

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure

Plan

Project No: EP15-038(12)

**Prepared for LWP Property Group Pty Ltd
June 2024**



Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



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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 while the front passes” (Standards Australia 2018). Building to the standards outlined in AS 3959 does not guarantee a building will survive a bushfire or that lives will not be lost.

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Executive Summary

LWP Property Group Pty Ltd (the proponent) have prepared an amended structure plan for the Cardup Brook Precinct within The Glades structure plan area, which is generally located south of Orton Road and north of Cardup Brook (herein referred to as ‘the site’). The site is approximately 95 ha in area and is located 33 km south east of the Perth CBD within the Shire of Serpentine Jarrahdale. The site forms part of the broader The Glades development, with previous stages located to the north of the site, supporting both residential and commercial development.

The 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 2021). The identification of a site within an area declared as bushfire prone necessitates 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 1.4* (the Guidelines) (DPLH & WAPC 2021).

The purpose of this BMP is to assess the bushfire hazards, both within and nearby the site, and identify the ‘management’ strategies required to ensure the development of the land is consistent with the intent of SPP 3.7, which is ‘to preserve life and reduce the impact of bushfire on property and infrastructure’.

This BMP has followed the requirements of SPP 3.7 to identify bushfire risk and the bushfire protection measures that will make the land suitable for its intended purpose. As part of this, a Bushfire Attack Level (BAL) assessment involving the classification of vegetation and effective slope within 150 m of the site has been undertaken.

The site currently supports non-native paddock grasses with scattered mature trees, classified as grassland (Class G), with areas of forest (Class A) associated with the Cardup Brook (also identified as a resource enhancement wetland) along the southern boundary of the site, with grassland, shrubland (Class C) and forest vegetation in the surrounding 150 m. The vegetation within the site will generally be converted to low threat vegetation and non-vegetated areas as part of future lots and roads. The following bushfire hazards were identified in the post-development scenario and require consideration as part of future development:

- Forest (Class A) vegetation, largely associated with vegetation within the Cardup Brook foreshore in the southern portion of the site and nearby Bush Forever Sites (350, 351 and 352).
- Woodland (Class B) vegetation associated with the 30 m-wide foreshore/buffer for Cardup Brook and the surrounding public open space areas that will be used for drainage. This has been considered in detail and allows for tree canopy over grasses/low groundcovers and responds to comments from the Shire of Serpentine Jarrahdale. No management is assumed.
- Shrubland (Class C) vegetation, located east of Soldiers Road within the Bush Forever Site 352.
- Temporary grassland (Class G) vegetation, located immediately to the west and associated with the ‘Water Corporation Services Corridor’ and Tonkin Highway road reserve, as well as private landholdings to the north that will be subject to urban development in the future.

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It has been assumed that Cardup Brook (and associated existing vegetation) will be retained and protected in perpetuity. A 30 m-wide buffer has been accommodated in the structure plan, between Cardup Brook and future residential development. This buffer area is not intended to be revegetated, and will be used for passive recreation activities and similar, but as outlined is assumed to achieve a woodland classification (currently it is grassland) to provide flexibility for future management.

Compliance Assessment

The outcomes of this BMP demonstrate that as development progresses, it will be possible for an acceptable solution to be adopted for each of the applicable bushfire protection criteria outlined in the Guidelines. This includes:

- **Location:** future development will be located in an area that will, on completion, be subject to a low or moderate bushfire hazard, and the structure plan is able to accommodate the setbacks required to ensure future dwellings can achieve a BAL rating of BAL-29 or less. This includes consideration of setbacks where existing vegetation is being retained and buffers are proposed.
- **Siting and Design:** future dwellings can be sited within the proposed development so that BAL-29 is not exceeded. If required as part of future subdivision, appropriate setbacks can largely be accommodated through the provision of public roads and/or areas of public open space. The lots fronting Cardup Brook, due to the assumed woodland classification, will require a minimum 1 m-wide front lot setback to achieve BAL-29. This can be accommodated by the standard lot setbacks required by the residential design codes. The western and eastern-most lots may also require in-lot setbacks to accommodate the appropriate separation, but the indicated development layout suggests this is achievable and will be confirmed as subdivision progresses. Overall, the majority of the proposed residential areas are likely to be subject to a BAL rating of BAL-12.5 or BAL-LOW.
- **Vehicular Access:** the proposed structure plan layout provides for an interconnected loop road network which will provide multiple egress options to the north (Orton Road and the broader The Glades development), south (across Cardup Brook to Cardup Siding Road) and east (Soldiers Road), with Orton Road connecting to the future Tonkin Highway extension to the west, a major metropolitan road (and north-south connector).
- **Water:** the development will be provided with a permanent and reticulated water supply to support onsite firefighting requirements.

The management/mitigation measures to be implemented through the proposed development of the site, as discussed in this BMP, demonstrate that the acceptable solutions of each bushfire protection criteria can be met. Accordingly, having regard to clause 6.11 of SPP 3.7, the precautionary principle has been satisfied.

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Appendix A

Structure Plan

Appendix B

Landscape Masterplan

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List of Abbreviations

Table A1: Abbreviations – General terms

| General terms | |
|---------------|------------------------------|
| AS | Australian Standard |
| APZ | Asset Protection Zone |
| BAL | Bushfire Attack Level |
| BMP | Bushfire Management Plan |
| BPAD | Bushfire Planning and Design |
| FDI | Fire Danger Index |
| FZ | Flame Zone |

Table A2: Abbreviations – units of measurement

| Units of measurement | |
|----------------------|---|
| cm | Centimetre |
| dB | Decibel |
| ha | Hectare |
| km | Kilometre |
| m | Metre |
| m ² | Square metre |
| m AHD | Metres in relation to the Australian Height Datum |
| mm | Millimetre |
| km/hr | Kilometers per hour |

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Table A3: Abbreviations – Organisations

| Organisations | |
|---------------|---|
| BoM | Bureau of Meteorology |
| DBCA | Department of Biodiversity Conservation and Attractions |
| DFES | Department of Fire and Emergency Services |
| DPIRD | Department of Primary Industries and Regional Development |
| DPLH | Department of Planning, Lands and Heritage |
| DWER | Department of Water and Environmental Regulation |
| EPA | Environmental Protection Authority |
| OBRM | Office of Bushfire Risk Management |
| SES | State Emergency Services |
| WAPC | Western Australian Planning Commission |

Table A4: Abbreviations – Legislation and policies

| Legislation | |
|-------------|---|
| Guidelines | <i>Guidelines for Planning in Bushfire Prone Areas version 1.4</i> (DPLH & WAPC 2021) |
| SPP 3.7 | <i>State Planning Policy 3.7 Planning in Bushfire Prone Areas</i> (WAPC 2015) |

Table A5: 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 |
| MRS | Metropolitan Region Scheme |

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1 Introduction

1.1 Background

This Bushfire Management Plan (BMP) has been prepared on behalf of LWP Property Group Pty Ltd (the proponent) to support the structure plan amendment for the Cardup Brook Precinct of The Glades residential estate, which is generally bounded by Orton Road to the north, Soldiers Road to the east, Cardup Brook to the south and the future Tonkin Highway to the west (herein referred to as 'the site'). The structure plan is provided in **Appendix A** and sets out the proposed spatial framework for future residential development within the site.

The site is approximately 95 ha in area and is located 33 km south east of the Perth CBD within the Shire of Serpentine Jarrahdale, as shown in **Figure 1**. The site forms part of the broader The Glades development, with previous stages located to the north of the site, supporting both residential and commercial development.

The site is currently identified as a 'bushfire prone area' under the state-wide *Map of Bush Fire Prone Areas* prepared by the Office of Bushfire Risk Management (OBRM 2019) and is shown in **Plate 1** below. The identification of a site within an area declared as bushfire prone necessitates 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 1.4* (the Guidelines) (DPLH & WAPC 2021).

The purpose of SPP 3.7 and its policy intent is to preserve life and reduce the impact of bushfire on property and infrastructure through effective risk-based land use planning. Importantly, it is risk-based, requiring a methodical approach to identify and evaluate the hazards and provide the treatments to ameliorate these hazards to an acceptable level. SPP 3.7 requires that the determining authority give consideration to the precautionary principle (clause 6.11 in SPP 3.7) and they must be satisfied that the potential for significant adverse impacts can be adequately reduced or managed. In particular:

*SPP 3.7 does not require that there be no increase at all in the threat of bushfire to people property or infrastructure. Rather, as is seen in clause 2 of SPP 3.7, the intention of the policy is to 'implement effective, risk-based land use planning and development to preserve life and **reduce the impact of bushfire on property and infrastructure**'. (emphasis added) ¹*

¹ Harmanis Holdings No. 2 Pty Ltd and Western Australian Planning Commission [2019] WASAT 43 (Harmanis).

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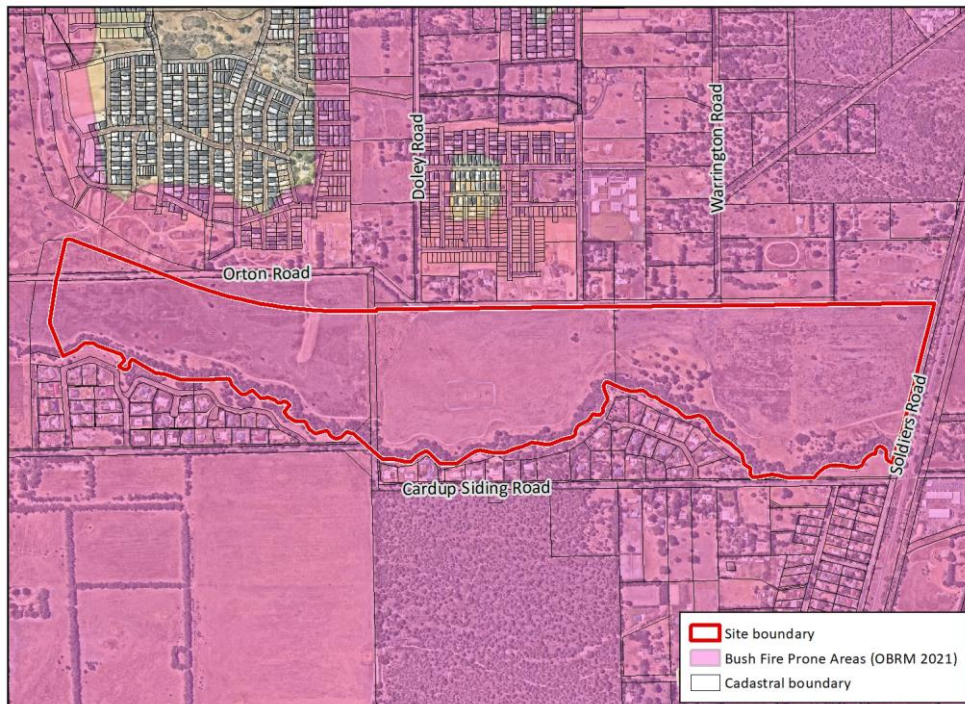


Plate 1: Areas within and surrounding the site identified as 'bushfire prone areas' (as indicated in purple) under the state-wide Map of Bush Fire Prone Areas ({OBRM, 2021 #1120}).

1.2 Aim of this report

The aim of this BMP is to assess bushfire hazards within the site and nearby areas and ensure that the threat posed by any identified hazards can be appropriately mitigated and managed and demonstrate satisfaction of clause 6.11 of SPP 3.7, the precautionary principle. It has been prepared to support the amended structure plan for the site and addresses the requirements of SPP 3.7 (WAPC 2015), the Guidelines (DPLH & WAPC 2021) and *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas* (AS 3959) (Standards Australia 2018). The document provides an assessment of the general bushfire management strategies to be considered as part of the future development within the site and includes:

- An assessment of the existing classified vegetation in the vicinity of the site (within 150 m) and consideration of bushfire hazards that will exist in the post development scenario (**Section 3**).
- Commentary on how 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**).

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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*
- *Fire and Emergency Services Act 1998*
- *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 1.4 (DPLH & WAPC 2021)*
- *Australian Standard AS 3959 – 2018 Construction of buildings in bushfire prone areas (Standards Australia 2018)*

1.4 Description of the proposed development

The site is currently zoned 'Urban' under the Metropolitan Region Scheme (MRS), see **Plate 2**, and 'Urban development' under the Shire of Serpentine Jarrahdale Town Planning Scheme (TPS) No. 2. The site forms part of the broader The Glades development, with previous stages located to the north of the site. Development within the site will be primarily associated with residential development, in addition to areas of mixed use as well as district playing fields and areas of public open space and a foreshore for Cardup Brook.

