwater supply.

The density of planting will be controlled to keep flammable ground fuel loads below 8 tonnes/ha.

8.0 SUBDIVISION AND CONSTRUCTION WORKS

The construction of the subdivision will involve minimal earthworks due to the large size of the lots. Subdivision works will be mainly confined to the construction of the access road and fences and the installation of water, power and telecommunications.

The developer will implement a Construction Management Plan for the development dealing with dust management, erosion and sediment control, containment of environmentally hazardous materials (chiefly fuel and oils) and spill response. The key elements of the Construction Management Plan will include the following:

Dust Minimisation

- No topsoil stripping will occur when the wind speed is greater than 25km/hr and no earthworks will occur in winds of greater than 40km/hr, unless effective dust suppression can be achieved.
- Dust will be suppressed on any disturbed ground and stockpiles during dry soil conditions by watering, hydromulching, wind fencing and/or covering.
- An adequate supply of water for dust suppression will be kept on site at all times.
- Ground to be disturbed will be wetted prior to disturbance.
- Any soil stockpiles will be limited to a height of 2m to minimise dust generation and facilitate watering.
- Other dust minimisation measures will include minimising areas of disturbance, limiting volume and speed of construction traffic, and instructing site workers in dust minimisation.

Erosion and Sedimentation

- Drains and bunds will be constructed where necessary to capture and direct all runoff from disturbed areas into settling ponds prior to discharge.
- Drains, bunds and ponds will be appropriately designed and sized.
- Vehicles and machinery will be kept to designated roads, tracks and work areas.

Water Conservation

- Water consumption during construction will be minimised by:
 - limiting dust suppression watering to prevent ponding and runoff, and
 - use of non-water dust control methods such as wind fencing and hydromulching.

Hazardous Materials

- All environmentally hazardous materials will be stored in their original labelled containers (or labelled jerrycans in the case of petroleum products) in a ventilated sea container equipped with appropriate signage, fire extinguishers and a spill response kit.
- Petroleum products will be held in a bunded enclosure.
- Material Safety Data Sheets (MSDS) and a chemical register for all hazardous materials on the site will be maintained by the site supervisor in the site office.

Complaints Register

- The construction manager will maintain a record of any public complaints and the actions taken in response.

9.0 IMPLEMENTATION AND FURTHER MANAGEMENT PLANS

Subdivision and development on the site will be carried out in general accordance with this LWMS.

Prior to subdivision and development, a detailed drainage design (including sizing and configuration of roadside swales) will be carried out and documented in a detailed Drainage Management Plan to the satisfaction of the Shire of Gingin.

Prior to development on individual lots, detailed design of on-site effluent disposal systems will be carried out by an experienced designer/installer to the satisfaction of the Shire of Williams.

The Shire of Williams may require the preparation of a Landscape Plan prior to subdivision.

10.0 REFERENCES

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<https://www.eng.auburn.edu/~xzf0001/Handbook/Channels.html>.

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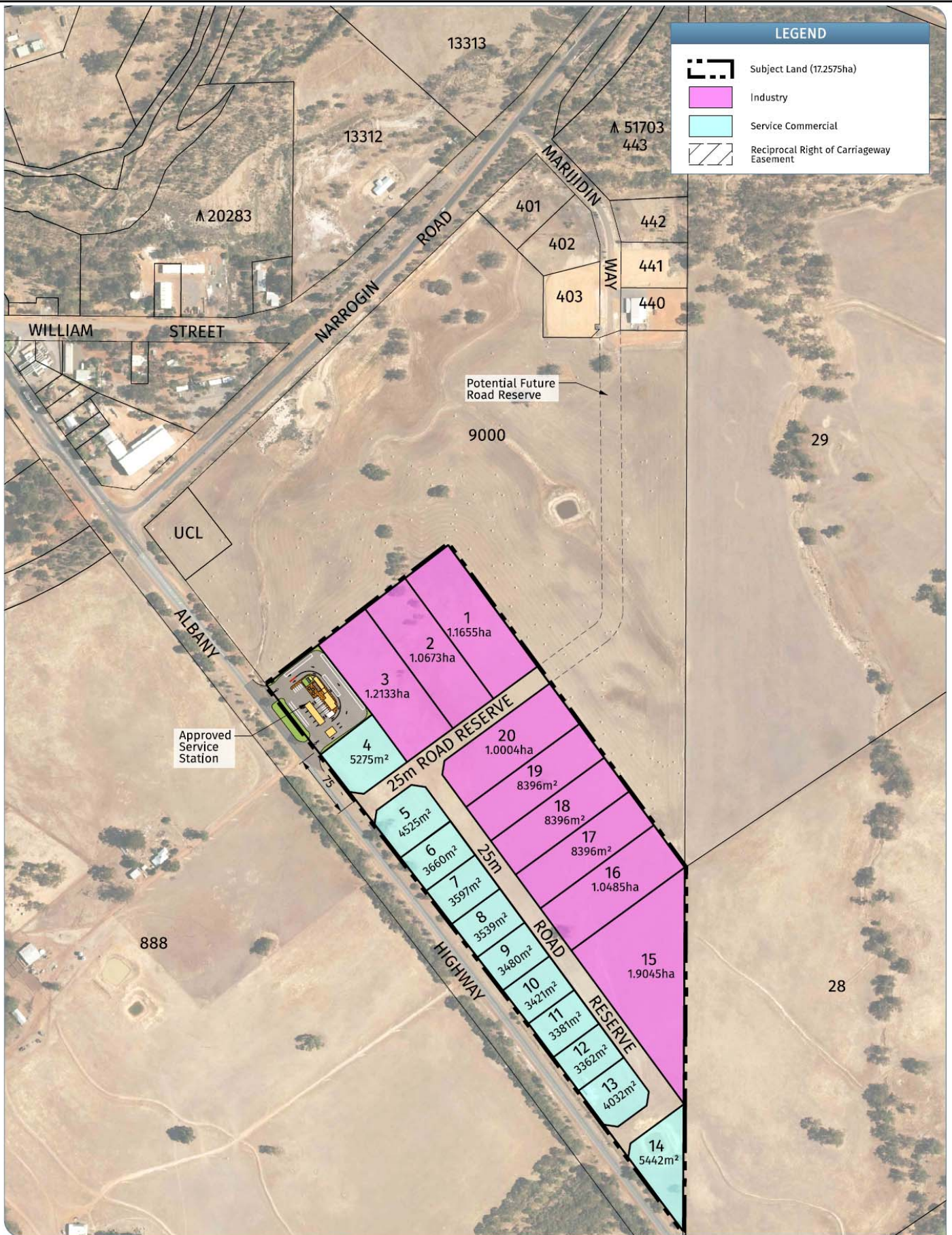
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Institute of Engineers, Australia (1987). *Australian Rainfall and Runoff: A Guide to Flood Estimation*. Institute of Engineers, Australia, Barton, ACT.

Standards Australia (2012). *Australian/New Zealand Standard 1547:2012 – On-site Domestic Wastewater Management*. SAI Global Ltd, Sydney.

—

Figures



STRUCTURE PLAN - LOT LAYOUT

Lot 889 on DP 416835 Albany Highway, WILLIAMS

Plan No. | 21520-13
 Date | 02/08/21
 Drawn | NP
 Checked | DM
 Revision | A

BUNBURY OFFICE:
 21 Spencer Street,
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ALBANY | BUNBURY | BUSSELTON | FORRESTDALE | PERTH

