Planned Focus

Lot 6 Sand Pits Road, Crooked Brook

Structure Plan Report

Prepared for M&G Muir

PF 1014 / October 2020

Kanella Hope Pty Ltd trading as
Planned Focus ACN 630 552 466

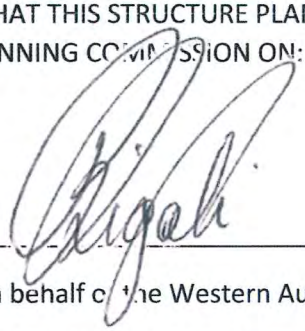
DOCUMENT CONTROL

ISSUE	DATE	ISSUE DETAILS	APPROVED
One	July 2017	Public Advertising	AR/GB
Two	April 2018	Council Adoption	AR/GB
Three	October 2020	WAPC requested updates Change from Calibre to Planned Focus format	KH

This structure plan is prepared under the provisions of the Shire of Dardanup Local Planning Scheme Number 3.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON: 18-Nov-2020

[DATE]



Signed for and on behalf of the Western Australian Planning Commission:

An officer of the Commission duly authorised by the Commission pursuant to section 16 of the Planning and Development Act 2005 for that purpose, in the presence of:

Witness

18-Nov-2020 Date

18-Nov-2030 Date of Expiry

Table of Amendments

Amendment No.	Summary of the Amendment	Amendment Type	Date approved by the WAPC

Executive Summary

Planned Focus has been engaged by M & G Muir to prepare a Structure Plan (and associated rezoning Amendment 191) over Lot 6 Sand Pits Road, Crooked Brook.

The subject land is located approximately 3.5km southeast of the Dardanup townsite and has an area of 41.871 hectares.

The subject land has historically been used for grazing and the keeping of livestock. Because of years of grazing, the land is predominantly clear of all vegetation. There are three pockets of vegetation located along the northern boundary line, southwestern corner and eastern portion of the site. A Resource Enhancement wetland is located within the central portion of the site.

These pockets of remnant vegetation are identified within the Structure Plan for protection, with suitable buffers provided to accommodate these protection measures.

Majority of the subject land is identified within the Crooked Brook/ West Dardanup Structure Plan (endorsed 2006, also referred to as the Dardanup Small Holdings Structure Plan). The eastern portion of the site was for reasons unknown to staff at the Shire of Dardanup not included within the Structure Plan area.

Discussions with the planning staff at the Shire of Dardanup has indicated their support to include the entire of Lot 6 within the Structure Plan area and associated rezoning amendment for Small Holdings development. There is no other existing structure plan over the subject land. The proposed structure plan is limited to Lot 6 and does not overlap with any other structure plan.

The Structure Plan (refer *Figure One: Structure Plan*) proposes 18 lots ranging from approximately 1ha to 15ha are proposed with an average lot size being 2.3ha.

The eastern portion of the site accommodates three larger lots to ensure protection of the existing wetland and vegetation. The western portion of the site incorporates 15 lots ranging in size from approximately 1ha to 3.8ha. All lots include building envelopes to designate developable areas, providing setbacks to boundaries as well as the larger pockets of existing vegetation to be protected.

Access to the development will be by way of repositioned Sand Pits Road to avoid vegetation in the existing Sand Pits Road Reserve, through to a Private Driveway to access rear lots. This design has the road central within the site to preserve vegetation.

Sand Pits Road south of the development to Poad Road (approximately 1km) will be constructed to a gravel standard, to the satisfaction of the Shire of Dardanup (similar to that of Poad Road) to provide an alternative exit to the development.

Table One: Structure Plan Summary

Item	Data
Total area covered by Structure Plan	41.871 hectares
Total estimate4d lot yield	18
Estimated number of dwellings	18
Average lot size	2.3 hectares
Estimated area of vegetation protection	14.39 hectares

Table of contents

Part 1 Implementation

Part 1

Implementation

Structure Plan Area

The Structure Plan applies to the whole of Lot 6 Sand Pits Road, Crooked Brook being the land contained within the boundary marked 'Subject Land' on the Structure Plan map and having an area of 41.871 hectares (refer *Figure One: Structure Plan*).

Operation

The Shire of Dardanup Local Planning Scheme No.9 and the Crooked Brook/West Dardanup Structure Plan enable the Structure plan. Both of which specifically identify the subject land for further structure planning and subdivision.

The Structure Plan comes into effect on the date it is approved by the Western Australian Planning Commission.

Staging

Any staging of the structure plan will be determined by specific subdivision applications in response to market demand.

Subdivision and development requirements

This Structure Plan provides a basis for zoning and subdivision of land and will be given due regard with determining applications within the Structure Plan area, including consideration of the objectives and requirements of the Scheme zone proposed by the Structure Plan.

The following subdivision and development requirements are to be implemented in conjunction with the Structure Plan map:

General

1. No more than one dwelling per lot.

2. Except with the prior consent of the Shire, all buildings, structures and on-site effluent disposal systems on each lot shall be located within the "Developable Area" depicted on this plan.

3. In accordance with the current annual firebreak notice and Guidelines for Planning in Bushfire Prone Areas all lots are required to install and maintain 2 metre wide lot boundary firebreaks. Lots 12 to 17 are encouraged to apply for an exemption to the Shire's firebreak notice as a single firebreak around the south western area of vegetation over these lots is recommended.

Prior to Subdivision

The landowner/applicant is to provide the following information prior to or accompanying any subdivision application.

4. An Urban Water Management Plan to the satisfaction of the Local Government and Department of Water and Environmental Regulation.

5. A Site and Soil Evaluation consistent with the requirements of the Government Sewerage Policy.

Conditions of Subdivision

At subdivision stage, the Local Government shall request the Western Australian Planning Commission to impose the following (but not limited to) as conditions of subdivision:

6. Implementation of an approved Urban Water Management Plan to the satisfaction of the Local Government and Department of Water and Environmental Regulation.

7. Preparation and implementation of a Wetland Management Plan in consultation with the Department of Biodiversity, Conservation and Attractions.

8. Preparation and implementation of a Wildlife Protection Management Plan in consultation with the Department of Biodiversity, Conservation and Attractions.

9. Final lot boundaries for Lots 12 to 17 to be determined so as to identify, protect and retain vegetation worthy of retention.

10. Preparation and implementation of an Acid Sulphate Soils Management Plan to the satisfaction of Department of Water and Environmental Regulation.

11. Section 70A of the Transfer of Land Act 1893 / Section 165 of the Planning and Development Act 2005 notifications are to be placed on titles advising land owners that:

    a. The area may be subject to seasonal inundation and significant Building Exclusion Areas apply as indicated on the approved Structure Plan.

    b. The area is subject to seasonal mosquito infestation.

    c. All dwellings shall be constructed to have a minimum finished floor level of 500mm above the nearest adjoining road level or 600mm above natural ground level, whichever is the greater, as determined by a licensed surveyor.

    d. There is to be a minimum vertical separation distance of 600mm from the base of the irrigation area of a Secondary Treatment System with Nutrient Removal to the highest known water table; and

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

12. Implementation of the approved Bushfire Management Plan.

13. A private driveway (with shared reciprocal rights of access) is to be provided to Lots 9-12.

14. Uniform rural style boundary fencing in accordance with Appendix VIII, Area 14, Cl.(o) to be provided to all boundaries of all newly created lots.

15. Secondary Treatment Systems with nutrient removal capabilities shall be used to ensure Phosphorous Retention Index (PRI) requirements are met, unless otherwise recommended

by a geotechnical and PRI report, to the satisfaction of the Local Government and the Department of Health.

Scheme Amendment

This Structure Plan is associated with a rezoning amendment to the Shire of Dardanup Planning Scheme No. 3. Scheme Amendment No. 191 was approved on 8 September 2020.

LEGEND

- EXISTING CADASTRE
- CONTOURS 5m INTERVALS
- SUBJECT LAND
- PROPOSED CADASTRE
- INDICATIVE ROAD LAYOUT
- PROPOSED GRAVEL ROAD
- PROPOSED WETLAND VEGETATION
- EDGE OF VEGETATION
- VEGETATION BUFFER
- DEVELOPABLE AREA
- BUILDING EXCLUSION ZONE
- COVENANT AREA
- PRIVATE DRIVEWAY
- EXISTING MARRI TREE

NOTE

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1. No more than one dwelling per lot.
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    a. The area may be subject to seasonal inundation and significant Building Exclusion Areas apply as indicated on the approved Structure Plan.
    b. The area is subject to seasonal mosquito infestation.
    c. All dwellings shall be constructed to have a minimum finished floor level of 500mm above the nearest adjoining road level or 600mm above natural ground level, whichever is the greater, as determined by a licensed surveyor.
    d. There is to be a minimum vertical separation distance of 600mm from the base of the irrigation area of a Secondary Treatment System with Nutrient Removal to the highest known water table; and
    e. This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner as is/maybe subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land.
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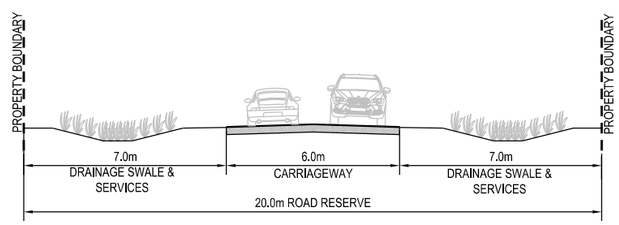

SECTION A-A: INDICATIVE ROAD CROSS SECTION

SCALE: N.T.S.

250m
0m

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STRUCTURE PLAN

Lot 6 Sand Pits Road, Crooked Brook

Plan No: 18-0007-SP-01A

Date:	04.10.2020
Rev:	A
Scale:	A1 @1:2 000, A3 @ 1:4 000
Co-ords:	MGA 50, GDA 94
Aerial:	Geo Ref JPEG

N

This plan has been prepared for planning purposes. Areas, contours and dimensions shown are subject to survey.

Part 2

Explanatory Report

1 Planning background

1.1 Introduction and purpose

Planned Focus has been engaged by M & G Muir to prepare a Structure Plan over Lot 6 Sand Pits Road, Crooked Brook for facilitating the rezoning, subdivision and development of the land for Small Holdings pursuits.

1.2 Land Description

The subject land comprises the whole of Lot 6 (P232768) Sand Pits Road, Crooked Brook.

1.1.1 Location

The subject land is located approximately 3.5km southeast of the Dardanup townsite (refer *Figure 2: Location Plan*).

1.1.2 Area and land use

The subject land has an area of 41.871 hectares. The land is bound by Sand Pits Road along its western boundary, general farming zoned land along its east and west boundary and smallholdings zoned land to the north.

Historically the land has been cleared for grazing and the keeping of livestock, with the exception of three vegetated areas located along the northern boundary, southwestern corner and eastern portion of the site. A Resource Enhancement wetland is located across the central portion of the site (refer *Figure 3: Environmental Plan*).

1.1.3 Legal description and ownership

The legal description of the subject land is Lot 6 on Plan 232768 (Vol 36 Folio 146A) Sand Pits Road, Crooked Brook. It is owned by M & G Muir of Manjimup. A copy of the Certification of Title can be found at *Appendix A*.

1.3 Planning framework

Following is a description of the principal planning framework that provides a context for the proposed Structure Plan.

1.3.1 Zoning and reservations

The subject land is zoned Small Holdings under the Shire of Dardanup Town Planning Scheme No.3.

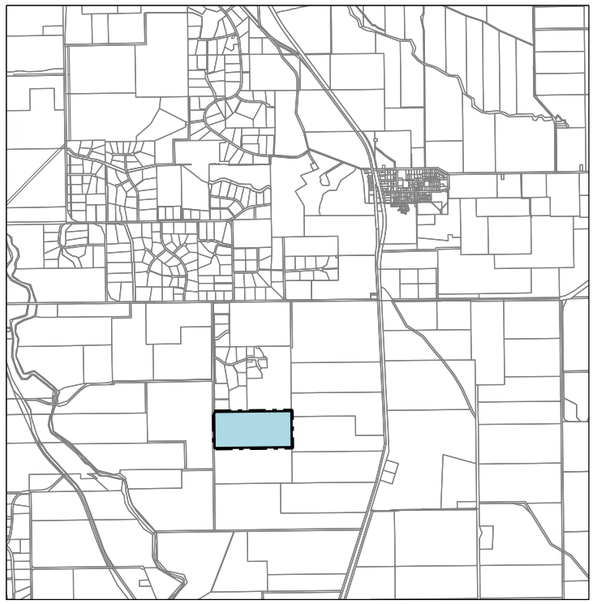
SAND PIT ROAD

6
41.871ha

LEGEND

EXISTING CADASTRE

SUBJECT LAND



LOCALITY PLAN
SCALE: N.T.S.

250m

0m

N

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Kanella Hope Pty Ltd
ACN: 630 552 466

LOCATION PLAN

Lot 6 Sand Pits Road, Crooked Brook

Plan No: 18-0007-FI-01A

Date:	06/10/2019
Rev:	A
Scale:	A1 @1:2 500, A3 @ 1:5 000
Co-ords:	MGA 50, GDA 94
Aerial:	N/A

This plan has been prepared for planning purposes. Areas, contours and dimensions shown are subject to survey.

1.3.2 Planning strategies

The Western Australian Planning Commission endorsed the Shire of Dardanup Local Planning Strategy in May 2015. The Strategy recommends that the land located within the Crooked Brook/ Dardanup West Structure Plan be identified as a 'Special Control Area' for future Structure Planning.

The Strategy further recommends, including provisions within LPS9 to allow for intensification of existing areas by way of subdivision. The inclusion of a Structure Plan as part of this report is consistent with the future requirements of this area.

1.3.3 Planning policies

Development Policy 19: Dardanup West/Crooked Brook Area – Provision of Foreshore Facilities Developer Contribution Policy

The Western Australian Planning Commission approved The Shire of Dardanup Development Policy 19 in 2007. The plan relates to further development of smallholding (rural residential) lots within the Dardanup West/Crooked Brook Structure Plan area. The objective of this planning policy is to ensure that the future development of foreshore facilities in the area covered by the plan is sufficiently funded via developer contributions to not place added burden on the ratepayers.

At the time of subdivision, the Western Australian Planning Commission is likely to impose a condition requiring a contribution towards the upgrading and construction of foreshore facilities as per requirements of this policy.

Development Policy 20: Local Biodiversity

The Shire of Dardanup *Local Biodiversity* Policy was endorsed in 2011. The Policy aims to preserve significant areas of remnant vegetation, significant wetlands and waterways as well as key biodiversity corridors for future generations.

Remnant vegetation on site has been identified for protection and enhancement as part of this Structure Plan. This is considered consistent with the policy objectives and specific requirements of the Crooked Brook/Dardanup West requirements, which include:

- Ensure that natural areas are not fragmented by subdivision (new lot boundaries do not intersect areas of native vegetation or intact wetlands)
- New subdivision to use WSUD principles as part of subdivision conditions

The measures proposed as part of this Structure Plan and the supporting documentation ensures that the vegetation and wetland located on site is well protected and in areas enhanced.

1.3.4 Other approvals and decisions

The Dardanup Small Holdings Structure Plan was endorsed by the Shire of Dardanup on February 9, 2006 and subsequently endorsed by the Western Australian Planning Commission on August 7, 2007. This Plan is also referred to as the Dardanup Small Holdings Structure Plan.

The subject land is included within a classification, which includes the notation

> *This land has main drains and a mosaic of landforms that provide opportunities for lots with a range of lot sizes. Each proposal will be treated on its merits but in general, where there is a mix of landform types then lots should be a minimum of 1 hectare and an average of 2 hectares. Revegetation conditions will apply.*

The eastern portion of the subject lot is currently excluded from the Structure Plan area; however, discussions with the Shire of Dardanup have indicated that they would support a rezoning over the entire property to enable development of the site.

The Structure Plan is consistent with the requirements of the Dardanup Small Holdings Structure Plan.

1.4 Pre lodgement consultation

Pre-lodgement consultation has occurred over the Structure Plan itself (with the Shire and Department of Parks and Wildlife), as well as during the preparation and preliminary assessment of the various technical reports.

2 SITE CONDITIONS AND CONSTRAINTS

2.1 Biodiversity and natural area assets

2.1.1 Flora and vegetation assessment

An Environmental Characteristics Report has been prepared over the site and can be read in full in *Appendix B*.

With the exception of the vegetation located along the southwestern boundary of the property, the understory across the site is almost completely composed of pasture/weed species. The understory within this southwestern portion has been protected from grazing by domestic stock and is considerably thicker than the rest of the site. The understory is still dominated by grass and pasture species, however there is an isolated clump of *Anigozanthos flavidus* (Tall kangaroo paw) and a small area of *Caladenia flava* (Cowslip orchid).

The over storey of the entire site is made up primarily of *Agonis flexuosa* (WA Peppermint), *Banksia attenuate* (Slender Banksia), *Eucalyptus marginata* (Jarrah) and *Corymbia callophylla* (Marri). There are a few isolated *Melaleuca rhaphiophylla* (Swamp Paperbark) trees on the edge of the western wetland.

Wherever possible, retention of the existing native vegetation has been sought. To achieve this, the lot layout has been designed to minimise locating fences/firebreaks through the bushland.

Some areas within the subject land may warrant revegetation with native vegetation. Any revegetation should carefully consider the increased fire risk this may pose. Revegetation methods are further detailed in *Section 4.2* and *Appendix C* of this report.

2.2 Landform and soils

The site is composed of a mix of sand dunes and sand plains. Along much of the northern boundary of the site is a low sand rise that sits approximately 3 to 8 meters above the surrounding flats. The sand dune peaks at 32m AHD on its western edge towards the east.

Two more small sand rises extend from this high point south, continuing over the southern boundary. Within this area, there is a trapped wetland system, and another surface water body that is now drained by a rural drain. This wetland also has a small-excavated waterhole on its northeastern edge. This area is shown on *Figure 1* as the 'central' sand dune and wetland complex' of *Appendix C*.

The other major sand ridge occurs in the south west of the site, rising to 35m AHD. This has been termed the 'southern sand dune'.

Between the sand ridges stretches gently sloping sand plains that exhibit groundwater close to the surface. Rural drains intersect the plain areas, transporting groundwater and surface water off the site to the west and another draining the eastern edge of the site southward. The two plains are called the 'western' and 'eastern plains'.

2.3 Groundwater and Drainage

The Groundwater Investigation Report has been undertaken to determine the annual maximum groundwater levels likely to be present within Lot 6. A full copy of this report can be found in *Appendix D,* the information contained within this report is to be used to support the planning and engineering for the development of the site to Small Holdings lots. This includes determining areas where there is adequate separation to groundwater for onsite effluent disposal.

There are two defined wetlands on site with seasonal surface water present in them. This surface water is directly linked to the groundwater table and is effectively the same. A rural drain intersects the western wetland, transporting water from this wetland, and the majority of the western portion of the site to the western boundary of the site. This drain effectively controls the groundwater level in this portion, as it continuously removes excess surface water and groundwater when it either reaches the surface, or discharges via the soil profile directly into the drain.

The eastern wetland is effectively trapped by the surrounding dune system. Groundwater within this wetland moves laterally and horizontally through the highly porous sand. Another drain is located near the eastern boundary of the site. This controls groundwater rise within the eastern portion of the site by removing water and channelling it through to the southern boundary and off site.

Due to the drainage system controlling the groundwater and that the test pits were dug after normal winter rains (September 5th 2014), when groundwater is likely to be at its highest, there is a high level of confidence that the depth to groundwater shown in the attached Ground Water Report are representative of the annual maximum. This allows the data to be used for determining suitable areas for onsite effluent disposal, fill for house pads (as necessary) and road construction.

To be slightly conservative the areas recommended for effluent disposal are set at 0.6m of depth of groundwater (0.5m minimum needed).

As part of the preparation of the lot layout, this groundwater information was taken into account. All lots shown have areas with at least 0.6m of separation that may be used for effluent disposal, after suitable treatment.

2.4 Fire risk and access assessment

A preliminary fire hazard assessment was prepared over the subject site relating to the vegetation (fuel) characteristics on the undeveloped site. Full details can be found in *Appendix E*.

Consideration of the overall fire danger or threat for the proposed development takes into consideration the context of the subject land, the existing vegetation, the proposed revegetation and landscaping, the risk of a bush fire and the likely consequences of this.

The bush fire hazard rating for the subject site is generally 'moderate' with the vegetated areas having an 'extreme' hazard rating. In areas with a 'moderate' hazard, rating development is required to comply with the Bushfire Protection Criteria.

In addition to the Fire Risk Assessment, advice was sought from Strategen in September 2016, and then revised in 2018 and 2020 (due to structure plan layout revisions), specifically regarding the current restricted access to the site, and potential fire risks.

The assessment identified that a bushfire approaching the subject site from the south would presumably be the worst-case bushfire scenario for this site. This is due to the extent of bushland areas within rural properties to the south and that under standard weather conditions in summer, the likely prevailing winds in the area are from the south and southeast in the morning and southwest, south and southeast in the afternoon (BoM 2016). In the event of a bushfire under these conditions, vehicular access to the north will provide the safest egress option.

Recent updates to the Structure Plan have removed the requirement for the original central cul-de-sac access, which was not supported by the Department of Fire and Emergency Services. This has been replaced with a single loop road off Sand Pits Road and the proposed gravel extension of Sand Pits Road to Poad Road. The development is now considered compliant with two access/egress options available to the development, and is further detailed as part of the Section 3.6 of this report and *Appendix E*.

The Crooked Brook/Dardanup West Structure Plan also identifies future road networks to the west of Sand Pits Road, which connect through to the existing Dardanup Road West. These roads will be developed as the balance of the Structure Plan area is developed. These future road linkages will provide additional entry/exit paths for residents.

2.5 Wetland and revegetation

A Wetland Assessment and Revegetation Report has been undertaken to determine the true wetland edge of the area identified as Resource Enhancement – Damp land 1774, on the Swan Coastal Plain Geomorphic Wetland data set, within Lot 6. A full copy of this report can be found in *Appendix C*.

Due to a discrepancy between the mapping and actual site conditions, a meeting was held with the Department of Parks and Wildlife (DPaW) in July 2014 to discuss the site issues. This discussion considered the highly degraded state of the wetland and what options for enhancement of the wetland should be considered as part of any future development. The main conclusions reached were:

Determining the top of the annual maximum water line of the wetland within the Resource Enhancement Wetland area will be sufficient for determining the real wetland boundary worth of protection

A simple revegetation program around this delineated edge, consisting of trees and shrubs in 2 or 3 lines, that links back the existing bush will be sufficient as a revegetation program

Based on the advice from DPaW, the entire edge of the water line around the subject wetland was delineated using a GPS. The recorded points are identified on *Figure 3 - Environmental Plan*.