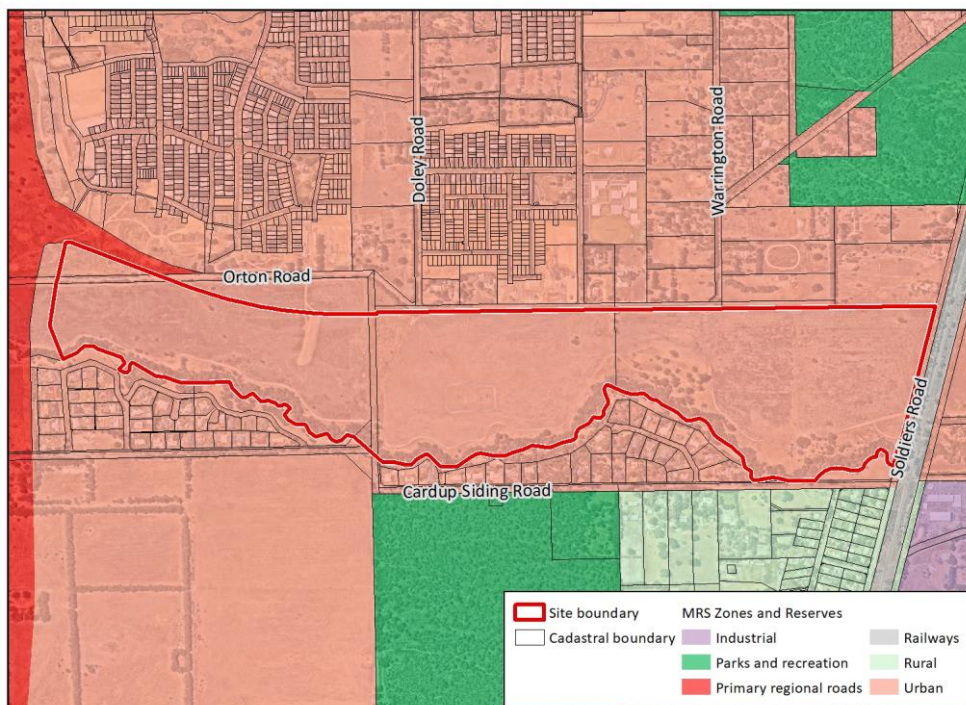


Plate 2: MRS zones and reserves within and surrounding the site.

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1.5 Description of land characteristics

The natural topographical contours indicate that the site is generally sloping from east to west, except for the area associated with Cardup Brook, where the elevation becomes steeper, associated with the banks of the waterway, which are generally only steep over a short length. Across the site, the elevation ranges from approximately 28 m Australian Height Datum (m AHD) in the western portion of the site, to 55 m in the eastern portion of the site, as shown in **Figure 1**.

Based on a review of available historic aerial photography, the majority of the site was historically cleared of native vegetation prior to 1953, likely to support agricultural purposes. Remnant vegetation within the site is associated with Cardup Brook, which is also identified as a resource enhancement wetland (Unique Feature Identifier (UFI) #14540), as shown in **Figure 2**, and is located adjacent to the southern boundary of the site. The western portion of Cardup Brook (where it occurs within the site) is also identified as Bush Forever Site 351 (as shown in **Figure 1**) and continues further west of Hopkinson Road. Bush Forever Site 350 is located immediately to the east of the site, and Bush Forever Site 352 occurs to the south of the site. These values are discussed further in **Section 2**.

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

- Areas of existing or proposed residential/rural residential development to the south of Cardup Brook, with Bush Forever Site 352 and cleared agricultural land located further south.
- Soldiers Road and Bush Forever Site 350 to the east, with land zoned for future industrial/commercial development further east.
- Orton Road to the north of the site, and existing residential/rural-residential development further north. The existing rural-residential landholdings are proposed for future urban development based on existing approved structure plans.

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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 as well as site specific information (where available) 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 previously been cleared of native vegetation prior to 1953, based on a review of publicly available aerial photography (Landgate 2019). Cardup Brook, a resource enhancement wetland, is located immediately adjacent to the southern boundary of the site and contains remnant native vegetation, predominantly overstorey species with some grasses/shrubs. Due to the historical disturbance within the site, the parkland cleared areas are not expected to contain any conservation significant values.

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

| 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)) | No | The majority of the site is mapped as a multiple use wetland (see Figure 2 , while Cardup Brook, adjacent to the southern boundary, is identified as a resource enhancement wetland (UFI 14540). In addition to conservation category wetlands (not identified within the site), REW wetlands can also be required to be retained. For the site, the REW will be retained and a 30 m wide buffer is proposed to be provided between Cardup Brook and future urban development, however this buffer area is not proposed to be revegetated. Two conservation category wetlands are located within 80 m of the site, one to the south and one to the east. Both wetlands are separated from the site by existing public roads. |
| Waterways (DWER-031) | Yes | Cardup Brook is located within the southern portion of the site and runs east-west in direction. |
| RAMSAR wetlands (DBCA-010) | No | Not applicable. No RAMSAR wetlands are located within or nearby to the site. |
| Threatened and priority flora | Potentially | If threatened or priority flora are located within the site, this will be restricted to Cardup Brook given no remnant native vegetation exists elsewhere. Cardup Brook and the existing remnant vegetation is proposed to be retained as part of the future development and therefore, conservation values are not expected to be impacted. |
| Threatened and priority fauna | Potentially | Due to the majority of the site being cleared of native vegetation (and composed of paddock grasses), suitable habitat for conservation significant fauna species is highly unlikely to be present. If threatened or priority fauna habitat is located within the site, these will be restricted to Cardup Brook. Cardup Brook and the existing remnant vegetation is proposed to be retained as part of the future development. |

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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 and site-specific information) (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 |
|---|--|---|
| Threatened ecological communities (TEC) (DBCA-038) | No. | It is unlikely that any TECs occur within the site. Cardup Brook, where remnant vegetation is present, is in a degraded condition and unlikely to support any conservation significant vegetation communities. |
| Bush Forever areas (DOP-071) | Yes | The western portion of Cardup Brook is located within Bush Forever Site 351 and occurs within the site boundary (see Figure 1). Cardup Brook and its associated vegetation is proposed to be retained as part of development within the site. Bush Forever Site 352, is located 80 m further south of the site, associated with Cardup Nature Reserve, while Bush Forever Site 350 is located immediately to the east and is associated with the Perth-Bunbury railway reserve (and is separated from the site by Soldiers Road). |
| Clearing regulations – Environmentally Sensitive Areas (DWER-046) | Yes | The majority of the site is identified as an Environmentally Sensitive Area (ESA) and is likely to be associated with the nearby conservation category wetlands, Bush Forever Sites and potential TECs within these areas. |
| DBCA controlled lands or waters (DBCA-011) | No | Cardup Nature Reserve is located approximately 80 m to the south of the site. |
| Conservation Covenants Western Australia (DPIRD-023) | No | Not applicable. |
| Aboriginal heritage (DAA-001) | Yes | Cardup Brook, within the southern portion of the site is identified as an ‘Other Heritage Place’ (Site 16108 Cardup Brook). Cardup Brook is proposed to be retained as part of future development. |
| Non-indigenous heritage (SHO-003) | No | Not applicable. No registered non-indigenous heritage sites were identified within or nearby to the site. |

2.1 Native vegetation – modification and clearing

With regard to bushfire management, native vegetation clearing within the site and surrounding 100 m may be required to enable the relevant siting and access requirements to be achieved and would be associated with clearing to establish:

- Future lots, including the portion of the public open space (POS) with the managed interface
- Asset protection zones (APZs), including areas of low threat vegetation outside the site boundary (where applicable).
- Vegetation management around retained vegetation to reduce the hazard.
- Public roads
- Firebreaks.

An environmentally sensitive area (ESA) extends across the majority of the site. The ESA would be associated with a 500 m buffer typically applied to known TECs present within the Brickwood Reserve, Bush Forever Sites and a 50 m buffer applied to conservation category wetlands. Where

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native vegetation is not present (i.e. where paddock grasses exist), the ESA is a not a relevant consideration.

Cardup Brook and the associated remnant native vegetation is proposed to be retained as part of development within the site, and therefore no clearing is anticipated. However, if clearing is required, appropriate approvals will be sought. For bushfire purposes, no existing remnant native vegetation within Cardup Brook needs to be removed.

Outside of Cardup Brook, a number of remnant isolated paddock trees remain. Where possible, these will be retained however some are likely to be removed for the proposed residential land uses. Clearing undertaken in accordance with addressing conditions associated with a subdivision approval, pursuant to the *Planning and Development Act 2005*, is exempt from requiring a clearing permit pursuant to Schedule 6 of the *Environmental Protection Act 1986* (where approved by a responsible authority) even where within an ESA.

2.2 Revegetation and landscape plans

No revegetation is proposed within the site as part of future development. However, the 30 m-wide buffer adjacent to Cardup Brook (and as outlined in **Table 1**) and surrounding public open space areas are assumed to achieve a woodland classification following implementation of the project and are assumed to be subject to no formal ongoing management and an ongoing bushfire hazard. It is anticipated that the buffer will support passive recreation activities so may have some management, but is not assumed as part of this bushfire assessment.

While the majority of the public open space areas are assumed to be a bushfire hazard, and exception is:

- The district open space area, which will have irrigated and managed sports fields.
- A small area of public open space in the central-eastern portion of the site, which even if not managed would still be able to be excluded as low threat in accordance with Section 2.2.3.2 of AS 3959 (due to its size and proximity to other classified vegetation).
- A small portion of public open space adjacent to lots along the Tonkin Highway/Water Corporation Services Corridor. This is a narrow 14 m-wide area, which is proposed to be well spaced trees over mulch and a footpath, so minor ongoing management needs.

These areas will be designed to achieve low threat vegetation in accordance with Section 2.2.3.2 of AS 3959. The management of the landscaped areas will be the responsibility of the proponent initially prior to handover to the Shire of Serpentine Jarrahdale. Management would be the same as similar areas within the Shire of Serpentine Jarrahdale.

The overall landscape concept plan for the Cardup Brook Precinct of The Glades development is provided in **Appendix B**.

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3 Bushfire Assessment Results

Bushfire risk for the site has been appropriately considered both in context to the site and potential impact upon the site using AS 3959 and the Guidelines.

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. AS 3959 measures the Bushfire Attack Level (BAL) as the radiant heat level (kW/m^2) over a distance of 100 m. AS 3959 also prescribes deemed-to-satisfy construction responses that can resist the determined radiant heat level at a given distance from the fire. It is based on six Bushfire Attack Level (BAL) ratings: BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ.

3.1 Assessment inputs

This bushfire attack level (BAL) assessment was undertaken in accordance with Method 1 of AS 3959. The existing vegetation classification and associated bushfire hazard levels are documented in **Figure 3** and **Figure 4** respectively. The assumed vegetation classifications and effective slope following development have been detailed in **Figure 5**. A BAL contour plan is provided as **Figure 6** and has been prepared based on the assumed developed condition of the site, including considerations of Cardup Brook and the 30 m buffer, in accordance with Appendix Three of the Guidelines.

A number of site assessments have been undertaken over the preceding years, to understand the existing vegetation and effective slope within the site and surrounding 150 m. These included assessments on the 27 July 2017, 22 February 2018 and 12 September 2019 in accordance with AS 3959 and the Guidelines (and the vegetation assessment process has not changed in this time) to provide context for the siting of the classified vegetation and give a broader understanding of the likely intensity of the fire.

3.1.1 Assumptions

The BAL assessment is based on the following assumptions:

- **Designated FDI:** 80
- **Flame temperature:** 1090 K
- **Effective slope beneath classified vegetation:** flat/upslope and downslope $>0-5^\circ$ (see **Figure 5**)
- Areas surrounding the site that have been identified as low threat (in accordance with Section 2.2.3.2 of AS 3959) will remain based on the current management regimes.
- All vegetation within the site, except for the forest vegetation associated with Cardup Brook (and the resource enhancement wetland) and areas identified as woodland (30 m buffer and public open space), will be removed/modified to achieve low threat vegetation as part future residential development.
- Areas of district open space and identified public open space will be landscaped and maintained to a low threat standard in accordance with Section 2.2.3.2 of AS 3959 (Clause 2.2.3.2(f) for the district open space). These areas will be maintained by the developer initially and following

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handover will be maintained by the Shire of Serpentine Jarrahdale, as per the standard subdivision process.

- Grassland vegetation adjacent to the northern and western portion of the site has been identified as a 'temporary hazard' within **Figure 5**. These areas are associated with future residential development and the 'Water Corporation Services Corridor' and the future Tonkin Highway extension, respectively, and while grassland vegetation in these areas will be removed in the future, given timing for these works is unknown it has been assumed to remain unmanaged in order to provide for a conservative assessment of bushfire hazards.
- All other areas of classified vegetation that has been identified outside the site has been assumed to remain in its current state (unless stated otherwise) and will therefore remain a bushfire hazard.

3.1.2 Vegetation classification

All vegetation within 150 m of the site was classified in accordance with Clause 2.2.3 of AS 3959. The assignment of vegetation classifications is based on an assessment of vegetation structure, which includes consideration of the various fuel layers of different vegetation types. For example, fuel layers in a typical forest environment can be broken down into five segments as illustrated in **Plate 3** below. These defined fuel layers are considered when determining the classification of vegetation.

Each distinguishable vegetation plot from the pre-development scenario is described in **Table 2** and shown in **Figure 3**. The post-development vegetation assumptions (underpinning the BAL assessment) are also described in **Table 2** and shown in **Figure 5**. This classification is a conservative assessment of the vegetation anticipated to be present in the medium to long-term.