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Scale | 1:4000@A3

0 50m 100m

NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey



Figure 1

CONCEPTUAL LOT LAYOUT





Figure 2

THE SITE AND SURROUNDINGS



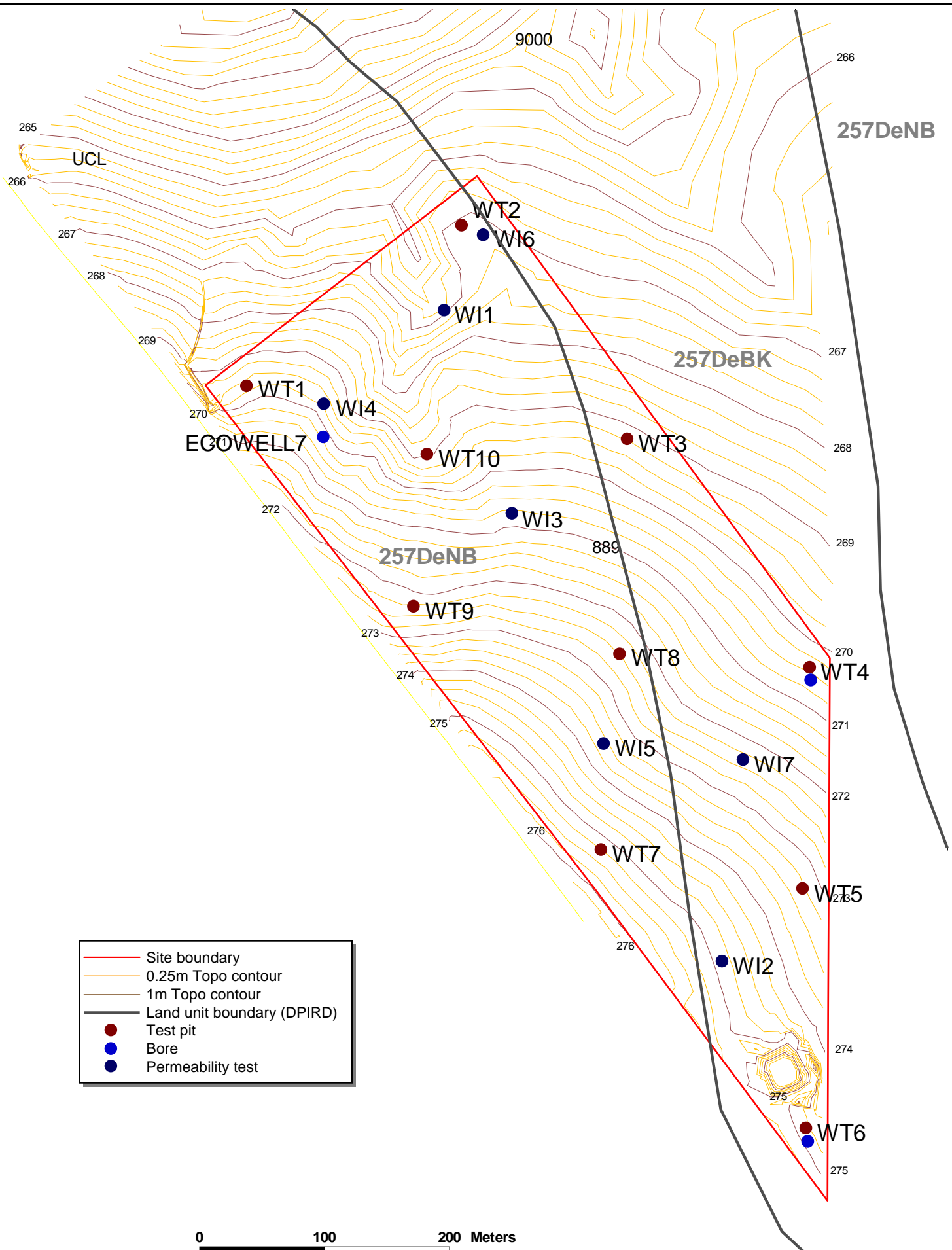


Figure 4

PHYSIOGRAPHY

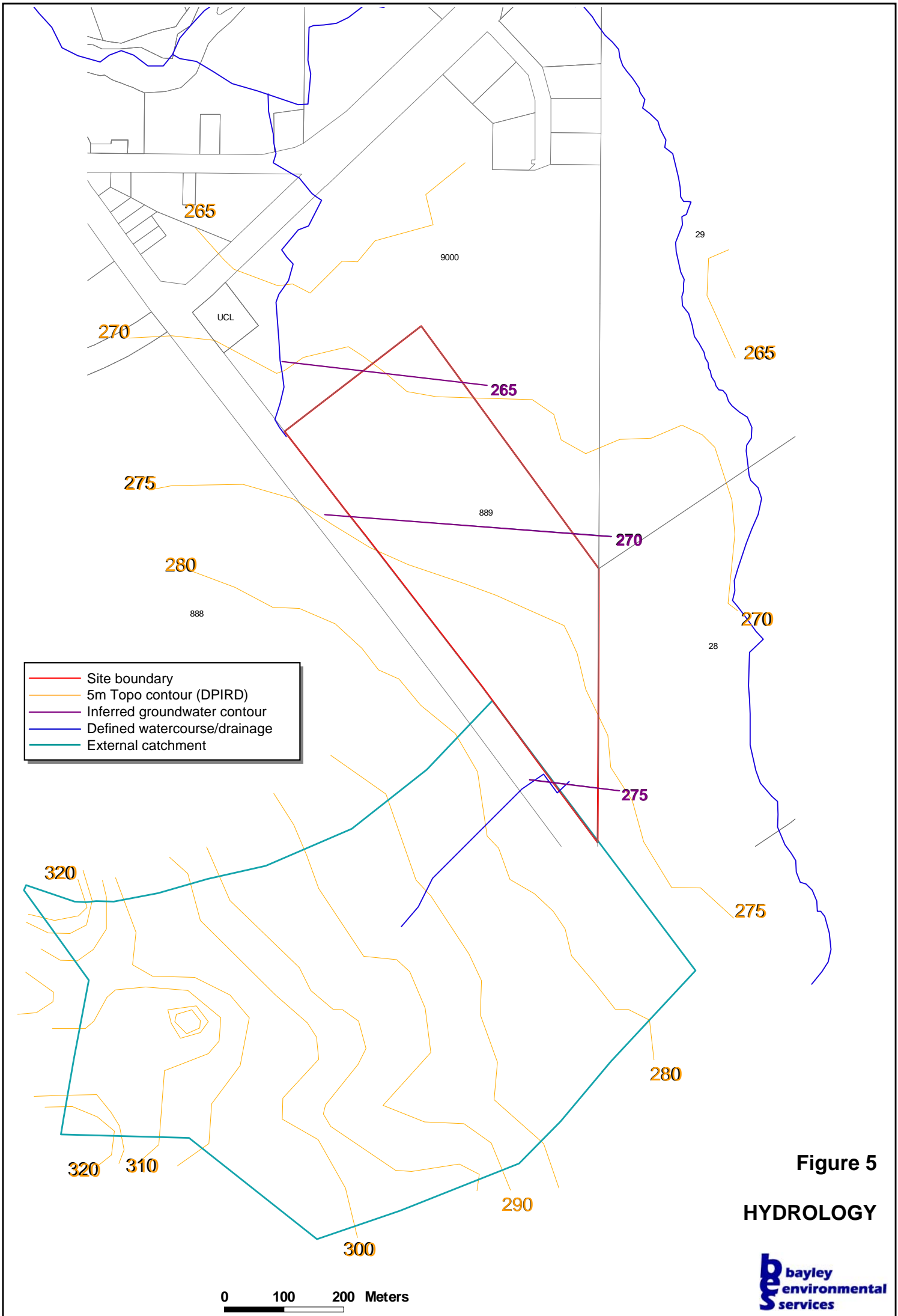


Figure 5
HYDROLOGY

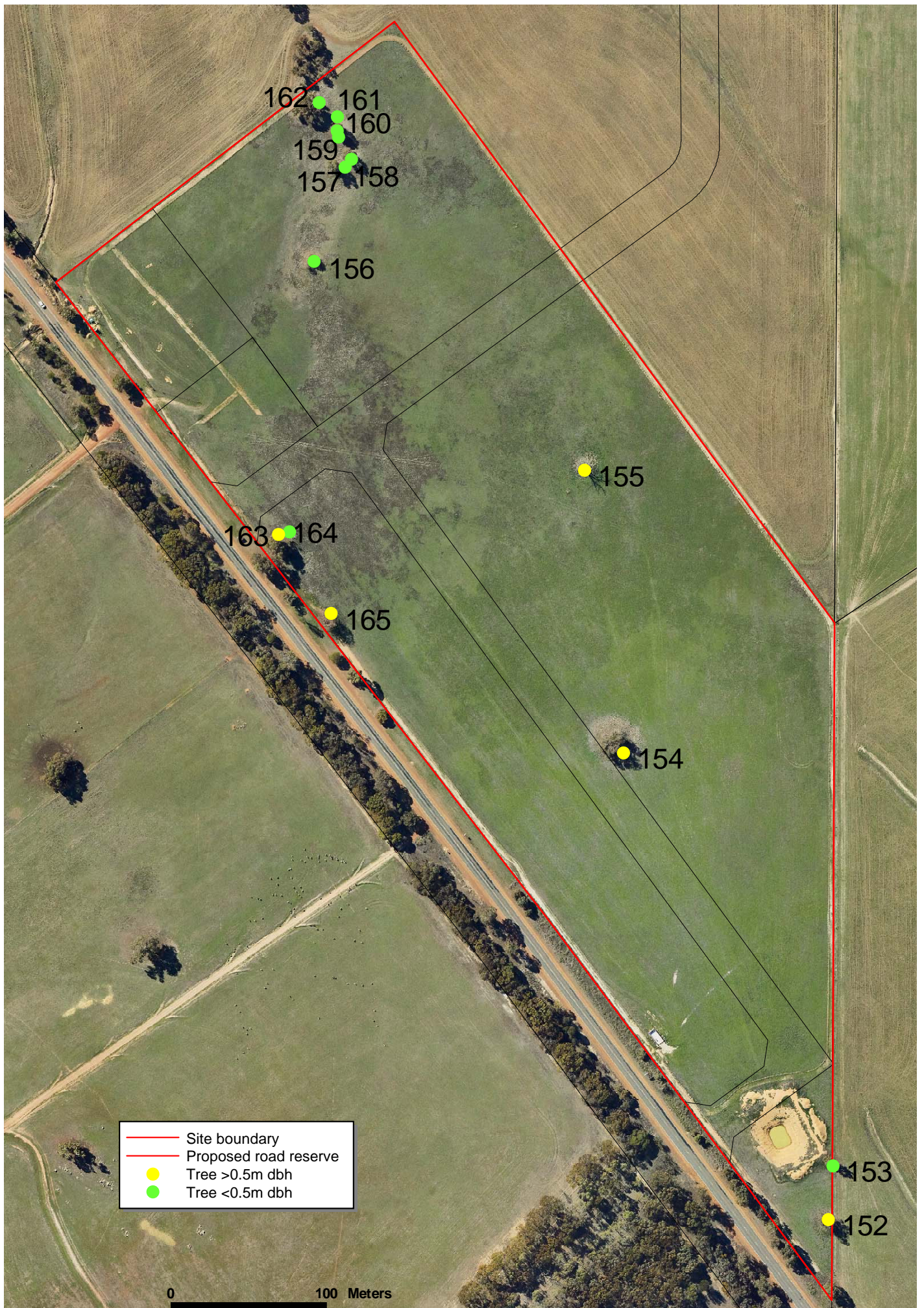
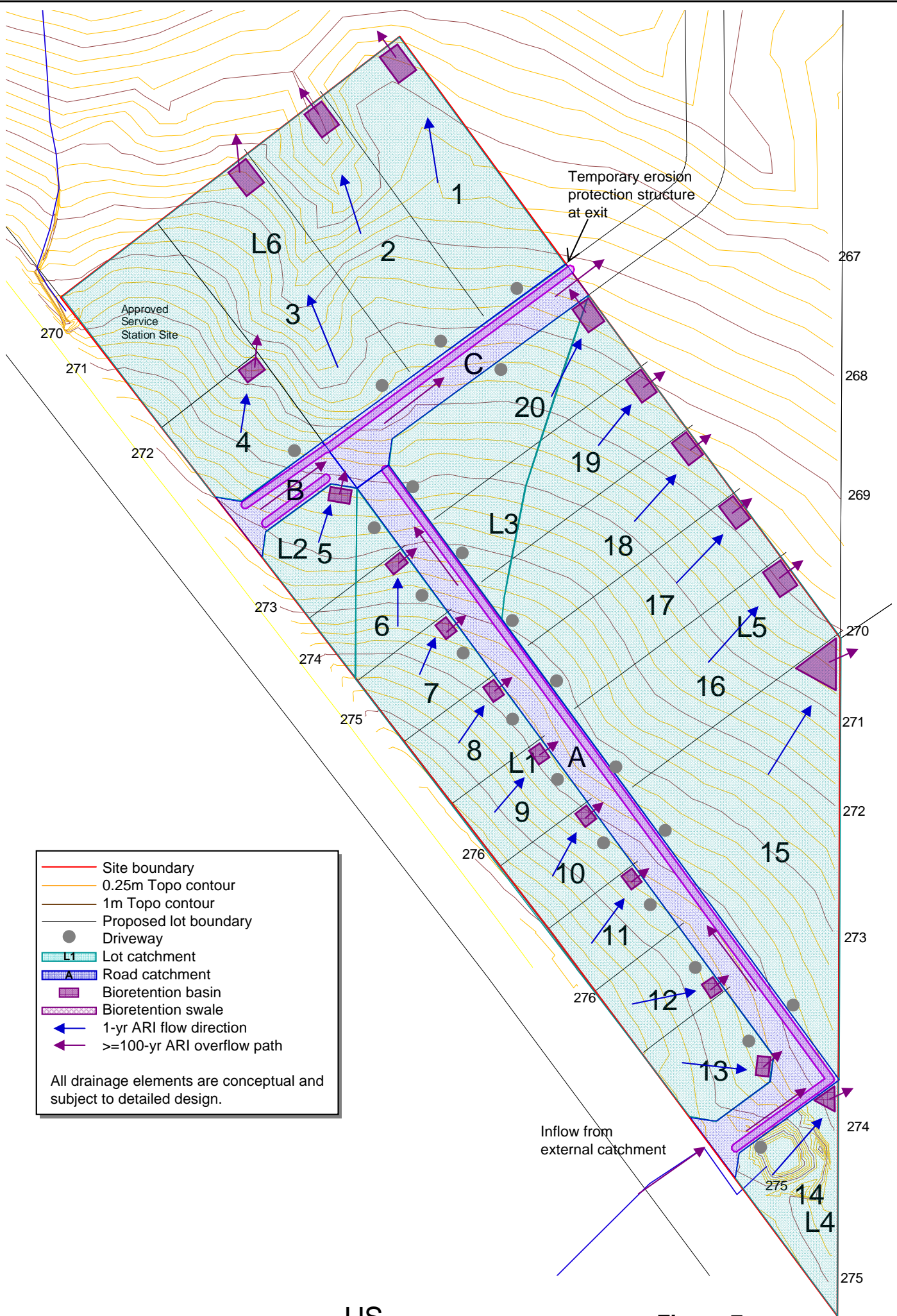