The proposed lot layout for the development of the subject land has been configured so that there is minimal disturbance possible to the areas of existing native vegetation, while also providing each lot with areas of adequate separation to the groundwater. The lot layout has been designed so that there is no fence within the wetland boundary.

The proposed revegetation will provide:

- Delineation of the wetland edge to assist with minimising disturbance to it
- Increase native wetland vegetation

- Increase available wetland fauna habitat and provide new fauna movement paths
- Increase aesthetics of the site

The revegetation is also to be undertaken in a way that does not appreciably increase the fire risk to the proposed dwellings. Furthermore, the revegetation will be predominately trees and shrubs, as this will minimise the long-term maintenance, compared to controlling weeds within sedges and rushes.

To achieve the above the proposed revegetation area is shown on the Wetland Management Plan of Appendix C. In general, a double line of vegetation around the wetland is proposed. Due to the species proposed for this band of vegetation it is estimated that it will have on average a canopy width of 10m at maturity.

To minimise fire risk to potential buildings, the band of vegetation becomes discontinuous on the western side, where the vegetation comes within 30m of proposed building areas. In this area, the vegetation will have a break of 20m, so that it meets a 'separation vegetation area' requirement under the fire regulations. To compensate for the breaks in vegetation, two infill areas are proposed for revegetation, with significantly more area of vegetation planted in the infill zones, then would be planted within the fire gap areas. These infill areas will also increase the linkages between existing bushland areas.

2.6 Heritage

A search of the Department of Aboriginal Affairs Heritage Inquiry System did not reveal any registered sites of indigenous heritage value within the locality of the subject land.

There are also no known sites of non-aboriginal heritage significance present on the subject land.

2.7 Context and other land use constraints and opportunities

The adjoining land to the south, west (across from Sand Pits Road) and east is predominantly cleared grazing land zoned 'General Farming'.

To the north lies a recent Small Holdings development, consistent to the development proposed as part of this Structure Plan.

Appropriate buffers have been considered as part of the Structure Plan concerning the surrounding land zones.

2.7.1 Title Covenant

Approximately 2.9hectares of the subject site (as identified on the Structure Plan) is held within a covenant with the National Trust of Western Australia, as listed on the Certificate of Title. In order to protect remnant vegetation from grazing stock or future uses the then owners of the land established this covenant.

Due to the conservation values of the covenanted area, subdivision of this part of the land is not generally supported, therefore to ensure the continuity of the covenant and protection of the remnant vegetation the area has been solely placed within one of the proposed lots. The title for this lot will have the covenant requirements transferred to ensure its ongoing protection.

Planned Focus

Town planning & strategy

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ENVIRONMENTAL PLAN

Lot 6 Sand Pits Road, Crooked Brook

Plan No: 18-0007-MP-01A

Date:	06/10/2019
Rev:	A
Scale:	A1 @1:2 000, A3 @ 1:4 000
Co-ords:	MGA 50, GDA 94
Aerial:	N/A

N

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3 LAND USE AND SUBDIVISION REQUIREMENTS

The landowners are looking to pursue development within the subject property. The proposed zoning of the subject land to 'Small Holdings' aims to facilitate the future subdivision of the land, which is in keeping with neighbouring properties and the intentions of the Crooked Brook/Dardanup West Structure Plan.

The Structure Plan report is supported by the preparation of rezoning documents, supporting technical studies and the Structure Plan (refer *Figure One*) which has been prepared in accordance with the requirements of Clause 3.14 and in conjunction with the additional requirements identified in Appendix VIII, Area No.14 of the Scheme.

The subject site is not currently included within Area No.14 of Appendix VIII of the Scheme, although advice from the Shire of Dardanup has indicated that due to its location nearby, site similarities and its identification within the Crooked Brook/Dardanup West Structure Plan the provisions of Area No.14 are relevant for this site.

3.1 Design principles

The subdivision design is based on the following principles:

- A response to the topography and land capabilities ensuring each lot has a suitable area of land on which to construct a dwelling and accommodate onsite effluent disposal;
- Recognising the current trend towards rural residential lots in the order of 1 hectare on the basis that where land is capable of accommodating this lots size it is a more efficient use of the land; and
- Contributing to the revegetation and protection of wetlands and the wider landscape.

3.2 Land use

This Small Holdings development proposes 18 lots, ranging in size that responds to the landscape of the site and conforms to the existing planning framework (refer *Figure 1: Structure Plan*).

3.3 Lot yield

It is proposed that 18 lots be created with areas ranging generally from 1ha to 15ha, with the majority of the lots approximately 1.1ha in area. The three larger lots have been created in response to the onsite vegetation and environmental characteristics (refer *Figure 1: Structure Plan*).

All lots have been designed to ensure suitable areas for a dwelling and associated outbuildings and onsite effluent disposal systems. The design of the lots has also taken into account the existing vegetation and topography to ensure no unnecessary clearing will be required.

3.4 Movement networks

Access to the proposed development will be by way of a repositioned Sand Pits Road reserve and cul de sac leading into a Private Driveway.

The internal subdivisional road will be located within a 20m reserve and constructed as per Shire standards. The battle-axe configurations to come lots meet Bushfire and Shire requirements for minimum widths.

The extension of Sand Pits Road to Poad Road will be approximately 1km in length and be of gravel standard, similar to that of Poad Road, compliant with the standards of the Shire of Dardanup.

3.5 Water management and drainage

As is common for many rural and rural residential subdivisions, it is proposed that there will be an open swale drain constructed either side of the central subdivision road. Further design and details will be undertaken to determine whether a small drainage basin will be required as part of the detailed design stage.

3.6 Bushfire management

Strategen prepared a Bushfire Management Plan (BMP) in April 2017, (which was further revised 2018 and then 2020 following public advertising and agency discussions about the Structure Plan), over the subject land. The project area is designated as bushfire prone on the *WA Map of Bush Fire Prone Areas* (DFES 2017) due to the extent of on-site and adjacent vegetation. The BMP has therefore been prepared to support the Structure Plan and related Scheme Amendment, in accordance with *State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7).

The purpose of the BMP is to provide guidance on how to plan for and manage the bushfire risk to the future life, property and environmental assets of the project area through integration of a range of bushfire management measures into development design and construction.

As classified vegetation has been identified within 100m of the proposed lots, BAL assessment and application of AS 3959 is required to inform future building design and construction requirements.

Strategen has identified the minimum separation distances between future buildings and the classified vegetation, with the minimum separation distances for a BAL-29 rating or lower achievable within all proposed lots.

The width of each BAL contour in *Appendix E* is set in accordance with AS 3959 and reflects the relevant BAL rating applicable to the respective Class A forest, Class B woodland, Class D scrub or Class G grassland vegetation types situated on the relevant slope category (refer to Table 1 of Appendix E).

Implementation of this BMP is expected to meet the following objectives of SPP 3.7:

5.1 *Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.*

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

5.3 *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.*

5.4 *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 bushfire management measures, as outlined in Section 3 of the BMP report, have been devised for the proposed development in accordance with acceptable solutions of the Guidelines to meet compliance with bushfire protection criteria. An 'acceptable solutions' assessment is provided in Table 3 of the BMP to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

3.7 Servicing

Power and Communications

The subject site is not currently connected to a power or communications network.

There is a High Voltage (1kV – 33kV) Overhead Power line located within the existing road reserve of Sand Pits road along the western boundary of the subject site. A Lot Voltage power line (< 1kV) is located just to the North of the subject site, it is understood that the subject site can easily by serviced with power and communications through connection to these overhead power line.

Water Supply

The subject land is not connected to a mains supply of water. It is proposed that the developed site will be catered for using onsite water tanks and bores.

The use of water tanks within the Small Holding zone is considered an acceptable alternative should a reticulated water supply not be within close proximity for connection. It will be a requirement of subdivision that all lots are required to have a minimum 90,000-litre roof water tank installed, or some other approved supply of potable water of no less capacity.

On-Site Effluent Disposal

The subject land is currently unsewered. The closest sewer infrastructure is located within the Dardanup townsite approximately 3km away.

Due to the rural nature of the development and similar developments within the area, it is proposed that on-site effluent disposal units are used to service each lot. These units will be required to meet the specifications of the Shire of Dardanup and Department of Health.

3.8 Building exclusion zones

The Structure Plan identifies 'Building Exclusion Zones' within all lots where no development can occur.

The 'Building Exclusion Zone' affects all of the proposed lots. This buffer relates to the area where no buildings or on-site effluent disposal systems are permitted to be constructed. The exclusion zones for this development are in relation to the setbacks from the existing vegetation on site and are in accordance with the requirements of the *Planning for Bush Fire Protection Guidelines*.

In addition to the Building Exclusion zones, all buildings, structures and on-site effluent disposal systems on each lot shall conform (where possible) with the minimum setbacks as follows:

- 20 metres from a road;
- 50 metres from line edge of any manmade water bodies or waterway;
- 10 metres from all side boundaries

An application to modify these building envelopes will be subject to the Shire's discretion for approval.

4 CONCLUSION

In conclusion, it is hoped that the Structure Plan is embraced by the decision-makers and the community as a balanced and sustainable guide to the development of this property and provides a constant reference for achieving the vision for the Dardanup Small Holdings Structure Plan.

Appendices

TECHNICAL APPENDICES

No.	Document title	Approval required or supporting document	Approval agency	Approval status
A	Certificate of Title			
B	Environmental Assessment Report			
C	Wetland and Revegetation Report			
D	Groundwater Report			
E	Bushfire Management Report			

APPENDIX A CERTIFICATE OF TITLE

INDEXED JT #

Transfer 56661/67
Volume 790 Folio 33

WESTERN AUSTRALIA ORIGINAL REGISTER BOOK

VOL. 36 FOL. 146A

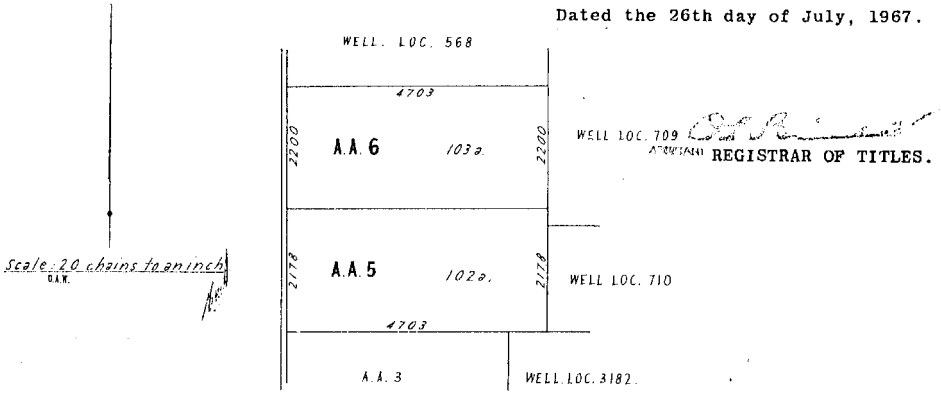
CT 0036 0146A F

Certificate of Title

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

Alexander Edwin Poad and Raymond Lewis Poad both of Dardanup, Farmers, are now the proprietors as tenants in common of an estate in fee simple subject to the easements and encumbrances notified hereunder in all those pieces of land delineated and coloured green on the map hereon containing together two hundred and five acres or thereabouts, being Boyanup Agricultural Area Lots 5 and 6.

Dated the 26th day of July, 1967.



REGISTRAR OF TITLES.

Transfer I555026 to Graham Donald Muir, Gail Cecelia Muir, Mark Bradley Muir and Geraldine Elizabeth Muir all of RMB 176, Manjimup, as joint tenants. Registered 30th June 2003 at 16.13 hrs.

REGISTRAR OF TITLES WESTERN AUSTRALIA

2830817/66—50M—O/FAL.

For encumbrances and other matters affecting the land see back

EASEMENTS AND ENCUMBRANCES REFERRED TO

Covenant H772225 in favour of National Trust of Australia (WA). Registered 8th June 2001 at 14.09 hrs.

CT 0036 0146A B

CERTIFICATE OF TITLE

VOL. 36 FOL. 146A

APPENDIX B ENVIRONMENTAL ASSESSMENT REPORT

Town Planning Management Engineering

Environmental Characteristics Report

for Lot 6 Sand Pits Road, Crooked Brook

town planning
management
engineering
environmental

Research, Design & Delivery of Sustainable Development

Job No. 14198
November 2014

Environmental Characteristics Report for Lot 6 Sand Pits Road, Crooked Brook

November 2014

Author: Brendan Oversby		
Issue	Purpose	Date
1	Supporting information to Structure Plan	November 2014

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Table of Contents

1.0 INTRODUCTION AND PURPOSE

This Environmental Characteristics Report has been undertaken to determine the flora present within Lot 6 Sand Pits Road, Crooked Brook (the subject land). The information contained within this report is to be used to support the planning and engineering for the development of the site to Rural Residential lots. This includes determining areas where vegetation should be retained.

A preliminary site visit was undertaken on the 8th June 2014 with a more detailed investigation of the flora conducted on the 5th September 2014.

2.0 SITE DESCRIPTION

An aerial of the site with general Landforms can be seen in Figure 1. The information below details these site characteristics in more detail

Landform

The site is composed of a mix of sand dunes and sand plains. Along much of the northern boundary of the site is a low sand rise that sits approximately 3 to 8m above the surrounding flats. The sand dune peaks at 32mAHD on its western edge and 38mAHD towards the east. This is shown as the 'northern sand dune'.
2 more small sand rises extend from this high point south, continuing over the southern boundary. Within this area there is a trapped wetland system, and another surface water body that is now drained by a rural drain. This wetland also has a small excavated waterhole on its north eastern edge. This area is shown on Figure 1 as the 'central sand dune and wetland complex'.
The other major sand ridge occurs in the south west of the site, rising to 35mAHD. This has been termed the 'southern sand dune'.
Between the sand ridges stretches a gently sloping sand plain that exhibits groundwater close to the surface. Rural drains intersects the plain areas, with one transporting groundwater and surface water off the site to the west and another draining the eastern edge of the site southward. The two plains are called the 'western' and 'eastern plains'.

Vegetation

Northern Sand Dunes
This area can be divided into two areas from a vegetation point of view, with the divide corresponding to the cleared fence line. In the eastern portion, the understorey is almost completely composed of pasture/weed species. The overstorey is made up of predominately *Agonis flexuosa* (Peppermint) with isolated *Banksia attenuata* (Slender Banksia) and *Eucalyptus marginata* (Jarrah) and a few *Corymbia callophylla* (Marri) on

the southern edges. There were large amounts of woody debris on the ground. This area is open to cattle grazing.
The western portion has been fenced for at least 10 years, excluding grazing by domestic stock, although there is considerable evidence of kangaroos living within the bush.
The vegetation in this area is considerably thicker than the rest of the site. The understorey is still dominated by grass and pasture species, however there is an isolated clump of *Anigozanthos flavidus* (Tall kangaroo paw) and a small area on the western end of *Caladenia flava* (Cowslip orchid).
The overstorey/shrub layer is mainly composed of *Kunzea ericifolia* (Spearwood) and *Agonis flexuosa* (WA Peppermint) with isolated trees of *Xylomelum occidentale* (Woody pear), *Banksia attenuata* (Slender Banksia), *Nuytsia floribunda* (Christmas tree), Xanthorrhea sp (Grass tree) and *Eucalyptus marginata* (Jarrah).
There have also been a number of individual plants planted, as can be ascertained due to the species and presence of tree planting bags around their trunks. These are limited in number, probably totalling less than 30 individuals. The species planted include *Calothamnus quadrifidus* (One sided bottle brush) and a mallee eucalyptus.

Central Sand Dune and Wetland Complex
The Central sand dune has an understorey is almost completely composed of pasture/weed species and is grazed by cattle. The overstorey is made up almost exclusively of *Agonis flexuosa* (WA Peppermint) and *Corymbia callophylla* (Marri). There was limited woody debris on the ground.
The wetlands in this area were virtually devoid of any native vegetation, with pasture species covering the areas where the water regime allowed. There are a few isolated *Melaleuca rhaphiophylla* (Swamp Paperbark) trees on the edge of the western wetland.

Southern Sand Dunes
The vegetation within this area is very similar to the eastern portion of the northern and central dune system. The understorey is almost completely composed of pasture/weed species. The overstorey is made up of predominately *Agonis flexuosa* (WA Peppermint) with isolated trees of *Xylomelum occidentale* (Woody pear), *Banksia attenuata* (Slender Banksia) and *Eucalyptus marginata* (Jarrah).
There was limited woody debris on the ground.
The edge of a degraded pasture filled wetland also existins within the subject land on the southern edge.

Just outside of the subject land to the west in the unformed road reserve there is a patchy native understorey with isolated hakeas, spearwood and *Nutysia floribundus*.

Western Plain
The western plain is mainly composed of cleared pasture with isolated trees. On the higher edges and rises, the trees are *Corymbia callophylla* while in the wet central section most of the trees are *Melaleuca rhaphiophylla*. Many of these paperbarks are dying. There are also a few old dead trees.

In the unformed road reserve to the west of the site (within the plain landform), the vegetation is composed mainly of *Melaleucas rhapiophylla* and *Pteridium esculentum* (Bracken Fern)

Eastern Plain

The eastern plain is similar to the western plain in that it is currently cleared pasture, however it has even less trees. There are a couple of old marris with a few isolated dead trees.

3.0 RECOMMENDATIONS

3.1 Vegetation Retention

Retention of the existing native vegetation where ever has been attempted.

To achieve this, the lot layout has been designed so that it minimises locating fences/firebreaks through the bushland. Where there is the likelihood that lot boundaries will traverse the vegetation an option to be explored is to mark the boundary with pegs instead of removing the vegetation for a fence and associated firebreaks. A firebreak could then be constructed around the edge of the whole section of bush.

Figure 2 shows the area of bush where the option of no actual boundary fencing and associated firebreaks would have the biggest benefit. This is primarily in the northern bushland, where the vegetation is in the best condition.

All lots are to be provided with an area that is suitable for a building envelope outside of the bush areas and their associated fire buffers. This will minimise the need to clear vegetation to achieve adequate fire separation.

Stock should be excluded from the vegetation either by exclusion of stock from the lots via notification on titles or similar. The alternative is to fencing off the bush with a stock proof fence.

3.2 Revegetation

Some areas may warrant revegetation with native vegetation. Any revegetation should carefully consider the increased fire risk this may pose.

A ring of shrubs and trees around a portion of the western wetland has been shown, along with infill revegetation attached to this wetland area. More details on this can be found in the *Wetland Assessment and Revegetation Report*.

There is also the possibility for small areas of infill planting within the eastern wetland and the dunal systems. Revegetation could also be undertaken in other areas across the site, where the new vegetation is unlikely to increase the risk of fire.

Landscape plantings may also be undertaken on the site as part of development. If this occurs, then the species should be locally native species.

Under planting the well treed areas with native vegetation is likely to be problematic due to the low light and intense competition from existing vegetation. The presence of kangaroos and their associated grazing in this area would also make it difficult to establish an understorey layer.

These areas are detailed in Figure 2.

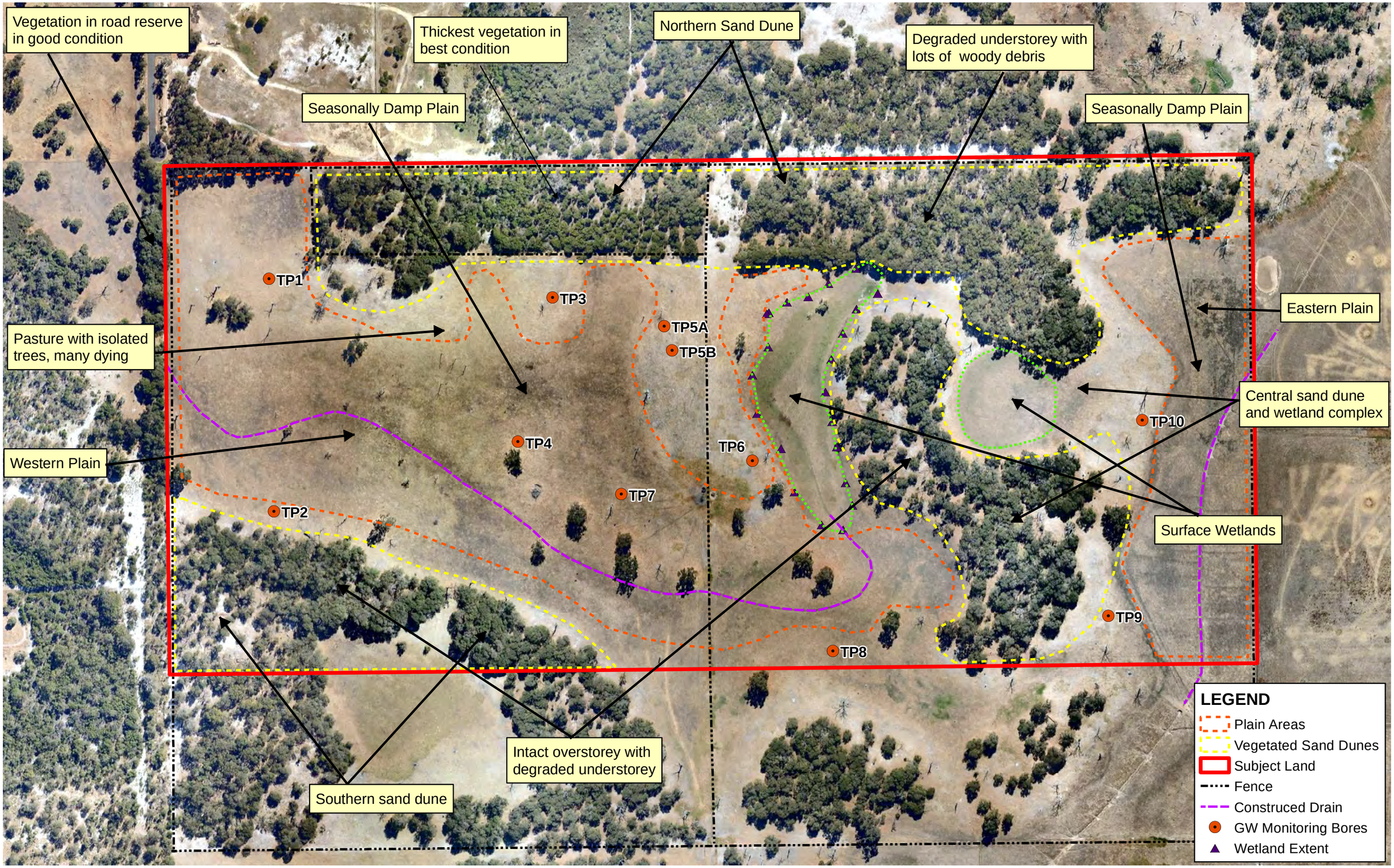
3.3 Further studies

A fauna study may be needed at later stages of planning in relation to the potential habitats on the site. This would include a focus on Western Ringtail Possums and Carnaby Cockatoos.