Not all vegetation is a classified bushfire risk. Vegetation and ground surfaces that are exempt from classification as a potential hazard are identified as a 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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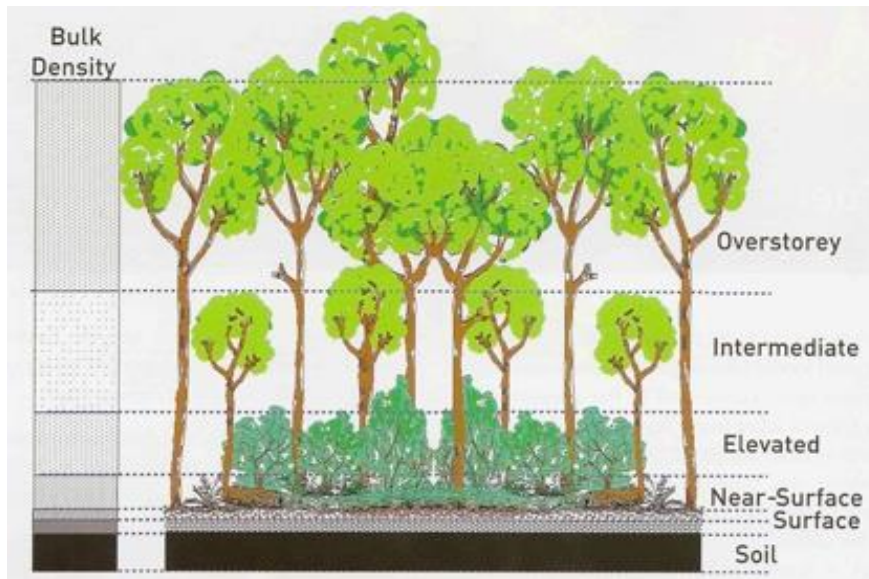


Plate 3: The five fuel layers in a forest environment that could be associated with fire behaviour (Gould et al. 2007)

3.1.3 Effective slope

The effective slope for each of the vegetation plots (underpinning the BAL assessment) is described in **Table 2** and shown in **Figure 5**.

With regard to the effective slope, the banks of the brook are relatively steep (exceeding 15° in some areas), however occur over a short distance (less than 10 m), while the base of the brook itself (a small 1 – 2 m incised channel) and land either side of the banks is effectively flat. The majority of the bank area is composed of grassland vegetation with the majority of remnant vegetation found on the flatter areas of the brook, although canopy from the vegetation from the base of the brook overhangs some areas.





Given the short nature of a possible fire run within this relatively narrow strip of vegetation over a steep slope, bushfire would not reach the same rate of spread, flame heights and intensity associated with a full 100 m fire run with the same steep slope. Therefore, based on the composition of slope within the brook and its effect on potential bushfire behaviour, the effective slope beneath classified vegetation within Cardup Brook has been assessed as an average of downslope >0 - 5° where the banks are steeper.

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Table 2: Vegetation classification, effective slope and future management





| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | | |
|---|---|---|--|--|---|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions | |
| 1 - 5 | <p>Forest vegetation has been identified along the southern boundary of the site, associated with Cardup Brook. This vegetation extends in an east to west direction, following the waterway.</p> <p>This area largely consists of <i>Eucalyptus</i> species with a dense overstorey, mixed intermediate layer and understorey consisting of grasses.</p> <p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Bushfire hazard rating (Figure 4): Extreme</p> <p>Photo points: 1, 2, 3, 4</p> |  <p>Photo location 1: forest vegetation associated with Cardup Brook, looking south.</p> |  <p>Photo location 2: forest vegetation, looking south.</p> | 1, 3 and 5 | <p>The areas identified as forest vegetation are expected to remain in the long term and be protected as part of Cardup Brook and the associated resource enhancement wetland. These areas will pose a permanent bushfire hazard to development within the site.</p> <p>AS 3959 classification (Figure 5): Forest (Class A)</p> <p>Effective slope (Figure 5): Downslope 0- 5</p> |
| | |  <p>Photo location 3: forest vegetation with multiple fuel layers, looking south-east.</p> |  <p>Photo location 4: forest vegetation, looking north-west.</p> | 2 and 4 | <p>The areas identified as forest vegetation are expected to remain in the long term and protected as part of Cardup Brook and the associated resource enhancement wetland. These areas will pose a permanent bushfire hazard to development within the site.</p> <p>AS 3959 classification (Figure 5): Forest (Class A)</p> <p>Effective slope (Figure 5): Flat/upslope</p> |

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

| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | |
|---|---|---|--|---|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 6, 7 | <p>Areas of forest vegetation occur to the east of the site within Bush Forever Site 350 (in the Soldiers Road and Perth – Bunbury rail reserve), as well as to the south of the site within Bush Forever Site 352, noting the tree canopy cover is more sporadic in these areas with less canopy cover compared to the vegetation within Cardup Brook (Plot 1 to 5).</p> <p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Bushfire hazard rating (Figure 4): Extreme</p> <p>Photo points: 5, 6, 7, 8</p> |  <p>Photo location 5 – forest vegetation, within Bush Forever Site 350.</p>  <p>Photo location 7 – forest vegetation, within Bush Forever Site 352</p> |  <p>Photo location 6 – forest vegetation, within Bush Forever Site 350</p>  <p>Photo location 8 – forest vegetation, within Bush Forever Site 352</p> | <p>6, 7</p> <p>The forest vegetation in areas surrounding the site are expected to remain in the long-term, protected within the respective Bush Forever sites, and will therefore pose a bushfire hazard in perpetuity.</p> <p>AS 3959 classification (Figure 5): Forest (Class A)</p> <p>Effective slope (Figure 5): Flat/upslope</p> |

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





| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | |
|---|---|---|---------------------------------|---|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 8 | <p>Shrubland vegetation occurs to the east of the site associated with more disturbed areas of Bush Forever Site 350 (within Soldiers Road and Perth – Bunbury rail reserve).</p> <p>AS 3959 classification (Figure 3): Shrubland (Class C)</p> <p>Bushfire hazard rating (Figure 4): Extreme</p> <p>Photo points: 9</p> |  <p><i>Photo location 9 – shrubland vegetation within Bush Forever Site 350</i></p> | 8 | <p>The shrubland vegetation in areas surrounding the site are expected to remain in the long-term, protected as part of Bush Forever Site 350, and will therefore remain a bushfire hazard in perpetuity.</p> <p>AS 3959 classification (Figure 5): Shrubland (Class C)</p> <p>Effective slope (Figure 5): Flat/upslope</p> |

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

| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | |
|---|--|---|---------------------------------|--|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 9-13 | <p>Grassland (Class G) vegetation has been identified across the majority of the site, associated with areas where clearing has previously occurred. Grassland vegetation has also been identified to the north, west, east and south of the site associated with paddocks and current unmanaged landholdings. Whilst some areas, particularly Plot 11 to the south of the site, appear to be managed, a conservative approach has been taken in classifying vegetation to determine the potential bushfire risk to the site</p> <p>AS 3959 classification (Figure 3): Grassland (Class G)</p> <p>Bushfire hazard rating (Figure 4): Moderate</p> <p>Photo points: 10, 11, 12, 13, 14, 24</p> <p>Continued below.</p> |  <p><i>Photo location 10 – grassland vegetation, well grazed/slashed</i></p>  <p><i>Photo location 11 – grassland vegetation, well grazed/slashed</i></p>  <p><i>Photo location 12 – grassland vegetation, evidence of some slashing</i></p>  <p><i>Photo location 13 – grassland vegetation, evidence of some slashing</i></p> | 9 | <p>The existing grassland vegetation within the site, associated with the 30 m-wide buffer area, and adjacent public open space areas have been assumed to change to a woodland classification (10-30% foliage cover (20-60% canopy cover) with grasses/low ground covers). No ongoing management has been assumed in this area. It is anticipated that the buffer and adjacent public open space areas are likely to support passive recreation activities (and therefore could have more 'low threat' areas), however, to provide flexibility for ongoing maintenance, the landscaping is assumed to be unmanaged and a hazard.</p> <p>AS 3959 classification (Figure 5): Woodland (Class B)</p> <p>Effective slope (Figure 5): Flat/upslope</p> <p>Continued below.</p> |

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

| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | |
|---|------------------------|---|---------------------------------|--|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 9-13 | Continued from above. |  <p><i>Photo location 14 – grassland vegetation, evidence of slashing</i></p>  <p><i>Photo location 24: grassland to the north-west of the site, looking west.</i></p> | 10, 11, 12, 13 | <p>Areas of grassland to the north and west of the site will be removed in the long-term as part of proposed residential development (where approved structure plans exist) and extension of Tonkin Highway (and construction within the ‘Water Corporation Services Corridor’). These areas have been identified as a ‘temporary hazard’, however for the purposes of this assessment are considered ‘grassland’ to provide a conservative assessment of bushfire risk. All other areas of grassland outside the site have been assumed to remain this classification in the long-term.</p> <p>AS 3959 classification (Figure 5): Grassland (Class G)</p> <p>Effective slope (Figure 5): Flat/upslope</p> <p>Continued below.</p> |

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

| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | |
|---|------------------------|---|---------------------------------|--|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 9-13 | Continued from above. | Continued from above. | 14 | <p>Vegetation identified as grassland within the site (Plot 9 in Figure 3) will be converted to non-vegetated areas (exclusion clause 2.2.3.2 (e)), associated with the implementation of residential lots and the proposed road network (including re-alignment of Orton Road).</p> <p>AS 3959 classification (Figure 5): Non-vegetated (exclusion clause 2.2.3.2(e))</p> <p>Effective slope (Figure 5): Not applicable</p> |
| | | | 15 | <p>Areas within the site identified as district open space and low threat public open space will managed to a low threat standard, in accordance with the typical requirements of Liveable Neighbourhoods and the Shire of Serpentine Jarrahdale. These areas will be managed by the proponent prior to handover to the Shire of Serpentine Jarrahdale who will manage these areas in the long-term.</p> <p>AS 3959 classification (Figure 5): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Effective slope (Figure 5): Not applicable</p> |

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





| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | |
|---|---|---|--|--|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 14 | <p>Non-vegetated areas such as roads, 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>AS 3959 classification (Figure 3): Non-vegetated (exclusion clause 2.2.3.2(e))</p> <p>Bushfire hazard rating (Figure 4): 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>Photo points: 15, 16, 17, 18</p> |  <p>Photo location 15 – Orton Road, non-vegetated area</p>  <p>Photo location 17 – Warrington Road, non-vegetated area</p> |  <p>Photo location 16 – Orton Road, non-vegetated area</p>  <p>Photo location 18 – Cardup Siding Road, non-vegetated area</p> | <p>14</p> <p>The condition and/or maintenance regimes for all existing non-vegetated areas surrounding the site are assumed to remain the same in the long-term based on current land uses and management arrangements.</p> <p>AS 3959 classification (Figure 5): Non-vegetated (exclusion clause 2.2.3.2(e))</p> <p>Effective slope (Figure 5) Not applicable</p> |

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



| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5)) | |
|---|--|---|--|--|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 15 | <p>Areas of low threat vegetation currently exist to the north and south of the site, associated with public reserves and residential gardens, and are composed of maintained grass/turf, gardens, and road reserves.</p> <p>AS 3959 classification (Figure 3): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Bushfire hazard rating (Figure 4): 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>Photo points 19, 20, 21, 22, 23, 25</p> <p>Continued below.</p> |  <p><i>Photo location 19 – managed private landholdings, low threat vegetation</i></p>  <p><i>Photo location 21 – low threat vegetation.</i></p> |  <p><i>Photo location 20: managed low threat vegetation within private landholdings.</i></p>  <p><i>Photo location 22 – low threat vegetation</i></p> | <p>15</p> <p>The maintenance regimes for all existing low-threat vegetation surrounding the site is assumed to continue in the long-term based on current land uses and management arrangements, in accordance with the requirements of the Shire of Serpentine Jarrahdale fire control notice and community expectations.</p> <p>This includes areas of grass north of the site and west of Doley Road that are owned by the proponent and will continue to be managed to a low threat standard or be developed for residential purposes.</p> <p>AS 3959 classification (Figure 5): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Effective slope (Figure 5): Not applicable</p> <p>Continued below.</p> |

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

| Pre-development (see Figure 3 and Figure 4) | | | Post development (see Figure 5) | |
|---|------------------------|--|---------------------------------|--|
| Plot no. | AS 3959 classification | Site photo/s (location points shown in Figure 3) | Plot no. | AS 3959 classification, effective slope, and assumptions |
| 15 | Continued above. |  <p>Photo location 23 – low threat vegetation</p> | 15 | Continued above. |
| | |  <p>Photo location 25: areas of managed landholdings with some minimal winter growth to the west of Doley Road, looking west.</p> | | |

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3.2 Assessment outputs

The post development vegetation classification described in **Section 3.1** is summarised in **Table 3** and incorporates the known changes to vegetation post-development. The resultant BALs are shown in **Figure 6**.

Table 4 provides a summary of the setback distances from the identified classified vegetation necessary to achieve the indicated BAL ratings, with the BAL contour plan (**Figure 6**) being a visual representation of these distances. The setback distances are based on the distances outlined in Table 2.5 of AS 3959.