Figure 6

REMNANT TREES



- Site boundary
 - 0.25m Topo contour
 - 1m Topo contour
 - Proposed lot boundary
 - Driveway
 - L1 Lot catchment
 - A Road catchment
 - Bioretention basin
 - ▨ Bioretention swale
 - ← 1-yr ARI flow direction
 - ← ≥ 100 -yr ARI overflow path
- All drainage elements are conceptual and subject to detailed design.

US

0 100 Meters

Figure 7

DRAINAGE CONCEPT



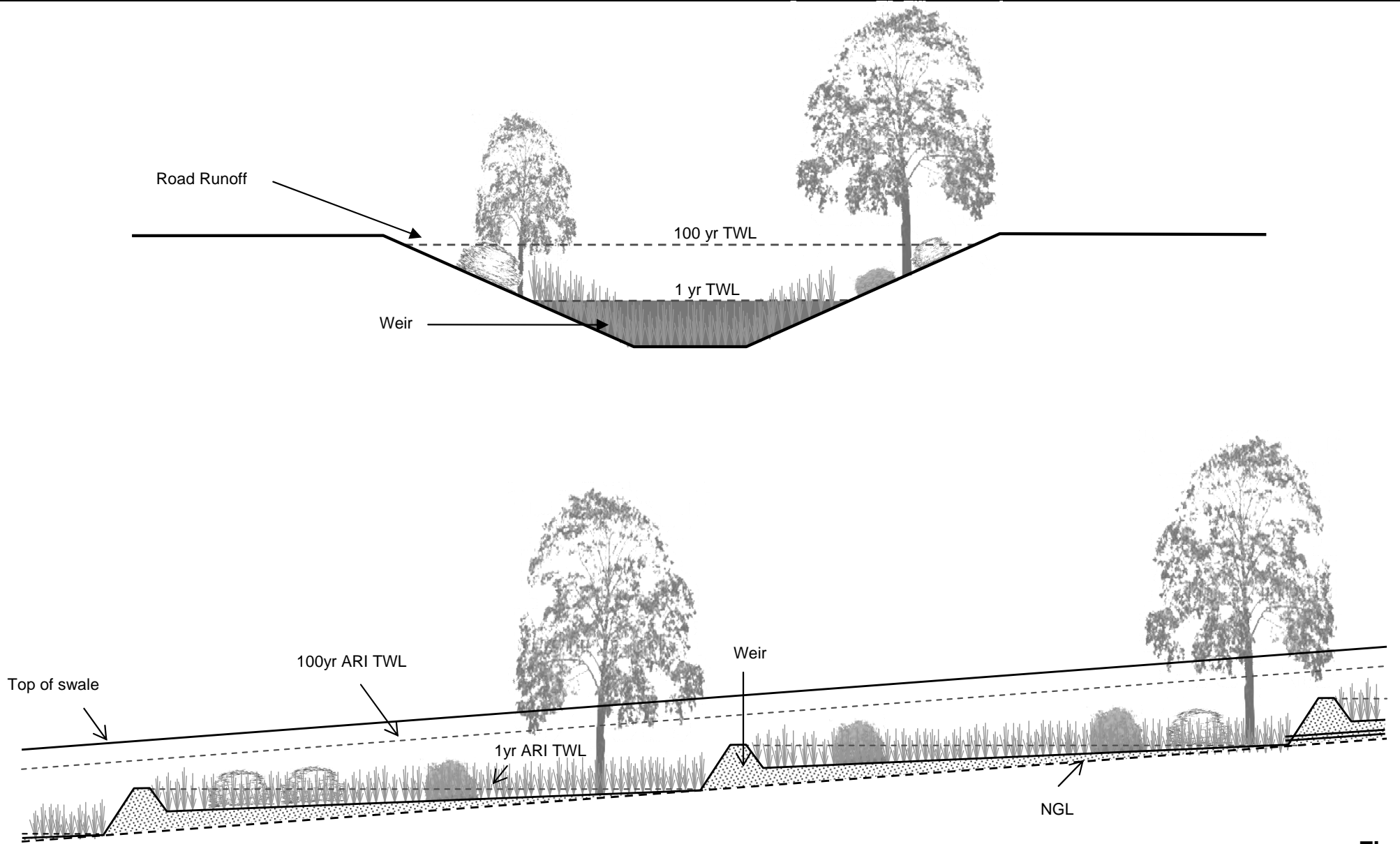


Figure 8

CONCEPTUAL SWALE PROFILES

Appendix A

Soil Logs

SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT1
EASTING:	489129
NORTHING:	6344748
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.3
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	-

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.15	Dark brown sandy topsoil		
0.15 - 0.3	Yellow-brown silty clay		
0.3 - 0.7	Orange silty clay		
0.7 - 2.2	Orange/red mottled well structured clay		
2.2 - 2.3	White/red mottled well structured clay		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT2
EASTING:	489301
NORTHING:	6344877
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.5
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	-

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.1	Brown loamy topsoil		
0.1 - 0.4	Yellow-brown gravelly loam		
0.4 - 1.8	Orange/red mottled clay with pebbles to 8mm		
1.8 - 2.5	Pale white/grey/red mottled well structured clay		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT3
EASTING:	489433
NORTHING:	6344705
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.5
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.15	Brown loamy topsoil		
0.15 - 0.4	Yellow-brown sandy loam		
0.4 - 0.9	Orange loamy clay		
0.9 - 1.8	Orange/red mottled well structured clay		
1.8 - 2.5	White/grey/orange/red mottled well structured clay		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT4
EASTING:	489579
NORTHING:	6344522
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.4
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	2.0

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.1	Dark brown topsoil		
0.1 - 0.4	Brown sandy clay-loam		
0.4 - 1.3	Orange slightly mottled silty clay		
1.3 - 2.4	Orange-brown/red mottled clay, water ingress at 2.0m		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT5
EASTING:	489573
NORTHING:	6344345
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.4
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	-

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.1	Dark brown topsoil		
0.1 - 0.6	Pale brown poorly structured clay-loam		
0.6 - 2.4	Orange/red/white mottled clay		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT6
EASTING:	489576
NORTHING:	6344154
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.4
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	1.8

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.1	Dark brown topsoil		
0.1 - 0.55	Pale brown clay-loam		
0.55 - 2.4	Orange/red mottled clay, water ingress at 1.8m		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT7
EASTING:	489412
NORTHING:	6344377
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.2
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	-