Should revegetation be undertaken on the site, a plan should be completed and approved so that appropriate species are utilised and that there is not an appreciable increase in fire risk to new dwellings.

Appendix A

LANDFORM AND GENERAL VEGETATION CONDITION



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Project ***Lot 6 SAND PITS ROAD, CROOKED BROOK***

Title **Figure 1 - Landform and General Vegetation**

Original Size	Map Ref.	Produced by	Produced on
A3	14198-WM-02	BM	13/11/2014

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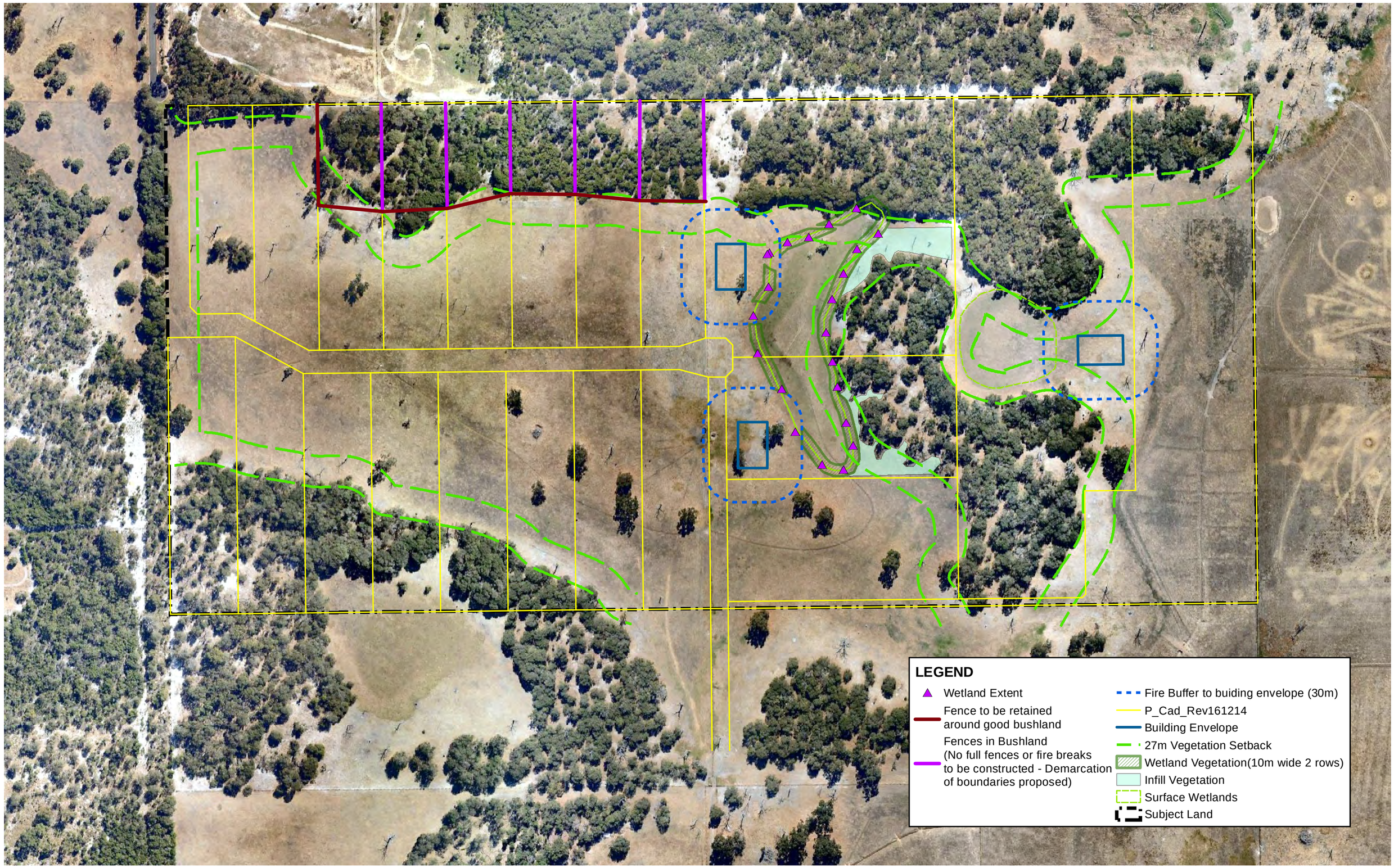
Appendix B

RECCOMENDATIONS PLAN



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Project ***Lot 6 SAND PITS ROAD, CROOKED BROOK***

Title **Environmental Plan**

Original Size	Map Ref.	Produced by	Produced on
A3	14198-WM-	BM	16/12/2014

1:3,000

0 25 50 100 150 200 250 300 m

THIS PLAN HAS BEEN PREPARED FOR PLANNING PURPOSES AREAS, CONTOURS AND DIMENSIONS SHOW ARE SUBJECT TO DETAILED SURVEY.

APPENDIX C WETLAND AND REVEGETATION REPORT

Town Planning Management Engineering

Wetland Edge Assessment and Revegetation Report

for Lot 6 Sand Pits Road, Crooked Brook

town planning
management
engineering
environmental

Research, Design & Delivery of Sustainable Development

Job No. 14198
November 2014

Environmental Characteristics Report for Lot 6 Sand Pits Road, Crooked Brook

November 2014

Author: Brendan Oversby		
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Appendices

1.0 INTRODUCTION AND PURPOSE

This Wetland Assessment and Revegetation Report has been undertaken to determine the true wetland edge of the area identified as Resource Enhancement – Dampland 1774, on the Swan Coastal Plain Geomorphic Wetland data set, within Lot 6 Sand Pits Road, Crooked Brook (the subject land). The information contained within this report is to be used to support the planning and engineering for the development of the site to Rural Residential lots. This includes determining the seasonal top water line for the wetland and potential revegetation around it.

A preliminary site visit was undertaken on the 8th June 2014 with a more detailed investigation of the wetland conducted on the 5th September 2014. This period of time in September was noted as being close to the annual maximum groundwater level. Water was noted flowing out of the drain from the wetland, meaning that the water level is unlikely to rise any higher, except for immediately after heavy rain.

2.0 CONSULTATION AND SITE INVESTIGATION PROCEDURE

2.1 Geomorphic Wetland Data set review

A Resource Enhancement Wetland (1774 – Dampland), as identified by the Geomorphic Wetlands (Swan Coastal Plain) dataset is located over a portion of the subject land. The mapping of this wetland does not match the actual wetland formations present in the subject land, with portions of it extending into the sand dune country around it. There are also a number of Multiple Use Wetlands present. These wetlands also do not match the true wetland edge. Both types of wetlands are in effect cleared paddocks with very little in the way of native vegetation present. The native vegetation found within the site is predominately found on the sand dunes. The current wetland categories can be seen in Appendix B.

2.2 Liaison with Department of Parks and Wildlife

Due to this discrepancy between the mapping and actual site conditions, a meeting was held with the Department of Parks on Wildlife (DPaW) in July 2014 to discuss the site issues. This discussion considered the highly degraded state of the wetland and what options for enhancement of the wetland should be considered as part of any future development.

The main conclusions reached were:

- Determining the top of the annual maximum water line of the wetland within the Resource Enhancement Wetland area will be sufficient for determining the real wetland boundary worthy of protection
- A simple revegetation program around this delineated edge, consisting of trees and shrubs in 2 or 3 lines, that links back to the existing bush will be sufficient as a revegetation program.

- The revegetation and wetland area should be fenced off to protect from stock.

2.3 Wetland Landform assessment

Based on the advice from DPaW, the entire edge of the water line around the subject wetland was delineated using a GPS. The recorded points can be seen in Appendix A. The field works was undertaken on the 5th of September 2014 after a typical winter rainfall period, resulting in groundwater being at its seasonal peak. As water from the wetland was flowing out of the drain, it was determined that this is the likely annual maximum water line. This water line was within growing pasture, further suggesting that it remains at this height for only a short period of time (eg not for the entire winter). Based on this, there is a high level of confidence that the delineated wetland edge line is strongly representative of the seasonal maximum surface water area of the wetland. Any water above this line would be a symptom of extreme rainfall events and move rapidly away through the drainage system.
The area within this wetland is 1.22hectares. The maximum length of the wetland is 562m.

3.0 SITE VEGETATION AND LANDFORM DESCRIPTION

An aerial of the site with general Landforms and vegetation types can be seen in Appendix B. This information covers the whole site and provides an indication of the potential vegetation that could be used for revegetation works around the wetland, as well as the areas of native vegetation that the wetland can be joined to. By joining any revegetation works with the existing native vegetation areas, there is likely to be increased future fauna movement around the wetland. The information below details these characteristics in more detail.

3.1 Landform

The site is composed of a mix of sand dunes and sand plains. Along much of the northern boundary of the site is a low sand rise that sits approximately 3 to 8m above the surrounding flats. The sand dune peaks at 32mAHD on its western edge and 38mAHD towards the east. This is shown as the 'northern sand dune'.
2 more small sand rises extend from this high point south, continuing over the southern boundary. Within this area there is a trapped wetland system, and another surface water body that is now drained by a rural drain. This wetland also has a small excavated waterhole on its north eastern edge. This area is shown on Figure 1 as the 'central sand dune and wetland complex'.
The other major sand ridge occurs in the south west of the site, rising to 35mAHD. This has been termed the 'southern sand dune'.
Between the sand ridges stretches a gently sloping sand plain that exhibits groundwater close to the surface. Rural drains intersects the plain areas, with one transporting groundwater and surface water off the site to the west and another draining the eastern edge of the site southward. The two plains are called the 'western' and 'eastern plains'.

3.2 Vegetation

Northern Sand Dunes

This area can be divided into two areas from a vegetation point of view, with the divide corresponding to the cleared fence line. In the eastern portion, the understorey is almost completely composed of pasture/weed species. The overstorey is made up of predominately *Agonis flexuosa* (Peppermint) with isolated *Banksia attenuata* (Slender Banksia) and *Eucalyptus marginata* (Jarrah) and a few *Corymbia callophylla* (Marri) on the southern edges. There were large amounts of woody debris on the ground. This area is open to cattle grazing.

The western portion has been fenced for at least 10 years, excluding grazing by domestic stock, although there is considerable evidence of kangaroos living within the bush.

The vegetation in this area is considerably thicker than the rest of the site. The understorey is still dominated by grass and pasture species, however there is an isolated clump of *Anigozanthos flavidus* (Tall kangaroo paw) and a small area on the western end of *Caladenia flava* (Cowslip orchid).

The overstorey/shrub layer is mainly composed of *Kunzea ericifolia* (Spearwood) and *Agonis flexuosa* (WA Peppermint) with isolated trees of *Xylomelum occidentale* (Woody pear), *Banksia attenuata* (Slender Banksia), *Nuytsia floribunda* (Christmas tree), Xanthorrhea sp (Grass tree) and *Eucalyptus marginata* (Jarrah).

There have also been a number of individual plants planted, as can be ascertained due to the species and presence of tree planting bags around their trunks. These are limited in number, probably totalling less than 30 individuals. The species planted include *Calothamnus quadrifidus* (One sided bottle brush) and a mallee eucalyptus.

Central Sand Dune and Wetland Complex

The Central sand dune has an understorey is almost completely composed of pasture/weed species and is grazed by cattle. The overstorey is made up almost exclusively of *Agonis flexuosa* (WA Peppermint) and *Corymbia callophylla* (Marri). There was limited woody debris on the ground.

The 2 wetlands in this area, including 1774 – Dampland, were virtually devoid of any native vegetation, with pasture species covering the areas where the water regime allowed. There are a few isolated *Melaleuca rhaphiophylla* (Swamp Paperbark) trees on the edge of 1774.

Southern Sand Dunes

The vegetation within this area is very similar to the eastern portion of the northern and central dune system. The understorey is almost completely composed of pasture/weed species. The overstorey is made up of predominately *Agonis flexuosa* (WA Peppermint) with isolated trees of *Xylomelum occidentale* (Woody pear), *Banksia attenuata* (Slender Banksia) and *Eucalyptus marginata* (Jarrah).

There was limited woody debris on the ground.

The edge of a degraded pasture filled wetland also exists within the subject land on the southern edge.

Just outside of the subject land to the west, in the unformed road reserve, there is a patchy native understorey with isolated hakeas, spearwood and *Nutysia floribundus*.

Western Plain
The western plain is mainly composed of cleared pasture with isolated trees. On the higher edges and rises, the trees are *Corymbia callophylla* while in the wet central section most of the trees are *Melaleuca rhaphiophylla*. Many of these paperbarks are dying. There are also a few old dead trees.
In the unformed road reserve to the west of the site (within the plain landform), the vegetation is composed mainly of *Melaleucas rhapiophylla* and *Pteridium esculentum* (Bracken Fern)
Eastern Plain
The eastern plain is similar to the western plain in that it is currently cleared pasture, however it has even less trees. There are a couple of old marris with a few isolated dead trees.

4.0 RECOMMENDATIONS

4.1 Lot creation

Appendix C shows the proposed lot layout for the development of the subject land. The layout has been configured so that there is the minimal disturbance possible to the areas of existing native vegetation, while also providing each lot with areas of adequate separation to the groundwater. The lot layout also has been designed so that there is only a single fence within the wetland boundary.

4.2 Revegetation

The following proposed revegetation will provide:

1. Delineation of the wetland edge to assist with minimising disturbance to it
2. Increase native wetland vegetation
3. Increase available wetland fauna habitat and provide new fauna movement paths
4. Increase aesthetics of the site

The revegetation is also to be undertaken in a way that does not appreciably increase the fire risk to the proposed dwellings. Furthermore the revegetation will be predominately trees and shrubs, as this will minimise the long term maintenance, compared to controlling weeds within sedges and rushes.

To achieve the above the proposed revegetation area is shown on Figure 3. In general, a double line of vegetation around the wetland is proposed. It is assumed that with the species chosen, this band will on average have a canopy width of 10m at maturity.

To minimise fire risk to potential buildings, the band of vegetation becomes discontinuous on the western side, where the vegetation comes within 30m of proposed building areas. In this area, the vegetation will have a break of 20m, so that it meets a 'separate vegetation area' under the fire regulations. To compensate for the breaks in vegetation, two infill areas are proposed for revegetation, with significantly more area of vegetation planted in the infill zones, then would be planted within the fire gap areas. These infill areas will also increase the linkages between existing bushland areas.

The proposed species for revegetation are:

Wetland edge
Melaleuca rhaphiophylla
Melaleuca viminea
Melaleuca incana
Eucalyptus rudis

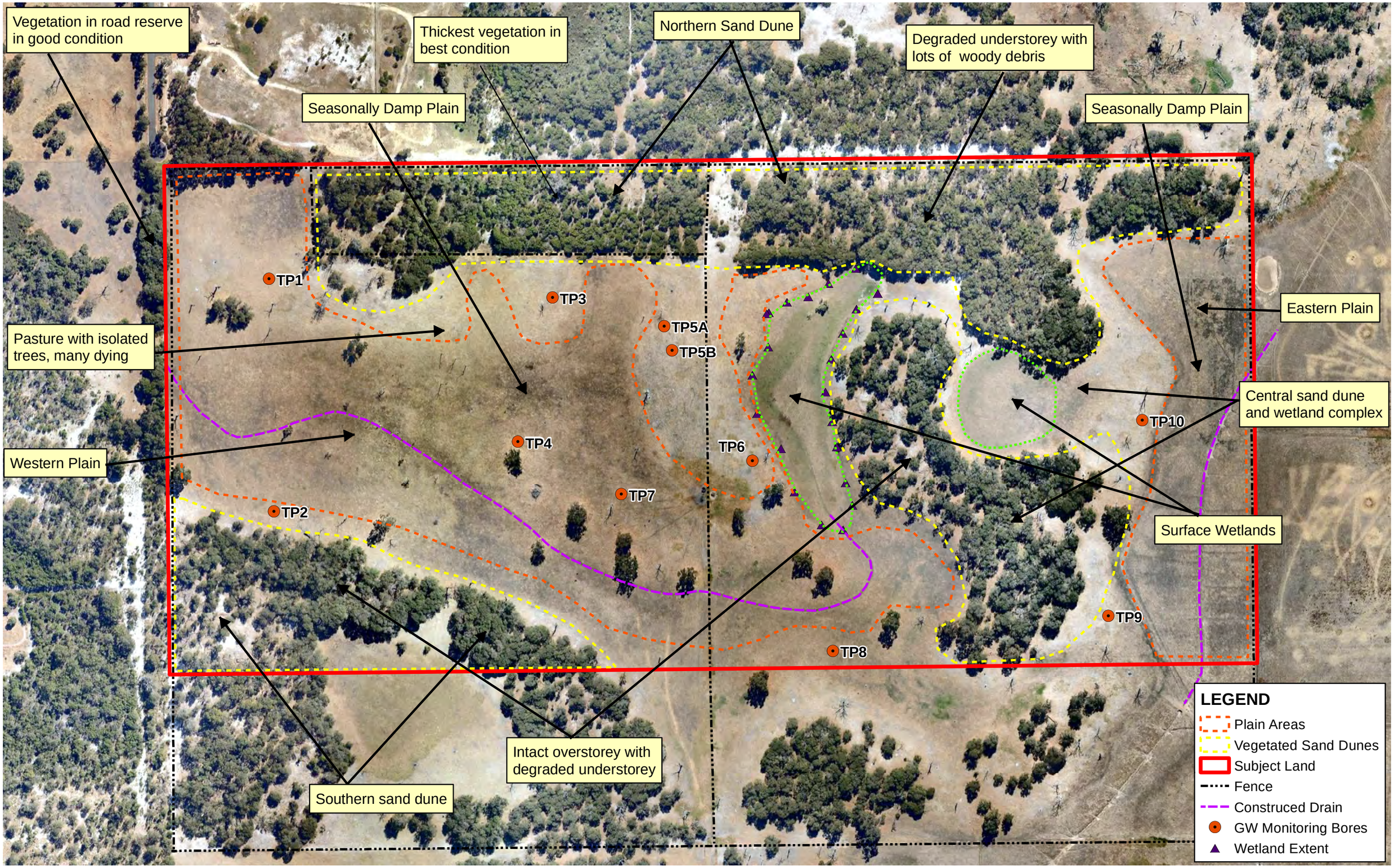
Dry areas of infill
Corymbia callophylla
Eucalyptus marginate
Agonis flexuosa
Acacia saligna
Banksia attenuata

Stock
Stock should be excluded from the vegetation either by exclusion of stock from the lots or fencing off the bush with a stock proof fence.

4.3 Further studies

A more detailed wetland management/overall site revegetation plan may be warranted as part of the future subdivision of the site. This would focus on the full revegetation program including weed control, fencing type, timeframes for works and maintenance.

