

Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road,
Serpentine LSP

Project No: EP20-064(02)

**Prepared for Stron Pty Ltd
March 2021**



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

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

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Executive Summary

Stron Pty Ltd (the proponent) is seeking to progress the *Lot 9001 Utley Road & Lot 9002 Wattle Road - Serpentine Structure Plan* (herein referred to as the 'structure plan') prepared by HEX Design and Planning on behalf of the proponent. The structure plan outlines the proposed development for rural residential purposes over Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine (herein referred to as 'the site'). The site is approximately 91.30 hectares (ha) in size and is generally bound by Wattle Road to the north, existing rural-residential landholdings to the east, Utley Road to the South and rural land to the west.

The entire site is located within a 'bushfire prone area' under the state-wide Map of Bush Fire Prone Areas prepared by the Office of Bushfire Risk Management (OBRM 2019). The identification of a site within an area declared as bushfire prone necessitates that a further assessment of the determined bushfire risk affecting the site (in accordance with *Australian Standard 3959:2018 Construction of buildings in bushfire prone areas* (AS 3959)) and the satisfactory compliance of the proposal with the policy measures described in *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) (WAPC 2015) and the *Guidelines for Planning in Bushfire Prone Areas Version 1.3* (the Guidelines) (WAPC and DFES 2017).

The purpose of SPP 3.7, and its policy intent, is best summarised as preserving life and reducing the impact of bushfire on property and infrastructure through effective risk-based land-use planning. Pursuant to SPP 3.7, this BMP examines the likely long-term bushfire risk risks and advances responses that will make the ultimate use of the land suitable for its intended purpose.

The majority of the site is cleared of trees and been classified as 'grassland' (Class G), with patches of 'woodland' (Class B) vegetation identified in the central portion of the site. Two small areas of 'scrub' (Class D) vegetation has been identified external to the site to the north-east and west within adjacent rural residential lots, in addition to patches of 'woodland' (Class B) to the north and east. 'Forest' (Class A) vegetation has been identified to the east and west of the site within unmanaged rural landholdings and the Wattle and Utley Road reserves to the north and south of the site. 'Grassland' (Class G) vegetation has been identified surrounding the site to the north, east, south and west associated with unmanaged rural paddocks.

In order to consider the likely bushfire risk applicable to future development within the site, a post development vegetation classification scenario has been assumed in which all classified vegetation, will be removed or managed to a 'low threat' standard. This will be enforced through a notification placed on future titles advising prospective purchasers that existing vegetation and future landscaping within each private lot is required to be maintained to a 'low threat' standard in accordance with AS 3959:2018 cl.2.2.3.2(f). This will also support the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice which requires landowners of lots greater than 1 acre (0.40 ha) to undertake clearing (i.e. removal of dead vegetation and cropping of grass) within open paddocks and along the boundaries of properties to minimise the spread of bushfire. All classified vegetation outside of the site is assumed to remain in its existing condition, and all existing management of vegetation will continue in the future.

Based on the identified hazards and existing land management, the BMP has been able to demonstrate that within the structure plan area (and associated development layout) there is

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sufficient area (i.e. a development site) with which a habitable building could be located so that a BAL rating of BAL-29 or less is achieved. The outcomes of this BMP demonstrate that as development progresses, it will be possible for an acceptable solution to be adopted for three elements of the bushfire protection criteria as outlined in the Guidelines (Element 1 (location), Element 2 (siting and design) and Element 4 (water)). This includes:

- **Location:** all future proposed habitable buildings can be located in an area subject to a BAL rating of BAL-29 or less. Therefore, future habitable buildings can be located in an area that will, on completion, be subject to a low or moderate bushfire hazard.
- **Siting and Design:** each lot (based on the proposed development layout) is appropriately sized to accommodate a future building that is able to achieve a BAL rating of BAL-29 or less based on the developable land. all future habitable buildings can be sited within the proposed development so that BAL-29 or less can be achieved based on the proposed structure plan through in lot setbacks.
- **Vehicular Access:** the proposed structure plan provides for an interconnected road network within the site that will connect to both Utley Road and Wattle Road. The new road network will result in the creation of three new intersections; two on Wattle Road and the other on Utley Road. A fourth connection via a direct connection to Salmon Bark Road (through an existing road reserve) will also be provided. These road connections will provide egress options to the north, east, south and west of the site.
- **Water:** the development will be provided with a permanent and reticulated water supply to support onsite firefighting requirements.

The measures to be implemented through this structure plan process have been outlined as part of this BMP and can be used to support future planning and development approval processes. If the current development layout changes at the future subdivision process, a revised BMP is likely to be required to support the subdivision application.

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Appendix A

Lot 9001 Utley Road & Lot 9002 Wattle Road Serpentine Structure Plan (Hex Design 2021)

Appendix B

Additional photographs

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List of Abbreviations

Table A1: Abbreviations – General terms

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

Table A2: Abbreviations – Organisations

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

Table A3: Abbreviations – Legislation and policies

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

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Table A4: Abbreviations – Planning and building terms

Planning and building terms	
AS 3959	<i>Australian Standard 3959-2018 Construction of buildings in bushfire prone areas</i>
TPS	Town Planning Scheme
POS	Public Open Space

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1 Introduction

1.1 Background

Stron Pty Ltd (the proponent) is seeking to progress the *Lot 9001 Utley Road & Lot 9002 Wattle Road - Serpentine Structure Plan* (herein referred to as the 'structure plan') prepared by HEX Design and Planning on behalf of the proponent, provided in **Appendix A**. The Structure Plan outlines the proposed development for rural residential purposes over Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine (herein referred to as 'the site'), as shown in **Figure 1**. The site is approximately 91.30 hectares (ha) in size and is generally bound by Wattle Road to the north, existing rural-residential landholdings and Salmon Bark Road to the east, Utley Road to the south and rural land to the west.

The entire site is located within a 'bushfire prone area' under the state-wide Map of Bush Fire Prone Areas prepared by the Office of Bushfire Risk Management (OBRM 2019) as shown in **Plate 1**. The identification of a site within an area declared as bushfire prone necessitates that a further assessment of the determined bushfire risk affecting the site (in accordance with *Australian Standard 3959:2018 Construction of buildings in bushfire prone areas* (AS 3959)) (Standards Australia 2018) and the satisfactory compliance of the proposal with the policy measures described in *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) (WAPC 2015) and the *Guidelines for Planning in Bushfire Prone Areas Version 1.3* (the Guidelines) (WAPC and DFES 2017).

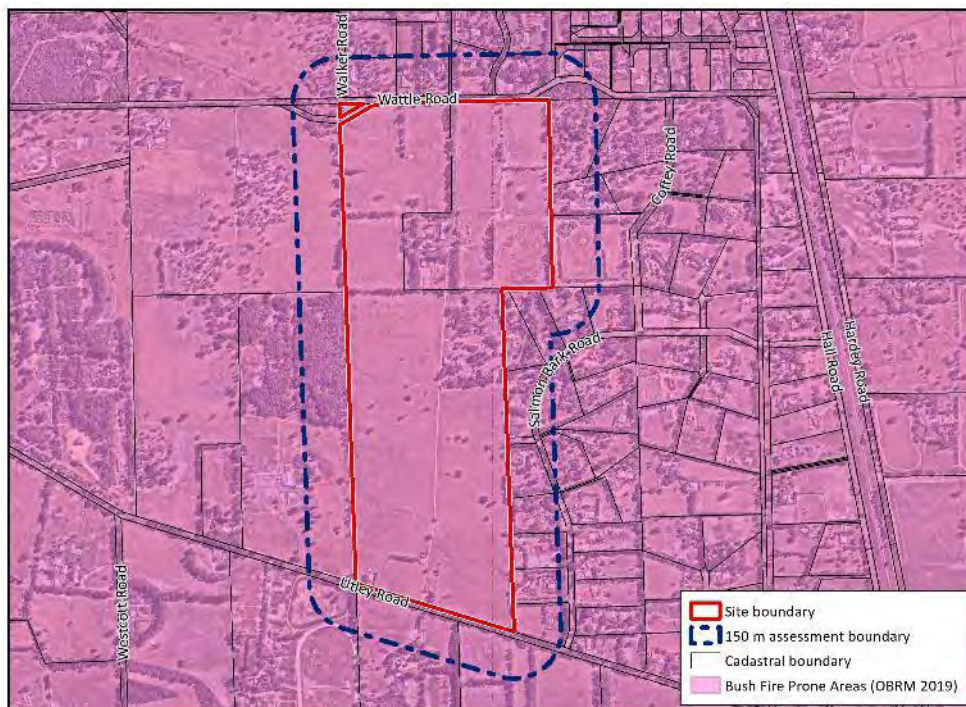


Plate 1: The entirety of the site identified as 'bushfire prone areas' (as indicated in purple) under the state-wide Map of Bush Fire Prone Areas (OBRM 2020).

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1.2 Aim of this report

The purpose of this BMP is to assess bushfire hazards within the site and nearby areas and ensure that the threat posed by any identified hazards can be appropriately mitigated and managed. It has been prepared to support the proposed structure plan for the site and addresses the requirements of SPP 3.7 (WAPC 2015), the Guidelines (WAPC and DFES 2017) and AS 3959 (Standards Australia 2018). The document provides an assessment of the general bushfire management strategies to be considered as part of future development of individual dwellings within proposed lots and includes:

- An assessment of the existing classified vegetation in the vicinity of the site (within 150 m as required by SPP 3.7) and consideration of bushfire hazards that will exist in the post development scenario (**Section 3**).
- Commentary on how the future development can achieve the bushfire protection criteria outlined within the Guidelines including an indication of BAL ratings likely to be applicable to future dwellings (**Section 5**).
- An outline of the roles and responsibilities associated with implementing this BMP (see **Section 6**).

1.3 Statutory policy and framework

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

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

In accordance with Section 2.2 of the Guidelines, the policy measures of SPP 3.7 and the Guidelines are not to be applied retrospectively or inflexibly. It is noted that approximately four existing buildings within the central north portion of the site are intended to be retained within the future development. Therefore, this BMP is not intended to apply to the existing habitable buildings present, only to the new habitable buildings to be constructed as part of the proposed development of the site. However, where possible bushfire risk to life, property and infrastructure associated with the existing buildings will be minimised in accordance with SPP 3.7.

1.4 Description of the proposed development

The site is proposed to be developed for rural-residential purposes, in line with the proposed structure plan layout provided in **Appendix A**. The development within the site will include:

- a total of 39 rural-residential lots with a minimum lot size of 2 hectares;
- a new public road that will connect with the existing road network.