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.1	Dark brown topsoil		
0.1 - 0.5	Pale brown poorly structured clay-loam		
0.5 - 2.2	Orange/white/red mottled well structured clay		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT8
EASTING:	489427
NORTHING:	6344534
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.4
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	-

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.1	topsoil		
0.1 - 0.45	Pale brown sandy clay-loam		
0.45 - 0.9	Pale orange slightly mottled clay		
0.9 - 2.4	Orange/red/white mottled clay		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT9
EASTING:	489262
NORTHING:	6344571
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.3
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	-

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.15	Dark brown topsoil		
0.15 - 0.4	Dark brown sandy loam		
0.4 - 1.0	Yellow-brown loamy clay, slightly mottled with gravel to 5mm		
1.0 - 2.3	Dark orange/red mottled, slightly lateritic, moderately structured clay with granite cobbles to 100mm		



SOIL PROFILE LOG

PROJECT NUMBER:	J21029
SITE ID:	WT10
EASTING:	489273
NORTHING:	6344693
METHOD:	Backhoe
TOTAL DEPTH (mbgl):	2.3
REFUSAL (Y/N):	N
DATE:	27/10/2021
DEPTH TO WATER (mbgl)	-

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.2	Dark chocolate-brown clay-loam topsoil		
0.2 - 1.1	Yellow-brown poorly structured slightly mottled sticky clay, damp		
1.1 - 2.3	Very hard reddish-brown poorly structured lateritic clay with ironstone nodules		



Appendix B

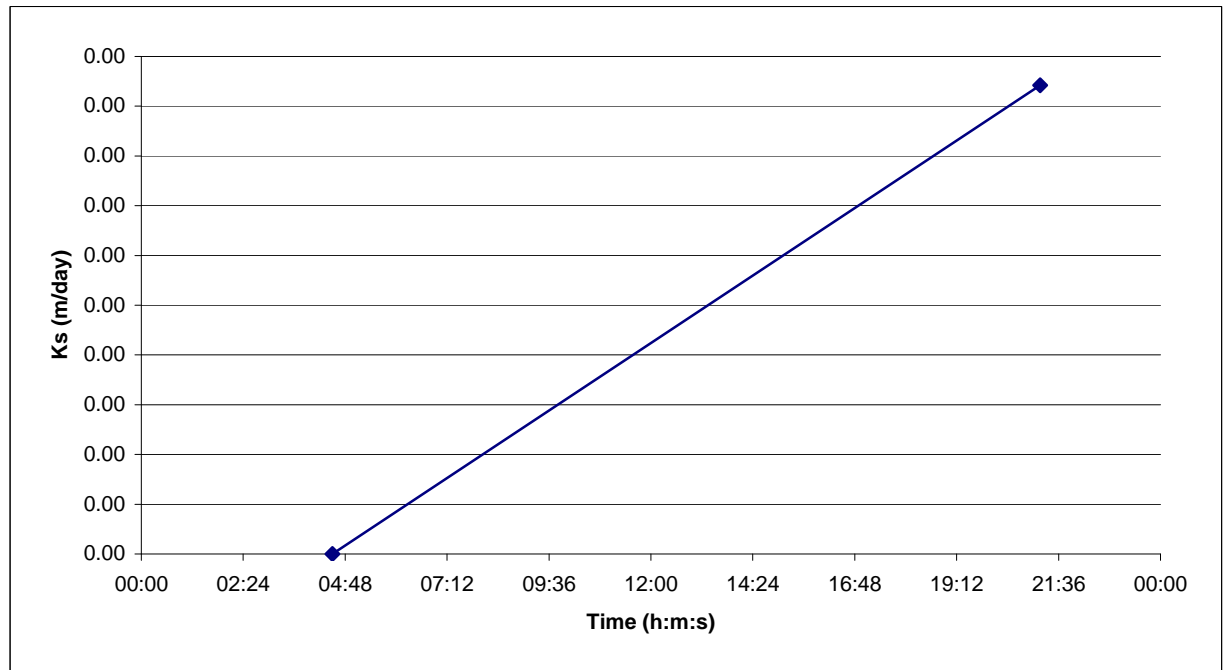
Permeability Test Results

SOIL PERMEABILITY TEST

Site No.	W11	Brown clay
Date	27/10/21	
Easting	489286	
Northing	6344808	
Depth	0.5	

Time (h:m:s)	Weight (kg)	Change in Weight (kg)	Ks (m/d)
02:30:00	42.2		0.0005
04:30:00	42.2		
21:10:00	42.1364	0.0636	
		42.1364	

H = 27.5
r = 4.5



Ks = 0.0005 m/day

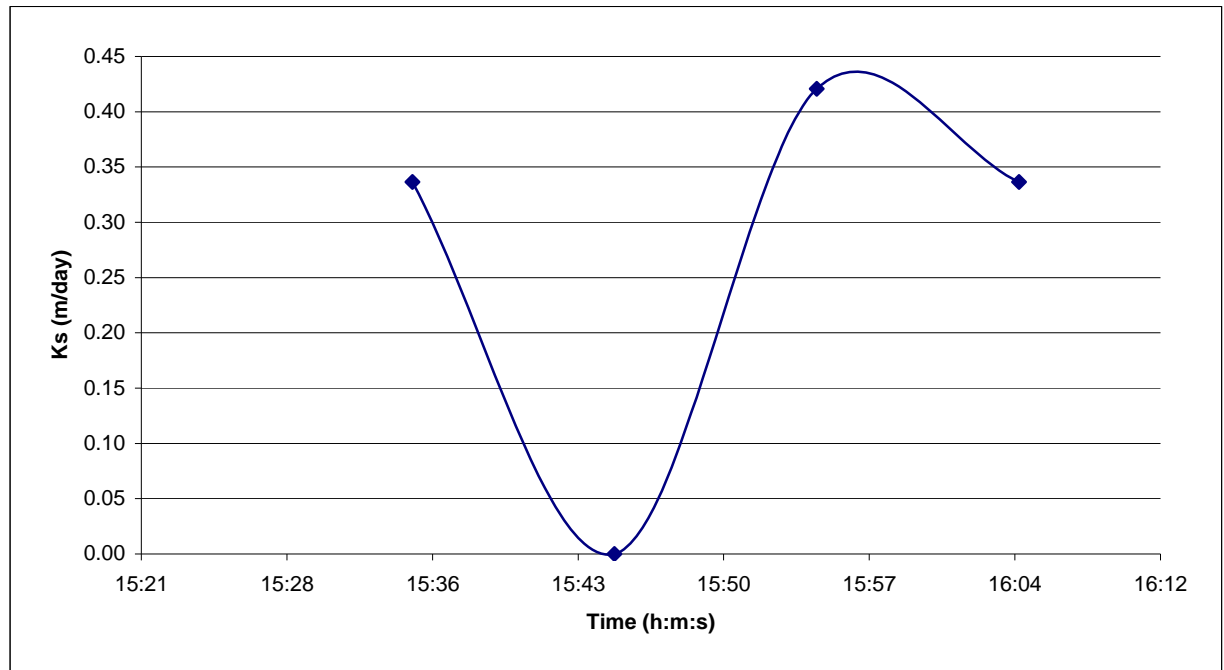
SOIL PERMEABILITY TEST

Site No.	W12	Pale brown clay
Date	27/10/21	
Easting	489508	
Northing	6344288	
Depth	0.5	

Time (h:m:s)	Weight (kg)	Change in Weight (kg)	Ks (m/d)
15:25:00	44		
15:35:00	43.6	0.4	0.34
15:45:00	43.6		
15:55:00	43.1	0.5	0.42
16:05:00	42.7	0.4	0.34
		42.7	

H = 25
r = 4.5

X Axis (delete)
min 0.6493056
max 0.6701389
major unit 0.0069444
minor unit auto



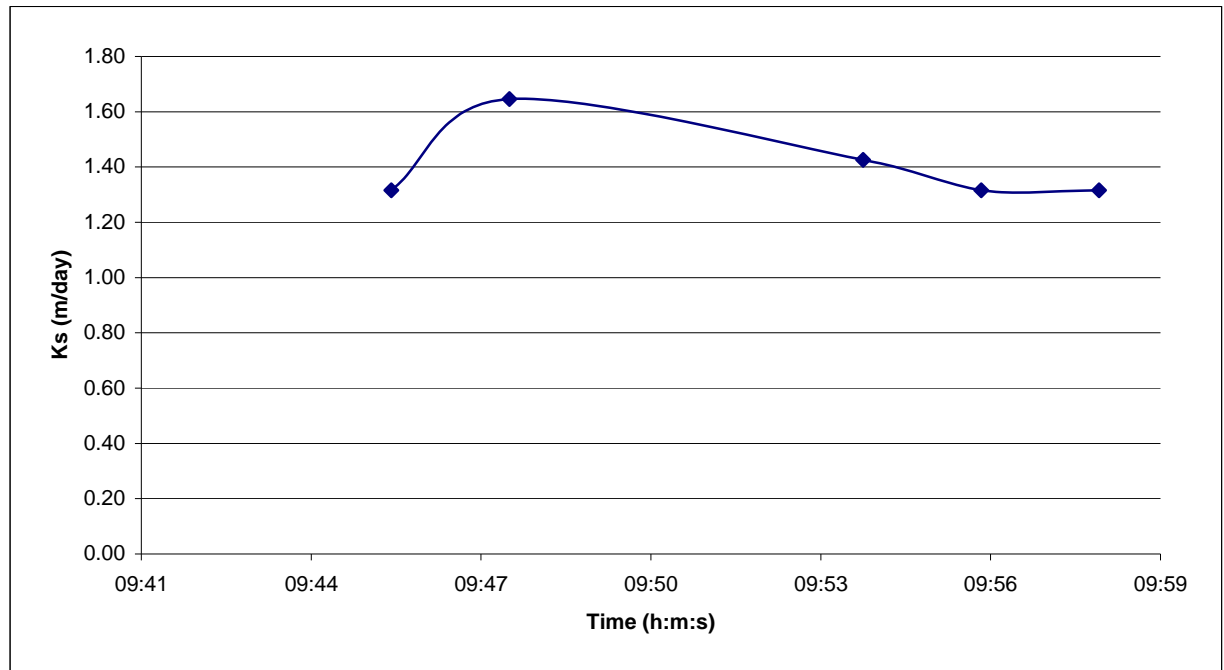
Ks = 0.3 m/day

SOIL PERMEABILITY TEST

Site No.	W13	orange-brown gravelly loam
Date	28/10/21	
Easting	489340	
Northing	6344645	
Depth	0.45	