Appendix A
EXISTING SITE CONDITIONS



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Project ***Lot 6 SAND PITS ROAD, CROOKED BROOK***

Title **Figure 1 - Landform and General Vegetation**

Original Size	Map Ref.	Produced by	Produced on
A3	14198-WM-02	BM	13/11/2014

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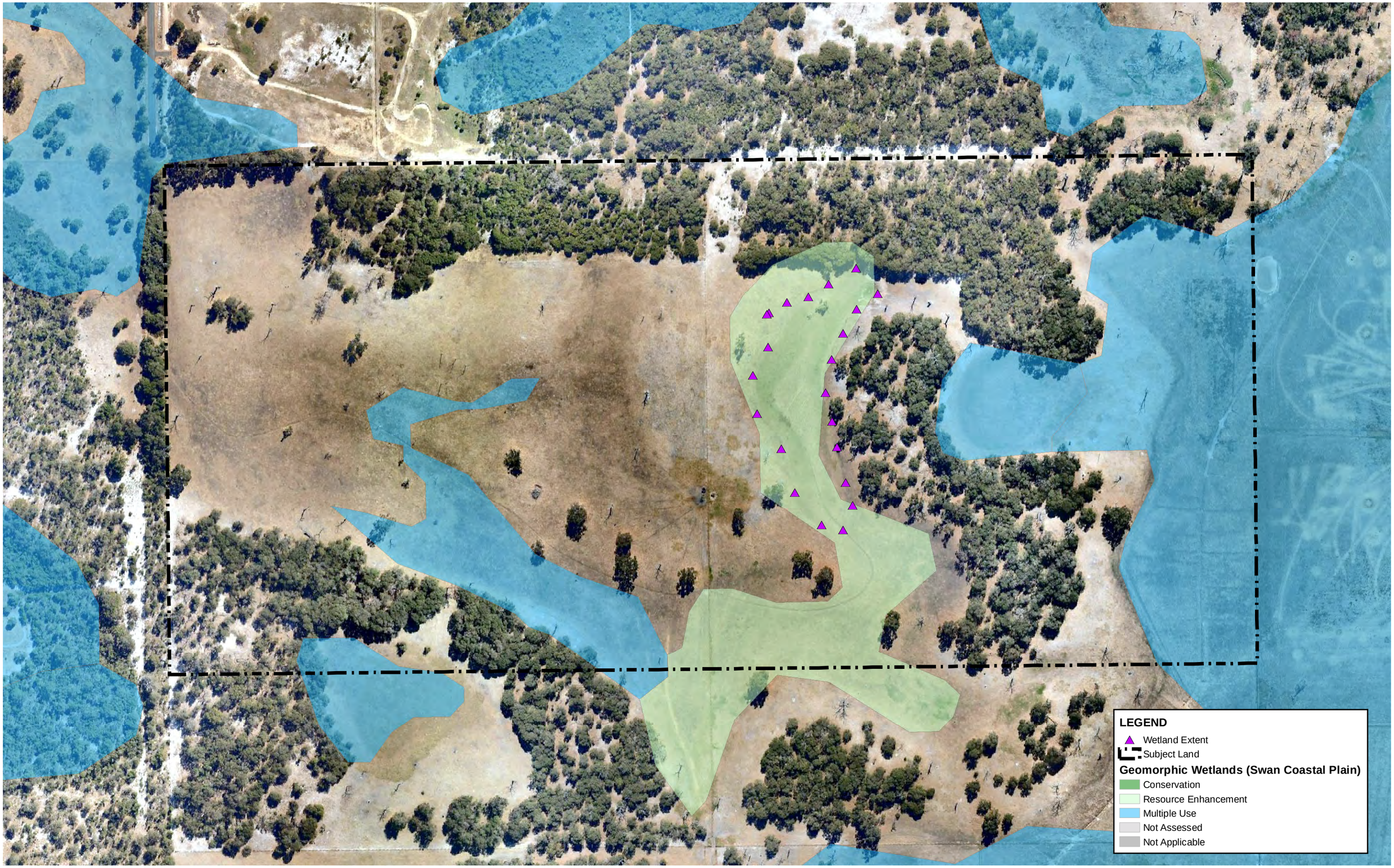
0 25 50 100 150 200 250 300 m

Appendix B

GEOMORPHIC WETLAND PLAN



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Project ***Lot 6 SAND PITS ROAD, CROOKED BROOK***

Title **GEOMORPHIC WETLANDS**

Original Size	Map Ref.	Produced by	Produced on
A3	14198-WM-03	BM	11/11/2014

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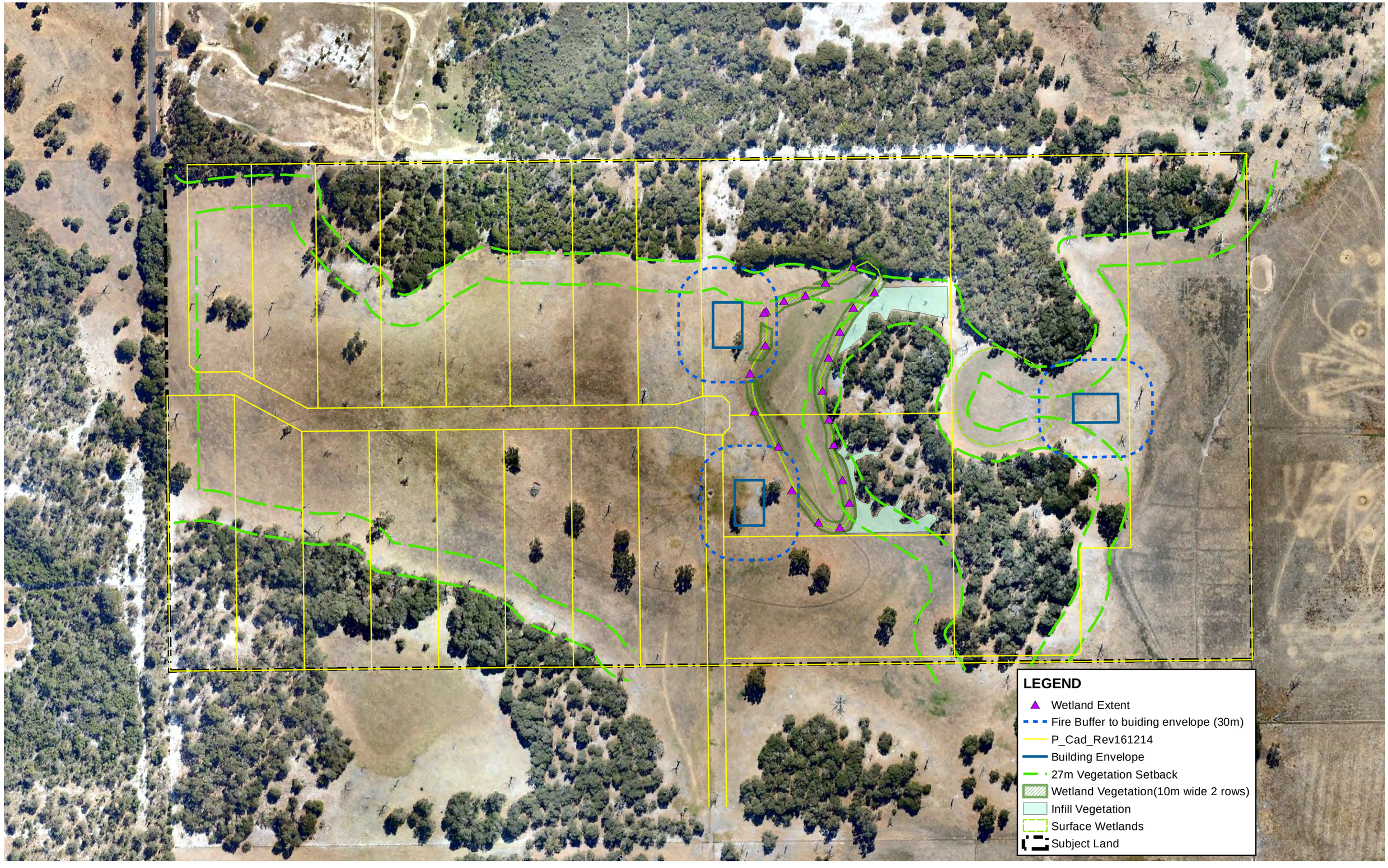
Appendix C

WETLAND PLAN AND DEVELOPMENT LAYOUT



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Project ***Lot 6 SAND PITS ROAD, CROOKED BROOK***

Title **WETLAND MANAGEMENT PLAN**

Original Size	Map Ref.	Produced by	Produced on
A3	14198-WM-	BM	16/12/2014

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0 25 50 100 150 200 250 300 m

Appendix D

SITE PHOTOS

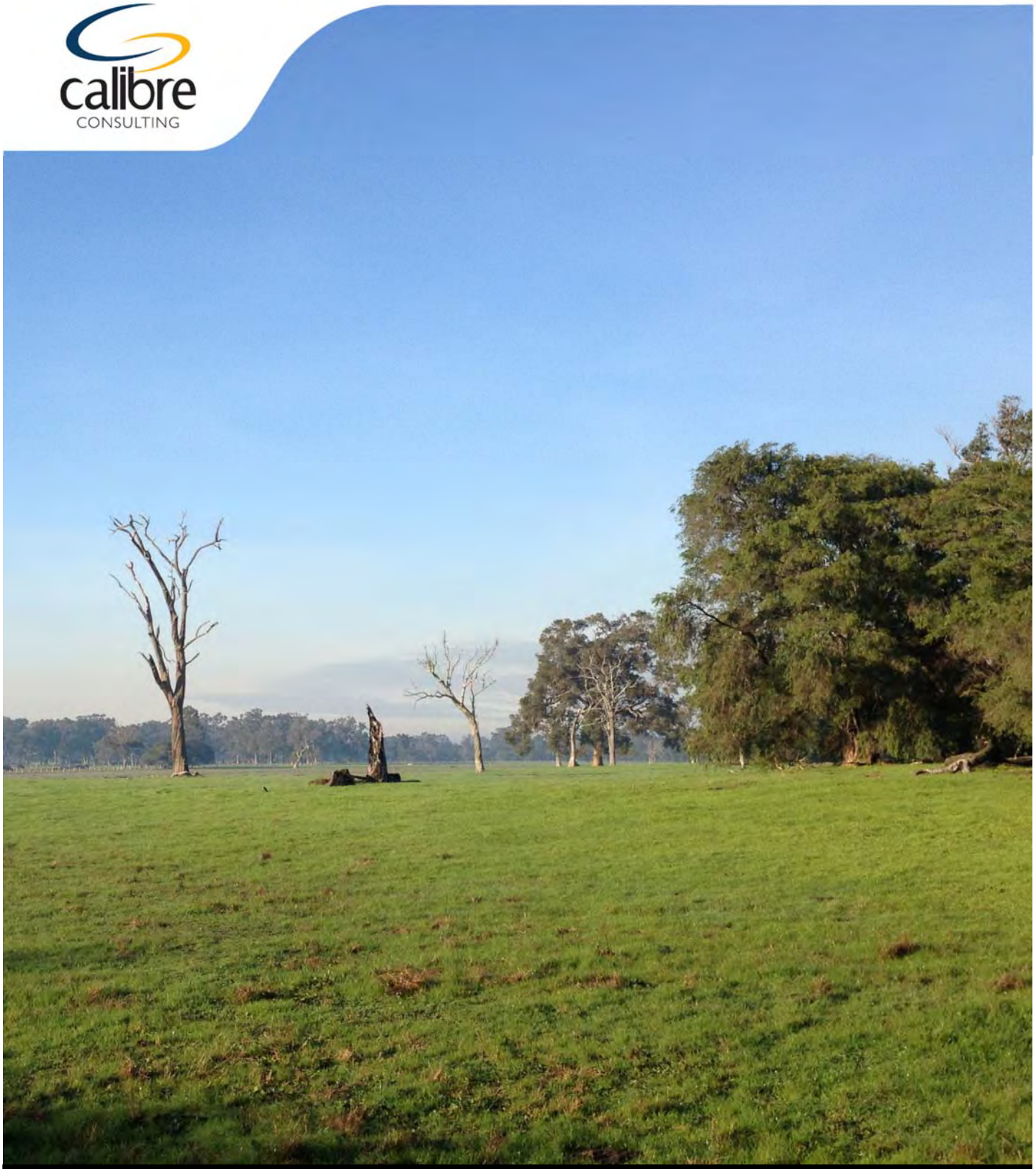
Drain flowing out of Resource Enhancement Wetland area– September 2014

Resource Enhancement Wetland area showing isolated Melaleuca and pasture – September 2014

Looking North East over Resource Enhancement Wetland area – June 2014

Excavated Soak on Northern end of Resource Enhancement Wetland – June 2014 – September 2014

APPENDIX D GROUNDWATER REPORT



Lot 6 Sand Pits Road, Crooked Brook
Groundwater Investigation Report

Prepared by Calibre Consulting
for Muir

November 2014

14198.

COMMERCIAL IN CONFIDENCE

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DOCUMENT CONTROL

Issue	Date	Issue Details	Author	Checked
1	November 2014	Supporting information to Structure Plan	Brendan Oversby	Brendan Oversby

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION AND PURPOSE

This Groundwater Investigation Report has been undertaken to determine the annual maximum groundwater levels likely to be present within Lot 6 Sand Pits Road, Crooked Brook (the subject land). The information contained within this report is to be used to support the planning and engineering for the development of the site to Rural Residential lots. This includes determining areas where there is adequate separation to groundwater for onsite effluent disposal.

The Department of Health's Draft Country Sewerage Policy recommends that a separation between the natural surface and groundwater is to be a minimum of 0.5m. As a conservative approach, the mapping has identified areas where there is at least 0.6m of separation. The other aspect to consider for effluent disposal is slope, with a 1:5 slope being the maximum usually allowed. There are no areas on the site with a grade of greater than 1:5 so this aspect has not been considered in determining areas of suitability for effluent disposal.

The absence of clay soils on site where there is adequate separation to groundwater, means that the effect that these may play in relation to groundwater perching or site suitability for onsite effluent disposal has not been considered

2 PROCESS UTILISED TO DETERMINE GROUNDWATER DEPTH

2.1 TEST PIT EXCAVATION

- To determine the peak groundwater level present on the site, 11 test holes were excavated on the 5th September 2014.
- The holes were dug via a 250mm diameter auger to a depth of 1200mm. The location of the test pits was determined using aerial information with ground truthing on the day of excavation. The holes were placed in areas where the sand dunes on the site started to flatten out onto the lower sand flats. These were seen as areas where groundwater was likely to be within 500mm of the surface. The holes were spread across the site, to provide site specific data across all potential development areas.
- As the holes were dug, the soil profile was recorded, including determining if there was a confining layer. The presence and depth of groundwater and wet soil was noted at this point in time as well. All holes were then left open for a minimum of 2 hours. After this time the depth to groundwater was again recorded. The holes were then back filled.
- Details of each pit can be seen in Table 1.
- The entire edge of the western wetland was also recorded by GPS to provide a line at which the groundwater is expressing to the surface.

2.2 ANALYSIS OF DATA

- LiDAR information was purchased for the subject land and surrounds. This was converted into 0.2m contours.
- A model of the groundwater depth and contours was developed using a combination of the LiDAR contours and the field test pit data. The model correlated the data between each pit to determine the likely flow direction of the groundwater. The wetland edges both on site and in the surrounding paddocks as well as the drain inverts were also incorporated to tailor the model to the actual site conditions.
- The annual maximum groundwater contours and depth to groundwater can be seen in Figures 2 and 3

3 RESULTS AND RECOMMENDATIONS

3.1 GROUNDWATER RESULTS

Figure 2 shows that at its annual maximum, the groundwater varies from above the surface through to more than 2m deep.

The contours show groundwater grading from approximately 30mAHD in the south eastern corner in two directions, eastward and westward. To the east the contours grade through to approximately 29.2mAHD. To the west the groundwater contours grade relatively consistently through to 25.6m AHD. There are 2 defined wetlands on site with seasonal surface water present in them. This surface water is directly linked to the groundwater table and is effectively the same. A rural drain intersects the western wetland, transporting water from this wetland, and the majority of the western portion of the site to the western boundary of the site. This drain effectively controls the groundwater level in this portion, as it continuously removes excess surface water and groundwater when it either reaches the surface, or discharges via the soil profile directly into the drain.

The Eastern wetland is effectively trapped by the surrounding dune system. Groundwater within this wetland moves laterally and horizontally through the highly porous sand. Another drain is located near the eastern boundary of the site. This controls groundwater rise within the eastern portion of the site by removing water and channelling it through to the southern boundary and off site. The higher sand dunes show no signs of groundwater being close to the surface, due to the highly porous nature of the soil profile. Any rainwater that falls on the sand dune will quickly move through to the underlying groundwater level, which is close to the levels seen on the sand flats.

September 2014, and the proceeding winter months had a relatively normal winter rainfall pattern, meaning that the groundwater rose to the point where it was flowing out of the onsite drains. Due to the drainage system controlling the groundwater and that the test pits were dug after normal winter rains, when groundwater is likely to be its highest, there is a high level of confidence that the depth to groundwater shown in Figures 2 and 3 are representative of the annual maximum. This allows the data to be used for determining suitable areas for onsite effluent disposal, fill for house pads (as necessary) and road construction.

To be slightly conservative the areas recommended for effluent disposal are set at 0.6m of depth to groundwater (0.5m minimum needed). All lots shown have areas with at least 0.6m of separation that may be used for effluent disposal, after suitable treatment. These areas are delineated as orange, brown, grey or white.

3.2 SOIL CONDITIONS

The soils profile was recorded for each hole. In general, the soil profiles were composed of dark grey sand over lighter sand. The dark surface sand often contained a high proportion of organics. The lighter sands varied from light grey to white, with the colour generally becoming lighter at depth. The sand was relatively coarse, allowing the groundwater to move freely through it. Only one pit had some gravel at 900mmm (Pit 7). Due to the continuous sand profile, no confining layers were encountered. This soil profile is typical of the sand dunes within the Crooked Brook area.

3.3 RECOMMENDATIONS

It is recommended that more detailed studies be undertaken as part of the building application for each dwelling. This should consider the actual depth of groundwater in the proposed location of the disposal area and soil type. This assessment should also include if the disposal area will need to be raised and optimum treatment method to minimise any potential negative impacts from onsite effluent disposal.

APPENDIX A GROUNDWATER TEST PIT DATA

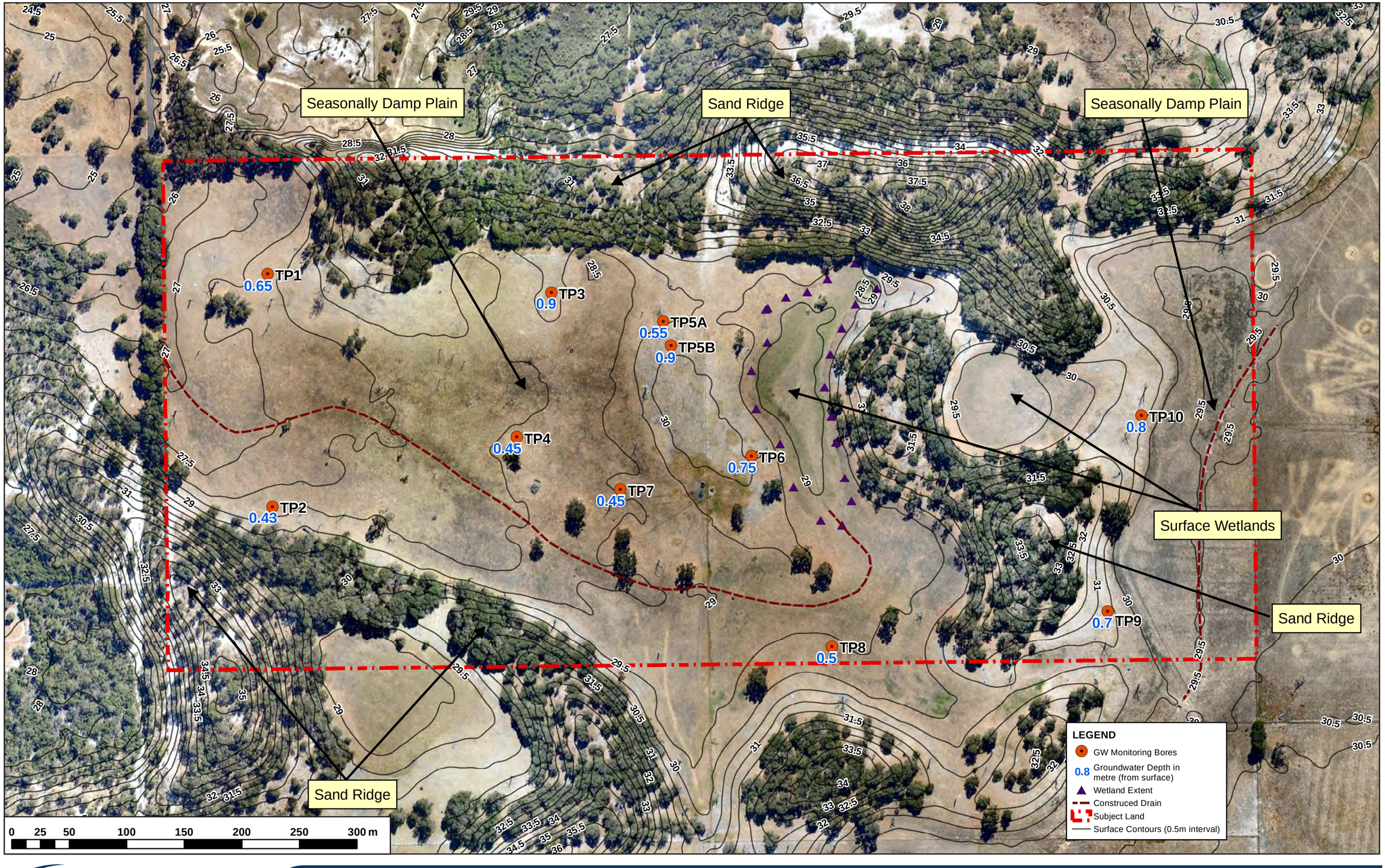
Soil and groundwater Pits for Lot 6 Sandpits Road, Crooked Brook

Date: 5th September 2014

Bore	Depth to Groundwater	Soil Profile			GPS Location		General Comments
		Topsoil	Subsoil	Confining Layer	Latitude	Longitude	
1	650	Dark grey 0-100mm	Light Grey 100-900mm White Sand 900-1100mm	Nil	33.42669 E	115.73141 S	Water coming in at 900mm
2	430	Dark black sand 0-100mm	Dark Grey Sand 100-600mm Medium-Light Grey Sand 600-1000mm	Nil	33.212851 E	115.73143 S	Water coming in at 900mmm
3	900	Black sand 100mm	Dark Grey 100-500mm Light Grey 500-900mm White Sand 900mm	Nil	33.42686 E	115.73406 S	No seepage
4	450	Black Organic 0-100mm	Grey Sand 100-250mm White Sand 250-1000mm	Nil	33.42799 E	115.73372 S	Ooze at 900mm
5 A	550	Black sand 0-100mm	Medium Grey 100-500mm Light Grey 500-1000mm	Nil	33.42730 E	115.73515 S	Seepage at 700mm
5 B	900	Black High Organics	Medium Grey 100-50mm Light Grey 500-100mm	Nil	33.42729 E	115.73517 S	Seepage at 900mm
6	750	Black Sand 0-150mm	Dark Grey Sand 150-900mm Light Grey Sand 9 900-1000mm	Nil	33.42816 E	115.73591 S	Slight rise in landform

Bore	Depth to Groundwater	Soil Profile			GPS Location		General Comments
		Topsoil	Subsoil	Confining Layer	Latitude	Longitude	
7	450	Black Organic Sand 0-150mm	White Sand 150-500mm Light Yellow Sand 500-100mm Slight Gravel Cementing at 900mm	Nil	33.42841 E	115.73468 S	Water coming in at 600
8	500	Black Sand 200mm	White/Grey Sand 200-600mm Slight Yellow Sand 600-1000mm	Nil	33.42966 E	115.73664 S	Flat pasture- Slumping at groundwater point Groundwater appearance at 900
9	700	Black Organic Sand 0-150mm	Medium Grey Sand 150-900mm Light Grey Sand 900-1000mm	Nil	33.42941 E	115.73922 S	Edge of rise Groundwater appearance at 900
10	800	Grey Organic Sand 0-100mm	Light Grey Sand 100-900mm White Sand 900-1000	Nil	33.42788 E	115.73956 S	Edge of rise Saturated Sand 900mm

