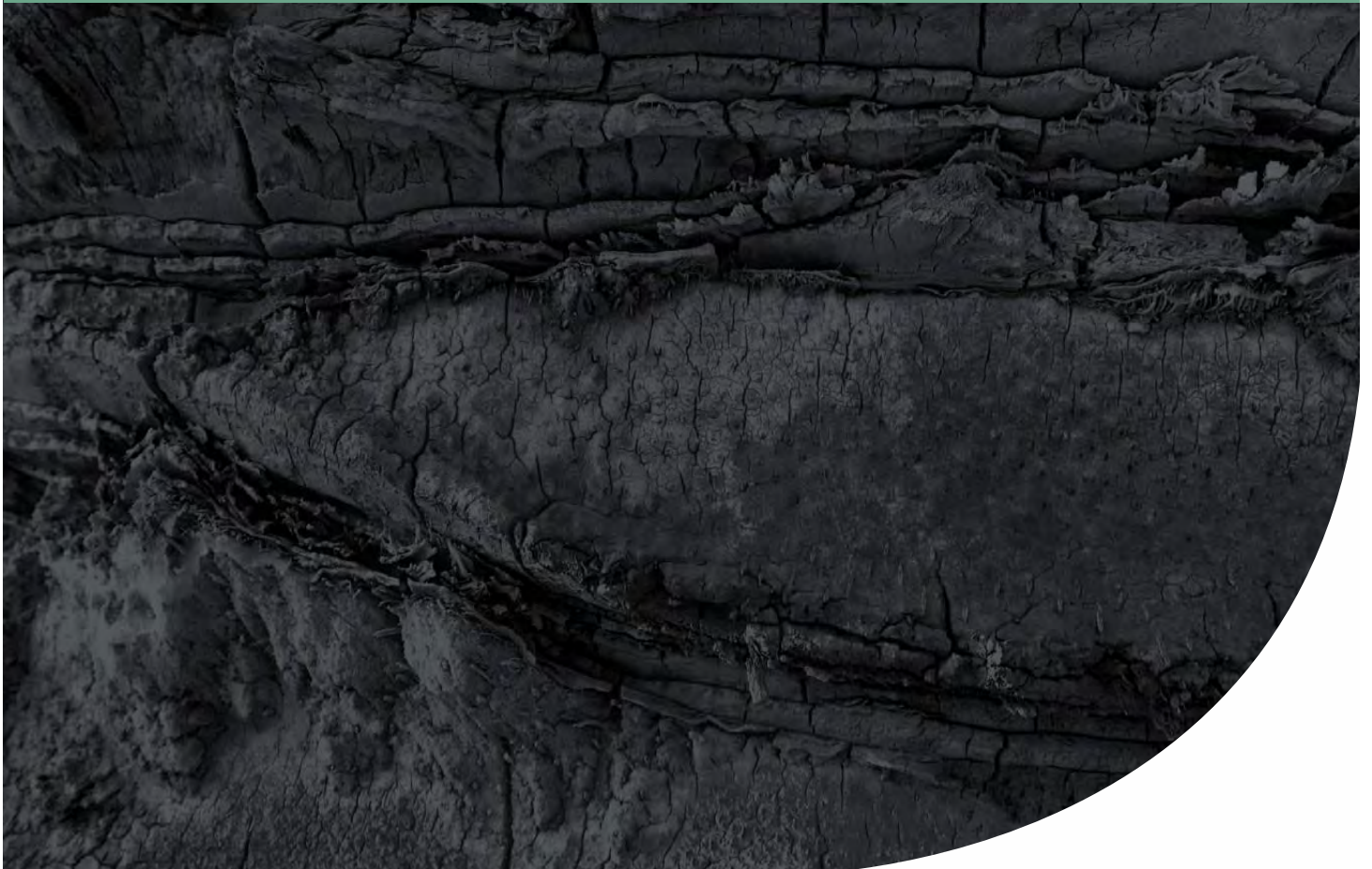


Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup

Project No: EP20-092(12)

**Prepared for Gold Estates Holdings
November 2024**



Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



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

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

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

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Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



Executive Summary

Gold Estates Holdings (the proponent) are proposing to lodge a subdivision application for a portion of Lot 33 Hopkinson Road, Cardup, which comprises Precinct A of the Lot 33 Hopkinson Road Structure Plan.