Time (h:m:s)	Weight (kg)	Change in Weight (kg)	Ks (m/d)
09:44:00	36.7		
09:46:00	36.3	0.4	1.32
09:48:00	35.8	0.5	1.65
09:54:00	34.5	1.3	1.43
09:56:00	34.1	0.4	1.32
09:58:00	33.7	0.4	1.32
		33.7	

H = 30
r = 4.5



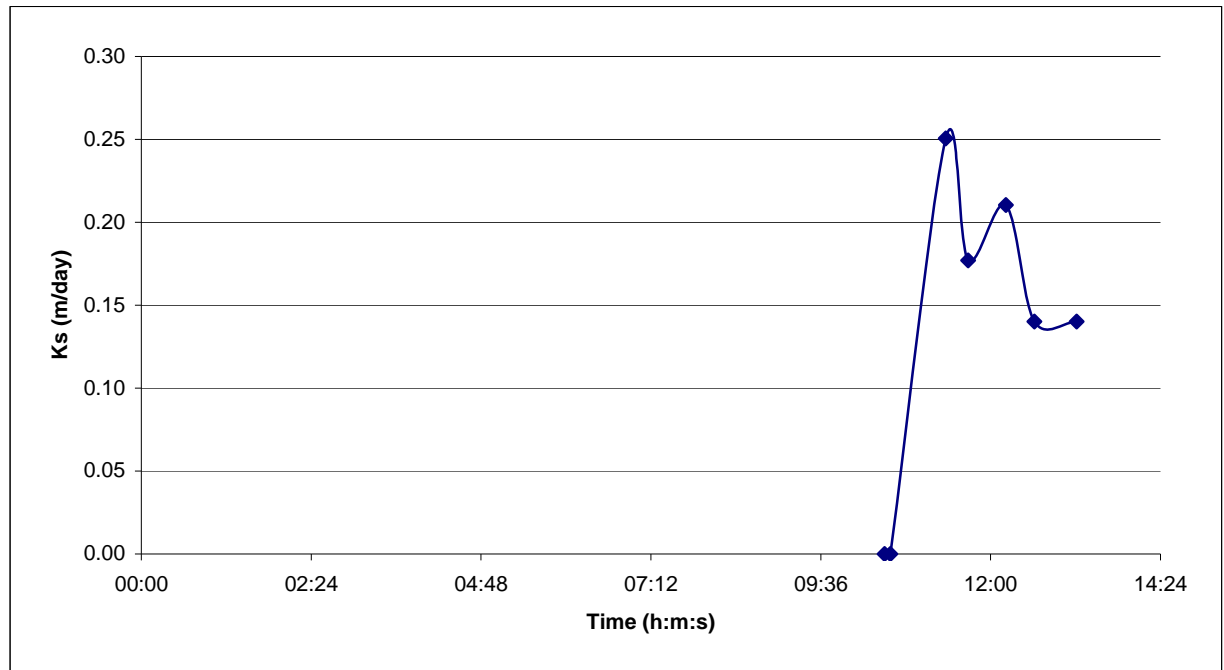
Ks = 1.3 m/day

SOIL PERMEABILITY TEST

Site No.	W14	Orange mottled clay
Date	28/10/21	
Easting	489191	
Northing	6344733	
Depth	0.5	

Time (h:m:s)	Weight (kg)	Change in Weight (kg)	Ks (m/d)
10:28:00	34.1		
10:30:00	34.1		
10:35:00	34.1		
11:22:00	32.7	1.4	0.25
11:41:00	32.3	0.4	0.18
12:13:00	31.5	0.8	0.21
12:37:00	31.1	0.4	0.14
13:13:00	30.5	0.6	0.14
		30.5	

H = 25
r = 4.5



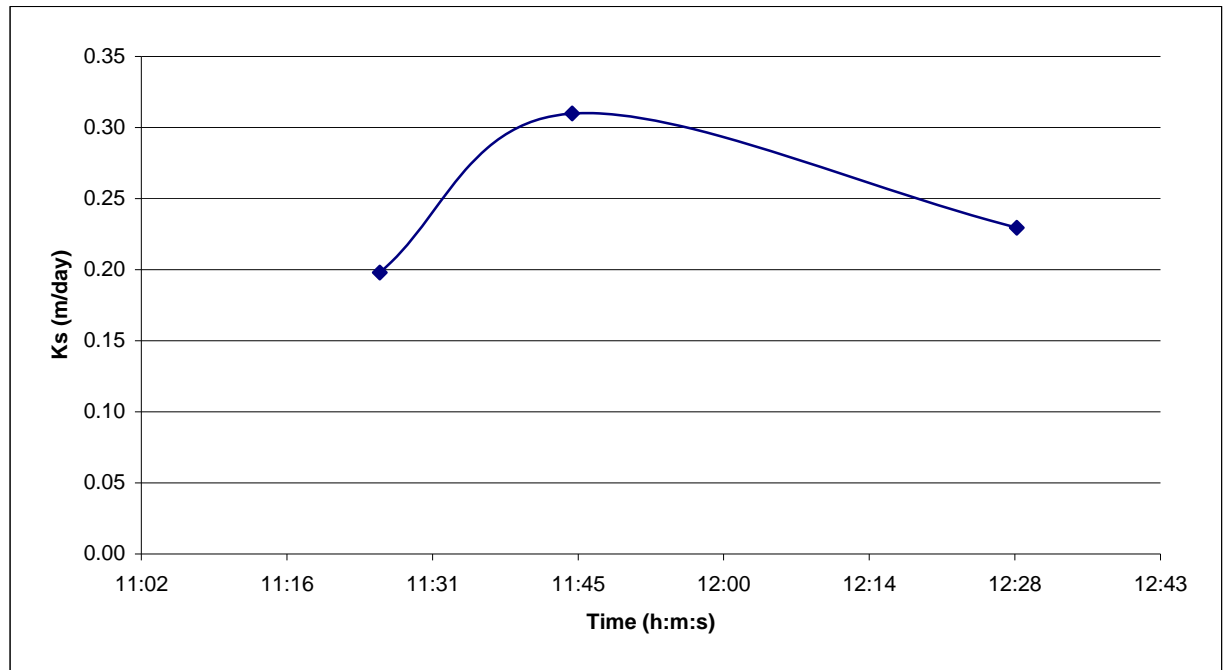
Ks = 0.14 m/day

SOIL PERMEABILITY TEST

Site No.	WI5	Orange-brown loamy clay
Date	28/10/21	
Easting	489414	
Northing	6344462	
Depth	0.5	

Time (h:m:s)	Weight (kg)	Change in Weight (kg)	Ks (m/d)
11:09:00	39.7		
11:26:00	39.3	0.4	0.20
11:45:00	38.6	0.7	0.31
12:29:00	37.4	1.2	0.23
		37.4	

H = 25
r = 4.5



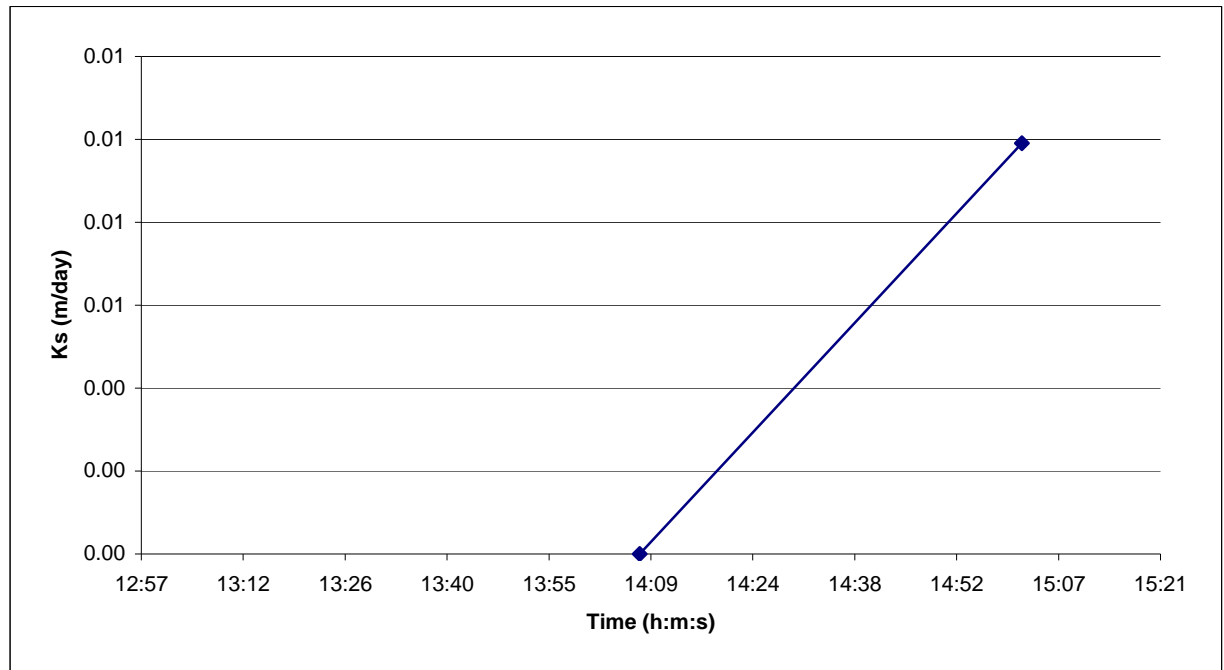
Ks = 0.25 m/day

SOIL PERMEABILITY TEST

Site No.	W16	Brown clay
Date	28/10/21	
Easting	489317	
Northing	6344868	
Depth	0.5	