APPENDIX B EXISTING SITE CONDITIONS



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EXISTING SITE CONDITIONS

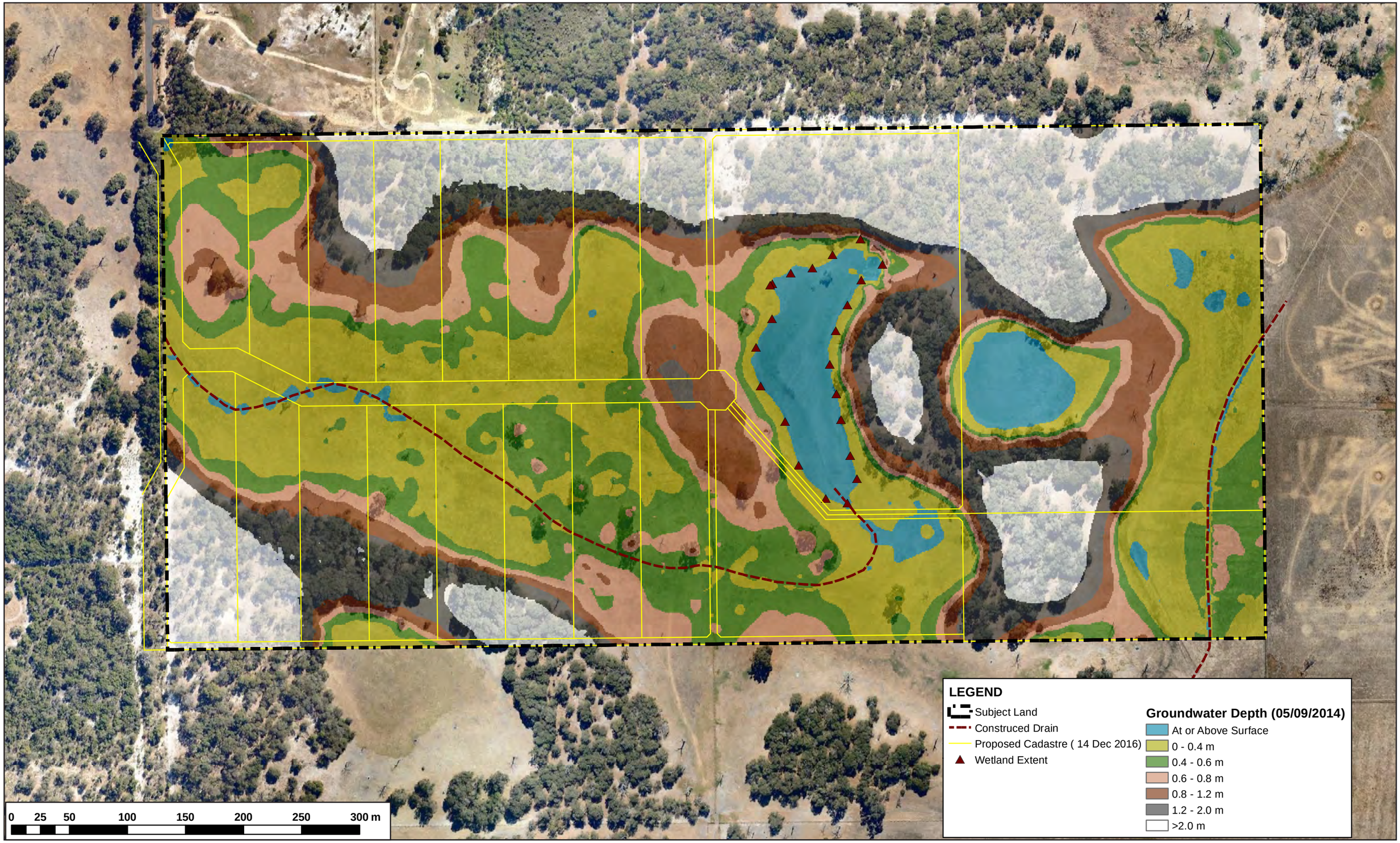
Lot 6 Sand Pits Road, Crooked Brook

Plan No: 14189P-MP-03

Date:	09.01.2017
Rev:	A
Co-ords:	MGA 50 GDA 94
Aerial:	Nearmap

This plan has been prepared for planning purposes. Areas, contours and dimensions shown are subject to survey.

APPENDIX C DEPTH TO GROUNDWATER PLANS



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GROUNDWATER DEPTH MAP WITH PROPOSED CADASTRE

Lot 6 Sand Pits Road, Crooked Brook

Plan No: 14189P-MP-04

Date:	09.01.2017
Rev:	A
Co-ords:	MGA 50 GDA 94
Aerial:	Nearmap

This plan has been prepared for planning purposes. Areas, contours and dimensions shown are subject to survey.

APPENDIX E BUSHFIRE MANAGEMENT REPORT

FPA AUSTRALIA | Fire Protection Association Australia | Life. Property. Environment.

BPAD Bushfire Planning & Design

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Lot 6 Sandpits Road

Suburb: Crooked Brook **State:** WA **P/code:** 6236

Local government area: Shire of Dardanup

Description of the planning proposal: Rezoning application and Structure Plan submission

BMP Plan / Reference Number: 58463 R01 **Version:** Rev 1 **Date of Issue:** 30/09/2020

Client / Business Name: Mark Muir

Reason for referral to DFES	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 BPC elements)?	☐	☒
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	☐	☒
Strategic planning proposal (including rezoning applications)	☒	☐
Minor development (in BAL-40 or BAL-FZ)	☐	☒
High risk land-use	☐	☒
Vulnerable land-use	☐	☒

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Strategic Planning Proposal

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Zac Cockerill	Level 2	BPAD 37803	31/08/2021
Company		**Contact No.**	
Strategen-JBS&G		(08) 9792 4797	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner  Date 30/09/2020

Mark Muir

Bushfire Management Plan

Lot 6 Sand Pits Road, Crooked Brook

30 September 2020

58463/128,880 (Rev 1)

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

www.jbsg.com.au

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1. Introduction

1.1 Background

The Dardanup West/Crooked Brook District Structure Plan, which includes Lot 6 Sand Pits Road, Crooked Brook (the project area), provides a framework for the rezoning, subdivision and development of land for rural residential lots within the Shire of Dardanup.

Planned Focus, on behalf of its client, is facilitating rural residential development of the project area and has prepared a rezoning application and Structure Plan submission with input from Western Australian Planning Commission (WAPC).

The proposed Development Guide Plan for the project area (Planned Focus 2020; Figure 1) identifies:

- layout for 18 proposed lots ranging in size from approximately 1 ha to 15.6 ha
- public road and private driveway layout
- area subject to proposed conservation covenant (within proposed Lot 2)
- a wetland revegetation area (within proposed Lot 8)
- building exclusion zones for the protection of existing native vegetation and wetland values.

1.2 Site description

The project area comprises approximately 41.87 ha and is bound by the following (see Figure 2):

- cleared rural land to the east
- partially cleared rural land to the west and south
- partially developed and cleared rural residential lots and Sand Pits Road to the north.

1.2.1 Zoning and land use

The project area is currently zoned 'General Farming' under provisions of the Shire of Dardanup Town Planning Scheme No 3. Land to the north is zoned 'Small Holding' and land to the east, south and west is zoned 'General Farming' under the Town Planning Scheme.

The site is predominantly cleared and currently used for cattle grazing purposes. Areas of trees retained within the project area are primarily Peppermint (*Agonis flexuosa*), with isolated Banksia, Jarrah and Marri trees.

The proposed Scheme amendment will rezone the project area to 'Small Holding' to accommodate future rural residential development.

1.2.2 Assets

The project area currently does not contain any life or property assets.

Environmental values within the project area consist of pockets of remnant vegetation, which includes species providing potential habitat for the threatened Western Ringtail Possum and species of Black Cockatoo. Bushland to the north is also subject to a conservation covenant with the National Trust.

The project area includes a Resource Enhancement Wetland, proposed to be retained and subject to revegetation of buffers. Lot layout and indicative building envelopes have been designed to minimise impacts on and retain as much remnant vegetation within lots as possible.

1.2.3 Bushfire prone designation

A portion of the project area is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2020; see Plate 1).

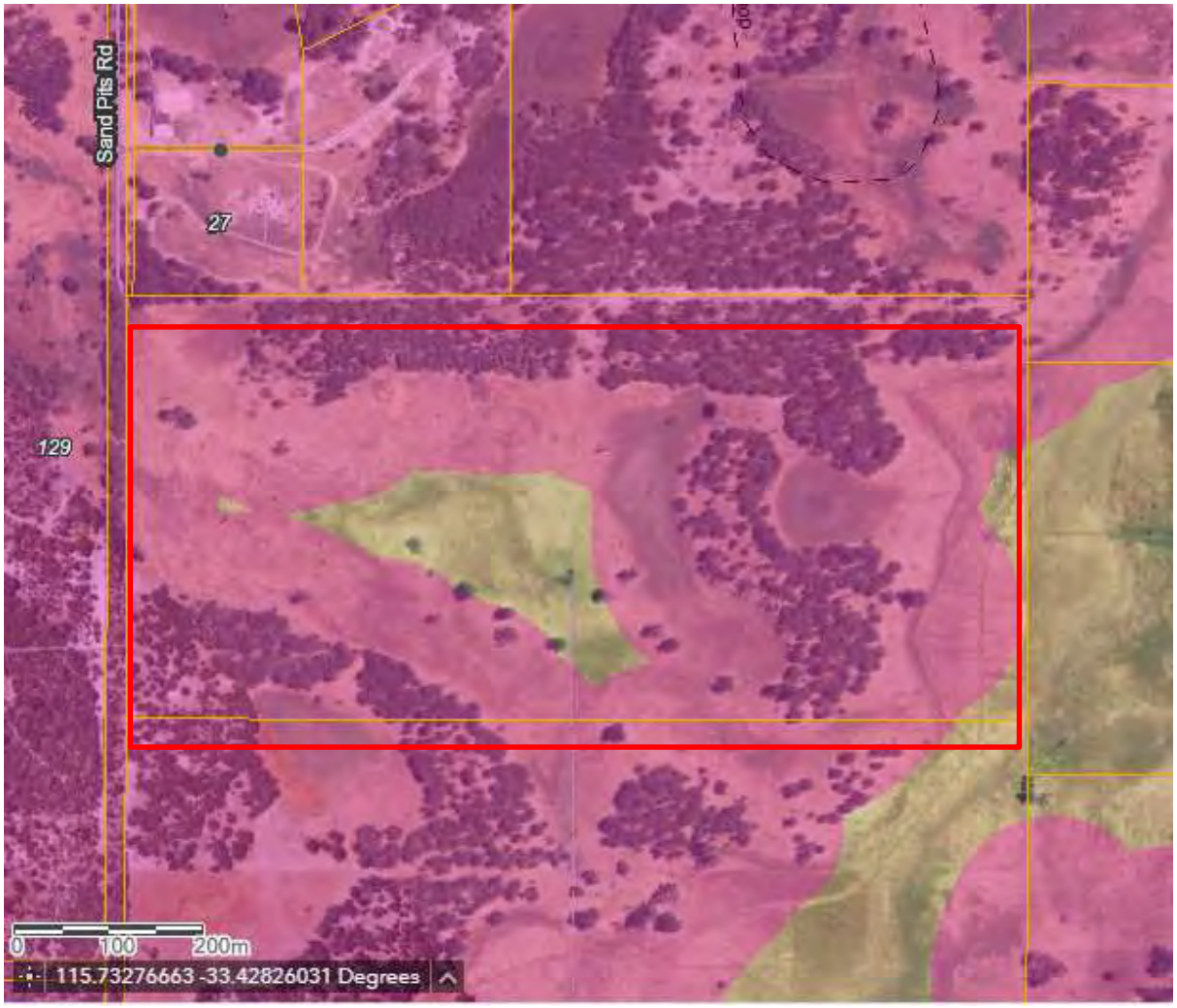


Plate 1: Map of bushfire prone areas (DFES 2020)

1.3 Purpose

This Bushfire Management Plan (BMP) has been prepared to address requirements under *Policy Measure 6.3 of State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015) and *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2017).

1.4 Other plans/reports

Other relevant reports that have been prepared for the project area include:

- Wetland Edge Assessment and Revegetation Report (Calibre 2014).

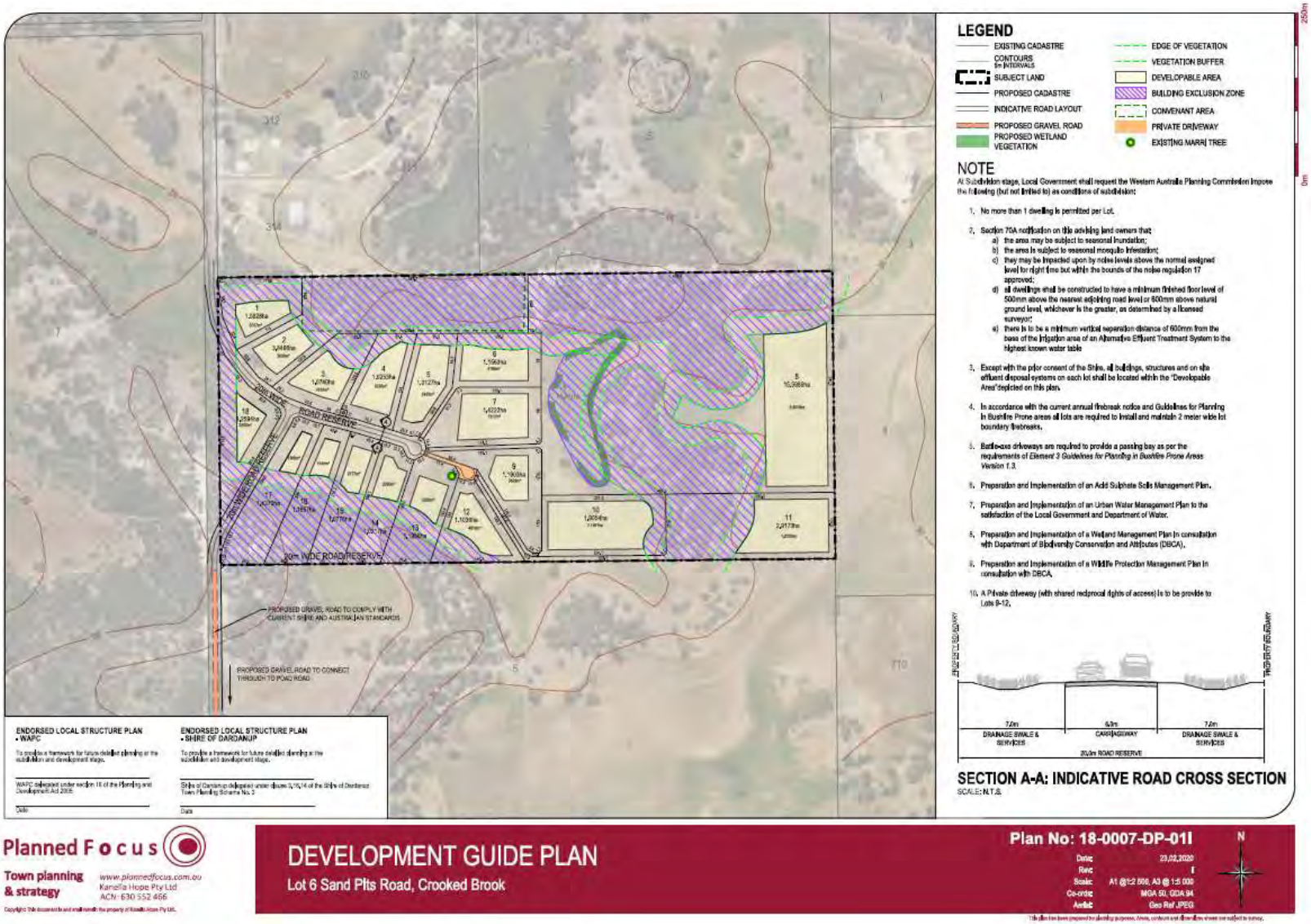
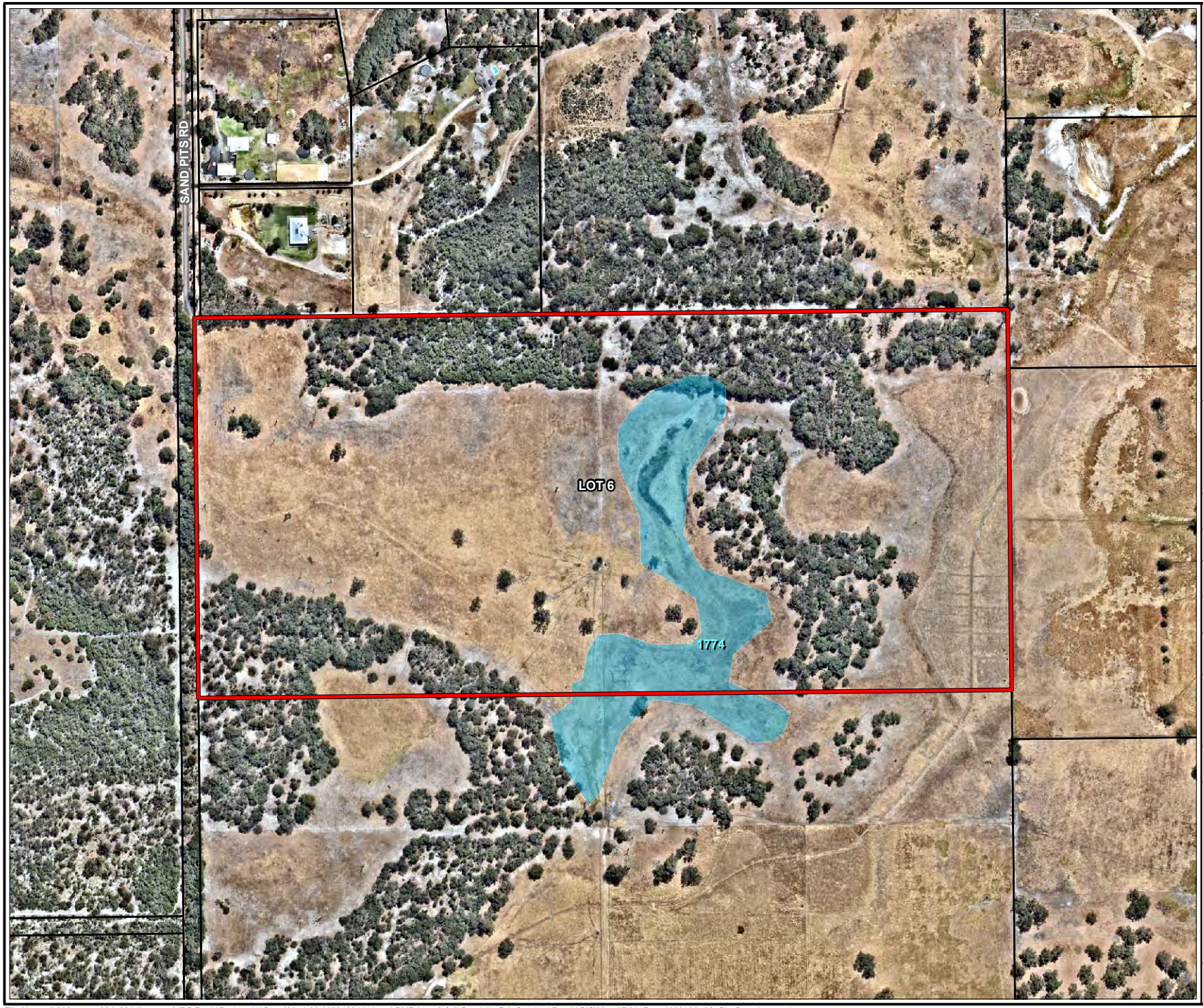


Figure 1: Development Guide Plan (Planned Focus 2020)



Legend:

- Project area
- Cadastral boundary
- Geomorphic Wetlands (DBCA)
  - Resource Enhancement
- Roads (MRWA)

strategen JBS&G

Job No: 58436	
Client: Mark Muir	
Version: A	Date 22/05/2020
Drawn By: cthatcher	Checked By: CT
Scale 1:6,000	

0 50 100
metres

Lot 6 Sand Pits Road, Crooked Brook, WA

SITE OVERVIEW

FIGURE 2

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Mark Muir\58463 Updated BMP Lots 6 & 7 Sandpits Rd, Crooked Brook\GIS\Maps\R01_Rev_A\58463_02_SiteOverview.mxd
Image Reference: www.nearmap.com© - Imagery Date: 2 March 2020.

2. Environmental considerations

The project area contains remnant native vegetation and wetland systems that are proposed to be retained as part of the development design. A Resource Enhancement Wetland (REW) is proposed to be conserved and revegetated within proposed Lot 8 in line with the Wetland Edge Assessment and Revegetation Report (Calibre 2014) and a portion of bushland within proposed Lot 2 is proposed for a conservation covenant. The remaining on-site native vegetation is proposed to be retained within each rural-residential lot and is identified as being within a "building exclusion area" (Figure 1).

Figure 2 depicts the extent of the REW as mapped by the Department of Biodiversity, Conservation and Attractions (DBCA), however, the true wetland edge has been assessed within the Wetland Edge Assessment and Revegetation Report and it is this boundary on which the development layout has been designed.

A search of publicly available environmental data relating to the project area has been undertaken and is summarised in Table 1.

Table 1: Summary of environmental values

Environmental value	Not mapped as occurring within or adjacent to the project area	Mapped as occurring within or adjacent to the project area		Description
		Within	Adjacent	
Environmentally Sensitive Area	✓			N/A.
Swan Bioplan Regionally Significant Natural Area	✓			N/A.
Ecological linkages			✓	Remnant vegetation within the project area is mapped as forming part of a South West Regional Ecological Linkage.
Wetlands		✓	✓	Multiple Use and Resource Enhancement Geomorphic Wetlands are recorded as occurring within the project area. The on-site Resource Enhancement Wetland is proposed to be revegetated as part of the proposed development. Multiple Use wetlands also occur adjacent to the project area.
Waterways			✓	Crooked Brook occurs 420 m to the south of the project area.
Threatened Ecological Communities listed under the EPBC Act		✓	✓	The Endangered Banksia Woodlands of the Swan Coastal Plain TEC is mapped as being likely to occur within project area. All remnant vegetation will be conserved as part of the development.
Fauna habitat listed under the EPBC Act		✓	✓	With respect to Carnaby's Black Cockatoo, the project area and adjacent areas are mapped as containing: • possible breeding areas • potential feeding areas. No potential Quenda habitat is mapped as occurring.
Bush Forever Site	✓			N/A.
DBCA managed lands and waters (includes legislated lands and waters and lands of interest)	✓			N/A.

Environmental value	Not mapped as occurring within or adjacent to the project area	Mapped as occurring within or adjacent to the project area		Description
		Within	Adjacent	
Conservation covenants		✓	✓	It is understood that bushland to the north of the project area is subject to a conservation covenant with the National Trust. The proposed development also apportions part of Lot 2 as a conservation covenant.

2.1 Revegetation / Landscape Plans

2.1.1 Wetland

Revegetation within the project area will be limited to the areas around the Resource Enhancement Wetland within proposed Lot 8 as identified in the Wetland Edge Assessment and Revegetation Report (Calibre 2014) (refer to relevant environmental plan contained in Appendix A).