Table 3: Summary of AS3959 vegetation classifications and effective slope

| Plot no. | Applied vegetation classification | Effective slope |
|---------------|-----------------------------------|-----------------|
| 1, 3 and 5 | Class A – Forest | Downslope >0-5° |
| 2, 4, 6 and 7 | Class A – Forest | Flat/upslope |
| 8 | Class C - Shrubland | Flat/upslope |
| 9 | Class B – Woodland | Flat/upslope |
| 10-13 | Class G – Grassland | Flat/upslope |
| 14 | Exclusion 2.2.3.2(e) | N/A |
| 15 | Exclusion 2.2.3.2(f) | N/A |

The BAL assessment indicates that through the location of public roads, public open space and/or in-lot setbacks, a BAL rating of BAL-29 or less can be achieved at new future habitable buildings based on the indicated spatial layout (see **Figure 6**). The majority of future habitable buildings within the site will be subject to a BAL rating of BAL-LOW or BAL-12.5.

For lots fronting Cardup Brook and the associated public open space area, while a public road interface has been provided, a 1 m front lot setback will be required for habitable buildings to achieve BAL-29, based on the current layout. This would be easily accommodated by the standard setbacks required through the residential design codes.

It is noted that the development areas adjacent to the western boundary of the site (adjacent to the future Tonkin Highway extension) and eastern boundary of the site (adjacent to Soldiers Road) include areas subject to BAL-FZ and/or BAL-40. The spatial layout in the structure plan enables habitable buildings to be developed in areas subject to BAL-29 or less based on the likely depth and/or orientation of future lots. It is anticipated that due to either the short fire run (for Bush Forever Site 350/Soldiers Road) and/or the difference in height between future development and areas of hazard including use of a future acoustic wall (i.e. Tonkin Highway), the actual BAL impacts will be significantly less than that predicted using a Method 1 assessment, when assessed using Method 2 of AS 3959. A Method 2 BAL assessment completed for residential lots immediately to the north of the site within earlier stages of The Glades development (Emerge Associates and Bushfire Safety Consulting 2019) indicates that the extent of BAL ratings is likely to be significantly less. The BAL ratings applicable to future habitable buildings in the western and eastern portions of the site will be further considered as part of future subdivision.

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Table 4: 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 5) | Vegetation classification (see Figure 5) | Effective slope (see Figure 5) | Distance to vegetation (from Table 2.5 of AS 3959) | BAL rating (see Figure 6) |
|---|--|--------------------------------|--|---------------------------|
| Plot 1, 3 and 5 | Forest (Class A) | Downslope 0 - 5 | < 20 m | BAL-FZ |
| | | | 20 - < 27 m | BAL-40 |
| | | | 27 - < 37 m | BAL-29 |
| | | | 37 - < 50 m | BAL-19 |
| | | | 50 - < 100 m | BAL-12.5 |
| | | | > 100 m | BAL-LOW |
| Plot 2, 4, 6 and 7 | 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 8 | Shrubland (Class C) | Flat/upslope | < 7 m | BAL-FZ |
| | | | 7 - < 9 m | BAL-40 |
| | | | 9 - < 13 m | BAL-29 |
| | | | 13 - < 19 m | BAL-19 |
| | | | 19 - < 100 m | BAL-12.5 |
| | | | > 100 m | BAL-LOW |
| Plot 9 | Woodland (Class B) | Flat/upslope | < 10 m | BAL-FZ |
| | | | 10 - < 14 m | BAL-40 |
| | | | 14 - < 20 m | BAL-29 |
| | | | 20 - < 31 m | BAL-19 |
| | | | 31 - < 100 m | BAL-12.5 |
| | | | > 100 m | BAL-LOW |
| Plot 10 -13 | 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, based on the requirements of SPP 3.7 and the Guidelines, 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 to ensure a BAL rating of BAL-29 or less can be achieved at habitable buildings (built form).
- Ensuring that site access is designed, constructed and managed to ensure safe access and egress for fire fighting vehicles and occupants.
- Ensuring that where identified (only small portions of the site) site landscaping for public and district open space is designed, implemented and managed to achieve low threat standards to reduce the risk of fires starting within the site.
- Ensuring that the provision of water for firefighting is sufficient and accessible by firefighting services.

4.1 Permanent hazards

In the long-term, permanent bushfire hazards will exist within and surrounding the site, including areas of remnant vegetation associated with Cardup Brook/resource enhancement wetland and the associated 30 m buffer and public open space network, as well as nearby Bush Forever Sites, in particular Bush Forever Site 350. Future development will need to ensure a BAL rating of BAL-29 or less can be achieved at future built form, with future subdivision to ensure adequate asset protection zones are accommodated, either within predominantly public road reserves and/or within lots.

The 30 m buffer area applied from the boundary of Cardup Brook/resource enhancement wetland will not be revegetated as part of future development within the site, but will be landscaped and subject to tree planting. It is assumed this area will be subject to a woodland classification. It may have some management given the likely passive recreation activities that will be supported in this areas but none is assumed or required based on this BMP.

4.2 Temporary/manageable hazards

As part of staged development, management of existing grassland vegetation within the site (where outside the areas identified as classified vegetation in the long-term, see **Figure 7**) will be a relevant consideration. Fuel management within future development areas as part of staged development will be required (within at least 50 m) to ensure temporary fuels do not impact on development.

Section 5.1 of this report provides guidance on mitigating these hazards to reduce the risk to the existing site and any future development within the site. Ongoing management of vegetation within future development stages as part of subdivision will need to be reviewed and undertaken regularly to ensure vegetation does not become a hazard.

Temporary hazards also exist externally to the north and west of the site, associated with the future Tonkin Highway extension and future areas of residential development. Until development of these areas is progressed, any proposed development within the site will need to be cognisant of these

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hazards and ensure the subdivision design is able to ensure a BAL rating of BAL-29 or less can be achieved at future built form.

4.3 Access to two different destinations

The proposed structure plan across the site facilitates access to multiple destinations, through connections to existing public roads namely Soldiers Road to the east, Orton Road to the north and Cardup Siding Road to the south. As part of future staging of development, access to different destinations will need to be considered, and may require use of temporary emergency access ways or similar to link to the public road network.

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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 development progresses within the site, an acceptable solution can be adopted for each of the bushfire protection criteria detailed within Appendix Four of the Guidelines. The applicable 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, an ‘acceptable solution’ will be able to address the intent of all four bushfire protection criteria as part of future subdivision of the site. A summary of how this can be achieved and an associated compliance statement for each has been provided in **Table 5**.

Table 5: Assessment against the bushfire protection criteria from the Guidelines

| Bushfire protection criteria | Proposed bushfire management strategies |
|-------------------------------------|--|
| Element 1: Location | |
| A1.1 Development location | The proposed development is located in an area that will, on completion, be subject to BAL-29 or below. The site includes areas of BAL-40 and BAL-FZ, however, there is sufficient developable area that achieves BAL-29 or below based on the development layout and use of in-lot setbacks that can be accommodated by the development cells and standard residential design code requirements. Therefore, the proposal complies with A1.1 . |
| Element 2: Siting and design | |
| A2.1 Asset Protection Zone | <p>All proposed lots that are intended to support habitable buildings are able to achieve an asset protection zone (APZ) with sufficient separation from classified vegetation to achieve BAL-29 or below. Separation from permanent bushfire hazards is provided within the structure plan through the management of future lots, and the strategic placement of public roads and the proposed design of interfaces between areas of bushfire hazard and development. The BAL contour plan provided in Figure 6 demonstrates that the proposed lots provide a developable area that can achieve a BAL rating of BAL-29 or below.</p> <p>Development areas fronting Cardup Brook and the associated public open space area, will likely require a 1 m to 2 m front lot setback to ensure habitable buildings achieve BAL-29. This is easily accommodated by the standard setbacks required through the residential design codes.</p> <p>It is also noted that development areas adjacent to the western boundary of the site (adjacent to the future Tonkin Highway extension) and eastern boundary of the site (adjacent to Soldiers Road) include areas subject to BAL-FZ and/or BAL-40 (as indicated in Figure 7). The spatial layout in the structure plan enables habitable buildings to be developed in areas subject to BAL-29 or less based on the likely depth and/or orientation of future lots. It is anticipated that due to either the short fire run (for Bush Forever Site 350/Soldiers Road) and/or the difference in height between future development and areas of hazard including use of a future acoustic wall (i.e. Tonkin Highway), the actual BAL impacts will be significantly less than that predicted through the current Method 1 BAL assessment. The BAL ratings applicable to future habitable buildings in the eastern and western portions of the site will be further considered as part of future subdivision.</p> |

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



Table 5: Assessment against the bushfire protection criteria from the Guidelines (continued)

| Bushfire protection criteria | Proposed bushfire management strategies |
|---|---|
| Element 2: Siting and design (continued) | |
| A2.1 Asset Protection Zone (continued from above) | <p>Continued from above.</p> <p>The distances Table 4 can be used to inform the future proposed residential development layout at subdivision stage based on the applicable classified vegetation, particularly for areas adjacent to permanent classified vegetation associated with Cardup Brook and public open space areas (shown in Figure 7). As a minimum future subdivision should ensure future dwellings are able to achieve a BAL rating of BAL-29 or less.</p> <p>It is recommended that as part of the staged development within the site and to minimise the impacts of temporary (grassland) hazards on proposed lots, the proponent should manage a 50 m-wide area immediately surrounding each subdivision stage (where within their broader landholding) to a low threat standard. This would include permanently removing the grass vegetation and/or regularly throughout any year mowing/slashing the grass to 100 mm in height or less. This would be maintained by the proponent until urban development progresses.</p> <p>Therefore, the proposal complies with A2.1.</p> |
| Element 3: Vehicular access | |
| A3.1 Public roads | <p>Surrounding public roads and all new internal roads can and will comply with the minimum standards outlined in Appendix Four of the Guidelines (DPLH & WAPC 2021), which includes a minimum 6 m-wide trafficable surface (refer to Plate 4 below). Therefore, the proposal complies with A3.1.</p> |
| A3.2a Multiple access routes. | <p>The proposed structure plan layout, provided in Appendix A, provides for an interconnected loop road network which will provide multiple egress options to the north (Orton Road and the broader The Glades development), south (across Cardup Brook to Cardup Siding Road) and east (Soldiers Road), with Orton Road connecting to the future Tonkin Highway extension to the west, a major metropolitan connector road. Therefore, the proposal complies with A3.2a.</p> |
| A3.2b Emergency access way | <p>No emergency access ways are proposed. Therefore, A3.2b is not applicable. If EAWs are required during staging of future development then they must meet the minimum technical requirements outlined in Appendix Four of the Guidelines.</p> |
| A3.3 Through-roads | <p>The proposed road network includes one no through road (shown in Figure 7). This road is adjacent to the Tonkin Highway road reserve, and if this was a through road, it would be too close to the Tonkin Highway interchange, and would not be safe from a traffic and road user perspective. The no through road is less than 200 m from a through-road compliant with A3.3 for no-through-roads. All no through-roads must meet the minimum technical requirements for public road and require a turning head, in accordance with Appendix Four of the Guidelines. The proposal is compliant with A3.3 given the no through road is less than 200 m in length and will be developed in accordance with the minimum technical requirements of the Guidelines.</p> <p>If development is staged, temporary no-through roads must comply with A3.3.</p> |
| A3.4a Perimeter roads | <p>The road network design incorporates perimeter roads that create separation between lots and classified vegetation (see Appendix A). No perimeter road has been provided along the western boundary of the site, adjacent to the future Tonkin Highway road reserve/Water Corporation services as this area will function as a perimeter road. In addition, the adjoining vegetation is grassland, negating the requirement for a perimeter road. All perimeter roads are required to meet the minimum technical requirements for public road in accordance with Appendix Four of the Guidelines. The proposed development complies with A3.4a.</p> |

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



Table 5: Assessment against the bushfire protection criteria from the Guidelines (continued)

| Bushfire protection criteria | Proposed bushfire management strategies |
|--|---|
| Element 3: Vehicular access (continued) | |
| A3.4b Fire service access route | Future land uses within the site will have appropriate vehicular access, as outlined above, and therefore fire service routes are not required. |
| A3.5 Battle-axe access legs | None proposed at this stage. |
| A3.6 Private driveways | None proposed at this stage based on the density of residential development. |
| Element 4: Water | |
| A4.1 Identification of future water supply | The proposed development is located in an area with a reticulated water supply along existing public roads. This will be expanded into the site as future subdivision occurs, as outlined in the water management and servicing reports supporting the structure plan. The proposal complies with A4.1 . |
| A4.2 Provision of water for fire fighting purposes | Not applicable at this stage. As the site will be serviced by a reticulated water scheme, water for fire-fighting purposes will be met through the provision of hydrants, in accordance with water authority requirements. |

Table 6: Vehicular access technical requirements

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

Notes:

¹ To have crossfalls between 3 and 6%.