Time (h:m:s)	Weight (kg)	Change in Weight (kg)	Ks (m/d)
13:06:00	32.4		
14:08:00	32.4		
15:02:00	32.3364	0.0636	0.01
		32.3364	

H = 25
r = 4.5



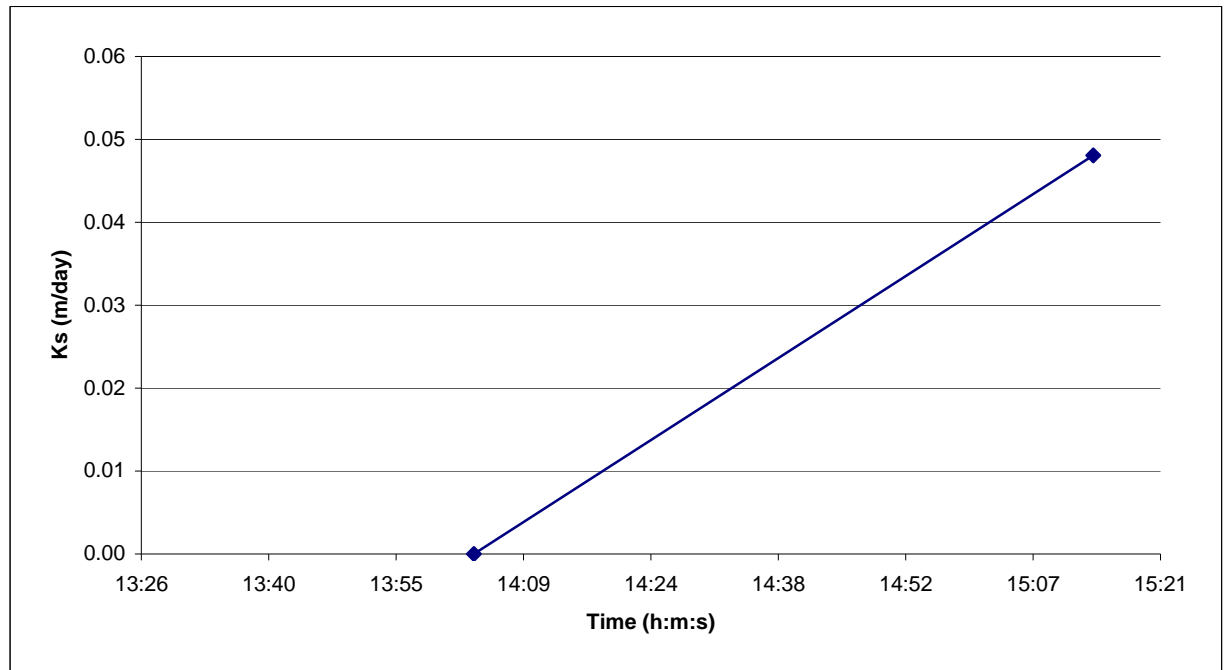
Ks = 0.01 m/day

SOIL PERMEABILITY TEST

Site No.	W17	Yellow-brown sandy clay
Date	28/10/21	
Easting	489525	
Northing	6344448	
Depth	0.5	

Time (h:m:s)	Weight (kg)	Change in Weight (kg)	Ks (m/d)
13:40:00	24.3		
14:04:00	24.3		
15:14:00	23.9	0.4	
		23.9	0.0481

H = 25
r = 4.5



Ks = 0.05 m/day

Appendix C

Tree Survey

Lot 889 Albany Hwy, Williams**List of Remnant Trees**

<i>Wpt</i>	<i>Easting</i>	<i>Northing</i>	<i>Species</i>	<i>DBH (m)</i>	<i>Height (m)</i>	<i>Description</i>
152			Wandoo	0.5	5	Many dead small branches, heavily branched at 1.5m, no hollows
153			Wandoo	0.4	5	Large dead limb, senescent, no hollows
154			Flooded Gum	2	15	Heavily branched at <1m, many small dead branches, possible small hollows
155			Unknown	0.8	15	Dead, no hollows
156			2 x Wandoo	0.2	4	Healthy, no hollows
157			Flooded Gum	0.3	10	Healthy, no hollows
158			Flooded Gum	0.2	8	Bifurcated at <1m, healthy, no hollows
159			Flooded Gum	0.2	5	Healthy, no hollows
160			Flooded Gum	0.25	8	Healthy, no hollows
161			Wandoo	0.15	3	Senescent, no hollows
162			Wandoo	0.3	10	Heavily branched at 1m, healthy, no hollows
163			Wandoo	0.7	10	Trifurcated at 1m, healthy, no hollows
164			Wandoo	0.2	3	Decrepit, no hollows
165			Wandoo	0.6	10	Recently deceased, no hollows

Appendix D

Runoff Calculations

1 YEAR ARI 1 HOUR FLOWS - ROADS

Rainfall Intensity i (mm/h)	14.9	(1yr, 1hr Storm)
Runoff Coefficient Road Reserves	0.8	
Runoff Coefficient Swale	1	
Runoff Coefficient Lots	0	Retain 1yr 1hr on each lot
Runoff Coefficient OS	0	
Permeability k (m/hr)	0.0063	(50% of mean measured Ks)
Driveway Width (m)	5.0	
Swale Side Slope (1/x)	3.00	

Segment	Road Reserve (m2)	Swale Length (m)	Swale Depth (m)	Weir Height (m)	Swale Base Width (m)	Swale Top Width (m)	Swale Area (m2)	Lots (m2)	OS (m2)	AI	Segment Peak Flow (L/s)	Segment 1 hr Flow (m3)
US	26822	536	0	0	0	0.00	0	0	463317	21458	89	320.0
A	10842	558	0.8	0.3	1	5.80	3236	30127	0	9321	39	139.0
B	1850	63	0.5	0.3	1	4.00	252	3178	0	1530	6	22.8
C	4202	193	0.7	0.3	1	5.20	1004	18954	0	3563	15	53.1

Trapezoidal Swales

Swale Segment	No. Driveways	No. Weirs	Length	Weir Spacing (m)	Long Slope	Max U/S Reach (m)	Upstream Ht (m)	1 hr Inflow per Weir (m3)	Storage per Weir (m3)	Total Storage (m3)	Effective Storage per Weir (m3)	Effective Total Storage (m3)	Volume Check
US	0	1	536	536	0.0206	0.0	0.0	319.97	0.00	0.00	0.00	0.00	
A	7	15	558	37	0.0075	34.9	0.0	9.27	8.94	134.13	9.30	139.57	ok
B	1	7	111	16	0.0183	15.1	0.0	3.26	3.60	25.18	3.74	26.19	ok
C	3	14	193	14	0.0176	12.7	0.1	3.79	3.79	53.09	3.94	55.20	ok

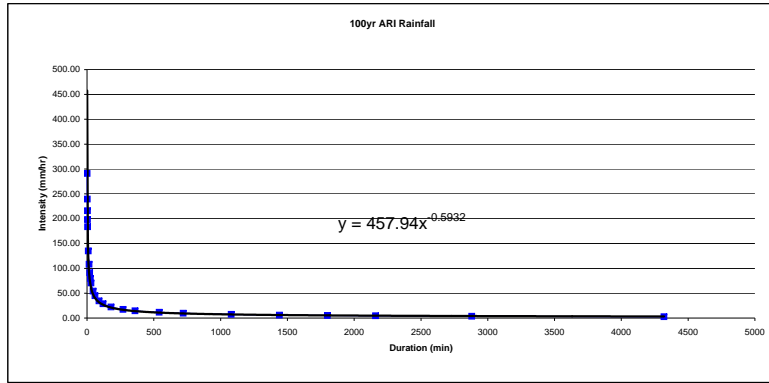
100 YEAR ARI CRITICAL FLOWS - ROADS

CATCHMENT	AREAS (m2)					EFFECTIVE AREAS (m2)						TIME OF CONCENTRATION PRE DEVELOPMENT						TIME OF CONCENTRATION POST-DEVELOPMENT				CRITICAL STORM INTENSITY (mm/h)		FLOW			STORAGE			FLOW DEPTH	
	Road Reserve (m2)	Swale	Lots (m2)	OS (m2)	Total	Pre	Post	Longest Path (m)	RL Top (mAHD)	RL Bottom (mAHD)	Slope (m/km)	TC (min)	Longest Path (m)	RL Top (mAHD)	RL Bottom (mAHD)	Slope	TC (min)	Pre-Dev	Post-Dev	Pre Dev	Post Dev	Total Flow (m3)	Storage Req (m3)	Effective Storage (m3)	Volume Check	Manning's n	Height Over Weir (m)				
A	10842	3236	30127	0	44205	15472	12452	570	275	270.75	7.46	33.6	570	275	270.75	7.46	34.3	57.0	56.2	244.86	194.54	400.35	0.00	137.24	ok	0.035	0.12				
B	1850	252	3178	0	5280	1848	1825	76	272	270.6	18.42	4.6	76	272	270.6	18.42	4.6	184.8	184.6	94.85	93.57	25.96	0.00	25.25	ok	0.035	0.06				
C	4202	1004	18954	0	24160	8456	4576	193	270.6	268.2	12.44	10.9	193	270.6	268.2	12.44	11.6	111.0	107.1	260.81	136.08	94.61	0.00	53.50	ok	0.035	0.07				