Proposed revegetation will result in a Class B Woodland vegetation extent based on the below potential species:

- wetland edge:
  - *Melaleuca rhaphiophylla*
  - *Melaleuca viminea*
  - *Melaleuca incana*
  - *Eucalyptus rudis*
- dry areas of infill:
  - *Corymbia calophylla*
  - *Eucalyptus marginate*
  - *Agonis flexuosa*
  - *Acacia saligna*
  - *Banksia attenuata.*

Two small areas of proposed revegetation are less than 0.25 ha when combined (total of 0.09 ha) and not within 20 m of other classified vegetation or the proposed building envelope on adjacent Lots 6 and 7. On this basis these revegetation areas have been excluded under Clause 2.2.3.2 (c) of AS 3959, as depicted on Figure 3 (Plot 9).

2.1.2 Road reserves

The Development Guide Plan includes an indicative road cross section, which indicates that drainage swales may be located on either side of the proposed public carriageways (Plate 2). The extent of vegetation and species composition within the swales is expected to be determined at the subdivision stage through development of an Urban Water Management Plan. This vegetation will need to be considered within the BMP prepared at the subdivision stage; however, the BAL impacts are not expected to impede unsatisfactorily on the proposed 'developable areas' due to separation provided and likely classification of either Class C Shrubland or Class G grassland (based on the indicative cross section).

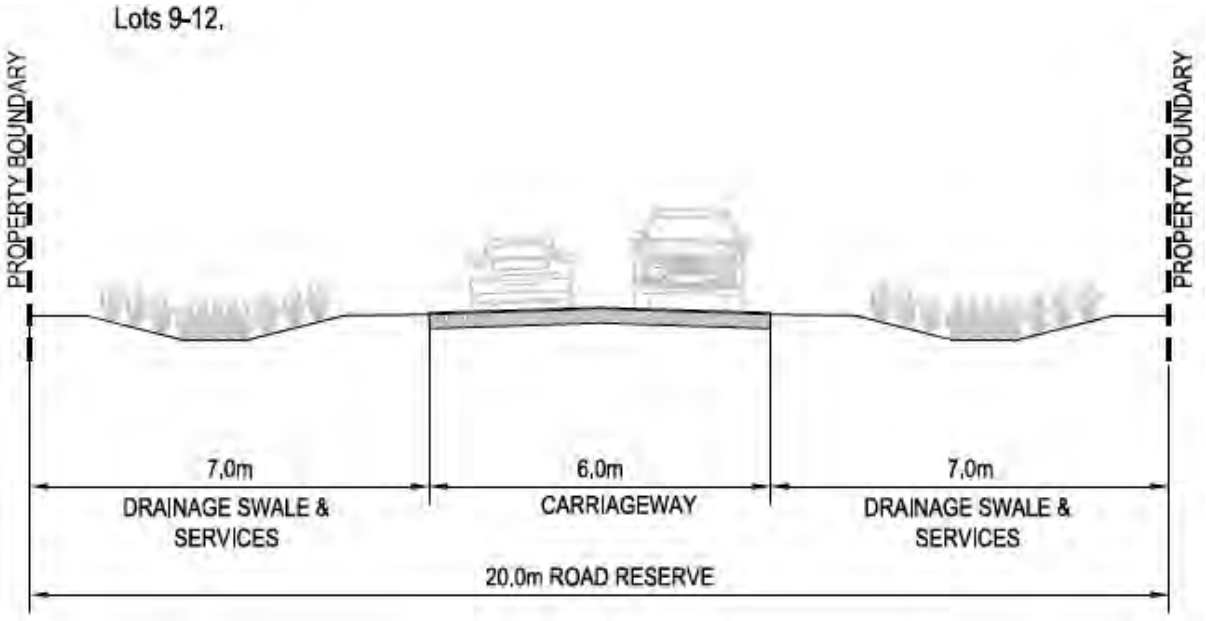


Plate 2: Indicative road cross section (Source: Figure 1)

3. Bushfire assessment results

3.1 Vegetation classification

Strategen-JBS&G assessed classified vegetation and exclusions within 100 m of the project area through on-ground verification on 27 March 2017 in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016). Georeferenced site photos are contained in Appendix B and depicted in Figure 3. A description of the assessed vegetation plots is provided in Table 2. Strategen-JBS&G has reviewed site conditions via desktop review of recent aerial imagery and can confirm that on-ground conditions have not materially changed since the 2017 assessment and as such, reassessment of site conditions is not deemed necessary.

3.2 Effective slope

Strategen-JBS&G assessed effective slope under classified vegetation through on-ground verification on 27 March 2017 in accordance with AS 3959. Results were cross-referenced with DPIRD 2m contour data and are depicted in Figure 3.

Site observations confirm that the slope is variable across the site, with areas of flat land on sand plains and slopes associated with sand dunes to the north, west and east. However, these slopes were identified to be up-slope from proposed development. Topographic elevation across the site ranges from approximately 27 Australian Height Datum (mAHD) in the west to approximately 38 mAHD in the northeast.

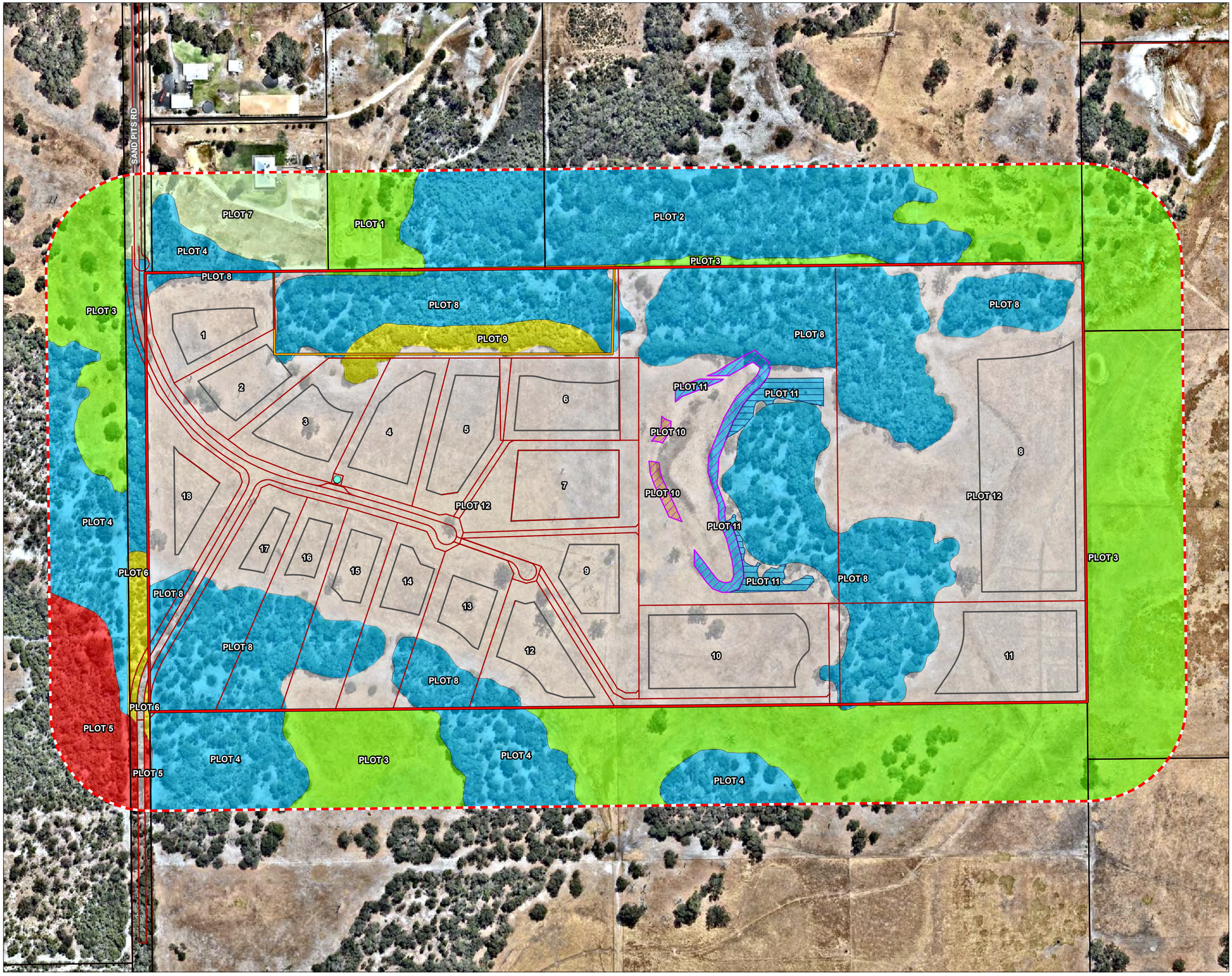
Effective slope under classified vegetation has been identified as either flat land or up-slope from proposed development areas, with the exception of classified vegetation within rural residential lots to the north and an area of classified vegetation to the southwest, which has been identified as being downslope >0-5 degrees. Effective slope is displayed in Figure 3 and validated through depiction of topographic contours. Effective slope for each of the assessed vegetation plots is outlined in Table 2.

3.3 Summary of inputs

Figure 3 illustrates the anticipated post-development vegetation classifications and exclusions following completion of subdivision works and implementation of revegetation and low threat landscaping throughout the project area and adjacent 100 m. The post-development vegetation classifications/exclusions and effective slope are summarised in Table 2. Georeferenced site photos of the vegetation are provided in Appendix B.

Table 2: Summary of post-development vegetation classifications/exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class G Grassland	Downslope >0–5°	Grassland within rural residential land directly north of the project area. Although these grassland areas are currently low fuel, these works are not enforceable under the Shire of Dardanup annual firebreak notice and as such, the grassland has been classified (Photo 28).
2	Class B Woodland	Downslope >0–5°	Woodland within rural land the north (Photo 22 and Photo 23).
3	Class G Grassland	Flat/upslope (0°)	Grassland within rural properties to the east, south and west. Although these grassland areas are currently low fuel, these works are not enforceable under the Shire of Dardanup annual firebreak notice and as such, the grassland has been classified (Photo 29, Photo 30, Photo 31, Photo 32 and Photo 33).
4	Class B Woodland	Flat/upslope (0°)	Woodland within rural land and the undeveloped road reserve to the west (Photo 25 and Photo 26), rural land to the south (Photo 19, Photo 20 and Photo 21) and rural residential land to the northwest (Photo 24).
5	Class A Forest	Downslope >0–5°	Forest within the undeveloped road reserve and rural land to the southwest (Photo 18).
6	Class D Scrub	Flat/upslope (0°)	Scrub within the undeveloped road reserve to the west (Photo 27).
7	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Non-vegetated areas occupied by existing or proposed roads, buildings and dams are excluded from classification under Clause 2.2.3.2 (e) of AS 3959 (Photo 34 and Photo 35)
8	Class B Woodland	Flat/upslope (0°)	Woodland vegetation to be retained within the project area as part of the development (Photo 1, Photo 2, Photo 3, Photo 4, Photo 5, Photo 6, Photo 7, Photo 8 and Photo 9).
9	Class D Scrub	Flat/upslope (0°)	Kunzea scrub thickets within the north of the project area (Photo 10 and Photo 11).
10	Excluded – Clause 2.2.3.2 [c]	N/A	Two areas of future wetland revegetation <0.25 ha in area and not within 20 m of the proposed lots or other areas of classified vegetation.
11	Class B Woodland	Flat/upslope (0°)	Remainder of future wetland revegetation areas, classified as Woodland based on Wetland Assessment and Revegetation Report (TME 2014).
12	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Grassland vegetation within the project area to be modified to a low threat state and maintained <50 mm in accordance with the Shire of Dardanup annual firebreak notice (Appendix C) (Photo 12, Photo 13, Photo 14, Photo 15, Photo 16 and Photo 17).



Legend:

- Project area
- 100m assessment area
- Proposed infill vegetation
- Proposed wetland vegetation
- Cadastral boundary

Vegetation classification

- Class A Forest
- Class B Woodland
- Class D Scrub
- Class G Grassland
- Excluded under Clause 2.2.3.2 (c)
- Excluded under Clauses 2.2.3.2 (e) & (f)
- Area to be modified to a non-vegetated or low threat state
- 50,000L firefighting water tank
- Surface elevation (mAHD)
- Roads (MRWA)

strategen JBS&G

Job No: 58436	
Client: Mark Muir	
Version: A	Date: 22-May-2020
Drawn By: cthatcher	Checked By: CT

Scale 1:3,500

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 6 Sand Pits Road, Crooked Brook, WA

PRE-DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

FIGURE 3

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Image Reference: www.nearmap.com© - Imagery Date: 2 March 2020.

3.4 Assessment outputs

3.4.1 Bushfire Attack Level (BAL) contour assessment

The Development Guide Plan (Figure 1) indicates a proposed lot layout; therefore, Strategen-JBS&G has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the project area (Figure 4). The Method 1 procedure incorporates the following factors:

- state-adopted FDI 80 rating
- vegetation classification
- effective slope
- distance maintained between proposed development areas and the classified vegetation.

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts and achieve compliant ratings of BAL-29 or lower.

The BAL contours are based on:

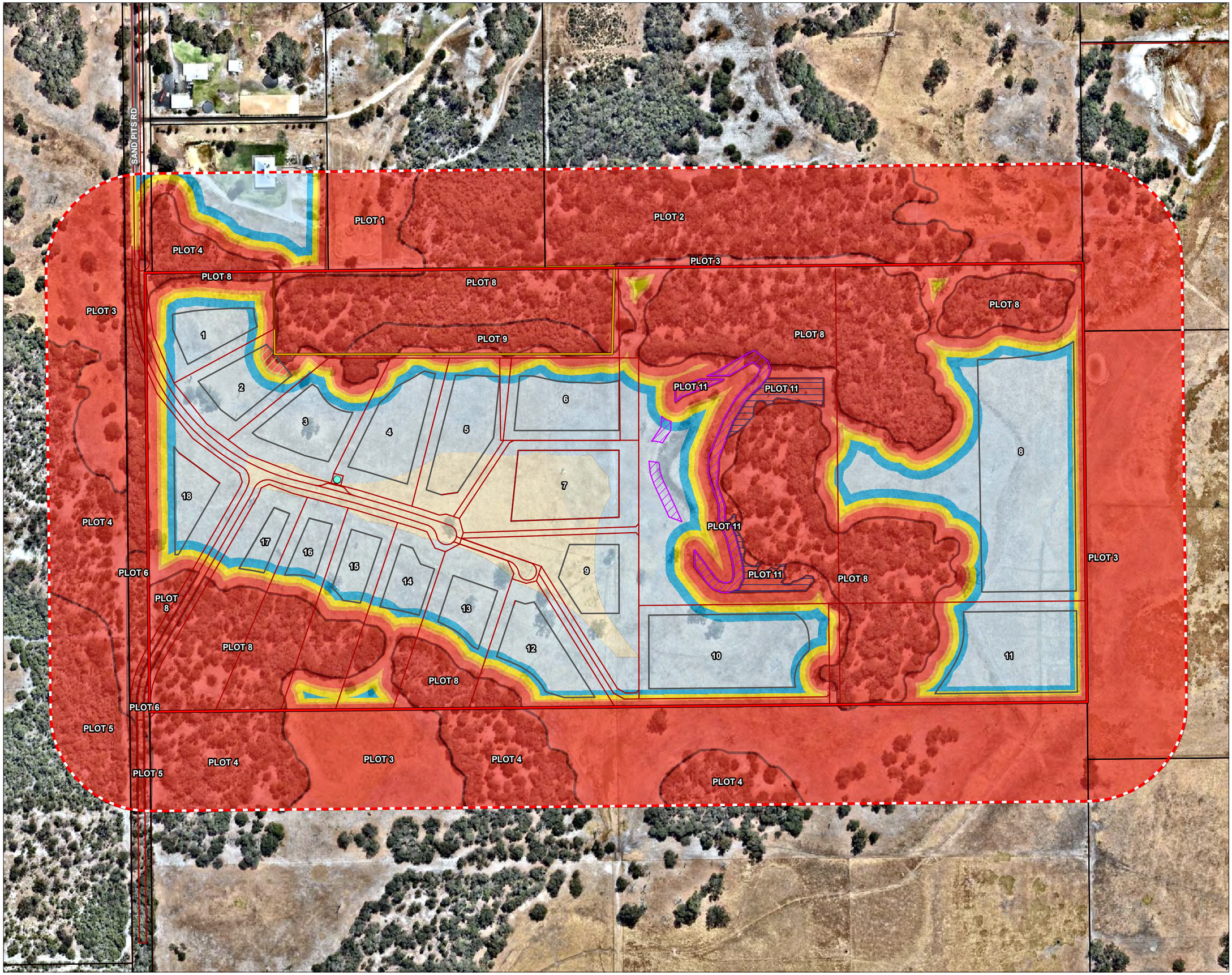
- the vegetation classifications and effective slope observed at the time of inspection, as well as consideration of the proposed on-site fuel modification, resultant vegetation exclusions and separation distances achieved in line with the Development Guide Plan
- consideration of revegetation within the resource enhancement wetland in proposed Lot 8 in accordance with the Wetland Edge Assessment and Revegetation Report (Calibre 2014).

Results of the BAL contour assessment are detailed in Table 3 and illustrated in Figure 4. The highest BAL applicable to the external boundary of the proposed 'Developable Areas' within each lot is BAL–FZ, which applies only to Lot 2. An APZ setback of 14 m within Lot 2 will result in future habitable development being able to achieve a rating of BAL-29 as detailed in Table 3. On this basis, all future habitable development will be subject to BAL-29, which achieves compliance with Acceptable Solution A1.1 (Development location) and Acceptable Solution A2.1 (Asset Protection Zone) of the Guidelines.

Table 3: BAL contour assessment results

Lot	Vegetation plot	Vegetation classification	Effective slope	Separation distance	Highest BAL
Lot 1	Plot 8	Class B Woodland	Flat/upslope (0°)	21 m	BAL–19
Lot 2	Plot 8	Class B Woodland	Flat/upslope (0°)	0 m	BAL–FZ*
Lot 3	Plot 9	Class D Scrub	Flat/upslope (0°)	28 m	BAL–12.5
Lot 4	Plot 9	Class D Scrub	Flat/upslope (0°)	22 m	BAL–19
Lot 5	Plot 9	Class D Scrub	Flat/upslope (0°)	24 m	BAL–19
Lot 6	Plot 9	Class D Scrub	Flat/upslope (0°)	21 m	BAL–19
Lot 7	Plot 11	Class B Woodland	Flat/upslope (0°)	75 m	BAL–12.5
Lot 8	Plot 3	Class G Grassland	Flat/upslope (0°)	10 m	BAL–29
Lot 9	Plot 11	Class B Woodland	Flat/upslope (0°)	76 m	BAL–12.5
Lot 10	Plot 8	Class B Woodland	Flat/upslope (0°)	21 m	BAL–19
	Plot 11	Class B Woodland	Flat/upslope (0°)	22 m	BAL–19
Lot 11	Plot 3	Class G Grassland	Flat/upslope (0°)	10 m	BAL–29
	Plot 8	Class B Woodland	Flat/upslope (0°)	23 m	BAL–19
Lot 12	Plot 8	Class B Woodland	Flat/upslope (0°)	23 m	BAL–19
	Plot 3	Class G Grassland	Flat/upslope (0°)	10 m	BAL–29
Lot 13	Plot 8	Class B Woodland	Flat/upslope (0°)	23 m	BAL–19
Lot 14	Plot 8	Class B Woodland	Flat/upslope (0°)	20 m	BAL–19
Lot 15	Plot 8	Class B Woodland	Flat/upslope (0°)	17 m	BAL–29
Lot 16	Plot 8	Class B Woodland	Flat/upslope (0°)	21 m	BAL–19
Lot 17	Plot 8	Class B Woodland	Flat/upslope (0°)	17 m	BAL–29
Lot 18	Plot 8	Class B Woodland	Flat/upslope (0°)	16 m	BAL–29

Notes:
*The Lot 2 Developable Area is subject to BAL-40/FZ without further controls. In order to mitigate this, an APZ setback of 14 m off the northeast boundary of the Developable Area is required for future habitable development within the lot to achieve BAL-29. Given the significant size of the Developable Area within Lot 2, the required APZ is deemed appropriate, whilst still being able to achieve a suitably sized dwelling.



Legend:

- Project area
- 100m assessment area
- Proposed infill vegetation
- Proposed wetland vegetation
- Cadastral boundary
- Classified vegetation
- 14 m habitable building setback (APZ)

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW

- 50,000L firefighting water tank
- Developable area
- Proposed development
- Covenant area
- Roads (MRWA)

stategen JBS&G

Job No: 58436	
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Scale 1:3,500

0 50 100
metres

Coord. Sys. GDA 1994 MGA Zone 50

Lot 6 Sand Pits Road, Crooked Brook, WA

BAL CONTOUR MAP

FIGURE 4

File Name: \\008pmpmr004v001.jbsg.aust\JBS Perth\Projects\1)Open\Mark Muir\58463 Updated BMP Lots 6 & 7 Sandpits Rd, Crooked Brook\GIS\Maps\R01_Rev_A\58463_04_BALs.mxd
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4. Identification of bushfire hazard issues

4.1 Bushfire context

Worst case (adverse) bushfire weather conditions can occur during the summer months in southwest WA when a low pressure trough forms off the west coast and strong winds develop from the north or northeast. These conditions are sometimes associated with 'Extreme' or 'Catastrophic' fire dangers, which are consistent with very high temperatures, low relative humidity and very strong winds. Based on the predominant summer climatic conditions of the local area, 'Extreme' and 'Catastrophic' fire dangers normally occur less than 5% of the time during the designated bushfire season, which equates to around six days between December and March (McCaw & Hanstrum 2003). However, there are no long bushfire runs through dense vegetation north of the project area, with the existing vegetation extent in this direction being fragmented.

Predominant bushfire weather conditions (those that occur 95% of the time during the designated bushfire season) for Crooked Brook generally correlate with average January climatic conditions. Based on available data from the closest weather station (Donnybrook), the January prevailing summer winds for the area are from the east and southeast in the morning and southwest in the afternoon (BoM 2017). The predominant bushfire weather conditions correlate with an average Fire Danger Index (FDI) rating of 'High', as determined using the Commonwealth Science and Industrial Research Organisation (CSIRO) Fire Danger and Fire Spread Calculator (CSIRO 1999).