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

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

Plate 4: Excerpt of Table 6 from The Guidelines

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



5.1 Additional management strategies

5.1.1 Future approval considerations

This BMP and the predicted BAL ratings (see **Figure 6**) have been prepared to support the structure plan for the site and assume future increased bushfire hazards due to public open space. If required, at the subdivision stage, a revised BMP (or subdivision specific BAL contour plan) can be prepared to respond to the specific subdivision layout, and to confirm that the bushfire mitigation strategies in this document have been accommodated. An updated BMP would detail any specific management actions, including the BAL rating applicable to future dwellings (and could be used to support the building licence process).

Following the creation of lot titles, a building licence will be required before the dwelling construction can commence. This BMP and the indicative BAL ratings can be used to inform the construction requirements for future dwellings.

5.1.2 Landscape management

5.1.2.1 Within the site

Public open space

It is assumed that as part of the development of the site, all areas of remnant vegetation associated with Cardup Brook/the resource enhancement wetland will be retained in its current state (see **Figure 7** and areas assumed to remain a hazard). The 30 m buffer area applied from the boundary of Cardup Brook/resource enhancement wetland and surrounding public open space areas are assumed to achieve a woodland classification (Class B) following landscaping, to accommodate a 'no management' scenario. It is anticipated that the buffer and surrounding public open space will support passive recreation activities so may have some management, but none is assumed or required to achieve the outcomes predicted in this BMP. Tree planting (10-30% foliage cover (20-60% canopy cover) with grass, reeds, sedges and groundcovers can be accommodated under the woodland classification.

Landscaping undertaken within the identified (small) areas of public open space and the district open space (shown in **Appendix A** and **Appendix B**) will be designed, landscaped and maintained to a low threat standard by the developer in accordance with Section 2.2.3.2 of AS 3959 (in particular Clause 2.2.3.2 (f)) and as per typical public open space requirements of Liveable Neighbourhoods and the Shire of Serpentine Jarrahdale. As a note, the public open space in the central-eastern portion of the site could be excluded as low threat due to size/location without management. The management of the landscaped areas will be the responsibility of the proponent/landowner initially and following handover, long-term the Shire of Serpentine Jarrahdale. Ongoing management will be aligned with typical urban requirements and will likely include:

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

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



The design and construction of public open space is generally a condition of subdivision approval. Detailed design for public open space areas is usually determined in collaboration with the local government as part of the typical subdivision construction process. Conceptual landscape designs will be developed as detailed design progresses, responding to the requirements of the Shire of Serpentine Jarrahdale.

Management of temporary bushfire hazards

In order to minimise the impacts of temporary grassland hazards on future proposed lots within the site, as part of staging of subdivision, it is recommended that the proponent manage a 50 m-wide area surrounding each stage to a low threat standard, where within their landholdings and outside the resource enhancement wetland associated with Cardup Brook.

This 50 m wide area should be maintained to achieve low threat in accordance with Section 2.2.3.2 of AS 3959 and will be the responsibility of the proponent until urban development progresses and/or other formal arrangements are made and agreed to with the Shire. Ongoing management is likely to include:

- Maintain areas to have a fine fuel loading of 2 tonnes per hectare or less.
- Where present, regular mowing/slashing of grass to less than 100mm in height (throughout the year, particularly during the bushfire season).
- Regular removal of weeds and built up dead material.
- Application of ground/surface covers such as mulch or non-flammable materials (i.e. mineral earth) as required/applicable.

Future lots

In accordance with the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice (as published) and this BMP, all future lots within the site will be managed to a low threat standard by the proponent until these are sold. Following sale, ongoing maintenance will be the responsibility of the lot owner.

5.1.2.2 Surrounding the site

Within existing private landholdings

It is assumed that the private landholdings surrounding the site will be managed by the applicable landowners and/or management authority in accordance with existing maintenance regimes or the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice (as published).

Existing road reserves and public open space

The existing road reserves are assumed to continue to achieve low threat standard (where identified) in accordance with Section 2.2.3.2 of AS 3959, in line with existing maintenance regimes, exclusions and/or Shire of Serpentine Jarrahdale requirements for residential areas.

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



5.1.3 Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice

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

In particular, in accordance with the firebreak notice, where land is one acre (4,047 m²) in size or less, all grass should be kept to less than 50 mm in height with all cuttings removed from the property.

5.1.4 Vulnerable or high-risk land uses

No vulnerable or high-risk land uses, as defined under SPP 3.7, are proposed within the site as part of the structure plan. Therefore, the requirements of policy measure 6.6 within SPP 3.7 are not applicable.

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

5.1.5 Public education and preparedness

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

The Shire of Serpentine Jarrahdale provides bushfire safety advice to residents available from their website <https://www.sjshire.wa.gov.au/community/fire-and-emergency-management>. 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 site users by DFES, the Department of Biodiversity, Conservation and Attractions (DBCA) and/or the Shire of Serpentine Jarrahdale on any specific recommendations with regard to responding to the bushfire, including evacuation if required. It is highly recommended that future operators within the site makes themselves aware of their responsibilities with regard to preparing for and responding to a potential bushfire that may impact upon them or those under their care.

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



6 Responsibilities for Implementation and Management of Bushfire Measures

Table 6 outlines the responsibilities of the proponent (developer) associated with implementing this BMP for the structure plan.

Table 6: Responsibilities for the implementation of this BMP

| No. | Implementation action |
|-----|--|
| 1 | Provide a copy of this BMP to the relevant decision makers to support approval of the proposed structure plan. |
| 2 | If required, prepare a new/revised BMP in accordance with SPP 3.7, the Guidelines and AS 3959 to support future subdivision applications, based on the proposed detailed layout and in consideration of existing bushfire hazards or those that will be present following development. In addition, if the assumptions regarding the treatment to POS change as part of future detailed design stages, a revised BMP will be required. |
| 3 | Where required, and based on the outcomes of this BMP or subsequent BMP/s, make spatial provision within the subdivision layout/design to accommodate: <ul style="list-style-type: none"> • A suitable public road network that provides access to at least two different destinations. Public roads meet the minimum requirements of Appendix Four in the Guidelines (or as agreed with the Shire). The proposed structure plan currently supports this requirement. • Where possible avoid no through roads and battle axe lots, or where no alternative is available ensure that these consider the requirements of Appendix Four of the Guidelines. • Ensure future habitable buildings are able to be located so that BAL-29 or less applies. Separation distances should be in accordance with the minimum distances outlined in Table 4 of this BMP for the corresponding vegetation plot/classification, or as determined in subsequent BMPs/BAL assessments. This may include the provision of public roads and/or managed public open space between habitable buildings and bushfire hazards, or by ensuring lots are an adequate depth or width to ensure BAL-29 is not exceeded at future habitable buildings. |
| 4 | Comply with the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice until subdivision progresses. |

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



7 Applicant Declaration

7.1 Accreditation

This assessment has been prepared by Emerge Associates who have been providing bushfire risk management advice for more than 10 years, undertaking detailed bushfire assessments (and associated approvals) to support the land use development industry. Emerge Associates have a number of team members who have undertaken Bushfire Planning and Design (BPAD) Level 1 and Level 2 training and are Fire Protection Association of Australia (FPAA) accredited practitioners (or are progressing).

Anthony Rowe is a FPAA Level 3 BPAD accredited practitioner (BPAD No. 36690) in accordance with clause 6.12 of the Guidelines.

7.2 Declaration

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

Reviewer signature:

A handwritten signature in black ink, appearing to read "Anthony Rowe", written over a light grey dotted grid background.

Name: Anthony Rowe

Company: Emerge Associates/Envision Bushfire Planning

Date: 05/06/2024

BPAD Accreditation: Level 3 BPAD No. 36690

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



8 References

8.1 General references

Department of Planning, Lands and Heritage, and Western Australian Planning Commission, (DPLH & WAPC) 2021, *Guidelines for Planning in Bushfire Prone Areas Version 1.4*, Perth, Western Australia.

Gould, J., McCaw, W., Cheney, N., Ellis, P. and Matthews, S. 2007, *Field Guide: Fuel Assessment and Fire Behaviour Prediction in Dry Eucalypt Forest*, CSIRO and Department of Environment and Conservation, Perth, Western Australia.

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.

8.2 Online references

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

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

Bushfire Management Plan

Cardup Brook Precinct, The Glades Structure Plan



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Figures



Figure 1: Site Plan and Topographic Contours

Figure 2: Geomorphic Wetlands

Figure 3: Existing Site Conditions – AS 3959 Vegetation Classifications

Figure 4: Existing Site Conditions – Bushfire Hazard Assessment

Figure 5: Post Development Conditions-AS 3959 Vegetation Classifications and Effective Slope

Figure 6: Bushfire Attack Level Contours

Figure 7: Spatial Representation of Bushfire Management Strategies

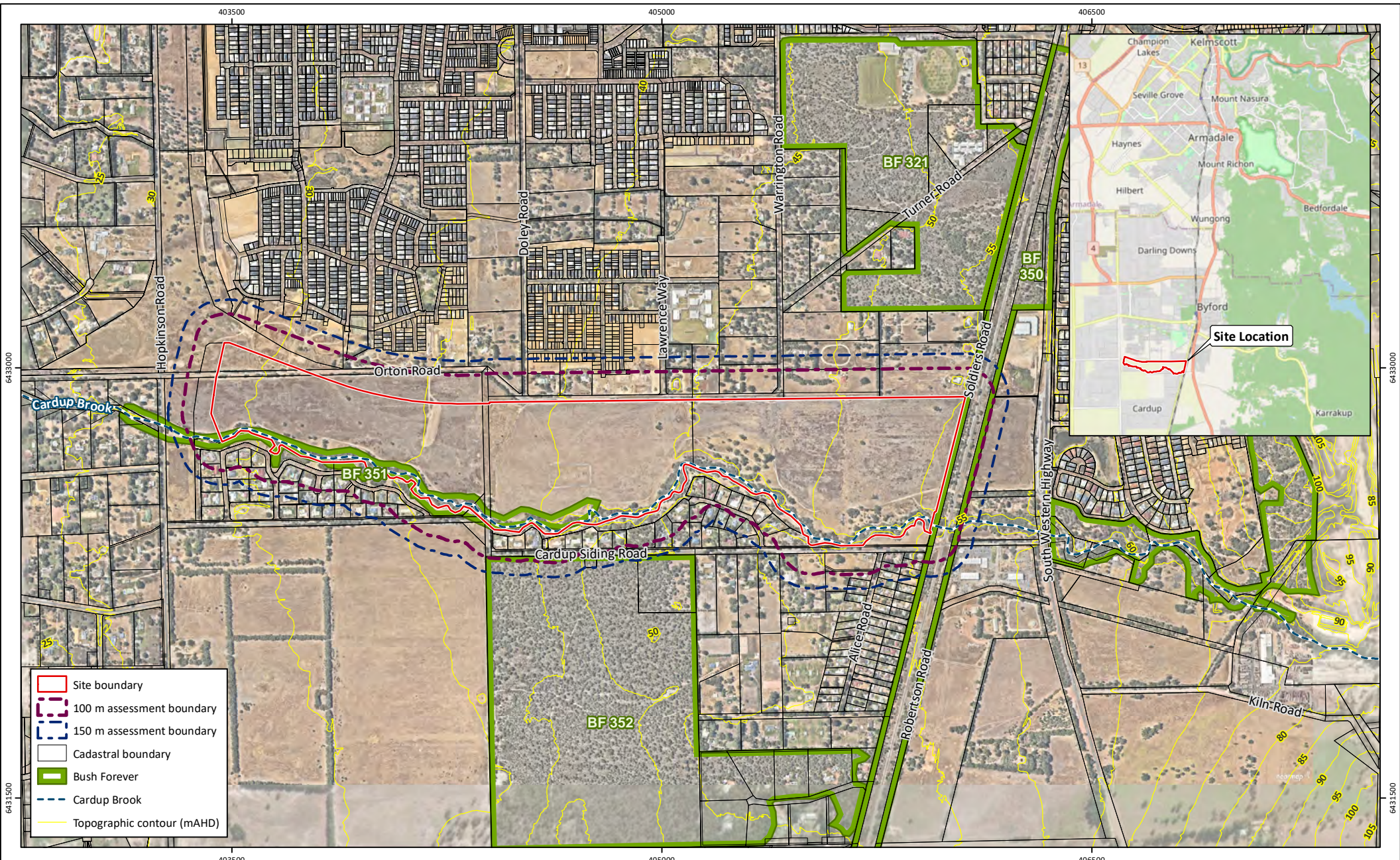
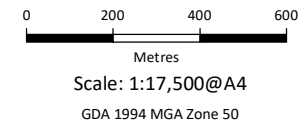


Figure 1: Site Location and Topographic Contours

Project: Bushfire Management Plan
 Cardup Brook Precinct The Glades Structure Plan
Client: LWP Property Group Pty Ltd

Plan Number:
 EP15-038(12)-F83b
Drawn: GAR
Date: 23/03/2022
Checked: KK
Approved: DAE
Date: 24/03/2022