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The proposed development within the site is consistent with the 'Rural' zoning of the site under the Metropolitan Region Scheme (MRS), and the 'Special rural (SR28)' zoning under the Shire of Serpentine Jarrahdale Town Planning Scheme (TPS) No. 2.

More broadly, the site is located within an area where land uses are rural-residential. The site is located in an area with an existing public road network, with Wattle Road located to the north and Utley Road to the south of the site.

1.5 Description of land characteristics

The site is relatively flat, with elevation ranging from 34 m Australian Height Datum (m AHD) in the north west corner of the site, to 40 m AHD across the middle east portion of the site (DPIRD 2020). The topographical characteristics of the site are shown in **Figure 1**.

The site has predominantly been cleared of native vegetation, with a review of aerial imagery indicating that the majority of the site was cleared prior to 1965 for agricultural purposes, with the exception of a patch of remnant vegetation within the central portion of the site (Landgate 2019). Vegetation in the central portion of the site was gradually thinned out to allow for the construction of a rural residential dwelling and associated farming infrastructures. Most of the site has then been retained as a predominately cleared landscape from 1965 until present, with areas of windbreak planting occurring along paddock edges and internal driveways associated with the agricultural land use (cattle grazing and horse agistment with low stocking rates).

Surrounding land use includes:

- Rural-residential properties to the north and east of the site.
- Rural landholdings with intensive agricultural land use to the south and west of the site.
- The Perth – Australind rail line further to the east of the site.
- Bush Forever Site 375 'Paul Robinson Park' approximately 1.5 km to the north-east of the site.
- The primary regional South Western Highway lies approximately 2.5 km east of the site.

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2 Environmental Considerations

In accordance with the *Bushfire Management Plan – BAL Contour* template prepared by the Department of Planning, Lands and Heritage (2018), this BMP has considered whether there are any environmental values that may require specific consideration through either protection, retention or revegetation. To support this, a review of publicly available databases and site-specific investigations has been undertaken, with particular reference to the Shared Location Information Platform (SLIP) databases. A summary of the search results has been provided in **Table 1**.

The majority of the site has been historically cleared to allow for agricultural activities between 1985 and 2000 (Landgate 2019). The central portion of the site currently contains farming associated infrastructure which extends from a smaller rural residential dwelling. Windbreak tree planting is located along the perimeter and transecting the centre of the site along existing driveways and lot boundaries.

A reconnaissance flora, vegetation and fauna assessment was conducted by Emerge Associates over the site on the 23rd June 2020. The survey indicated the site is largely dominated by areas of 'parkland cleared' vegetation with scattered remnant native trees in 'completely degraded' condition. No vegetation within the site has been identified as significant (i.e. threatened ecological communities or threatened flora) or of regional or local significance (Emerge Associates 2020b).

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

Key environmental feature (information in brackets refers to mapping data source)	Yes / no / potentially occurring within the site	If yes / potentially, describe value that may be impacted
Conservation category wetlands and buffer (Geomorphic wetlands, Swan Coastal Plain (DBCA- 019))	Yes	<p>A review of the Geomorphic Wetlands, Swan Coastal Plain dataset (DBCA 2018) identifies two wetlands extending across the site, described below:</p> <ul style="list-style-type: none"> • REW UFI 15364 (damp land basin) extends across the northern portion of the site. • MUW UFI 16021 (plausplain flat) extends across the southern portion of the site. MUWs do not require specific conservation or protection measures and therefore the presence of this MUW within the site does not represent a constraint to the proposed rural residential development. <p>Despite the geomorphic wetlands database indicating the presence of a REW across the northern portion of the site, no prominent natural wetland landform features or areas supporting intact native wetland vegetation were recorded in the site surveys (Emerge Associates 2020a). Notwithstanding, specific management/protection of the hydrological function of REWs in accordance with <i>Better Urban Water Management</i> is detailed as part the Local Water Management Strategy (LWMS) prepared to support the structure plan.</p>
Waterways (DWER-031)	No	<p>There are no defined natural waterways traversing the site, however, there are multiple artificial drainage channels, most notably in the central portion of the site and along the driveway in the northern portion of the site (Emerge Associates 2020a). A LWMS has been prepared to support the preparation of the structure plan and includes detailed management approaches for groundwater and stormwater drainage.</p>

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

Key environmental feature (information in brackets refers to mapping data source)	Yes / no / potentially occurring within the site	If yes / potentially, describe value that may be impacted
RAMSAR wetlands (DBCA-010)	No	Not applicable. No RAMSAR wetlands are located within the site.
Threatened and priority flora (DBCA-036)	No	The flora and vegetation survey undertaken by Emerge Associates (2020b) did not identify any threatened or priority flora species within the site, and due to the historical clearing, it is unlikely that any threatened or priority flora species are likely to occur within the site.
Threatened and priority fauna (DBCA-037)	Potentially	Given the previous clearing for agriculture the site now generally consists of parkland cleared areas comprising of pasture grasses, with scattered paddock trees. Fauna habitat values are therefore limited and restricted to the scattered paddock trees, which will provide potential habitat values for opportunistic and mobile fauna species. Notwithstanding, vegetation within the site was identified as representing potential foraging and breeding habitat for three species of threatened black cockatoo species and the quenda (Priority 4) (Emerge Associates 2020b). The structure plan design provides opportunities for retention of native vegetation and associated habitat for black cockatoos within future rural-residential lots and wide road reserves, while still minimising bushfire risk through maintenance of bushfire hazards in accordance with this BMP.
Threatened ecological communities (DBCA-038)	No	Not applicable. No TECs are identified within the site. In addition, the flora and vegetation survey undertaken by Emerge Associates (2020b) did not identify any TECs within the site, and due to the historical clearing, it is unlikely that any TECs are likely to occur within the site.
Bush Forever areas (DOP-071)	No	Not applicable. It is noted Bush Forever Site 375 occurs approximately 1.6 km north-east of the site however, the proposed development of the site is not likely to impact on the site and no further consideration of this factor is required.
Clearing regulations – Environmentally Sensitive Areas (DWER-046)	No	Not applicable. The site is not mapped as occurring within an ESA and therefore no further consideration of this factor is required.
Swan Bioplan Regionally Significant Natural Areas 2010 (DWER-070)	No	Not applicable.
Aboriginal heritage (DAA-001)	No	Not applicable. There are no Registered Aboriginal Sites or Other Heritage Places located within or adjacent to the site.
Non-indigenous heritage (SHO-003)	No	Not applicable. No registered non-indigenous heritage sites were identified within or nearby to the site.

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2.1 Native vegetation – modification and clearing

The existing stand of remnant native trees within the central portion of the site is proposed to be modified to low threat and retained within future rural-residential lots. Where the spacing of individual or groups of trees is less than 15 metres apart, or canopies of existing trees are touching, branches will be lopped to provide for a separation between tree crowns. In addition, retained trees will be low pruned to 2 m from the ground and the grassy understory will be managed through regular mowing/slashing of grass to less than 100 millimetres (mm) in height on an ongoing basis. Scattered windbreak trees may also be retained within future lots or road reserves where future earthworks allow.

All vegetation outside the site is assumed to remain in its existing condition. No areas of native vegetation outside the site are proposed to be cleared by the proponent as part of the future development of the site.

2.2 Revegetation and landscape plans

No revegetation is proposed as part of the development, and no areas of public open space are proposed within the site. The rural-residential lots proposed to be created in accordance with the structure plan will be adequately sized to allow for the creation of future gardens within lots. Any gardens created as part of the proposed development will be designed to achieve low threat vegetation in accordance with Section 2.2.3.2 of AS 3959. This may include the retention of existing trees within lots, which will be managed to a low threat standard. Ongoing management is likely to include:

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

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3 Bushfire Assessment Results

Bushfire risk for the site has been considered following the methods described in the Guidelines (WAPC and DFES 2017) and in AS 3959.

Appendix Two of the Guidelines provides a description for undertaking a broad level of assessment using the vegetation classifications from AS 3959. The purpose is to identify at the strategic level the Bushfire Hazard Level (BHL) and the likely impact and intensity of a bushfire attack. A BHL uses 150 m to establish the sample area from which to determine the fire run and intensity of a bushfire attack.

The objective of AS 3959 is to reduce the risk of ignition and loss of a building to bushfire. It provides a consistent method for determining a radiant heat level (radiant heat flux) as a primary consideration of bushfire attack on a building or object. It measures the Bushfire Attack Level as the radiant heat level (kWm^2) over a distance of 100 m.

Bushfire risk for the site has been appropriately considered in the specific context of the Guidelines and AS 3959.

The objective of AS 3959 is to reduce the risk of ignition and loss of a building to bushfire. It provides a consistent method for determining a radiant heat level (radiant heat flux) as a primary consideration of bushfire attack on a building or object. It also prescribes simple construction responses that can resist the determined radiant heat level at a given distance from the fire and is based on six Bushfire Attack Level (BAL) ratings: BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ, although building survival is not guaranteed.

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

- a) Vegetation of any type that is more than 100 m from the site.
- b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified.
- c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified.
- d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified.
- e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.
- f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and wind breaks.

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3.1 Bushfire attack level (BAL) assessment

In accordance with Appendix Five of the Guidelines, there is an option to complete a bushfire hazard level assessment to support structure plans. Therefore, this BMP includes a bushfire hazard level assessment as well as a method 1 BAL assessment in order to determine the BAL ratings likely to be applicable to future habitable buildings based on the vegetation classifications and effective slopes detailed in **Table 2**.

3.1.1 Assessment inputs

The assignment of vegetation classifications within 150 m of the site for context and 100 m for impact is based on an assessment of vegetation structure, which includes consideration of the various fuel layers of different vegetation types. For example, fuel layers in a typical forest environment can be broken-down into five segments as illustrated in **Plate 2** below. These defined fuel layers are considered when determining the classification of vegetation and associated bushfire hazard levels.