Strategen therefore considers a fire front approaching the project area from the southwest to be the worst case bushfire scenario due to the presence of a potential bushfire run in this direction within remnant bushland vegetation on surrounding rural and rural residential land. In the event of a bushfire under this scenario, safest access and egress would be in a northerly direction via Sand Pits Road.

There are also emergency service resources in the Shire of Dardanup that could provide a prompt bushfire suppression response to the project area within 30 minutes, including bushfire brigades at Dardanup West and Dardanup Central.

The bushfire risks to proposed development posed by post development hazards can be managed through standard application of acceptable solutions under the Guidelines, including provision for and implementation of Asset Protection Zones (APZs), relevant bushfire construction standards under AS 3959, provision of adequate emergency water supply and vehicular access, as well as through a direct bushfire suppression response if required.

These responses have been factored in to proposed development early in the planning process to ensure a suitable, compliant and effective bushfire management outcome is achieved for protection of future life and property assets.

4.2 Bushfire hazard issues

Examination of strategic development design in accordance with the Development Guide Plan and the post-development BAL Contour assessment has identified the following specific bushfire hazard issues to be considered at future planning stages:

1. The Developable Area within Lot 2 is subject to BAL-40/FZ due to vegetation retained within the proposed conservation covenant in the northeast of the lot. Future habitable development constructed within the lot will require an APZ setback of 14 m from Class B Woodland vegetation (Plot 7, Flat/upslope), as per Figure 4.
2. In order the maintain the BAL ratings depicted on the BAL Contour map, all grassland within the project area, including within the resource enhancement wetland (Lot 8) is required to be maintained at a maximum height of 50 mm in accordance with requirements of the Shire of Dardanup Firebreak Notice (Appendix C).
3. The Class B Woodland classification that has been applied to the proposed wetland and infill vegetation will need to be confirmed at the subdivision stage, on completion of an updated Wetland Management Plan.
4. The Development Guide Plan includes an indicative road cross section, showing that drainage swales may be located on either side of the proposed public carriageways. This vegetation should be considered in a future BAL Contour assessment at the subdivision stage.

5. Assessment against the bushfire protection criteria

5.1 Compliance table

An acceptable solutions assessment against the bushfire protection criteria is provided in Table 4.

Table 4: Compliance with the bushfire protection criteria of the Guidelines

Bushfire protection criteria	Method of compliance Acceptable solutions	Proposed bushfire management strategies
Element 1: Location	A1.1 Development location	The BAL contour assessment (see Figure 4 and Table 3) indicates that the Developable Area of all proposed lots are sufficiently located to achieve BAL-29 or lower.
Element 2: Siting and design	A2.1 Asset Protection Zone	Future habitable development within the Lot 2 Developable Area will require a 14 m setback off the northeast boundary, to be managed as an APZ, in order to achieve BAL-29 (refer to Figure 4). All other proposed lots are already sufficiently sited with adequate separation to achieve BAL-29 or lower without any additional APZ controls. Maintenance of the BAL ratings depicted in Figure 4 will be dependent on ongoing management of current cleared and low fuel areas as per the Shire of Dardanup annual firebreak notice (including grassland maintained at <50 cm height; Appendix C), in accordance with Schedule 1 of the Guidelines (Appendix D) and management measures outlined in this BMP.
Element 3: Vehicular access	A3.1 Two access routes	Current access to the project area is limited to Sand Pits Road from the north, which terminates at the project area. The currently unconstructed Sand Pits road reserve extends to the south, connecting to Poad Road. As identified on the Development Guide Plan, the proposed extension of Sand Pits Road through the project area will provide a connection to Poad Road to the south and negate the existing legacy dead end. The proposed internal access network will therefore provide two access points onto Sand Pits Road, including: • Sand Pits Road to the north, which provides the option of either travelling west on Dardanup Road West, which connects to South Western Highway, or continue north on Sand Pits Road, which connects to Garvey Road • Sand Pits Road to the south, which provides the option of travelling east along Poad Road and then north or south along Boyanup-Picton Road. If the development is to be staged, two access routes are to be provided during all stages of development.
	A3.2 Public road	The proposed public roads are to be constructed to the relevant technical requirements of the Guidelines (see Appendix E).
	A3.3 Cul-de-sac (including a dead-end-road)	The project area is currently serviced by a dead end (i.e. Sand Pits Road), which will be resolved as part of the proposed development, as discussed under A3.1 above. Proposed development will also result in one new compliant cul-de-sac of approximately 180 m in length, with a 20 m wide turnaround head at its eastern terminus. The proposed cul-de-sac will be constructed to meet the relevant technical requirements of the Guidelines (Appendix E). Inclusion of the cul-de-sac in the development design has occurred due to design restrictions resulting from protection of a resource enhancement wetland in the eastern portion of the site and vegetation retention along the northern and southern boundaries of the project area. It is understood that this access arrangement has been designed in consultation with planning authorities and provides the most desirable outcome from a planning and environmental perspective.

Bushfire protection criteria	Method of compliance Acceptable solutions	Proposed bushfire management strategies
	A3.4 Battle-axe	Battle-axe legs for Lots 6, 8, 9, 10, 11 and 12 are proposed due to design restrictions resulting from protection of a resource enhancement wetland in the eastern portion of the site and associated wetland revegetation as identified in Appendix A. The battle-axes will be compliant with acceptable solution A3.4 of the Guidelines in that they will be less than 600 m in length, will be 6 m wide and will comply with technical requirements of the Guidelines (see Appendix E). Private driveways longer than 50 m constructed along the battle-axe are to comply with A3.5, including provision of a 4 m trafficable surface with passing bays every 200 m. A shared private driveway (with reciprocal rights of access) will be provided as part of the battle-axe arrangements for Lots 9, 10, 11 and 12. In order to facilitate access along this shared course, and to allow firefighters to turn-around at 500 m intervals (as per requirements of A3.5) a compliant turnaround point will be constructed to allow vehicles to safely turn around adjacent to Lot 12.
	A3.5 Private driveway longer than 50 m	All private driveways longer than 50 m are to be constructed to the relevant technical requirements of the Guidelines (see Appendix E) including passing bays if driveways are longer than 200 m and turn-around areas for fire appliances where driveways are longer than 500 m. Turn-around areas additional to those shown on the DGP are expected to be required for the private driveways servicing future dwellings within Lots 8 and 11. In regard to Lot 8, the distance from the nearest public road turnaround point will exceed 500 m. For Lot 11, it is possible that the distance from the nearest turn-around point will exceed 500 m.
	A3.6 Emergency access way	N/A – the proposed development does not include any emergency access ways (EAWs).
	A3.7 Fire service access routes (perimeter roads)	N/A – the proposed development does not include any fire service access routes (FSARs).
	A3.8 Firebreak width	The Shire Dardanup annual firebreak notice (Appendix C) requires two metre wide, mineral earth internal perimeter firebreaks with 4 m vertical clearance around the boundary of all lots.
Element 4: Water	A4.1 Reticulated areas	N/A – the proposed subdivision is not located within an existing reticulated area.
	A4.2 Non-reticulated areas	In lieu of reticulated water supply to the project area, a dedicated 50 kL firefighting emergency water tank will be located along the proposed internal road network, adjacent to Lot 4 (see Figure 1 and Figure 4) and constructed in accordance with Acceptable Solution A4.2 and technical standards of the Guidelines (see Appendix F). This water tank will be installed by the developer and maintained by the Shire. The water supply tank will be equipped with a hardstand and turnaround area suitable for a type 3.4 fire appliance, suitable pump and 20 mm hose reel, which will provide suppression capability for each dwelling. All water tanks are to be fitted with 50 mm male camlock couplings with full flow valves in accordance with 'Category C Domestic Water Tanks in Bush Fire Prone Areas', as outlined in the Coupling Standard for Static Water Supplies to enable quick refill for fire appliances.
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	N/A – the proposed development will involve creation of multiple lots.

5.2 Additional management strategies

Strategen-JBS&G makes the following additional bushfire management recommendations to inform ongoing planning stages of the development.

5.2.1 Separation distances and fuel management

5.2.1.1 Asset Protection Zone (APZ)

The BAL contours identified in Figure 4 demonstrate that the 'developable areas' within the majority of the proposed rural residential lots are located within areas of BAL-29 or lower. Future habitable development within these lots will therefore achieve the minimum separation distances at all interfaces sufficient to achieve BAL-29 or lower without the need for additional APZ controls, except for proposed Lot 2.

The 'developable area' of Lot 2 is subject to BAL-40/FZ impacts due to vegetation retained within the proposed conservation covenant. In order for future habitable development to achieve BAL-29, a 14 m APZ setback will be required off the northeast boundary of the developable area, as depicted in Figure 4.

APZs are low fuel areas and are required to be maintained on a regular and ongoing basis by the land manager/authority at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition status all year round. Overstorey trees can be retained to some extent within the APZ provided all flammable material including understorey grasses, weeds, shrubs and scrub are removed from the fuel profile, essentially creating a managed parkland cleared landscape, which would result in a diminishing level of radiant heat, ember attack and fire rate of spread at the dwelling interface.

Requirements under the Guidelines for APZs are included in Appendix D.

APZs around building sites are to be implemented prior to construction of dwellings and managed on a regular and ongoing basis by the landowner. Management will involve slashing/mowing of grassland and weeds to height of less than 5 cm, which is driven through compliance with the Shire of Dardanup annual firebreak notice (refer to Appendix C).

5.2.1.2 On-site fuel management

Maintenance of the BAL ratings depicted in Figure 4 will be dependent on ongoing management of the current extent of on-site cleared and low fuel areas, as required under the Shire of Dardanup annual firebreak notice (Appendix C). This level of fuel maintenance meets minimum APZ requirements as per Guideline acceptable solution A2.1 and will ensure development is avoided throughout all areas of BAL–FZ and BAL–40 as per Guideline acceptable solution A1.1.

Following lot title, these areas will need to be maintained by the developer until such time that the land is transferred or sold.

In reference to the required on-site fuel management, the Shire of Dardanup annual firebreak notice (Appendix C) requires all grass be maintained at a height no greater than 5 cm on all properties within the 'Small Holding' zone.

5.2.1.3 Road verge fuel management

Existing and proposed road verges that have been excluded as low threat are to be managed to ensure the understorey and surface fuels remain in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Ongoing road verge management is the responsibility of the Shire.

5.2.2 Increased building construction standards

Strategen has undertaken a BAL contour assessment across the project area and determined that, depending on building location, all 18 of the proposed lots have potential to require implementation of building construction standards under AS 3959 (i.e. all proposed developable areas are subject to BAL-12.5 or higher; see Figure 4).

All proposed developable areas have the capacity to achieve minimum separation distances for a rating of BAL-29 or lower, meaning that no development will occur within areas of BAL–FZ or BAL–40 in accordance with Guidelines acceptable solution A 1.1. Land within the project area that is unaffected by a BAL rating on the BAL contour map is considered to be BAL–Low, where there is insufficient risk to warrant specific building construction requirements.

Some of the proposed lots include areas of BAL-Low and, depending on final building location, may not be subject to bushfire building construction requirements. The BAL contours are based on proposed Development Guide Plan design and implementation of the bushfire management measures documented in this BMP.

The BAL contour map outlined in Figure 4 is considered suitable for the purposes of informing subdivision and future building permit approval processes; however, acceptance of the BAL contour map at future planning or building permit stages is at the discretion of the Shire and reassessment of the BAL for individual lots located in designated bushfire prone areas may be required at the subdivision and/or building permit stage in accordance with WA planning and building legislation.

Future buildings will need to be constructed to the assessed BAL rating, either in accordance with this BMP or future reassessment of the BAL.

5.2.3 Staging of access

If development (and therefore construction of vehicular access) is to occur on a staged basis, vehicular access arrangements will need to ensure that all occupiers and visitors are provided with at least two access routes at all stages. This can be achieved via construction of access in advance of stages or through provision of temporary compliant cul-de-sacs/emergency access ways until two formal access roads are available.

5.2.4 Revegetation Plan

The BAL contour assessment is reliant on all revegetation occurring in accordance with the current Wetland Edge Assessment and Revegetation Plan (refer to environmental plan in Appendix A). Any revisions made to this plan will need to be accounted for in a future subdivision BMP to ensure the vegetation classifications, and subsequent BAL contours remain accurate.

5.2.5 Notification on title

Notification is to be placed on the Title of proposed lots subject to BAL-12.5 or higher (either through condition of subdivision or other head of power) to ensure landowners/proponents and prospective purchasers are aware that their lot is subject to an approved BMP and BAL assessment.

5.2.6 BMP compliance

A BMP compliance report will be prepared prior to issue of title to validate and confirm that relevant management measures of this BMP have been implemented appropriately to achieve the intended bushfire management outcomes and compliance with bushfire protection criteria.

5.2.7 Compliance with annual firebreak notice

The developer/land manager and prospective land purchasers are to comply with the current Shire of Dardanup annual firebreak notice (refer to Appendix C).

Relevant firebreak notice requirements include:

- bare earth mineral firebreaks of 2 m width and 4 m height maintained within and adjacent to the lot boundary and surrounding all haystacks
- fire hazards on properties to be slashed to a height of no more than 50 mm and flammable material must be removed from the property.

Landowners of Lots 12 to 17 are encouraged to apply for an exemption from the Shire's annual firebreak notice (fire prevention order) in order to provide a single firebreak surrounding the vegetation on these lots.

6. Responsibilities for implementation and management of the bushfire measures

This BMP has been prepared as a strategic guide to demonstrate how development compliance will be delivered at future planning stages in accordance with the Guidelines. Aside from the preparation of future BMPs to accompany future subdivision and development applications where appropriate, there are no further items to implement, enforce or review at this strategic stage of the planning process.

Future BMPs prepared for subsequent subdivision and development applications are to meet the relevant commitments outlined in this strategic level BMP, address the relevant requirements of SPP 3.7 (i.e. Policy Measures 6.4 and 6.5 respectively) and demonstrate in detail how the proposed development will incorporate the relevant acceptable solutions or meet the performance requirements of the Guidelines. Future BMPs are to include the following detailed information:

- conformation of proposed lot layout, including retained vegetation, revegetation, conservation covenants and wetland conservation areas
- detailed revegetation design in regard to the wetland conservation area, consistent with the provisions of this BMP and Appendix A
- confirmation of post development classified vegetation extent and effective slope
- BAL contour map to confirm that proposed development areas will achieve BAL–29 or lower
- width and alignment of compliant APZs/setbacks
- confirmation of how bushfire management will be addressed during development staging
- vehicular access provisions, including demonstration that a minimum of two access routes will be achieved for each stage of development in accordance with Acceptable Solution A3.1
- confirmation of water supply provisions with regards to the firefighting water tank
- provisions for notification on Title for any future lots with a rating of BAL–12.5 or greater as a condition of subdivision
- compliance requirements with the current annual firebreak notice as amended
- construction of Class 1, 2, 3 or associated 10a buildings in accordance with AS 3959 to the assessed BAL rating
- requirement for a BMP compliance report as condition of subdivision
- compliance with the bushfire protection criteria
- proposed implementation and audit program outlining all measures requiring implementation and the appropriate timing and responsibilities for implementation.

On the basis of the information contained in this BMP, Strategen-JBS&G considers the bushfire hazards both within and adjacent to the project area and the associated bushfire risks are readily manageable through standard management responses outlined in the Guidelines and AS 3959. Strategen-JBS&G considers that on implementation of the proposed management measures, the project area will be able to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959.

7. References

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8. Limitations

Scope of services

This report ("the report") has been prepared by Strategen-JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen-JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen-JBS&G has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen-JBS&G has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen-JBS&G has also not attempted to determine whether any material matter has been omitted from the data. Strategen-JBS&G will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen-JBS&G. The making of any assumption does not imply that Strategen-JBS&G has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen-JBS&G disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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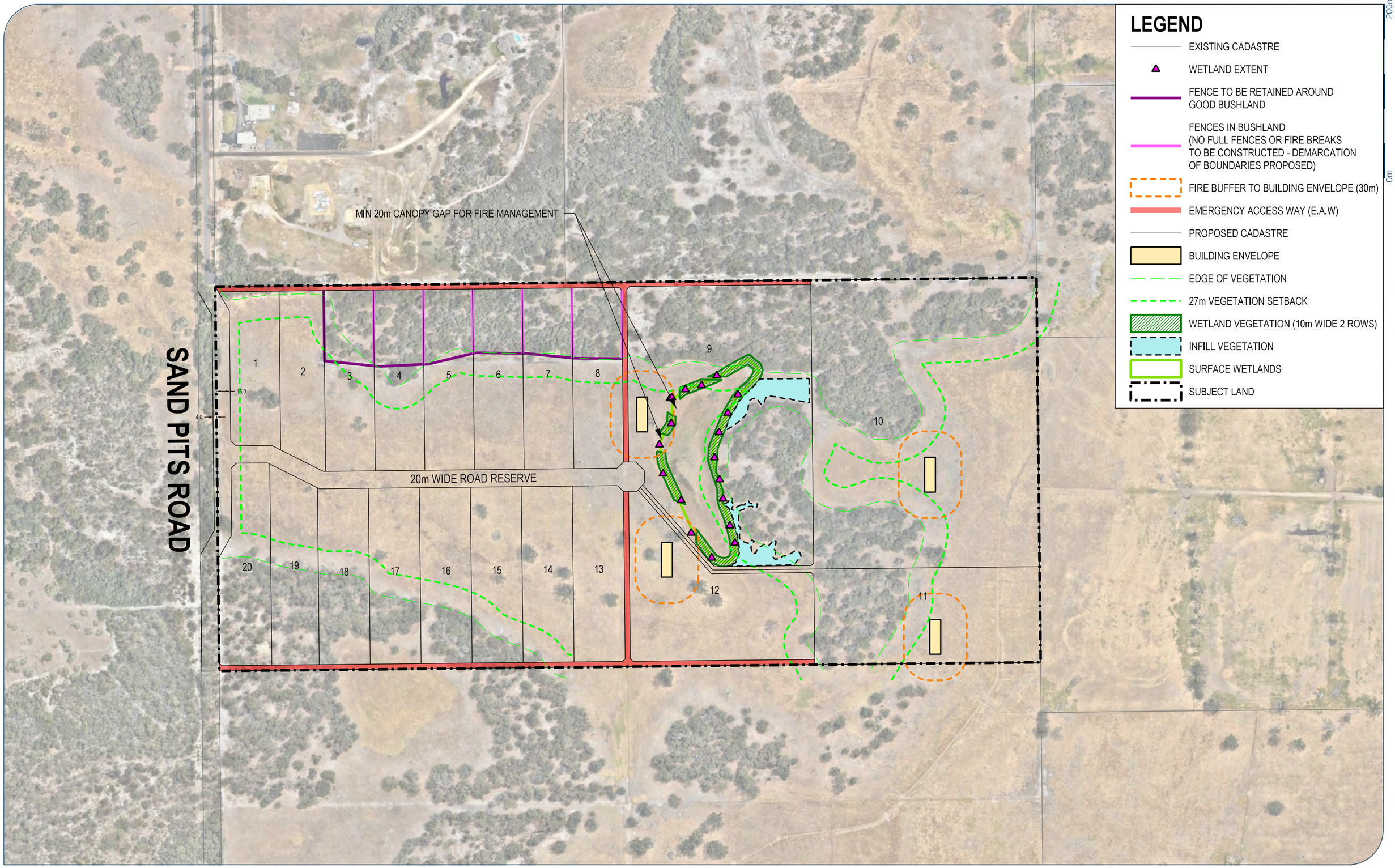
Appendix A Extent of proposed wetland vegetation



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ENVIRONMENTAL PLAN

Lot 6 Sand Pits Road, Crooked Brook

Plan No: 16-003446P-MP-02B

Date:	13.12.2016
Rev:	B
Scale:	A1 @1:2000, A3 @ 1:4000
Co-ords:	MGA
Aerial:	Nearmap

This plan has been prepared for planning purposes. Areas, contours and dimensions shown are subject to survey.