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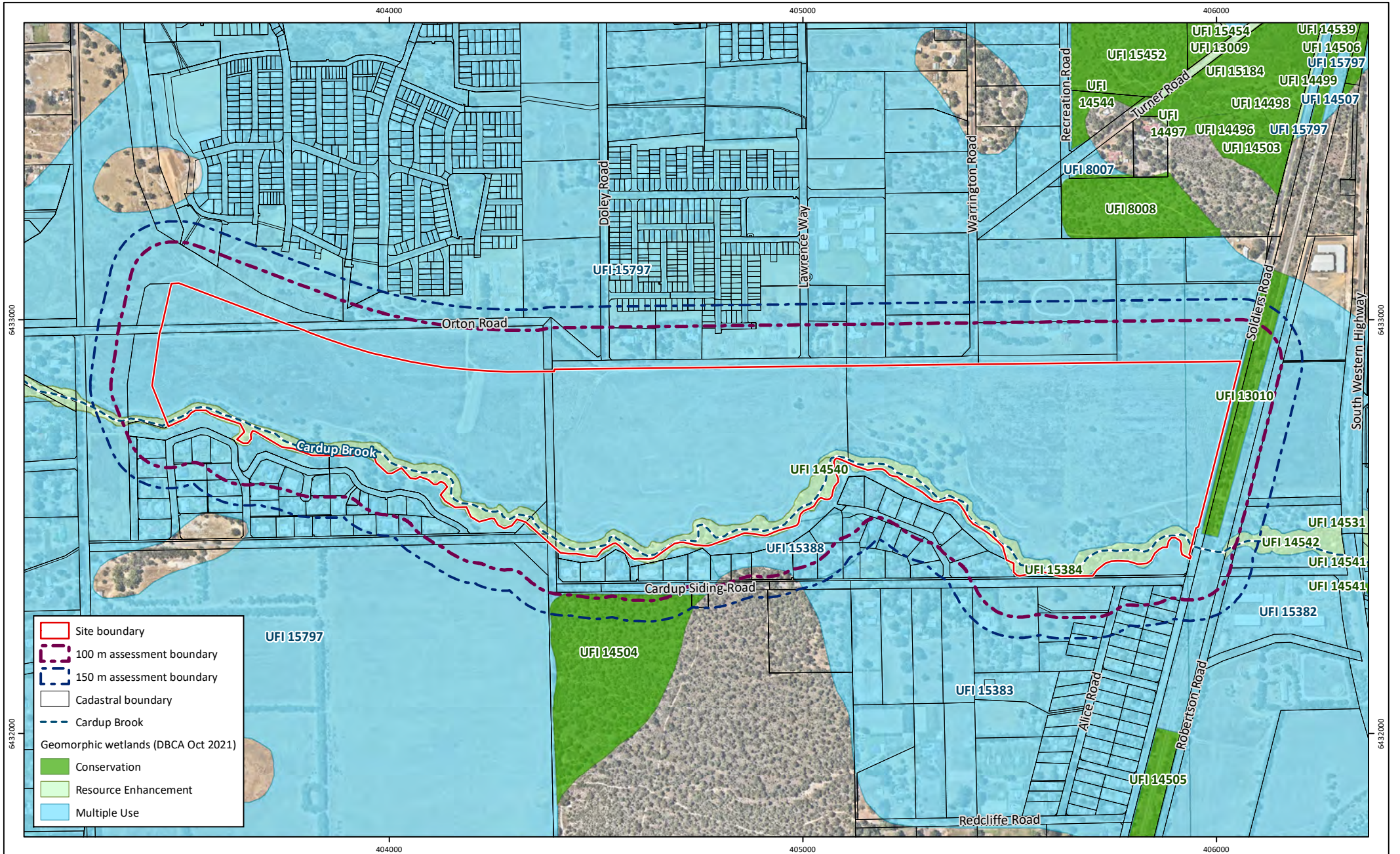
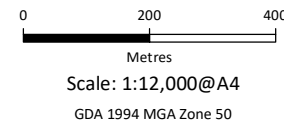


Figure 2: Geomorphic Wetlands

Project: Bushfire Management Plan
Cardup Brook Precinct The Glades Structure Plan
Client: LWP Property Group Pty Ltd

Plan Number:
EP15-038(12)-F84b
Drawn: GAR
Date: 23/03/2022
Checked: KK
Approved: DAE
Date: 24/03/2022



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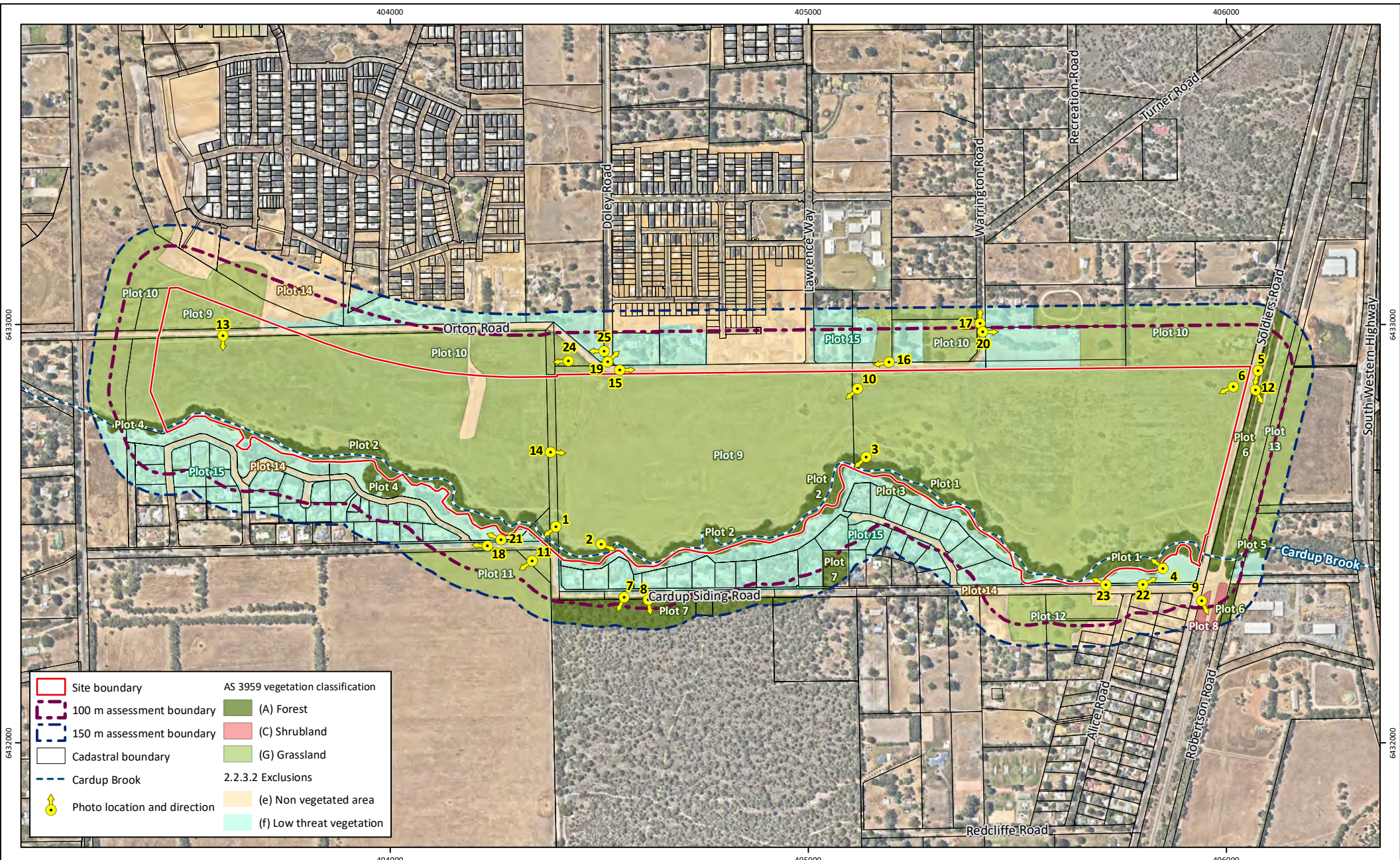


Figure 3: Existing Site Conditions – AS 3959 Vegetation Classification

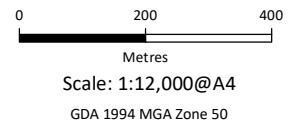
Project: Bushfire Management Plan
Cardup Brook Precinct The Glades Structure Plan

Client: LWP Property Group Pty Ltd

Plan Number:
EP15-038(12)-F85b

Drawn: GAR
Date: 23/03/2022

Checked: KK
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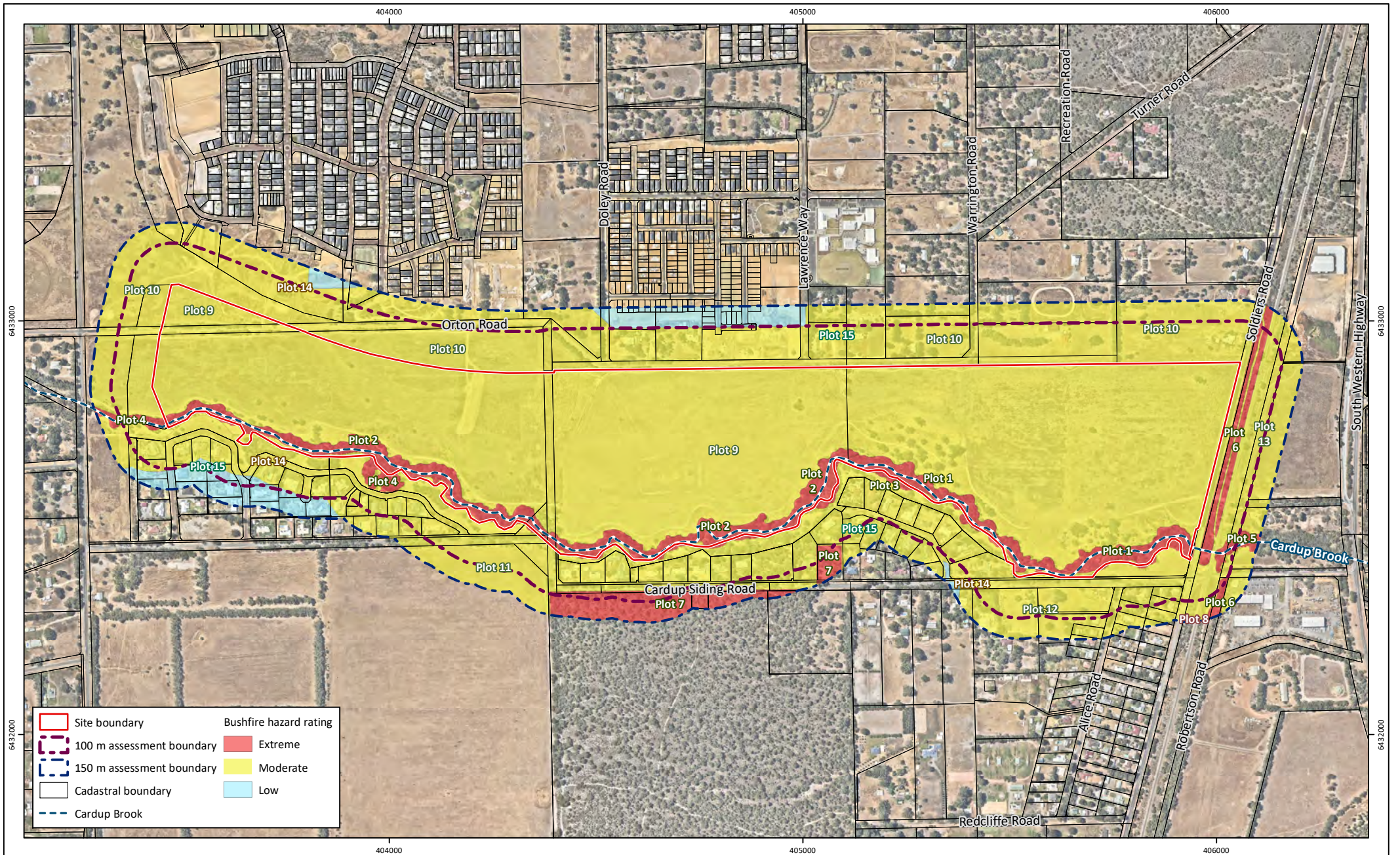
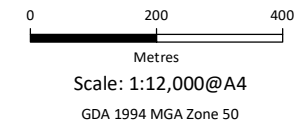


Figure 4: Existing Site Conditions - Bushfire Hazard Rating

Project: Bushfire Management Plan
 Cardup Brook Precinct The Glades Structure Plan
Client: LWP Property Group Pty Ltd

Plan Number:
 EP15-038(12)--F86b
Drawn: GAR
Date: 23/03/2022
Checked: KK
Approved: DAE
Date: 24/03/2022