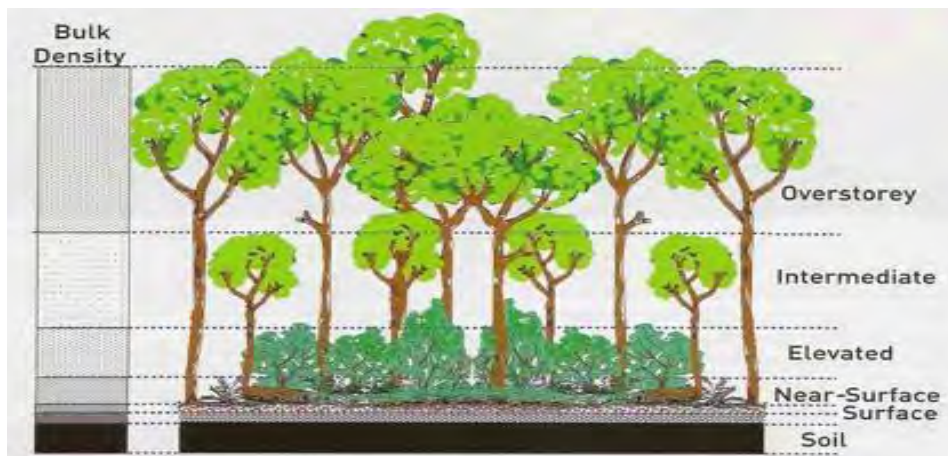


Plate 2: The five fuel layers in a forest environment that could be associated with fire behaviour (Gould et al. 2007)

An assessment of existing vegetation within the site and surrounding 150 m was undertaken on 13 December 2018 in accordance with AS 3959 and the Guidelines.

Table 2 below outlines the type of vegetation observed within and surrounding the site, the classification of each area of vegetation in accordance with Section 2.2.3 and Table 2.3 of AS 3959, and its assumed post-development classification and any associated management of this vegetation (where applicable).

As outlined in **Table 2**:




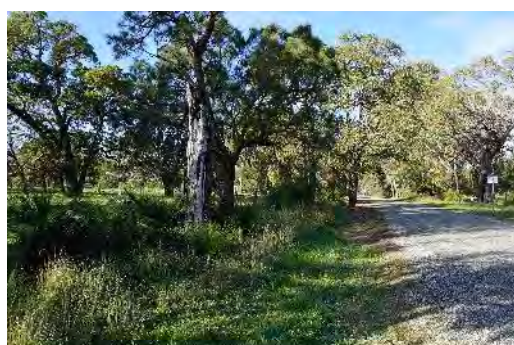
- The pre-development AS 3959 vegetation classifications (and associated photo locations) are shown in **Figure 2**.
- The post-development AS 3959 vegetation classifications are shown **Figure 3**.
- The effective slope for each area of classified vegetation present in the post-development scenario is shown in **Figure 4**.

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Table 2: Vegetation classification, effective slope and future management

Pre-development (see Figure 2)			Post development (see Figure 3)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
1-3	<p>AS 3959 classification (Figure 2): Forest (Class A)</p> <p>Bushfire hazard level: Extreme</p> <p>Patches of forest vegetation are located external to the site within adjacent rural-residential landholdings and the Wattle Road and Utley Road reserves to the north and south. This vegetation is characterised by a mixture of planted <i>Eucalyptus spp.</i> and native <i>Corymbia calophylla</i> (marri) trees in addition to an understory of native shrub species.</p> <p>Areas of forest vegetation are characterised by surface, near-surface, elevated, intermediate and overstory fuel layers.</p> <p>A small stand of juvenile <i>Eucalyptus spp.</i> trees, less than 6 m in height are located to the east of the site. This patch of vegetation has been classified as Forest (Class A) vegetation based on the future growth of the trees to a height greater than 6 m.</p>	 <p>Photo location 1: Forest vegetation to the north of the site abutting Wattle Road.</p>  <p>Photo location 3: Forest vegetation to the west of the site.</p>  <p>Photo location 2: Forest vegetation to the south of the site within the Utley Road reserve.</p>  <p>Photo location 24(20): Forest vegetation to the north of the site within the Wattle Road reserve.</p>	1-3	<p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Effective slope (Figure 4): Flat/upslope</p> <p>Forest vegetation external to the site within adjacent rural-residential landholdings and within the Wattle Road and Utley Road reserves will be retained as future development progresses. Therefore, this vegetation will pose a permanent bushfire risk to the site.</p>

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Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



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


Pre-development (see Figure 2)			Post development (see Figure 3)		
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions	
4 & 5	AS 3959 classification (Figure 2): Woodland (Class B) Bushfire hazard level: Extreme Woodland vegetation is located within the central portion of the site surrounding an existing residential dwelling. Woodland vegetation within the site is characterised by an open woodland of <i>Corymbia calophylla</i> (marri) and <i>Eucalyptus marginata</i> (jarrah) with a 10 – 30% foliage cover over the area, growing to a height of 10 – 20 m with an understory of non-native grassland and isolated shrubs. Woodland vegetation has also been identified to the north, east and west of the site within adjacent rural-residential landholdings and is characterised principally by an overstorey of marri over an understory of unmanaged grassland and occasional scattered native shrubs.		10	AS 3959 classification (Figure 3): Low threat vegetation (Exclusion 2.2.3.2(f)) Effective slope (Figure 4): Not applicable The woodland vegetation within the site (Plot 4) will be converted to low threat vegetation within future lots that will be managed to a low threat standard in accordance with the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice. These lots are likely to include non-vegetated areas (e.g. dwellings, private driveways and firebreaks), however as the siting of these are currently unknown, it has been identified as low threat vegetation.	
					
				5	AS 3959 classification (Figure 3): Woodland (Class B) Effective slope (see Figure 4): Flat/upslope Woodland vegetation located to the north, east and west of the site is assumed to remain in its existing state and is therefore assumed to remain a bushfire risk to the site.
		<p>Photo location 4: Woodland vegetation within the central portion of the site.</p> <p>Photo location 5: Woodland vegetation within the central portion of the site.</p> <p>Photo location 6: Woodland vegetation to the north of the site.</p> <p>Photo location 7: Woodland vegetation to the east of the site.</p>			

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Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



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

Pre-development (see Figure 2)			Post development (see Figure 3)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
6	<p>AS 3959 classification (Figure 2): Scrub (Class D)</p> <p>Bushfire hazard level: Extreme</p> <p>Scrub vegetation is located to the north and east of the site within adjacent rural residential lots.</p> <p>Scrub vegetation to the north of the site is characterised by series of planted/regrowth scrub species growing to a height of 2 - 4 m, less than 6 m in height with continuous fuel loads from the surface and near-surface fuel layers through to the intermediate and overstorey fuel layers.</p> <p>Scrub vegetation to the east of the site within an adjacent rural-residential lot (Photo location 9, 27) comprises a ring of planted low shrub species with isolated occurrences of juvenile <i>Eucalypt spp.</i>. When mature, the <i>Eucalypt spp.</i> will form less than 10% of the mature canopy, and based on the current growth (i.e. existing conditions) and in accordance with AS 3959 the vegetation has been classified based on the dominant growth form which is scrub as the predominant vegetation will be less than 6 m in height.</p>	 <p>Photo location 8: Scrub vegetation to the north of the site.</p>  <p>Photo location 27: Scrub vegetation to the east of the site showing the ring of planted shrub species</p>	6	<p>AS 3959 classification (Figure 3): Scrub (Class D)</p> <p>Effective slope (see Figure 4): Flat/upslope</p> <p>Scrub vegetation located to the north of the site (Photo location 8) is assumed to remain in its existing state and is therefore assumed to remain a bushfire risk to the site.</p>
			11	<p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Effective slope (Figure 4): Flat/upslope</p> <p>With regards to the scrub vegetation to the east of the site (Photo location 9, 27); DFES have indicated concern about the presence of juvenile eucalypts potentially at a density that may affect the vegetation classification when the trees mature. Based on site observations, the eucalypts are likely to be less than 10% of the mature canopy cover. However, to address the DFES concern, this vegetation has been identified as forest in the post development scenario.</p>

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Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



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



Pre-development (see Figure 2)			Post development (see Figure 3)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
7	AS 3959 classification (Figure 2): Grassland (Class G) Bushfire hazard level: Moderate Grassland vegetation has been identified within the majority of the site associated with open areas of unmanaged rural-residential paddocks. Areas of grassland are characterised by grasses growing to a height of ~ 50 cm, with occasional scattered trees (less than 10% foliage cover). In accordance with AS 3959, this vegetation has been classified based on the understorey, due to the low overall canopy cover.		10	AS 3959 classification (Figure 3): Low threat vegetation (Exclusion 2.2.3.2(f)) Effective slope (Figure 4): Not applicable The grassland vegetation within the site will be converted to low threat vegetation within future lots that will be maintained in accordance with the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice. These lots are likely to include non-vegetated areas (e.g. dwellings, private driveways and firebreaks), however as the siting of these are currently unknown, it has been identified as low threat vegetation.
				
			7	AS 3959 classification (Figure 3): Non-vegetated area (Exclusion 2.2.3.2(e)) Effective slope (see Figure 4): Not applicable Grassland vegetation within the site will be removed to facilitate the future sealed public road network which will result in currently vegetated areas being converted to non-vegetated areas comprised of bitumen.
				

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Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



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

Pre-development (see Figure 2)			Post development (see Figure 3)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
8	Continued from above. Grassland vegetation has also been identified surrounding the site associated with unmanaged adjacent rural-residential lots with grass ground to a height ~ 1 m.	 <p>Photo location 14: Grassland vegetation to the north of the site.</p>	8	<p>AS 3959 classification (Figure 3): Grassland (Class G)</p> <p>Effective slope (see Figure 4): Flat/upslope</p> <p>Grassland vegetation external to the site to the north and east will be retained as future development progresses. Therefore, this vegetation will pose a permanent bushfire risk to the site.</p>
		 <p>Photo location 15: Grassland vegetation to the south of the site.</p>		