Runoff Coefficients	Pre-Dev	Post-Dev
Roads	0.35	0.85
Swales/Basins	0.35	1
Lots	0.35	0
OS	0.35	0.35

All lot drainage retained or directed offsite

Rainfall IFD Event	Duration (mins)	Intensity (mm/hr)
1 min	1	291.00
2 min	2	239.40
3 min	3	216.00
4 min	4	198.00
5 min	5	183.60
10 min	10	135.00
15 min	15	108.40
20 min	20	91.20
25 min	25	79.44
30 min	30	70.60
45 min	45	54.13
1 hr	60	44.80
1.5 hr	90	34.40
2 hr	120	28.65
3 hr	180	22.23
4.5 hr	270	17.38
6 hr	360	14.62
9 hr	540	11.44
12 hr	720	9.58
18 hr	1080	7.28
24 hr	1440	5.96
30 hr	1800	5.03
36 hr	2160	4.39
48 hr	2880	3.46
72 hr	4320	2.42



1 YEAR ARI 1 HOUR FLOWS - LOTS

LOT	AREAS (m2)				FLOWS		
	Hardstand	Basin	OS	Total	Effective Area	1hr Peak Flow (L/s)	1hr Total Flow (m3)
1	10490	323	843	11655	9407	39.0	140.28
2	9606	293	774	10673	8613	35.7	128.43
3	10920	323	891	12133	9783	40.5	145.88
4	4748	160	368	5275	4269	17.7	63.66
5	4073	145	307	4525	3668	15.2	54.70
6	3294	125	241	3660	2973	12.3	44.34
7	3237	125	234	3597	2924	12.1	43.60
8	3185	116	238	3539	2871	11.9	42.81
9	3132	116	232	3480	2824	11.7	42.12
10	3079	116	226	3421	2778	11.5	41.43
11	3043	116	222	3381	2747	11.4	40.96
12	3026	116	221	3362	2732	11.3	40.73
13	3629	135	268	4032	3273	13.6	48.81
14	4898	171	374	5442	4408	18.3	65.74
15	17141	491	1413	19045	15343	63.6	228.80
16	9437	293	755	10485	8465	35.1	126.23
17	7556	241	599	8396	6783	28.1	101.15
18	7556	241	599	8396	6783	28.1	101.15
19	7556	241	599	8396	6783	28.1	101.15
20	9004	273	727	10004	8072	33.4	120.37

BASIN SIZING

Lot	Depth	Slope 1:x	Base Width	Base Length	Top Width (m)	Top Length (m)	Volume	Effective Volume	Surface Area (m2)	Volume check	% Area
1	0.6	4	10.0	17.0	14.8	21.8	145	147	323	ok	2.77
2	0.6	4	10.0	15.0	14.8	19.8	131	132	293	ok	2.75
3	0.6	4	10.0	17.0	14.8	21.8	145	147	323	ok	2.66
4	0.6	4	6.0	10.0	10.8	14.8	64	64	160	ok	3.03
5	0.6	4	5.0	10.0	9.8	14.8	56	57	145	ok	3.21
6	0.6	4	5.0	8.0	9.8	12.8	47	48	125	ok	3.43
7	0.6	4	5.0	8.0	9.8	12.8	47	48	125	ok	3.49
8	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.27
9	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.32
10	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.38
11	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.42
12	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.44
13	0.6	4	5.0	9.0	9.8	13.8	52	52	135	ok	3.35
14	0.6	4	6.0	11.0	10.8	15.8	69	69	171	ok	3.14
15	0.6	4	15.0	20.0	19.8	24.8	235	237	491	ok	2.58
16	0.6	4	10.0	15.0	14.8	19.8	131	132	293	ok	2.79
17	0.6	4	8.0	14.0	12.8	18.8	103	104	241	ok	2.87
18	0.6	4	8.0	14.0	12.8	18.8	103	104	241	ok	2.87
19	0.6	4	8.0	14.0	12.8	18.8	103	104	241	ok	2.87
20	0.6	4	9.0	15.0	13.8	19.8	120	121	273	ok	2.73

Permeability Ks (m/hr) 0.00625 (50% of mean measured Ks)

Rainfall (1yr 1hr) 14.9

Runoff Coefficients Pre-Dev Post-Dev

Hardstand 0.35 0.85

Basin 0.35 1

OS 0.35 0.2

100 YEAR ARI CRITICAL FLOWS - LOTS

LOT	AREAS (m2)				EFFECTIVE AREAS (m2)		TIME OF CONCENTRATION PRE DEVELOPMENT					TIME OF CONCENTRATION POST-DEVELOPMENT					CRITICAL STORM INTENSITY (mm/h)		FLOW			
	Hardstand	Basin	OS (m2)	Total	Pre	Post	Longest Path (m)	RL Top (mAHD)	RL Bottom (mAHD)	Slope (m/km)	TC (min)	Longest Path (m)	RL Top (mAHD)	RL Bottom (mAHD)	Slope	TC (min)	Pre-Dev	Post-Dev	Pre Dev	Post Dev	Total Flow (m3)	Storage Req (m3)
1	10490	323	843	11655	4079	9534	178	268.9	266.5	13.48	10.6	178	268.9	266.5	13.48	9.8	112.6	118.5	127.64	313.71	183.92	64.71
2	9606	293	774	10673	3736	8729	195	269.6	266	18.46	11.0	195	269.6	266	18.46	10.1	110.2	115.9	114.33	280.96	170.96	60.13
3	10920	323	891	12133	4247	9916	136	270.5	267.2	24.26	7.2	136	270.5	267.2	24.26	6.6	142.0	149.3	167.52	411.36	163.20	57.34
4	4748	160	368	5275	1846	4324	97	272	269.4	28.80	5.5	97	272	269.4	28.80	5.0	167.1	175.8	85.71	211.14	63.63	22.45
5	4073	145	307	4525	1584	3714	86	273.2	271.2	23.26	5.1	86	273.2	271.2	23.26	4.7	174.9	184.0	76.95	189.82	52.98	18.73
6	3294	125	241	3660	1281	3010	90	274.5	272	27.78	5.2	90	274.5	272	27.78	4.8	171.7	180.6	61.10	151.00	43.47	15.41
7	3237	125	234	3597	1259	2959	88	275.25	273	25.57	5.2	88	275.25	273	25.57	4.8	172.1	181.1	60.20	148.85	42.67	15.14
8	3185	116	238	3539	1239	2906	86	275.5	273.65	21.51	5.3	86	275.5	273.65	21.51	4.8	170.8	179.7	58.76	145.04	42.14	14.91
9	3132	116	232	3480	1218	2859	77	275.7	273.75	25.32	4.6	77	275.7	273.75	25.32	4.2	185.7	195.4	62.84	155.18	39.14	13.86
10	3079	116	226	3421	1197	2812	85	275.9	273.8	24.71	5.1	85	275.9	273.8	24.71	4.7	174.5	183.5	58.03	143.36	40.18	14.23
11	3043	116	222	3381	1183	2780	84	276	274.3	20.24	5.2	84	276	274.3	20.24	4.8	171.5	180.4	56.37	139.30	40.19	14.25
12	3026	116	221	3362	1177	2765	84	276	274.55	17.26	5.4	84	276	274.55	17.26	5.0	168.2	177.0	54.98	135.90	40.50	14.36
13	3629	135	268	4032	1411	3314	84	275.75	274.25	17.86	5.3	84	275.75	274.25	17.86	4.8	170.7	179.6	66.92	165.30	48.05	17.02
14	4898	171	374	5442	1905	4465	106	275.25	273.75	14.15	6.8	106	275.25	273.75	14.15	6.2	147.3	154.9	77.92	192.10	71.66	25.32
15	17141	491	1413	19045	6666	15555	202	274.15	270.1	20.05	10.6	202	274.15	270.1	20.05	9.8	112.8	118.6	208.81	512.39	299.87	105.26
16	9437	293	755	10485	3670	8578	180	273.35	269.8	19.72	10.1	180	273.35	269.8	19.72	9.3	116.3	122.3	118.58	291.52	161.88	56.97
17	7556	241	599	8396	2939	6873	175	273.2	269.7	20.00	10.0	175	273.2	269.7	20.00	9.2	116.9	123.0	95.45	234.79	129.24	45.52
18	7556	241	599	8396	2939	6873	175	273.15	269	23.71	9.7	175	273.15	269	23.71	8.9	119.3	125.5	97.40	239.59	127.46	44.89
19	7556	241	599	8396	2939	6873	176	272.5	268.85	20.74	10.0	176	272.5	268.85	20.74	9.2	117.0	123.1	95.54	235.01	129.15	45.49
20	9004	273	727	10004	3501	8181	176	271.7	268.35	19.03	10.0	176	271.7	268.35	19.03	9.2	117.1	123.1	113.86	279.76	153.71	54.05