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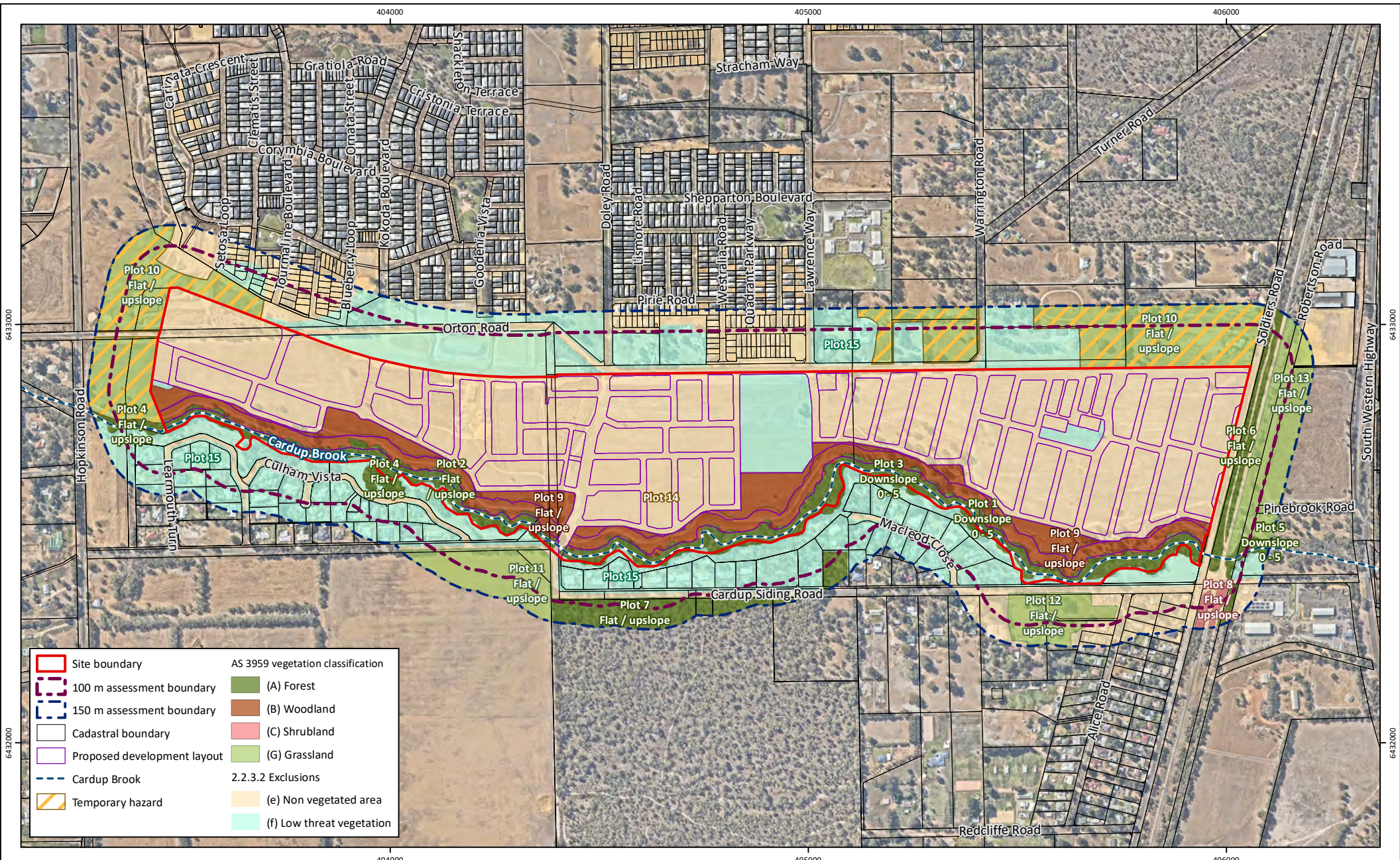
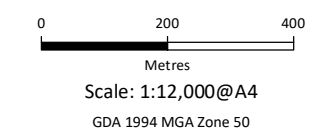


Figure 5: Post Development Site Conditions – AS 3959 Vegetation Classification and Effective Slope

Project: Bushfire Management Plan
 Cardup Brook Precinct The Glades Structure Plan

Client: LWP Property Group Pty Ltd

Plan Number: EP15-038(12)-F87c
Drawn: WJC
Date: 29/05/2024
Checked: KK
Approved: KK
Date: 29/05/2024



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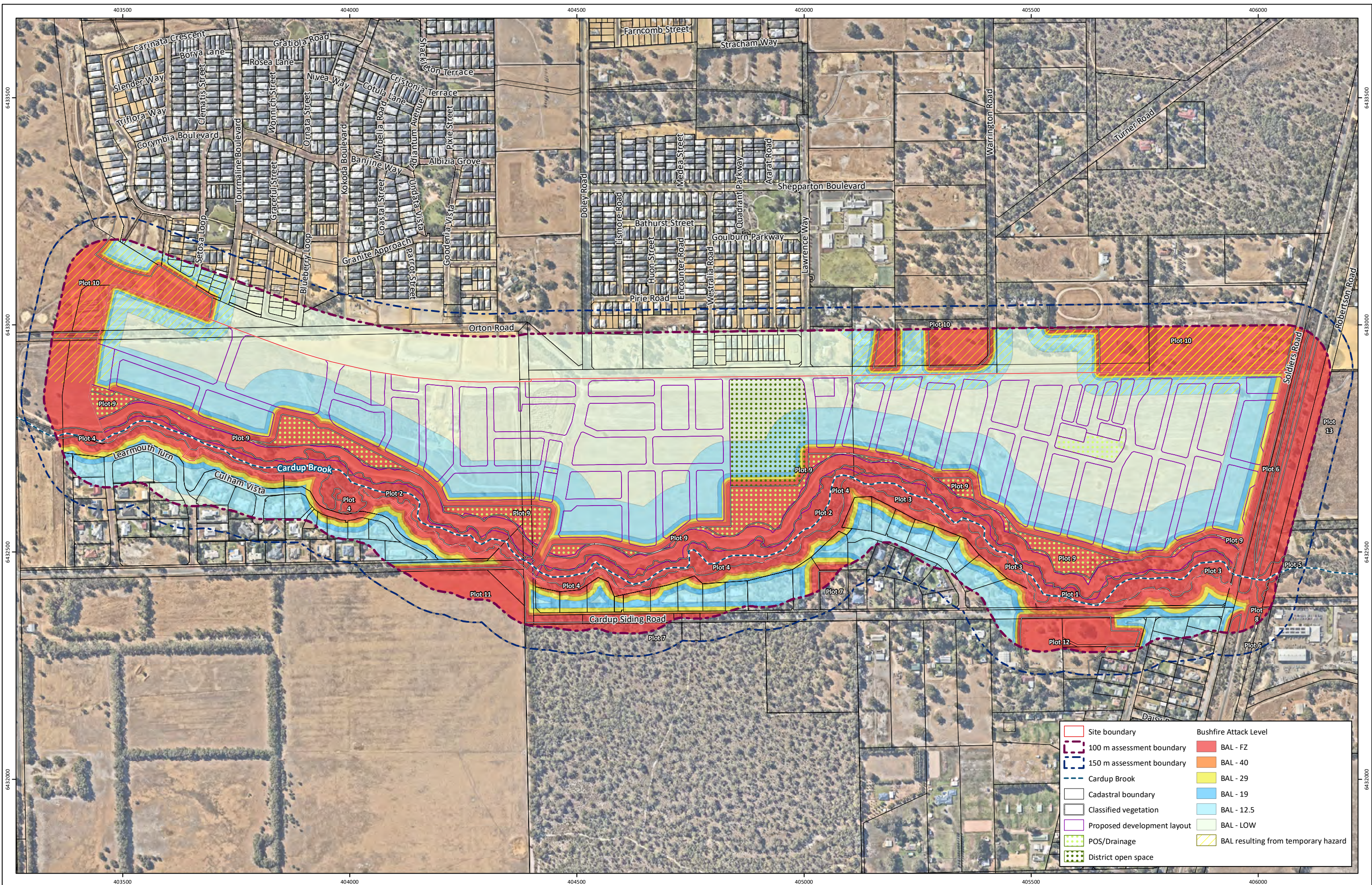


Figure 6: Bushfire Attack Level Contour Plan

Project: Bushfire Management Plan
Cardup Brook Precinct The Glades Structure Plan
Client: LWP Property Group Pty Ltd

Plan Number:
EP15-038(12)-F89c
Drawn: WJC
Date: 29/05/2024
Checked: KK
Approved: KK
Date: 29/05/2024



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Metres
Scale: 1:7,500@A3
GDA 1994 MGA Zone 50



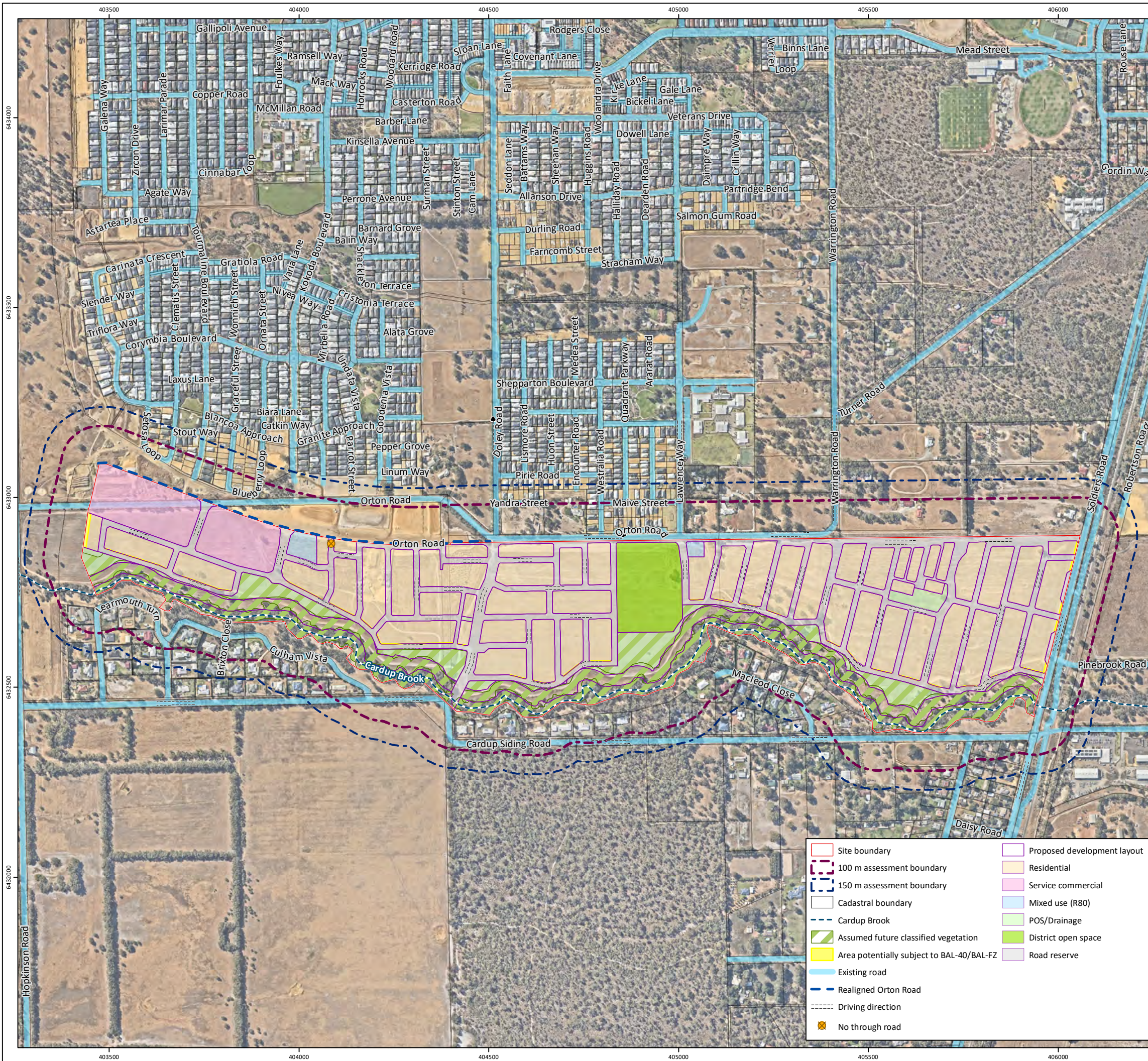


Figure 7: Spatial Representation of Bushfire Management Strategies

Asset protection zones (APZs)
 - All habitable buildings should achieve BAL-29 or less. Asset protection zones will be required around future habitable buildings to achieve BAL-29 or lower. These may be installed within areas of managed POS/road reserves or within lots (e.g. as carparks, drive ways, manicured lawn/gardens etc).

Building construction requirements
 - Where designated bushfire prone, future Class 1, 2, 3 and associated 10a buildings will need to be constructed in accordance with BAL ratings determined in accordance with AS 3959.

Areas of bushfire hazard
 To prepare this BMP, it has been assumed, to provide a conservative assessment of bushfire risk, that the following hazards will exist in the long-term (shown as 'assumed future classified vegetation'):
 - The existing vegetation associated with the resource enhancement wetland (Cardup Brook) will be protected and maintained in its current condition. Some revegetation may occur, however this would not change the existing forest (Class A) classification.
 - The 30 m buffer and public open space areas adjacent to Cardup Brook, while it will support passive recreation activities, it is assumed to achieve a woodland (Class B) classification (based on tree planting over grass and clumps of groundcovers/shrubs) and will be subject to no ongoing management.
 - The proponent will manage temporary hazards as part of staged development, associated with the existing grassland hazards.