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

Pre-development (see Figure 2)			Post development (see Figure 3)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
9	<p>AS 3959 classification (Figure 2): Non-vegetated area (Exclusion 2.2.3.2(e))</p> <p>Bushfire hazard level: Low. As required under the Guidelines, any areas within 100 m of moderate or extreme hazards have been shown as moderate, to reflect the potential increased risk.</p> <p>Non-vegetated areas such as roads, driveways, existing residential buildings and areas of mineral earth within and surrounding the site have been excluded in accordance with Clause 2.2.3.2(e) of AS 3959.</p>	 <p>Photo location 16: Non-vegetated driveway within the northern portion of the site.</p>  <p>Photo location 18: Non-vegetated sealed Wattle Road to the north of the site.</p>	 <p>Photo location 17: Non-vegetated residential area within the central portion of the site.</p>  <p>Photo location 19: Non-vegetated sealed Salmon Bark Road to the east of the site.</p>	<p>9</p> <p>AS 3959 classification (Figure 3): Non-vegetated area (Exclusion 2.2.3.2(e))</p> <p>Effective slope (see Figure 4): Not applicable</p> <p>The existing maintenance regimes for all existing non-vegetated areas surrounding the site are assumed to continue in the long-term based on current land uses and management arrangements and/or future proposed land uses.</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
10	<p>AS 3959 classification (Figure 2): Low threat vegetation (Exclusion 2.2.3.2(f))</p> <p>Bushfire hazard level: Low. As required under the Guidelines, any areas within 100 m of moderate or extreme hazards have been shown as moderate, to reflect the potential increased risk.</p> <p>Low threat vegetation has been identified within the site to the north and east associated with open paddocks managed to a low threat standard in accordance with the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice.</p>	 <p>Photo location 20: Low threat vegetation within a roadside swale within the northern portion of the site.</p>  <p>Photo location 22: Low threat vegetation to the east of the site.</p>	 <p>Photo location 21: Low threat vegetation to the north of the site.</p>  <p>Photo location 23: Low threat vegetation to the east of the site.</p>	<p>AS 3959 classification (Figure 3): Low threat vegetation (Exclusion 2.2.3.2(f))</p> <p>Effective slope (see Figure 4): Not applicable</p> <p>The maintenance regimes for all existing managed areas outside the site are assumed to continue in the future based on current land uses and management arrangements.</p>

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3.1.1.1 Post development assumptions

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

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

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

- All classified vegetation within the site will be removed or modified to achieve low threat in accordance with Section 2.2.3.2 of AS 3959. This will be enforced through a notification placed on future titles advising prospective purchasers that existing vegetation and future landscaping within each private lot is required to be maintained to a 'low threat' standard in accordance with AS 3959:2018 cl.2.2.3.2(f). Management of these areas to a low threat standard are likely to require:
 - Where the spacing of individual or groups of trees is less than 15 metres apart or canopies of existing trees are touching, branches will be lopped to provide for a separation between tree crowns.
 - Retained trees will be low pruned to 2 m from the ground.
 - Regular maintenance including removal of weeds and dead material.
 - Application of ground covers such as mulch or non-flammable materials.
 - Regular mowing/slashing of grass to less than 100 millimetres (mm) in height.
- Areas of low threat vegetation outside the site will continue to be managed and/or considered to achieve low threat in accordance with Section 2.2.3.2 of AS 3959 based on the existing maintenance regimes, and/or as per the Shire of Serpentine Jarrahdale's Firebreak and Fuel Hazard Reduction Notice.
- Other classified vegetation that has been identified outside of the proponent's landholdings has been assumed to remain in its existing state.

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3.1.2 Assessment outputs

The BAL assessment completed for the site indicates that a BAL rating of BAL-29 or less can be achieved for the majority of the site. BAL-40 and BAL-FZ does extend into portions of the site (due to external hazards), however with the large lot size it will be possible for all future habitable buildings to be located in an area subject to BAL-29 or less (with the majority of the site likely to be BAL-12.5 or BAL-LOW). **Table 3** provides a summary of the setback distances necessary from classified vegetation to achieve the indicated BAL ratings, with the BAL Contour Plan (**Figure 5**) being a visual representation of these distances. The setback distances are based on the post-development classified vegetation (**Figure 3**), effective slope (**Figure 4**) and are taken from Table 2.5 of AS 3959.

It is important to note that as part of future subdivision, should this area still be subject to a BAL rating greater than BAL-29, development can be designed to ensure habitable buildings achieve BAL-29 or less through in-lot setbacks or the location of public roads, and through the accommodation of setback distances provided in **Table 3**.

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

Post development plot number (see Figure 4)	Vegetation classification (see Figure 4)	Effective slope (see Figure 5)	Distance to vegetation (from Table 2.5 of AS 3959)	BAL rating
Plot 1-3 & 11	Forest (Class A)	Flat/upslope	< 16 m	BAL-FZ
			16 - < 21 m	BAL-40
			21 - < 31 m	BAL-29
			31 - < 42 m	BAL-19
			42 - < 100 m	BAL-12.5
			> 100 m	BAL-LOW
Plot 5	Woodland (Class B)	Flat/upslope	< 10 m	BAL-FZ
			10 - < 14 m	BAL-40
			14 - < 20 m	BAL-29
			20 - < 29 m	BAL-19
			29 - < 100 m	BAL-12.5
			> 100 m	BAL-LOW
Plot 6	Scrub (Class D)	Flat/upslope	< 10 m	BAL-FZ
			10 - < 13 m	BAL-40
			13 - < 19 m	BAL-29
			19 - < 27 m	BAL-19
			27 - < 100 m	BAL-12.5
			> 100 m	BAL-LOW

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

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

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4 Identification of Bushfire Hazard Issues

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

- Provision of appropriate separation distance from bushfire hazards external to the site to the north, east, south and west of the site to ensure a BAL rating of BAL-29 or less can be achieved at future habitable buildings (built form).
- Ensuring that future rural-residential lots within the site are managed to achieve low threat standards, in accordance with AS 3959 and the requirements of the Shire of Serpentine Jarrahdale.
- Provision of appropriate vehicular access to ensure that when development within the site is fully constructed, egress to at least two different destinations will be available to residents, visitors, future workers and emergency personnel.

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

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5 Assessment Against the Bushfire Protection Criteria

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

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

As part of future development, it is likely that an 'acceptable solution' will be able to address the intent of all four bushfire protection criteria as part of future development within of the site. A summary of how this can be achieved and an associated compliance statement for each has been provided in **Table 4**.

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Table 4: Summary of bushfire protection criteria and compliance statement

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 1: Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.	A1.1 Development location		Based on the bushfire hazard level assessment, the site is located in an area of extreme and moderate bushfire hazard level. As development within the site is progressed, classified vegetation will be removed and development will be located within an area subject to a bushfire hazard level of low or moderate. The acceptable solution can be satisfied.	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 1: Location.
		Yes.	N/A		
Element 2: Siting and design	To ensure the siting and design of development minimises the level of bushfire impact.	A2.1 Asset Protection Zone		One of the most important bushfire protection measures influencing the safety of people and property is to create an Asset Protection Zone (APZ) around buildings. The APZ is a low fuel area immediately surrounding a building and can include non-flammable features such as irrigated landscapes, gardens, driveways and public roads. The post-development vegetation classification (Figure 4) identifies permanent external bushfire hazards to the north, east, south and west of the site. Based on the outcomes of the BAL assessment and the BAL contour plan (see Figure 6), lots along the northern, eastern, southern and western boundaries of the site will be exposed to a BAL rating exceeding BAL-29. However, due to the large lot sizes associated with the proposed rural-residential development, future habitable buildings will be subject to a BAL rating of BAL-29 or less. Future habitable buildings will be able to achieve a BAL rating of BAL-29 or less, due to the size of the lot and setbacks provided by public roads and in-lot APZs where required.	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 2: Siting and design.
		Yes.	N/A		

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

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Continued from above.	Continued from above.	Continued from above.		<p>As discussed in Section 3.1.1.1, there is an area of remnant trees within the central portion site that have been identified for retention within future lots. This area of woodland vegetation is proposed to be managed to a low threat standard in accordance with Section 2.2.3.2 of AS 3959. The management of this area will include the lopping of tree branches to provide for a separation between tree crowns where canopies are connected, pruning of tree branches to 2 m off the ground, and regular maintenance of understory grasses at or below 100 mm in height.</p> <p>Overall, the acceptable solution can be satisfied. Class 1, 2 and 3 buildings, where located within an area subject to a BAL rating higher than BAL-12.5 will be subject to higher construction standards in accordance with AS 3959. Furthermore, where future development is subject to increased BALs, these BAL ratings can be reassessed at future building licence stage, to determine if the BAL rating has been reduced through the removal of hazards.</p>	Continued from above.
Element 3: Vehicular access	To ensure vehicular access serving a subdivision/ development is available and safe during a bushfire event.	A3.1 Two access routes		As part of the proposed development, an internal road will be constructed connecting to the broader road network via Wattle Road to the north and Utley Road to the south, as shown on Figure 6 . Immediate egress options will be available to the north and south of the site via Wattle Road and Utley Road, in addition to east and west of the site via Salmon Bark Road. The proposed structure plan provides for an interconnected public road network within the site creating 2 new T-junctions and one four-way intersection. A fourth connection is provided via an unconstructed road link that connects to Salmon Bark Road to the east.	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 3: Vehicular access.
		Yes.	N/A		
		A3.2 Public road		Existing public roads within the site and surrounds, as well as proposed new public roads can and will comply with the minimum standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) or as agreed with the Shire of Serpentine Jarrahdale and includes a minimum 6 m - wide trafficable surface. Wattle Road and Utley Road are constructed to a two-lane undivided road standard. The road reserve widths for the new internal road network are proposed to be 20 m. The existing pavement widths are in the order of 5.5 – 6 m seal width plus unsealed shoulders within a 20 m road reserve.	
		Yes.	N/A		

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

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement																																																						
		Acceptable solution	Performance principle																																																								
Continued from above.	Continued from above.	Continued from above.		<p><i>Excerpt of Table 6 from Appendix Four of the Guidelines (WAPC & DFES 2017)</i></p> <table><tr><th>TECHNICAL REQUIREMENTS</th><th>1 Public road</th><th>2 Cul-de-sac</th><th>3 Private driveway</th><th>4 Emergency access way</th><th>5 Fire service access routes</th></tr><tr><td>Minimum trafficable surface (m)</td><td>6*</td><td>6</td><td>4</td><td>6*</td><td>6*</td></tr><tr><td>Horizontal clearance (m)</td><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td></tr><tr><td>Vertical clearance (m)</td><td>4.5</td><td>N/A</td><td>4.5</td><td>4.5</td><td>4.5</td></tr><tr><td>Maximum grade <50 metres</td><td>1 in 10</td><td>1 in 10</td><td>1 in 10</td><td>1 in 10</td><td>1 in 10</td></tr><tr><td>Minimum weight capacity (t)</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr><tr><td>Maximum crossfall</td><td>1 in 33</td><td>1 in 33</td><td>1 in 33</td><td>1 in 33</td><td>1 in 33</td></tr><tr><td>Curves minimum inner radius (m)</td><td>8.5</td><td>8.5</td><td>8.5</td><td>8.5</td><td>8.5</td></tr><tr><td colspan="6">*Refer to E3.2 Public roads: Trafficable surface</td></tr></table>	TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway	4 Emergency access way	5 Fire service access routes	Minimum trafficable surface (m)	6*	6	4	6*	6*	Horizontal clearance (m)	6	6	6	6	6	Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5	Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10	Minimum weight capacity (t)	15	15	15	15	15	Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33	Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5	*Refer to E3.2 Public roads: Trafficable surface						Continued from above.
		TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway	4 Emergency access way	5 Fire service access routes																																																				
		Minimum trafficable surface (m)	6*	6	4	6*	6*																																																				
Horizontal clearance (m)	6	6	6	6	6																																																						
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5																																																						
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10																																																						
Minimum weight capacity (t)	15	15	15	15	15																																																						
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33																																																						
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5																																																						
*Refer to E3.2 Public roads: Trafficable surface																																																											
A3.3 Cul-de-sac (including dead-end-road)		Not applicable. No cul-de-sacs are proposed at this stage of planning.																																																									
N/A	N/A	If any temporary cul-de-sacs are required as part of staged development, they should be constructed to meet the minimum standards as outlined in Appendix Four of the Guidelines (WAPC and DFES 2017), or as agreed with the Shire of Serpentine Jarrahdale, including: <ul style="list-style-type: none">• A minimum trafficable surface of 6 m• A horizontal clearance of 6 m• Support a minimum weight of 15 tonnes• The length of the cul-de-sac is 200 m or less• Will have a turn-around area with a minimum 17.5 m diameter head.																																																									