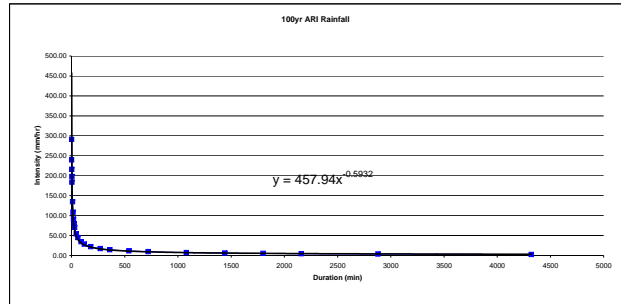
BASIN SIZING

Lot	Depth	Slope 1:x	Base Width	Base Length	Top Width (m)	Top Length (m)	Volume	Effective Volume	Surface Area (m2)	Volume check	% Area
1	0.6	4	10.0	17.0	14.8	21.8	145	146	323	ok	2.77
2	0.6	4	10.0	15.0	14.8	19.8	131	131	293	ok	2.75
3	0.6	4	10.0	17.0	14.8	21.8	145	146	323	ok	2.86
4	0.6	4	6.0	10.0	9.8	14.8	64	64	160	ok	3.03
5	0.6	4	5.0	10.0	9.8	14.8	56	56	145	ok	3.21
6	0.6	4	5.0	8.0	9.8	12.8	47	47	125	ok	3.43
7	0.6	4	5.0	8.0	9.8	12.8	47	47	125	ok	3.49
8	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.27
9	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.32
10	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.38
11	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.42
12	0.6	4	5.0	7.0	9.8	11.8	43	43	116	ok	3.44
13	0.6	4	5.0	9.0	9.8	13.8	52	52	135	ok	3.35
14	0.6	4	6.0	11.0	10.8	15.8	69	69	171	ok	3.14
15	0.6	4	15.0	20.0	19.8	24.8	235	235	491	ok	2.58
16	0.6	4	10.0	15.0	14.8	19.8	131	131	293	ok	2.79
17	0.6	4	8.0	14.0	12.8	18.8	103	104	241	ok	2.87
18	0.6	4	8.0	14.0	12.8	18.8	103	104	241	ok	2.87
19	0.6	4	8.0	14.0	12.8	18.8	103	104	241	ok	2.87
20	0.6	4	9.0	15.0	13.8	19.8	120	120	273	ok	2.73

Permeability Ks (m/hr) 0.00625 (50% of mean measured Ks)

Runoff Coefficients	Pre-Dev	Post-Dev
Hardstand	0.35	0.85
Basin	0.35	1
OS	0.35	0.35

Rainfall IFD Event	Duration (mins)	Intensity (mm/hr)
1 min	1	291.00
2 min	2	239.40
3 min	3	216.00
4 min	4	198.00
5 min	5	183.60
10 min	10	135.00
15 min	15	108.40
20 min	20	91.20
25 min	25	79.44
30 min	30	70.60
45 min	45	54.13
1 hr	60	44.80
1.5 hr	90	34.40
2 hr	120	28.65
3 hr	180	22.23
4.5 hr	270	17.38
6 hr	360	14.62
9 hr	540	11.44
12 hr	720	9.58
18 hr	1080	7.28
24 hr	1440	5.96
30 hr	1800	5.03
36 hr	2160	4.39
48 hr	2880	3.46
72 hr	4320	2.42



100 YEAR ARI UPSTREAM FLOWS

CATCHMENT	AREAS (m2)								
	Road Reserve (m2)	Cleared Upland (m2)	Forested Upland (m2)	Cleared Lowland (m2)	Forested Lowland (m2)	Cleared Palusplain (m2)	Vegetated Palusplain (m2)	Hardstand (m2)	Effective Total
US	26822	423465	39852	0	0	0	0	0	179633

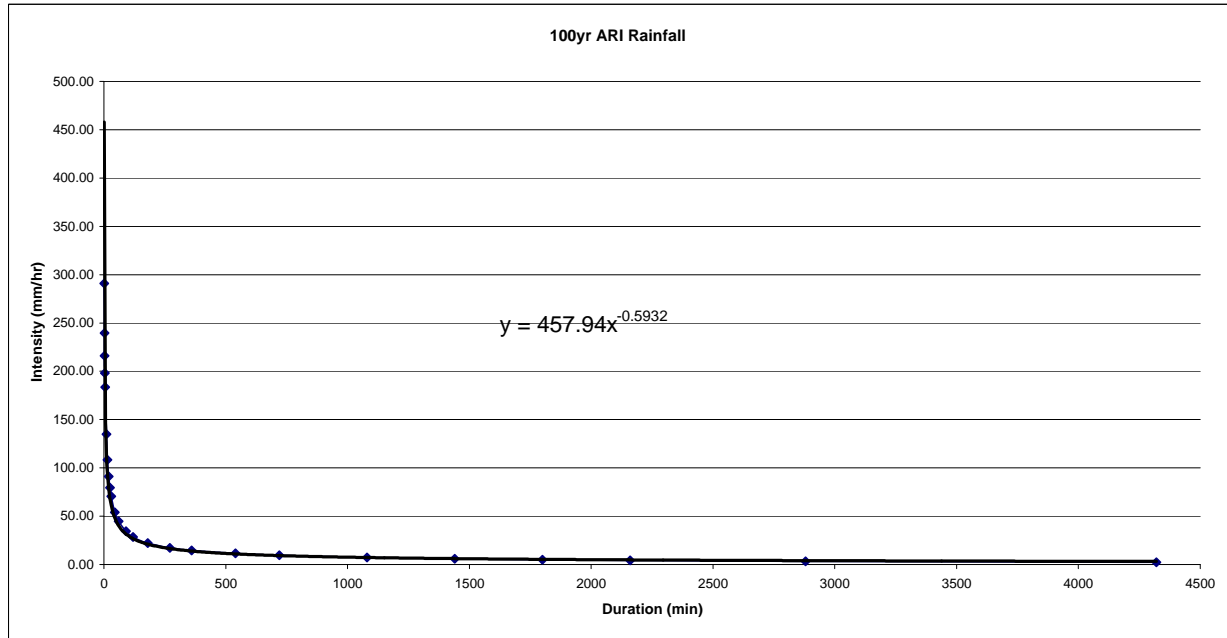
CATCHMENT	TIME OF CONCENTRATION					CRITICAL STORM INTENSITY (mm/h)	Flow (L/s)	Total Flow (m3)
	Longest Path (m)	RL Top (mAHD)	RL Bottom (mAHD)	Slope (m/km)	TC (min)			
US	1387	324	275	35.33	46.8	46.8	2333	6555

Runoff Coefficients

Road Reserve	0.8
Cleared Upland	0.35
Forested Upland	0.25
Cleared Lowland	0.4
Forested Lowland	0.25
Cleared Palusplain	0.9
Vegetated Palusplain	0.7
Hardstand	0.8

Rainfall IFD

Event	Duration (mins)	Intensity (mm/hr)
1 min	1	291.00
2 min	2	239.40
3 min	3	216.00
4 min	4	198.00
5 min	5	183.60
10 min	10	135.00
15 min	15	108.40
20 min	20	91.20
25 min	25	79.44
30 min	30	70.60
45 min	45	54.13
1 hr	60	44.80
1.5 hr	90	34.40
2 hr	120	28.65
3 hr	180	22.23
4.5 hr	270	17.38
6 hr	360	14.62
9 hr	540	11.44
12 hr	720	9.58
18 hr	1080	7.28
24 hr	1440	5.96
30 hr	1800	5.03
36 hr	2160	4.39
48 hr	2880	3.46
72 hr	4320	2.42



100 YEAR ARI CRITICAL FLOWS - COMBINED (including roads and upstream run-on)

CATCHMENTS		AREAS (m2)					EFFECTIVE AREAS (m2)		TIME OF CONCENTRATION PRE DEVELOPMENT					TIME OF CONCENTRATION POST-DEVELOPMENT					CRITICAL STORM INTENSITY (mm/h)		FLOW			STORAGE			FLOW DEPTH	
Catchment	Contributing Catchments	Road Reserve (m2)	Swale	Lots (m2)	OS (m2)	Total	Pre	Post	Longest Path (m)	RL Top (mAHD)	RL Bottom (mAHD)	Slope (m/km)	TC (min)	Longest Path (m)	RL Top (mAHD)	RL Bottom (mAHD)	Slope	TC (min)	Pre-Dev	Post-Dev	Pre Dev	Post Dev	Total Flow (m3)	Storage Req (m3)	Effective Storage (m3)	Volume Check	Manning's n	Height Over Weir (m)
A	US, A	37664	3236	30127	463317	534344	187020	194660	1957	324	270.75	27.21	69.3	1957	324	270.75	27.21	69.0	37.1	37.1	1924.79	2036.56	8437.11	25.41	140.39	ok	0.035	0.45
B	B	1850	252	3178	0	5280	1848	1610	76	272	270.6	18.42	4.6	76	272	270.6	18.42	4.7	184.8	183.3	94.85	92.88	26.09	0.00	25.26	ok	0.035	0
C	US, A, B, C	43716	4492	52259	463317	563784	197324	203812	2150	324	268.2	25.95	76.5	2150	324	268.2	25.95	76.2	35.0	35.0	1915.97	1982.76	9068.31	10.29	55.78	ok	0.035	0.34

Runoff Coefficients	Pre-Dev	Post-Dev
Roads	0.35	0.85
Swales/Basins	0.35	1
Lots	0.35	0
OS	0.35	0.35

All lot drainage retained or directed offsite

Rainfall IFD Event	Duration (mins)	Intensity (mm/hr)
1 min	1	291.00
2 min	2	239.40
3 min	3	216.00
4 min	4	198.00
5 min	5	183.60
10 min	10	135.00
15 min	15	108.40
20 min	20	91.20
25 min	25	79.44
30 min	30	70.60
45 min	45	54.13
1 hr	60	44.80
1.5 hr	90	34.40
2 hr	120	28.65
3 hr	180	22.23
4.5 hr	270	17.38
6 hr	360	14.62
9 hr	540	11.44
12 hr	720	9.58
18 hr	1080	7.28
24 hr	1440	5.96
30 hr	1800	5.03
36 hr	2160	4.39
48 hr	2880	3.46
72 hr	4320	2.42