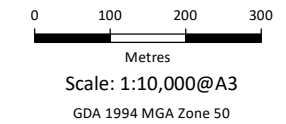
Landscaping
 - The district open space and small areas of public open space (unless otherwise stated above) and future residential gardens will be managed in a low threat state in accordance with section 2.2.3.2 of AS 3959.

Access
 - All future development will be able to achieve two access routes upon completion of development.

Water supply
 - The future development will be serviced by a network of reticulated water hydrants.

Project: Bushfire Management Plan
 Cardup Brook Precinct The Glades Structure Plan
Client: LWP Property Group Pty Ltd

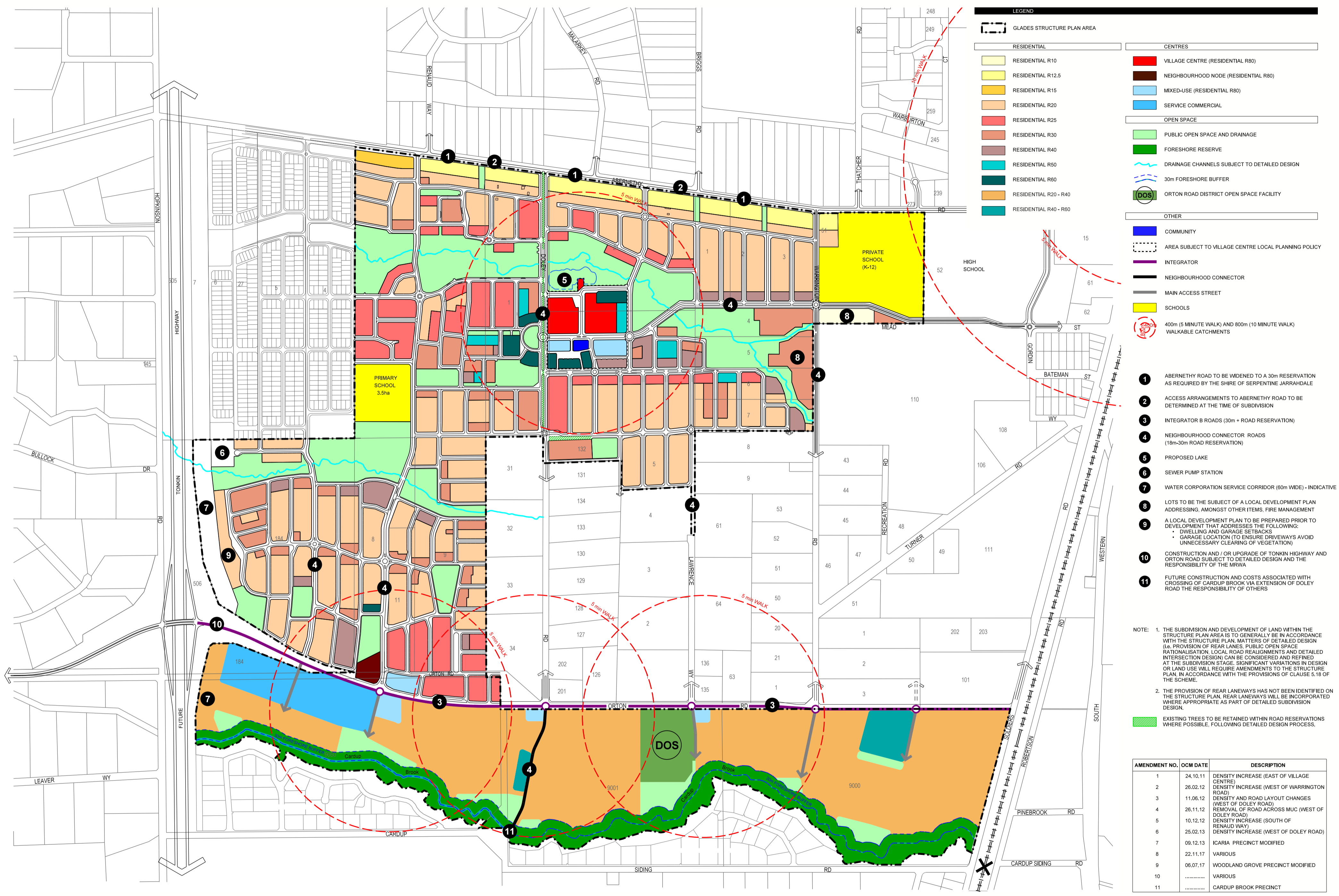
Plan Number: EP15-138(12)-F118b
Drawn: WJC
Date: 29/05/2024
Checked: KK
Approved: KK
Date: 29/05/2024



Appendix A

Structure Plan





LEGEND

GLADES STRUCTURE PLAN AREA

RESIDENTIAL

- RESIDENTIAL R10
- RESIDENTIAL R12.5
- RESIDENTIAL R15
- RESIDENTIAL R20
- RESIDENTIAL R25
- RESIDENTIAL R30
- RESIDENTIAL R40
- RESIDENTIAL R50
- RESIDENTIAL R60
- RESIDENTIAL R20 - R40
- RESIDENTIAL R40 - R60

CENTRES

- VILLAGE CENTRE (RESIDENTIAL R80)
- NEIGHBOURHOOD NODE (RESIDENTIAL R80)
- MIXED-USE (RESIDENTIAL R80)
- SERVICE COMMERCIAL

OPEN SPACE

- PUBLIC OPEN SPACE AND DRAINAGE
- FORESHORE RESERVE
- DRAINAGE CHANNELS SUBJECT TO DETAILED DESIGN
- 30m FORESHORE BUFFER
- ORTON ROAD DISTRICT OPEN SPACE FACILITY (DOS)

OTHER

- COMMUNITY
- AREA SUBJECT TO VILLAGE CENTRE LOCAL PLANNING POLICY
- INTEGRATOR
- NEIGHBOURHOOD CONNECTOR
- MAIN ACCESS STREET
- SCHOOLS
- 400m (5 MINUTE WALK) AND 800m (10 MINUTE WALK) WALKABLE CATCHMENTS

- 1 ABERNETHY ROAD TO BE WIDENED TO A 30m RESERVATION AS REQUIRED BY THE SHIRE OF SERPENTINE JARRAHDALE
- 2 ACCESS ARRANGEMENTS TO ABERNETHY ROAD TO BE DETERMINED AT THE TIME OF SUBDIVISION
- 3 INTEGRATOR B ROADS (30m + ROAD RESERVATION)
- 4 NEIGHBOURHOOD CONNECTOR ROADS (18m-30m ROAD RESERVATION)
- 5 PROPOSED LAKE
- 6 SEWER PUMP STATION
- 7 WATER CORPORATION SERVICE CORRIDOR (60m WIDE) - INDICATIVE
- 8 LOTS TO BE THE SUBJECT OF A LOCAL DEVELOPMENT PLAN ADDRESSING, AMONGST OTHER ITEMS, FIRE MANAGEMENT
- 9 A LOCAL DEVELOPMENT PLAN TO BE PREPARED PRIOR TO DEVELOPMENT THAT ADDRESSES THE FOLLOWING:
 - DWELLING AND GARAGE SETBACKS
 - GARAGE LOCATION (TO ENSURE DRIVEWAYS AVOID UNNECESSARY CLEARING OF VEGETATION)
- 10 CONSTRUCTION AND / OR UPGRADE OF TONKIN HIGHWAY AND ORTON ROAD SUBJECT TO DETAILED DESIGN AND THE RESPONSIBILITY OF THE MRWA
- 11 FUTURE CONSTRUCTION AND COSTS ASSOCIATED WITH CROSSING OF CARDUP BROOK VIA EXTENSION OF DOLEY ROAD THE RESPONSIBILITY OF OTHERS

NOTE:

1. THE SUBDIVISION AND DEVELOPMENT OF LAND WITHIN THE STRUCTURE PLAN AREA IS TO GENERALLY BE IN ACCORDANCE WITH THE STRUCTURE PLAN. MATTERS OF DETAILED DESIGN (i.e. PROVISION OF REAR LANES, PUBLIC OPEN SPACE, RATIONALISATION, LOCAL ROAD REALIGNMENTS AND DETAILED INTERSECTION DESIGN) CAN BE CONSIDERED AND REFINED AT THE SUBDIVISION STAGE. SIGNIFICANT VARIATIONS IN DESIGN OR LAND USE WILL REQUIRE AMENDMENTS TO THE STRUCTURE PLAN, IN ACCORDANCE WITH THE PROVISIONS OF CLAUSE 5.18 OF THE SCHEME.
2. THE PROVISION OF REAR LANEWAYS HAS NOT BEEN IDENTIFIED ON THE STRUCTURE PLAN. REAR LANEWAYS WILL BE INCORPORATED WHERE APPROPRIATE AS PART OF DETAILED SUBDIVISION DESIGN.

EXISTING TREES TO BE RETAINED WITHIN ROAD RESERVATIONS WHERE POSSIBLE, FOLLOWING DETAILED DESIGN PROCESS.

| AMENDMENT NO. | OCM DATE | DESCRIPTION |
|---------------|----------|--|
| 1 | 24.10.11 | DENSITY INCREASE (EAST OF VILLAGE CENTRE) |
| 2 | 26.02.12 | DENSITY INCREASE (WEST OF WARRINGTON ROAD) |
| 3 | 11.06.12 | DENSITY AND ROAD LAYOUT CHANGES (WEST OF DOLEY ROAD) |
| 4 | 26.11.12 | REMOVAL OF ROAD ACROSS MUC (WEST OF DOLEY ROAD) |
| 5 | 10.12.12 | DENSITY INCREASE (SOUTH OF RENAULD WAY) |
| 6 | 25.02.13 | DENSITY INCREASE (WEST OF DOLEY ROAD) |
| 7 | 09.12.13 | ICARIA PRECINCT MODIFIED |
| 8 | 22.11.17 | VARIOUS |
| 9 | 06.07.17 | WOODLAND GROVE PRECINCT MODIFIED |
| 10 | | VARIOUS |
| 11 | | CARDUP BROOK PRECINCT |

The Glades - Local Structure Plan - Figure 1

Appendix B

Landscape Masterplan



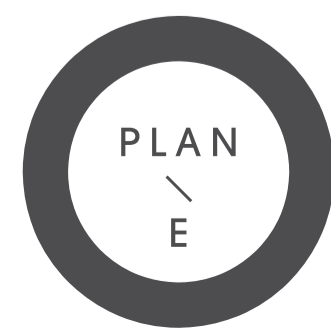


LEGEND

- | | |
|---|---|
| <p>01 RE-ALIGNED ORTON ROAD WITH NATIVE ENDEMIC TREE AND SHRUB PLANTING TO MEDIAN ISLAND AND SOUTHERN VERGE BUFFER LANDSCAPE</p> <p>02 INDICATIVE LOCATION FOR ENTRY STATEMENT & ASSOCIATED LANDSCAPING</p> <p>03 MAIN NORTH/SOUTH ENTRY ROADS WITH BOULEVARD OF TALL NATIVE TREES TO GUIDE VEHICLES INTO ESTATE AND TIE INTO CARDUP BROOK WETLAND LANDSCAPE</p> <p>04 EXISTING CARDUP BROOK WETLAND AREA- TO BE RETAINED AND PROTECTED</p> <p>05 RESOURCE ENHANCEMENT WETLAND BUFFER POS- LOW FUEL REVEGETATION AREA WITH NATURE TRAIL NETWORK & LINKAGES, INFORMAL REST STOPS & SIGNAGE</p> <p>06 FORESHORE DRAINAGE POS- MIX OF PARKLAND WITH TURF AREAS AND PLANTED DRAINAGE BASINS, PATHWAYS, FURNITURE & BUILT STRUCTURES</p> | <p>07 SMALL NATURE PLAYGROUND NODE & BBQ AREA</p> <p>08 MAIN PLAYGROUND NODE WITH COMMUNITY PARKLAND FACILITIES & BBQ AREAS, LINKED TO SPORTS OVAL</p> <p>09 FULL SIZE AFL SPORTS OVAL- DISTRICT OPEN SPACE</p> <p>10 NEIGHBOURHOOD PARKLAND WITH SMALL PLAY AREA & SHELTER</p> <p>11 STREET TREE PLANTING- AVERAGE 1 PER RESIDENTIAL LOT</p> <p>12 PROPOSED COMMERCIAL AREA- LANDSCAPE TBC</p> |
|---|---|

TREE SPECIES LEGEND

- MAJOR ENTRY ROAD TREE SPECIES
- ENTRY ROAD TREE SPECIES
- BROOK EDGE TREE SPECIES
- RESIDENTIAL EAST/WEST TREE SPECIES
- RESIDENTIAL NORTH/SOUTH TREE SPECIES
- ORTON ROAD TREE SPECIES



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ORTON ROAD - CARDUP BROOK MASTERPLAN

PREPARED FOR LWP/ SATTERLEY PROPERTY GROUP
 MAY 2024

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