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

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Continued from above.	Continued from above.	A3.4 Battle-axe		Four battle-axes lots are proposed in the central and southern portion of the site. The battle-axe legs for each lot are 10 m-wide and can more than accommodate the minimum 6 m-wide horizontal clearance as required by Appendix Four of the Guidelines. Additionally, the dwellings are likely to be located less than 100 m from the public road network, based on the size of the lot. All four battle-axes lots can meet the requirements outlined within Appendix Four of the Guidelines, with construction to include: <ul style="list-style-type: none">• A minimum trafficable surface of 4 m.• A horizontal clearance of 6 m.• Support a minimum weight of 15 tonnes.• The length of the battle-axe access is less than 600 m. Whilst battle-axe lots should be avoided in bushfire prone areas, in this instance battle-axe legs cannot be avoided due to the location of the structure plan area within the existing road network. Internal lots without frontage onto the proposed internal road network will require battle axe-legs due to the inability to create additional road linkages abutting the existing rural residential lots to the east, and as battle axe lots can meet the requirements of Appendix Four in the Guidelines, this can be satisfied.	Continued from above.
		Yes	N/A		
		A3.5 Private driveway longer than 50 m		The exact length of the future private driveways for the future development within the site is unknown at this stage and will depend on the final location of the building envelopes within each lot. However, it is possible that the private driveways will be longer than 50 m in length based on the proposed development layout and size of the lots. If private driveways longer than 50 m in length are required, they will need to meet the minimum requirements outlined within Table 6 of Appendix Four of the Guidelines (or as agreed with the Shire of Serpentine Jarrahdale), including construction suitable for two-wheel-drive vehicles, minimum horizontal and vertical clearance, overtaking bays (if required) and appropriate turn around areas. This can be confirmed at the building licence stage.	
		Yes	N/A		
		A3.6 Emergency access way		The proposed structure plan provides for egress to at least two different destinations, therefore emergency access ways are not required as part of the proposed development of the site.	
		N/A	N/A		
		A3.7 Fire service access routes (perimeter roads)		Whilst development within the site will be provided with appropriate vehicular access, and a fire service access route is not required, the proposed Structure Plan provides for a 6 m wide Emergency Accessway/Fire Service Access Route along the western and eastern boundaries of the site, as shown in Figure 6 . This route will provide access on the perimeter of the structure plan area for firefighters and a link between two public roads,	
		Yes	N/A		

Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
				namely Wattle Road to the north and Utley Road to the south. The road will be provided as an easement, fenced on the inside and gated to ensure accessibility to the public and fire services during an emergency.	
		A3.8 Firebreak width		Due to the size of future rural-residential lots proposed as part of the development of the site, firebreaks will be required once subdivision occurs. A 6 m wide Fire Service Access Route will be constructed along the western boundary of the site, as shown in Figure 6 , and will also serve the function of a strategic firebreak. Firebreaks will be required to satisfy the requirements as set out in the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice, which includes a minimum 3 m-wide firebreak within the internal boundary of the property.	
		Yes.	N/A		
Element 4: Water	To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	A4.1 Reticulated areas		Development is located within an Emergency Services Levy (ESL) Category 5 area, which indicates that bushfire events are responded to by the State Emergency Service and usually a bush fire brigade. Fire response services require ready access to an adequate water supply during bushfire emergencies. The site will connect with a reticulated water supply and will include fire hydrants installed within 200 m of residential dwellings (Class 1a).	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 4: Water.
		Yes.	N/A		
		A4.2 Non-reticulated areas		Not applicable.	
		N/A	N/A		
		A4.3 Individual lots within non-reticulated areas (only for use if creating 1 additional lot and cannot be applied cumulatively)		Not applicable.	
		N/A	N/A		

Bushfire Management Plan

Lot 9001 Utlely Road & Lot 9002 Wattle Road, Serpentine LSP



5.1 Additional management strategies

5.1.1 Future approval considerations

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

The measures to be implemented through this structure plan and associated future subdivision process have been outlined as part of this BMP and can be used to support future planning and development approval processes. A revised BMP is likely to be required to support any future subdivision applications, particularly if the development layout detail is different to that outlined within this document, and will need to respond to the subdivision design (and/or the stage of development).

5.1.2 Landscape management

5.1.2.1 Within the site

No areas of public open space are proposed to be developed within the site. However, future lots will be managed to a low threat standard by the future lot owners. This will be enforced through a notification placed on future titles advising prospective purchasers that existing vegetation and future landscaping within each private lot is required to be maintained to a 'low threat' standard in accordance with AS 3959:2018 cl.2.2.3.2(f). This will also support the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice which requires landowners of lots greater than 1 acre (0.40 ha) to undertake clearing (i.e. removal of dead vegetation and cropping of grass) within open paddocks and along the boundaries of properties to minimise the spread of bushfire. This will include management of any existing vegetation that is retained within lots and the ongoing maintenance of any gardens which will be developed as part of future private landholdings. Management of these areas to a low threat standard are likely to require:

- Clearing of vegetation
- Regular maintenance including removal of weeds and dead material
- Low pruning of trees
- Application of ground covers such as mulch or non-flammable materials
- Regularly mowing/slashing of grass to less than 100mm in height

5.1.2.2 Surrounding the site

Within private landholdings

The private landholdings surrounding the site are assumed to be managed by the applicable landowners in accordance with the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice in perpetuity and/or in accordance with existing maintenance regimes. All other vegetation will remain in its existing condition for the foreseeable future.

Bushfire Management Plan

Lot 9001 Utlely Road & Lot 9002 Wattle Road, Serpentine LSP



5.1.3 Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice

As outlined previously, the Shire of Serpentine Jarrahdale releases a Firebreak and Fuel Hazard Reduction Notice annually (or as required) to provide a framework for bushfire management within the Shire. The Shire of Serpentine Jarrahdale is able to enforce this notice in accordance with Section 33 of the *Bush Fire Acts 1954* and landowners will need to ensure compliance with this notice as published. This is likely to include (but is not limited to):

- Maintenance of short cropped grass.
- Particular standards for firebreaks, including the location of the firebreak and horizontal and vertical clearances.
- Maintenance of appropriate asset protection zones around buildings and fixed assets within a landholding.

Where there is conflict in the requirements of this BMP or the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice, the higher level of bushfire protection should prevail.

5.1.4 Vulnerable or high-risk land uses

There are no vulnerable or high-risk land uses, as defined under SPP 3.7, proposed within the site at part of the proposed structure plan.

5.1.5 Public education and preparedness

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

The Shire of Serpentine Jarrahdale provides bushfire safety advice to residents available from their website <http://www.sjshire.wa.gov.au/what-we-do/emergency-services/bushfires-and-fire-control/>. Professional, qualified consultants also offer bushfire safety advice and relevant services to residents and businesses in high-risk areas in addition that that provided in this BMP.

In the case of a bushfire in the area, advice would be provided to residents by DFES, Department of Biodiversity Conservation and Attractions (DBCA) and/or the Shire of Serpentine Jarrahdale on any specific recommendations with regard to responding to the bushfire, including evacuation if required. However, it is highly recommended that future residents make themselves aware of their responsibilities with regard to preparing for and responding to a potential bushfire that may impact them, their family and property, regardless of the BAL rating their properties are subject to.

Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



6 Responsibilities for Implementation and Management of Bushfire Measures

Table 5 outlines the future responsibilities of the proponent (developer), future users of the site, and the Shire of Serpentine Jarrahdale associated with implementing this BMP with reference to ongoing bushfire risk mitigation measures for existing land uses (through compliance with the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice) or future mitigation measures to be accommodated as part of the structure planning process. These responsibilities will need to be considered as part of the subsequent development and implementation process.

Table 5: Responsibilities for the implementation of this BMP

Management action	Timing
Developer	
Certify BAL ratings for all lots designated as bushfire prone at the time titles are created, based on the BAL Contour Plan and/or in accordance with a BAL assessment if the site conditions are different. The certified BAL ratings can be submitted by lot owners to the Shire of Serpentine Jarrahdale to support future building licences.	As part of subdivision and development, and to support the creation of lot titles.
For each new lot created within areas exposed to a BAL rating exceeding BAL-LOW, lodge a Section 165 Notification on the Certificate of Title in order to alert purchasers and successors in title of the existence of the overarching BMP and the requirements associated with meeting AS 3959 construction standards. This should be based on the outcomes of the BAL certification process.	To support the creation of lot titles.
Given the proposal is for a rural residential development within a bushfire prone area, it is recommended that notification be placed on future titles advising prospective purchasers that existing vegetation and future landscaping within each private lot is required to be maintained to a 'low threat' standard in accordance with AS 3959:2018 cl.2.2.3.2(f).	To support the creation of lot titles.
Ensure fire hydrants are installed by the developer within 200 m of a dwelling. Reticulated water supply and hydrants to be installed as per standard Water Corporation requirements unless otherwise agreed.	To support the creation of lot titles.
Install public roads to the standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) or as agreed with the Shire of Serpentine Jarrahdale	To support the creation of lot titles.
The entirety of the site or where within 100 m of titled lots (if development is to be staged), is to be maintained to a low threat standard (in accordance with Section 2.2.3.2 of AS 3959) until development progresses and/or lots are sold. Management should include (but is not limited to): <ul style="list-style-type: none"> • Clearing/modification of vegetation • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.) • Low pruning of trees (i.e. removal of branches less than 2 m in height) if individual trees are proposed for retention, particularly where these are located in future road reserves). • Application/re-application of ground/surface covers such as mulch or non-flammable materials as required. • Where the grass is present, this should be regularly cut so that the grass is maintained at or below 100 mm in height. 	As part of the subdivision and to support the creation of lot titles, and ongoing where applicable.
Make a copy of the BMP and BAL certification/assessment available to each lot owner within designated bushfire prone areas.	During the lot sale process, and ongoing as required.

Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



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

Management action	Timing
Developer (continued)	
Reticulated water supply and hydrants to be installed as per standard Water Corporation requirements, unless otherwise agreed.	To support the creation of lot titles
<p>Ensure any temporary cul-de-sacs are constructed to the minimum standards as set out in Appendix Four of the Guidelines (WAPC and DFES 2017), as provided below:</p> <ul style="list-style-type: none"> • A minimum trafficable surface of 6 m. • A horizontal clearance of 6 m. • Support a minimum weight of 15 tonnes. • Will have a turn-around area with a minimum 17.5 m diameter head. 	To support the creation of lot titles
<p>Ensure the Fire Service Access Road along the perimeter of the site is constructed to a width of 6 m and to the minimum standards as set out in Table 6 in Appendix Four of the Guidelines (WAPC and DFES 2017) (or as agreed with the Shire of Serpentine Jarrahdale). This includes:</p> <ul style="list-style-type: none"> • Allow for two-way traffic. • Have an all-weather surface. • Be adequately signposted • Where gates are used, these should be wide enough to accommodate type 3.4 fire appliances. • An easement in gross to the benefit of the local government is provided. 	As part of subdivision and development.
Property owner/occupier	
Ensuring construction of dwelling/s complies with AS 3959, as per the applicable BAL rating, determined as part of this BMP (outlined within Section 3 of this BMP) or through a separate BAL assessment. The BAL rating for a dwelling should not exceed BAL-29.	As part of building design and construction
Install private driveways to standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) or as agreed with the Shire of Serpentine Jarrahdale.	To support the creation of lot titles
If dwellings are subject to additional construction in the future, such as renovations, compliance with AS 3959 is required (i.e. where located within a designated bushfire prone area and identified to have a BAL rating greater than BAL-LOW).	As part of building design and construction
<p>The entirety of their lots is to be maintained to a low threat standard (in accordance with Section 2.2.3.2 of AS 3959). Management should include (but is not limited to):</p> <ul style="list-style-type: none"> • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.) • Low pruning of trees (i.e. removal of branches less than 2 m in height). • Application/re-application of ground/surface covers such as mulch or non-flammable materials as required. • Where the grass is present, this should be regularly cut so that the grass is maintained at or below 100 mm in height. 	Ongoing, where applicable
Ensuring that their property complies with the Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice as published.	Ongoing, where applicable
Ensuring that where hydrants are located, these are not obstructed and remain visible at all times.	Ongoing, where applicable.
Shire of Serpentine Jarrahdale	
Providing fire prevention and preparedness advice to landowners upon request, including the <i>Homeowners Bush Fire Survival Manual: Prepare, Act, Survive</i> (or similar suitable documentation) and the latest Shire of Serpentine Jarrahdale Firebreak and Fuel Hazard Reduction Notice.	Ongoing, as required
Maintaining public road reserves under their management to appropriate standards, where required/applicable.	Ongoing, as required

Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



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

Management action	Timing
Water Corporation	
The Water Corporation is responsible for the ongoing maintenance and repair of water hydrants.	Ongoing, as required.

Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



7 Applicant Declaration

7.1 Accreditation

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

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

7.2 Declaration

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

Signature:

Name: Anthony Rowe

Company: Emerge Associates

Date: 12 March 2021

BPAD Accreditation: Level 3 BPAD no. 36690

Signature:

Name: Kirsten Knox

Company: Emerge Associates

Date: 12 March 2021

Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



8 References

8.1 General references

Emerge Associates 2020a, Local Water Management Strategy - Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine, EP20-064(01)--001, 1.

Emerge Associates 2020b, Technical Memorandum - Flora, Vegetation and Fauna Assessment - Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine, EP20-064(03)--003 RAW, 1.

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

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

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

8.2 Online references

Department of Water 2008, *LIDAR derived 1 m elevation contours* dataset, Government of Western Australia.

Department of Primary Industries and Regional Development (DPIRD) 2020, *2 metre contours*, viewed June 2020, <<https://maps.slip.wa.gov.au/landgate/locate/>>.

Landgate 2020, *Landgate Map Viewer Plus*, viewed August 2020, <<https://maps.landgate.wa.gov.au/maps-landgate/registered/>>.

Landgate 2020, *Map Viewer*, viewed July 2019, <<https://www0.landgate.wa.gov.au/maps-and-imagery/interactive-maps/map-viewer>>

Office of Bushfire Risk Management (OBRM) 2020 Map of Bush Fire Prone Areas, viewed August 2019, <<https://maps.slip.wa.gov.au/landgate/bushfireprone/>>

Figures



Figure 1: Site Location and Topographic Contours

Figure 2: Existing Conditions - AS 3959 Vegetation Classification

Figure 3: Post Development Conditions – AS 3959 Vegetation Classification

Figure 4: Post Development Conditions – Effective Slope

Figure 5: Bushfire Attack Level Contours

Figure 6: Vehicle Access

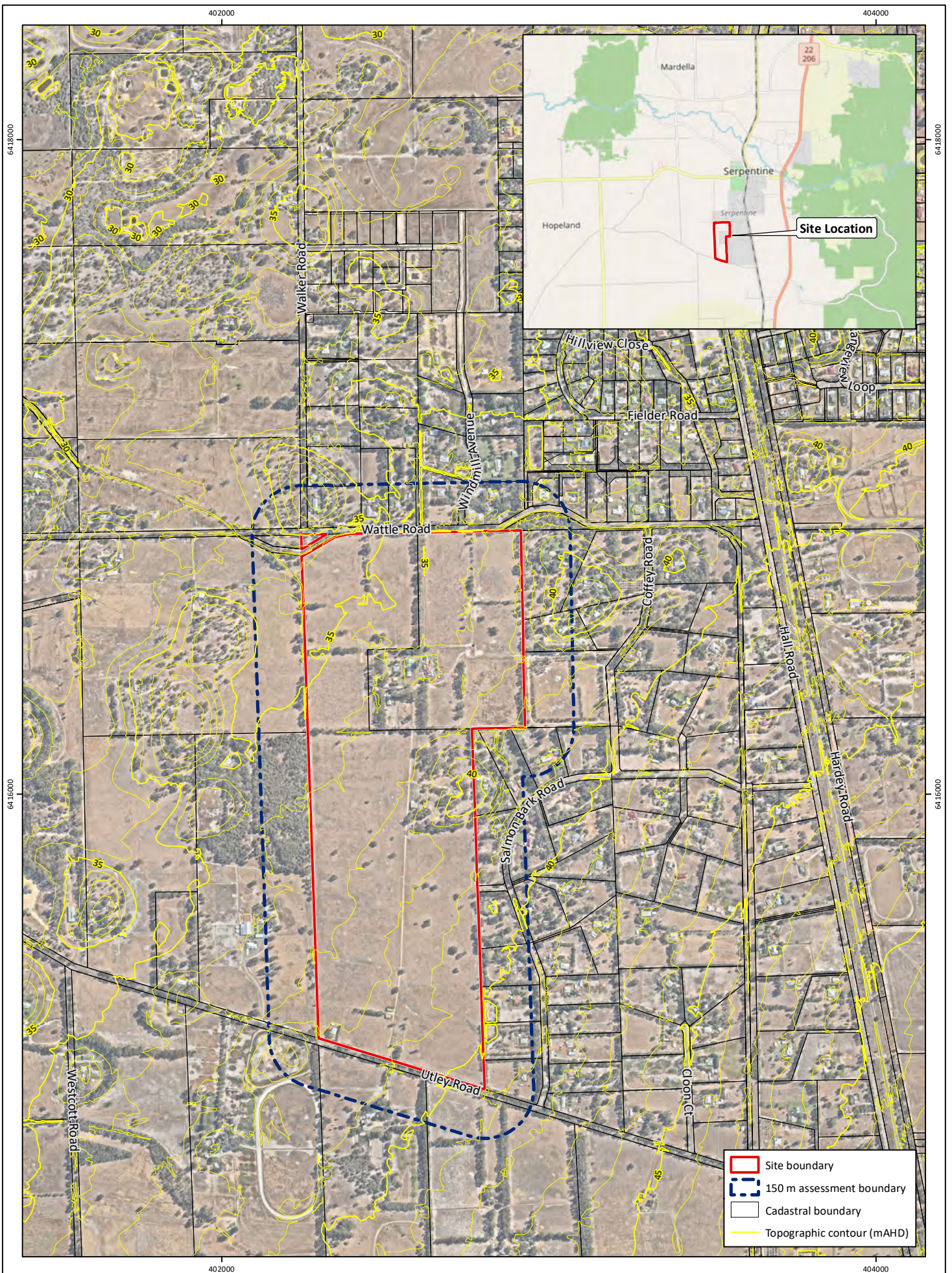


Figure 1: Site Plan and Topographic Contours

Project: Bushfire Management Plan
 Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine
Client: Stron Pty Ltd

Plan Number: EP20-064(02)-F31
Drawn: GAR
Date: 11/08/2020
Checked: BRB
Approved: BRB
Date: 14/08/2020