Figure 3 - Environmental Plan

Appendix B Site photographs

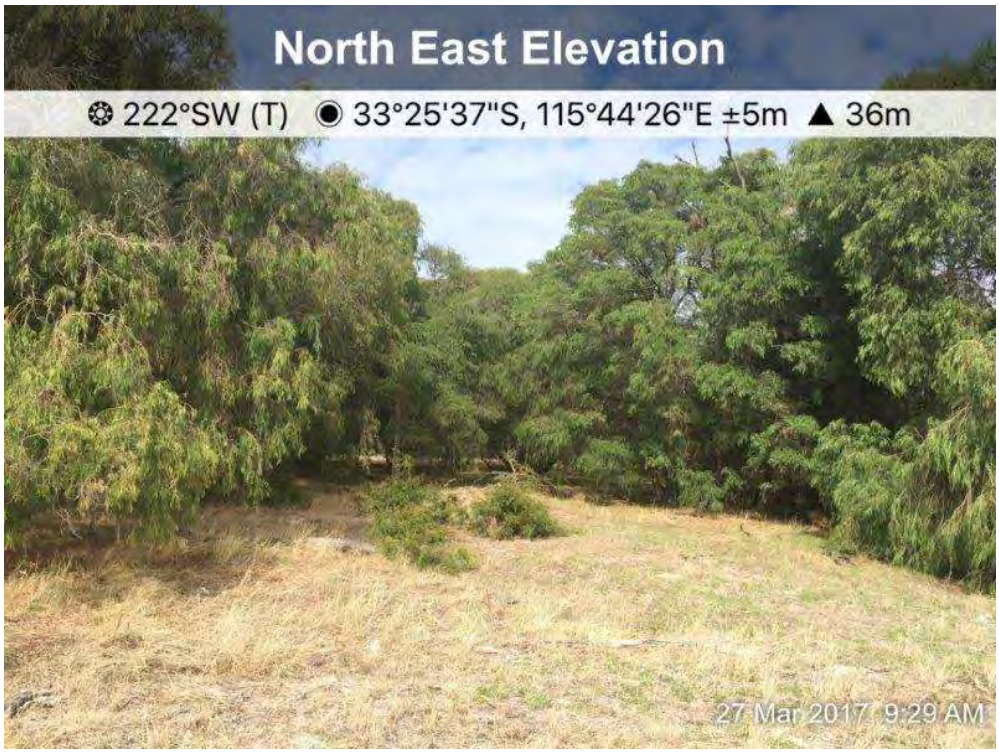


Photo 1: On-site Class B woodland to the southeast (Plot 8)

Photo 2: On-site Class B woodland to the southwest (Plot 8)

Photo 3: On-site Class B woodland to the southwest (Plot 8)

Photo 4: On-site Class B woodland to the southwest (Plot 8)

Photo 5: On-site Class B woodland to the northeast (Plot 8)

Photo 6 On-site Class B woodland to the northeast (Plot 8)

Photo 7: On-site Class B woodland to the north (Plot 8)

Photo 8: On-site Class B woodland to the north (Plot 8)

Photo 9: On-site Class B woodland to the north (Plot 8)

Photo 10: On-site Class D scrub to the north (Plot 9)

Photo 11: On-site Class D scrub to the north (Plot 9)

Photo 12: On-site cleared and excluded areas (Clause 2.2.3.2 f) (Plot 12)

Photo 13: On-site cleared and excluded areas (Clause 2.2.3.2 f) (Plot 12)

Photo 14: On-site cleared and excluded areas (Clause 2.2.3.2 f) (Plot 12)

Photo 15: On-site cleared and excluded areas (Clause 2.2.3.2 f) (Plot 12)

Photo 16: On-site cleared and excluded areas (Clause 2.2.3.2 f) (Plot 12)

Photo 17: On-site cleared and excluded areas (Clause 2.2.3.2 f) (Plot 12)

Photo 18: Off-site Class A forest southwest of project area (Plot 5)

Photo 19: Off-site Class B woodland south of project area (Plot 4)

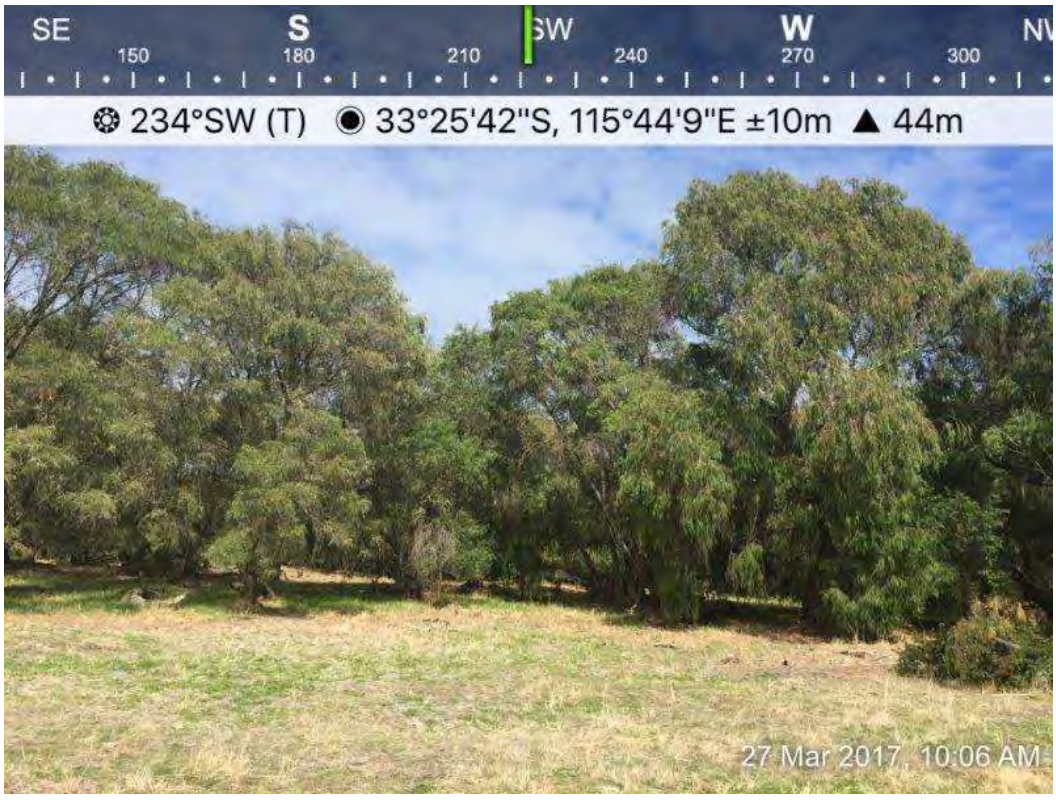


Photo 20: Off-site Class B woodland south of project area (Plot 4)

Photo 21: Off-site Class B woodland south of project area (Plot 4)

Photo 22: Off-site Class B woodland north of project area (Plot 2)

Photo 23: Off-site Class B woodland north of project area (Plot 2)

Photo 24: Off-site Class B woodland within rural residential land northwest of project area (Plot 4)

Photo 25: Off-site Class B woodland within road reserve west of project area (Plot 4)

Photo 26: Off-site Class B woodland within road reserve west of project area (Plot 4)

Photo 27: Off-site Class D scrub within road reserve west of project area (Plot 6)

Photo 28: Off-site Class G grassland within rural residential land north of project area (Plot 1)

Photo 29: Class G Grassland south of project area (Plot 3)

Photo 30: Class G Grassland south of project area (Plot 3)

Photo 31: Class G Grassland south of project area (Plot 3)

Photo 32: Class G Grassland south of project area (Plot 3)

Photo 33: Class G Grassland south of project area (Plot 3)

Photo 34: Off-site cleared and excluded areas (Clause 2.2.3.2 e) northwest of project area (Plot 7)

Photo 35: Off-site cleared and excluded areas (Clause 2.2.3.2 e and f) north of project area (Plot 7)

Appendix C Shire of Dardanup annual firebreak notice

Shire of Dardanup

FIRE PREVENTION ORDER
FIRST AND FINAL NOTICE

With reference to Section 33 of the Bush Fires Act 1954, you are required to carry out fire prevention work on land owned or occupied by you, in accordance with the provisions of this order.

This order is valid for the period 1 July – 30 June annually. Work **must** be completed by the **30 November** **annually** and maintained until the close of the **Restricted Burning Period**.

PLEASE READ THIS NOTICE CAREFULLY
If you do not fully understand this notice, please contact Emergency & Ranger Services during office hours on 9724 0000 or your local Fire Control Officer to discuss.

PERSONS WHO FAIL TO COMPLY WITH THE REQUIREMENTS OF THE ORDER MAY BE ISSUED WITH AN INFRINGEMENT NOTICE PENALTY ($250.00) OR PROSECUTED WITH AN INCREASED PENALTY (MAXIMUM PENALTY $5,000).
ADDITIONALLY THE SHIRE OF DARDANUP MAY CARRY OUT THE REQUIRED WORK AT COST TO THE OWNER/OCCUPIER.

RESTRICTED BURNING PERIOD
Burning Permits Required

1 November to 13 December
annually

PROHIBITED BURNING PERIOD
No Fires Permitted

14 December to 15 March
annually
(subject to extension)

RESTRICTED BURNING PERIOD
Burning Permits Required

16 March to 15 May
annually
(subject to extension)

RESIDENTIAL, INDUSTRIAL, DEVELOPMENT, RESTRICTED USE, MIXED BUSINESS AND COMMERCIAL ZONES*

- All flammable material/vegetation (except living trees) MUST be slashed or grazed to a height that does not exceed 50 millimetres and flammable material MUST be removed.

SMALL HOLDINGS ZONE*

- BARE EARTH firebreaks of 2 metres width and 4 metres in height must be maintained within and adjacent to the lot boundary and surrounding all haystacks.
- Fire hazards on properties must be slashed to a height of no more than 50 millimetres and flammable material MUST be removed from the property. Where slashing is not possible, material/vegetation must be burnt back or sprayed with suitable herbicide to prevent growth until the end of the restricted period.
- Burn piles can be kept and approved under the following conditions:
  - a burn pile is to be no closer than 10 metres to any structure; and
  - a 2 metre wide and 4m in height firebreak is to be placed around the perimeter of any burn pile.
- All wood piles during the restricted and prohibited burning period are to be stored securely away from the building.

GENERAL FARMING, RESTRICTED USE AND TOURIST ZONES*

- Irrigated land is defined as land that is watered, kept fully watered and is maintained in a non-flammable state for the whole of the restricted and prohibited burning periods.
- **Non Irrigated lots** – BARE EARTH firebreaks of 2 metres width and 4 metres in height must be maintained within and adjacent to the lot boundary where it adjoins a road and/or rail reserve.
- **Irrigated lots** – firebreaks are **NOT** required on that lot of land where the lot is being **actively and regularly irrigated throughout the restricted and prohibited burning periods.**
- Irrigation channels that are situated **WITHIN** and adjacent to a lot boundary will be accepted as a firebreak provided the irrigation channel is utilised on that property throughout the **restricted and prohibited burning periods.**
- Burn piles are approved under the following conditions:
  - a burn pile is to be no closer than 10 metres to any structure; and
  - a 2 metre wide and 4m in height firebreak is to be placed around the perimeter of any burn pile.
- All wood piles during the restricted and prohibited burning period are to be stored securely away from the building.

PLANTATIONS

- BARE EARTH firebreaks of 15 metres width and 4 metres in height must be maintained within and adjacent to the perimeter of plantations with 6-10 metres wide internal firebreaks between compartments.
- Where power lines pass through plantation areas, firebreaks must be in accordance with Western Power specifications.

WHERE AND HOW TO OBTAIN BURNING PERMITS

Applications for burning permits are available from your local Bush Fire Control Officer at no cost.

The local Bush Fire Control Officer will note the relevant conditions you must comply with on your burning permit.

You are advised that Burning Permits are automatically invalidated on days of "very high" "severe", "extreme" or "catastrophic" fire danger.

Garden Refuse Urban Areas (town sites):
No garden refuse is permitted to be burnt on the ground, in the open air or in outdoor incinerator within the urban areas of Dardanup, Eaton and Burekup town sites at any time of the year unless a permit to burn has first been obtained from a Fire Control Officer for special circumstances such as a large block that needs hazard reduction.

All Other Areas in Shire of Dardanup:
Pursuant to section 24G(2) and section 25(1a) of the Bush Fires Act 1954, the burning of garden refuse and camp and cooking fires is prohibited in all areas within the Shire of Dardanup during the **Prohibited Burning Period**. Furthermore, pursuant to section 24G(2) the burning of garden refuse and camp and cooking fires are prohibited within the Shire of Dardanup during the **Restricted Burning Period** unless a permit to burn has first been obtained from a Fire Control Officer.

Solid Fuel Cooking Appliances (e.g.: pizza oven/outdoor barbeque or outdoor stove):
The use of enclosed solid fuel cooking appliances is prohibited in all areas within the Shire of Dardanup during the Prohibited and Restricted Burning Period UNLESS;

- the fire rating is below VERY HIGH;
- is fitted with an effective spark arrestor;
- an area of 2m surrounding the appliance is cleared from flammable materials;
- running water is on site and is accessible;
- a responsible able body adult is in attendance throughout and;
- the fire is completely extinguished when cooking is complete.

FIREBREAK VARIATIONS/EXEMPTIONS

If it is considered impractical for any reason to clear firebreaks or remove flammable materials from any land as required by this Order, you should make written application to the Shire of Dardanup **no later than 30 September each year** and include a plan of your land detailing your fire prevention measures to abate fire hazards on the land. The prescribed Firebreak Variation/Exemption Forms are available from the Shire of Dardanup offices. If your request for a variation/exemption is not granted, you must comply with the requirements of this Order.

For further information please call the Shire of Dardanup 9724 0000 or your local Fire Control Officer.

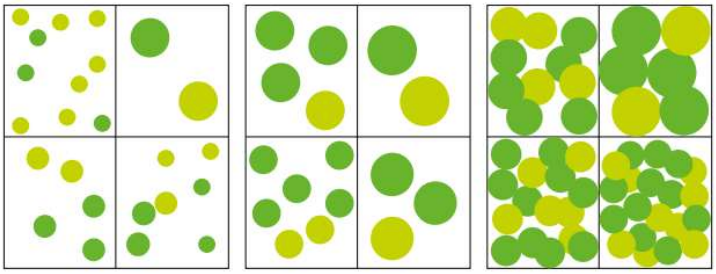
FOR ALL FIRE EMERGENCIES, PLEASE DIAL "000"

*Zones defined by the Shire of Dardanup Town Planning Scheme No.3.

Appendix D APZ standards (Schedule 1 of Guidelines)

Schedule 1: Standards for Asset Protection Zones

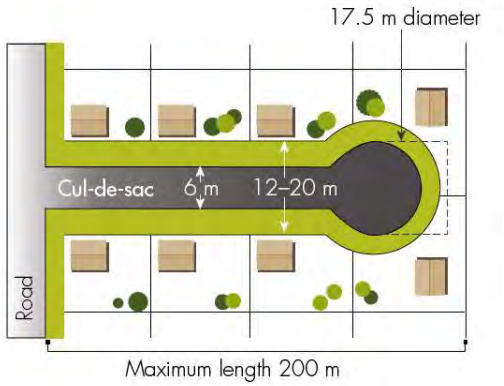
- **Fences:** within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- **Objects:** within 10 metres of a building, combustible objects must not be located close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

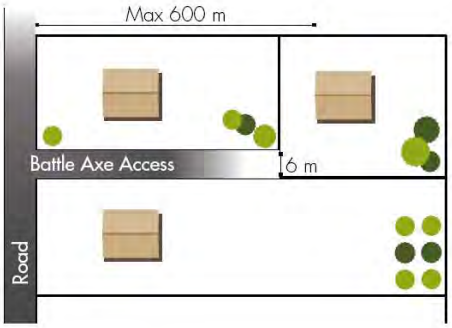


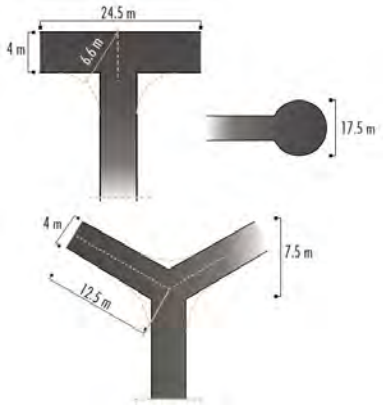
- **Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than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

Appendix E Vehicular access technical standards of the Guidelines

Public roads	
Acceptable solution A3.2	A public road is to meet the requirements in Table 1, Column 1.
Explanatory note E3.2	Trafficable surface: Widths quoted for access routes refer to the width of the trafficable surface. A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metre wide paving one metre wide constructed road shoulders. In special circumstances, where eight lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of 90 metres may be provided subject to the approval of both the local government and Department of Fire and Emergency Services. Public road design: All roads should allow for two-way traffic to allow conventional two-wheel drive vehicles and fire appliances to travel safely on them. 

Cul-de-sac (including a dead-end road)	
Acceptable solution A3.3	A cul-de-sac and/ or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/ or will need to be demonstrated by the proponent), the following requirements are to be achieved: • Requirements in Table 1, Column 2 • Maximum length: 200 metres (if public emergency access is provided between cul-de-sac heads maximum length can be increased to 600 metres provided no more than eight lots are serviced and the emergency access way is no more than 600 metres) • Turn-around area requirements, including a minimum 17.5 metre diameter head.
Explanatory note E3.3	In bushfire prone areas, a cul-de-sac subdivision layout is not favoured because they do not provide access in different directions for residents. In some instances it may be possible to provide an emergency access way between cul-de-sac heads to a maximum distance of 600 metres, so as to achieve two-way access. Such links must be provided as right of ways or public access easements in gross to ensure accessibility to the public and fire services during an emergency. A cul-de-sac in a bushfire prone area is to connect to a public road that allows for travel in two directions in order to address Acceptable Solution A3.1. 

Battle-axe	
Acceptable solution A3.4	Battle-axe access leg should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) all of the following requirements are to be achieved: • Requirements in Table 1, Column 3 • Maximum length: 600 metres • Minimum width: six metres.
Explanatory note E3.4	In bushfire prone areas, lots with battle-axe access legs should be avoided because they often do not provide two-way access and egress for residents and may be easily blocked by falling trees or debris. In some instances, however; it may be appropriate for battle-axe access to be used to overcome specific site constraints. Where used, they should comply with the minimum standards for private driveways. Passing bays should be provided at 200 metre intervals along battle-axe access legs to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres. Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at house sites and at 500 metre intervals along the access leg. 

Private driveway longer than 50 metres	
Acceptable solution A3.5	A private driveway is to meet all of the following requirements: • Requirements in Table 1, Column 3 • Required where a house site is more than 50 metres from a public road • Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres) • Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house • Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes • All-weather surface (i.e. compacted gravel, limestone or sealed).
Explanatory note E3.5	For a driveway shorter than 50 metres, fire appliances typically operate from the street frontage however where the distance exceeds 50 metres, then fire appliances will need to gain access along the driveway in order to defend the property during a bushfire. Where house sites are more than 50 metres from a public road, access to individual houses and turnaround areas should be available for both conventional two-wheel drive vehicles of residents and type 3.4 fire appliances. Turn-around areas should be located within 50 metres of a house. Passing bays should be available where driveways are longer than 200 metres and turn-around areas in driveways that are longer than 500 metres. Circular and loop driveway designs may also be considered. These criteria should be addressed through subdivision design. Passing bays should be provided at 200 metre intervals along private driveways to allow two-way traffic. The passing bays should be a minimum length of 20 metres, with the combined width of the passing bay and the access being a minimum of six metres. Turn-around areas should allow type 3.4 fire appliances to turn around safely (i.e. kerb to kerb 17.5 metres) and should be available at the house sites and at 500 metre intervals along the driveway. 

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

Appendix F Water technical standards of the Guidelines

Non-reticulated areas	
Acceptable solution A4.2	Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet the following requirements: • Volume: minimum 50,000 litres per tank • Ratio of tanks to lots: minimum one tank per 25 lots (or part thereof) • Tank location: no more than two kilometres to the further most house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turnaround time at legal road speeds • Hardstand and turn-around areas suitable for a type 3.4 fire appliance (i.e. kerb to kerb 17.5 metres) are provided within three metres of each water tank • Water tanks and associated facilities are vested in the relevant local government.
Explanatory note E4.2	A procedure must be in place to ensure that water tanks are maintained at or above the designated capacity, including home tanks on single lots, at all times. This could be in the form of an agreement with the local government and the fire service.

Document Status

Report version	Rev No.	Purpose	Author	Reviewed and Approved for Issue	
				Name	Date
Final Report	Rev 0	For client use	Louisa Robertson (BPAD 36748, Level 1)	Zac Cockerill (BPAD 37803, Level 2)	22 May 2020
Final Report	**Rev 0**	**Updated in accordance with WAPC Schedule of Modifications**	**Louisa Robertson (BPAD 36748, Level 1)**	**Zac Cockerill (BPAD 37803, Level 2)**	**30 September 2020**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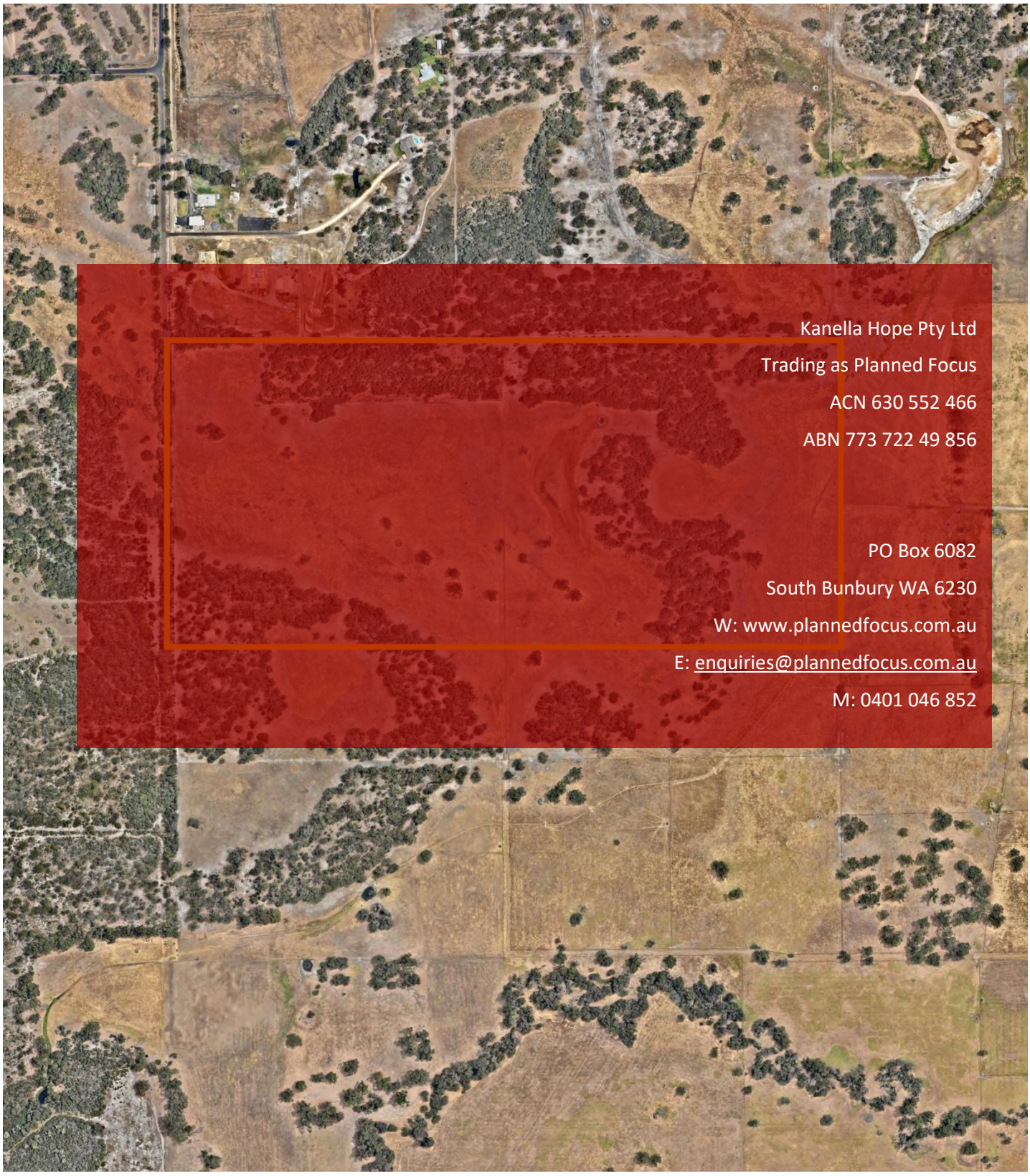

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