Scale: 1:15,000@A4
 GDA 1994 MGA Zone 50



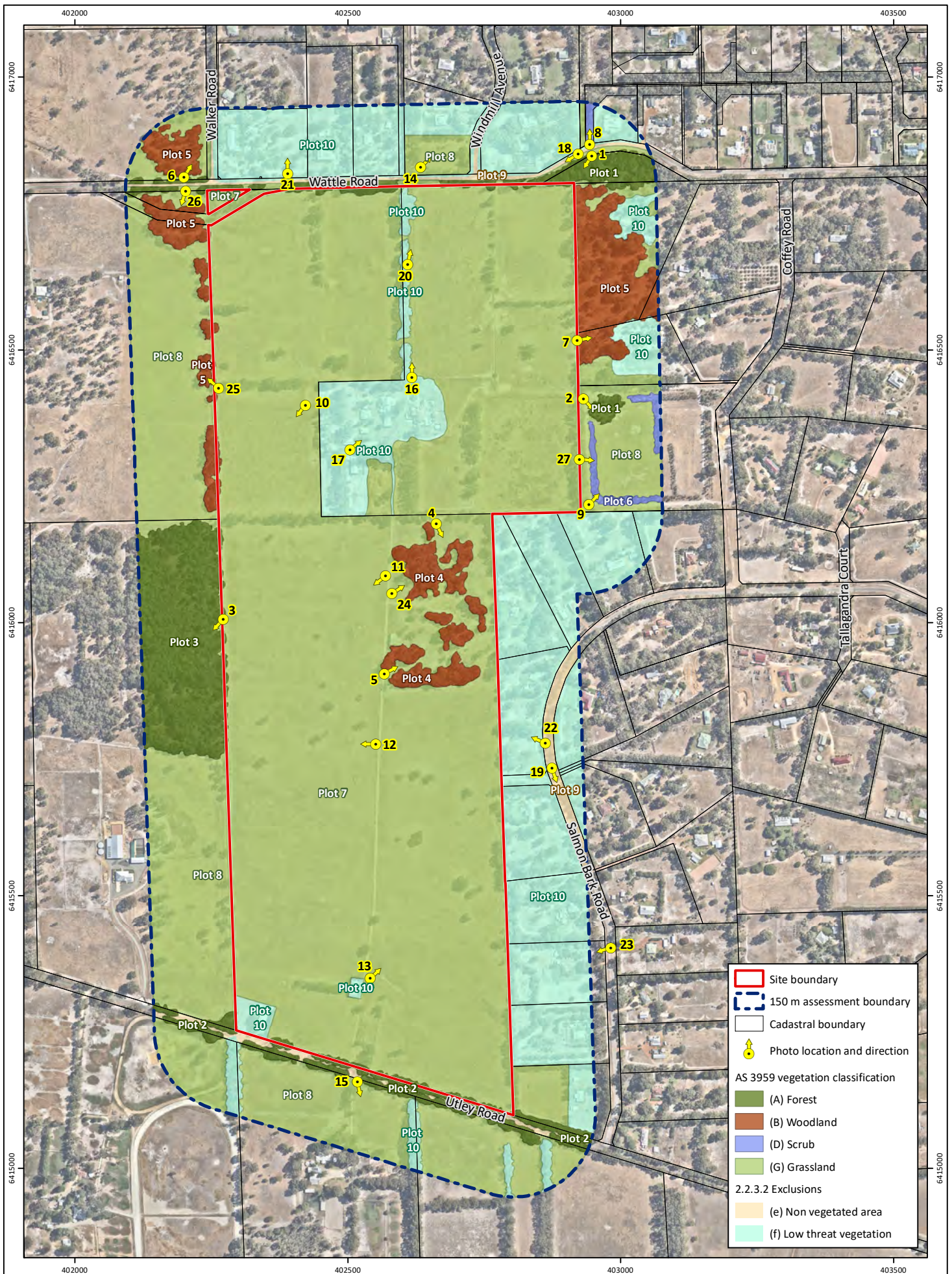


Figure 2: Existing Site Conditions - AS 3959 Vegetation Classifications

Project: Bushfire Management Plan
 Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine
Client: Stron Pty Ltd

Plan Number: EP20-064(02)-F32a
Drawn: GAR
Date: 10/03/2021
Checked: BRB
Approved: BRB
Date: 10/03/2021



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 Scale: 1:9,000@A4
 GDA 1994 MGA Zone 50



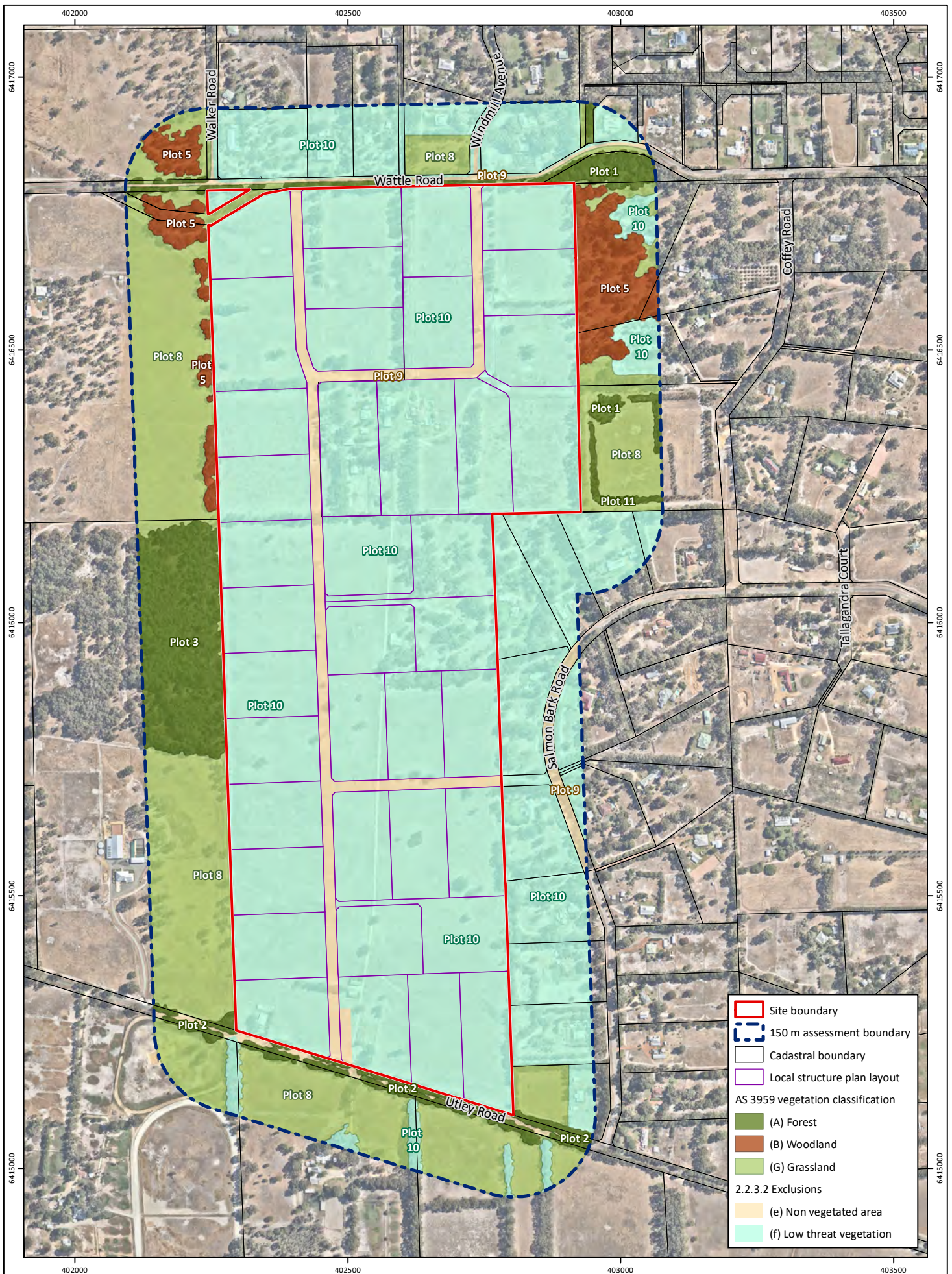


Figure 3: Post Development Site Conditions - AS 3959 Vegetation Classifications

Project: Bushfire Management Plan
 Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine
Client: Stron Pty Ltd

Plan Number: EP20-064(02)-F33a
Drawn: GAR
Date: 10/03/2021
Checked: BRB
Approved: BRB
Date: 10/03/2021



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 GDA 1994 MGA Zone 50



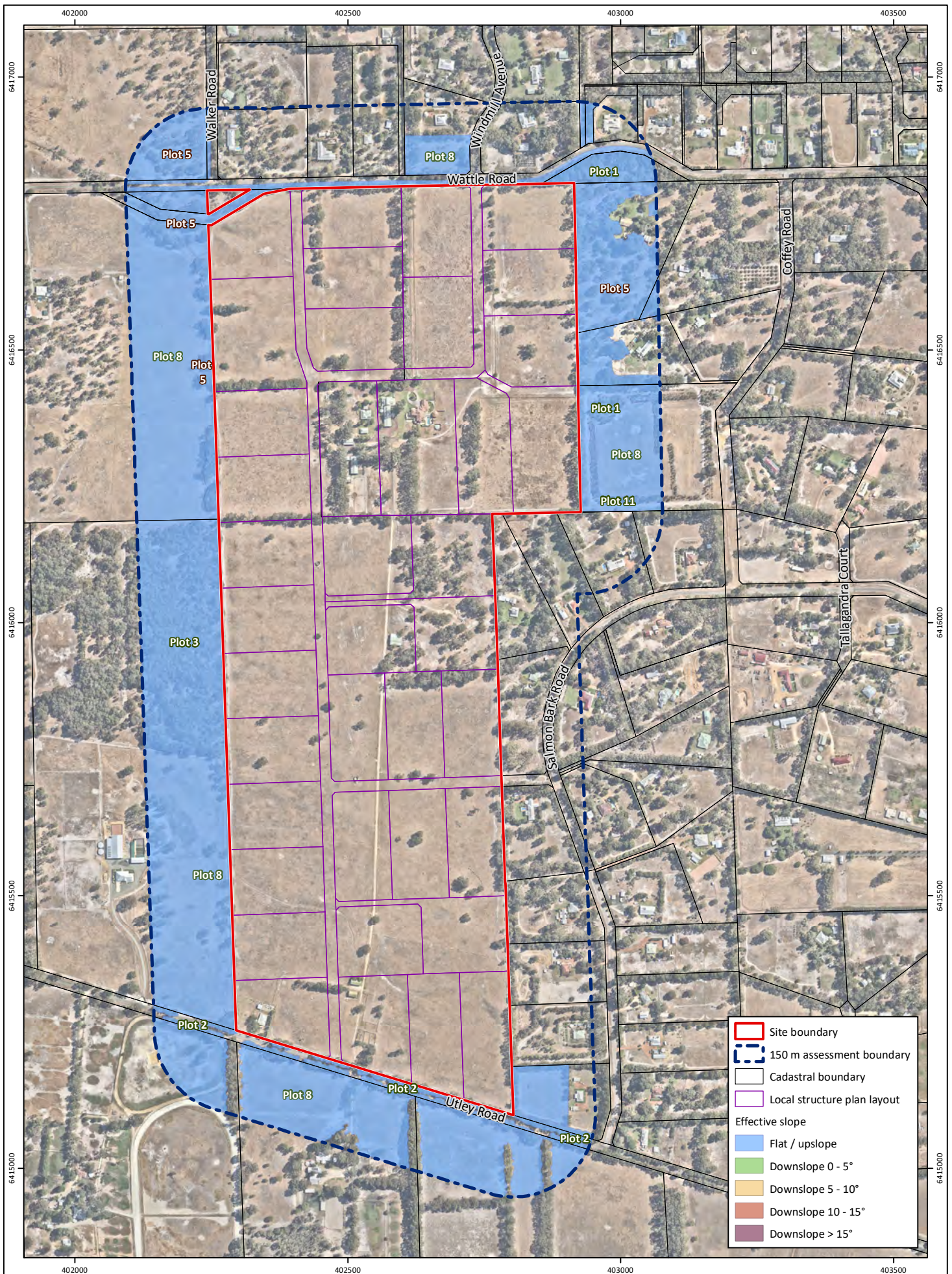


Figure 4: Post Development Site Conditions - Effective Slope

Project: Bushfire Management Plan
 Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine
Client: Stron Pty Ltd

Plan Number:
 EP20-064(02)-F34a
Drawn: GAR
Date: 10/03/2021
Checked: BRB
Approved: BRB
Date: 10/03/2021



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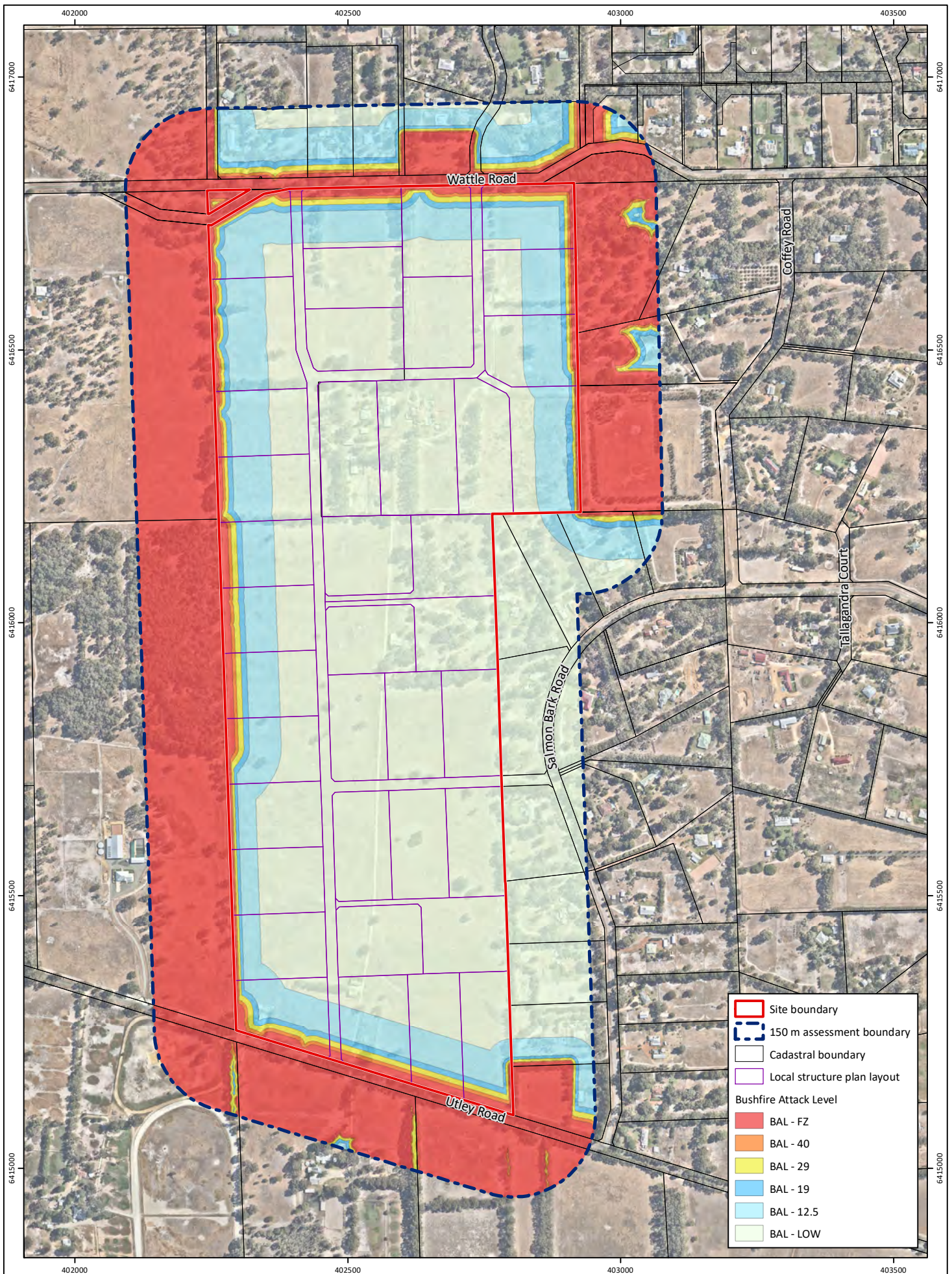


Figure 5: Bushfire Attack Level Contours

Project: Bushfire Management Plan
 Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine

Client: Stron Pty Ltd

Plan Number: EP20-064(02)--F35a
Drawn: GAR
Date: 10/03/2021
Checked: BRB
Approved: BRB
Date: 10/03/2021



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 GDA 1994 MGA Zone 50



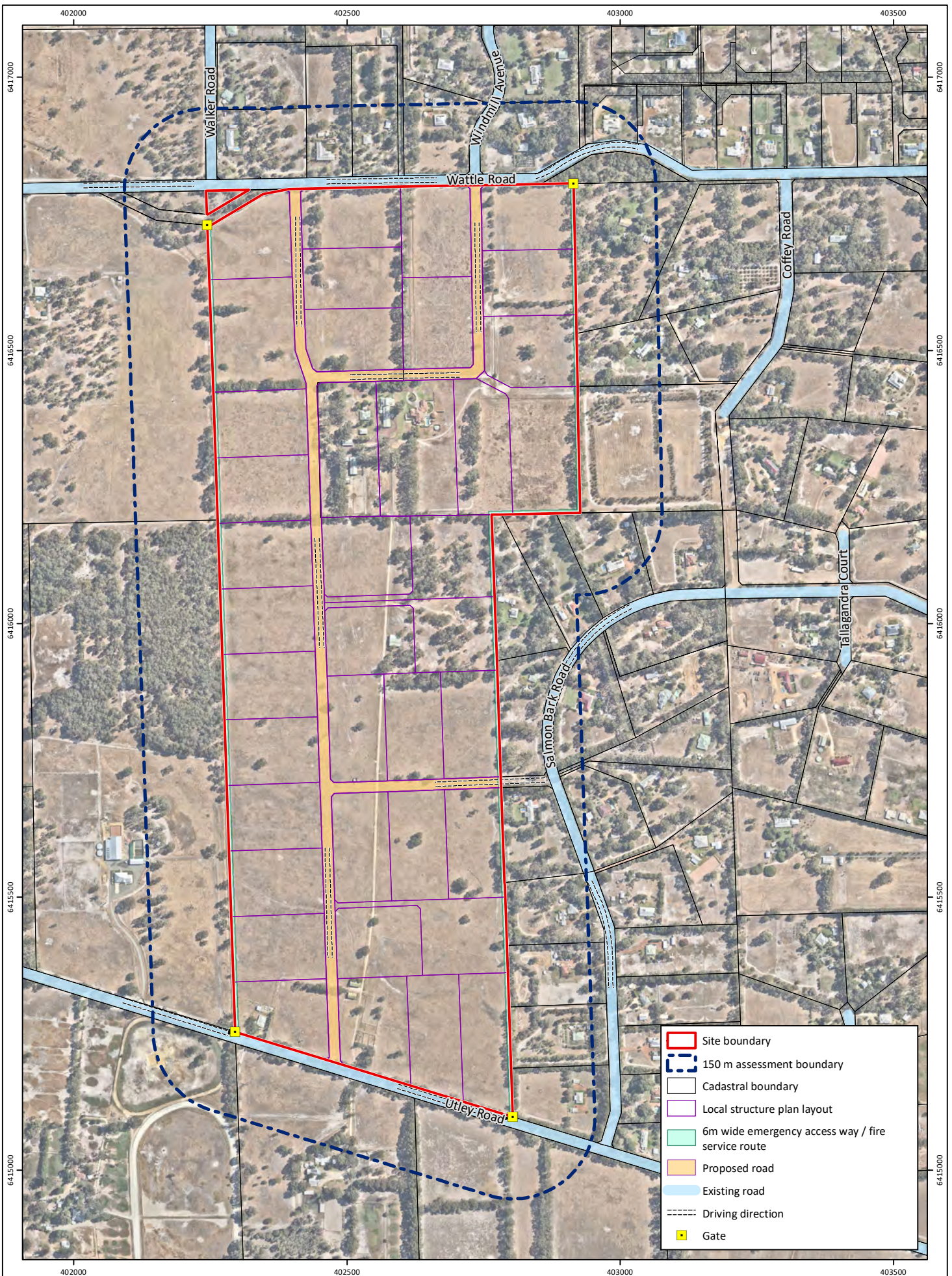


Figure 6: Vehicle Access

Project: Bushfire Management Plan
 Lot 9001 Utley Road and Lot 9002 Wattle Road, Serpentine
Client: Stron Pty Ltd

Plan Number: EP20-064(02)-F36a
Drawn: GAR
Date: 10/03/2021
Checked: BRB
Approved: BRB
Date: 10/03/2021



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 Metres
 Scale: 1:9,000@A4
 GDA 1994 MGA Zone 50



Appendix A

Lot 9001 Utley Road & Lot 9002 Wattle Road
Serpentine Structure Plan (Hex Design 2021)



The logo for HEX Design Planning features the word "HEX" in a large, bold, sans-serif font. The letter "E" is replaced by a stylized hexagon with three horizontal bars inside. Below "HEX" is the text "DESIGN | PLANNING" in a smaller, all-caps, sans-serif font, with a vertical line separating the two words.

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Appendix B

Additional photographs



Bushfire Management Plan

Lot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSPLot 9001 Utley Road & Lot 9002 Wattle Road, Serpentine LSP



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

Plot 5	
AS 3959 classification: Woodland (Class B)	
 <p><i>Photo location 24: woodland vegetation within the central portion of the site</i></p>	 <p><i>Photo location 25: woodland vegetation to the west of the site</i></p>
 <p><i>Photo location 26: woodland vegetation to the north-west of the site</i></p>	