The area subject to subdivision (herein referred to as 'the site') is 32.5 hectares (ha) in area and is located within the Shire of Serpentine Jarrahdale. It is bounded by Cardup Nature Reserve to the east; Cardup Siding Road to the north, with Cardup Brook and rural residential landholdings further to the north; the Tonkin Highway extension and a Water Corporation corridor (which is within the broader Lot 33 landholding currently) and Hopkinson Road to the west; and undeveloped rural land (which is also within the broader Lot 33 landholding) to the south.

The site presently comprises largely cleared rural paddocks historically utilised for cattle grazing. The site is zoned 'Urban' under the Metropolitan Region Scheme and 'Urban Development' under the Shire of Serpentine Jarrahdale Local Planning Scheme No. 3, consistent with the proposed urban subdivision and 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 Bushfire Management Plan (BMP) is to assess the bushfire hazards affecting the site (risk) and identify the 'management' strategies (risk treatments) required to ensure future development can achieve the intent of SPP 3.7 - *to preserve life and reduce the impact of bushfire on property and infrastructure*.

As part of assessing the risk, a Bushfire Attack Level (BAL) assessment involving the classification and condition of vegetation and topography within 150 m of the site (post-development) has been undertaken.

Bushfire hazards identified within 150 m of the site that are assumed to remain in the long-term include:

- Forest (Class A) vegetation to the east within Bush Forever Site 352 (Cardup Nature Reserve) and to the north within Bush Forever Site 351 (Cardup Brook Bushland). Cardup Brook is separated from the site by rural residential development.
- Woodland (Class B) vegetation to the west of the site, within the future Tonkin Highway extension and Water Corporation corridor. This is currently associated with the broader Lot 33 landholding and is used for cattle grazing. Woodland vegetation has also been assumed for a

Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



portion of one of the public open space areas in the site, associated with a registered Aboriginal heritage site.

- Grassland (Class G) vegetation to the north, west and south within paddock areas. The areas to the west and south form part of the broader Lot 33 Hopkinson Road landholding and will be subject to future urban development.

Grassland vegetation that has been identified within 50 m to the south and south-west of the site within the proponent's broader landholdings (future development precincts of the Lot 33 Hopkinson Road Local Structure Plan) will be managed by the proponent to low threat in accordance with Section 2.2.3.2 of AS 3959. This is to minimise the impacts of the temporary hazards from the undeveloped portion (future precincts) of Lot 33 on habitable buildings within the site.

Areas of land identified as low threat that are external to the site are assumed to continue to be managed in accordance with existing land management practices and the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice in the long-term (unless stated otherwise).

Compliance assessment

The bushfire protection criteria provided in the Guidelines represents the risk treatments applicable to achieving the intent and the objectives listed in SPP 3.7. The bushfire protection criteria are divided into four subsystems (elements), plus a standalone element for tourism. Each subsystem is provided to the decision maker with an intent and solution method, either performance principle or acceptable solution (predetermined solution). Compliance with each subsystem (as a risk treatment) is required to demonstrate that the risk is within acceptance.

The BMP has identified that future development within the site (future residential and commercial buildings) will comply with the 'acceptable solution' for each of the applicable bushfire protection criteria outlined in the Guidelines.

This includes:

- **Element 1 Location:** All future habitable buildings will be able to achieve BAL-29 or lower as part of the proposed subdivision.
- **Element 2 Siting and design:** The BAL assessment undertaken as part of the BMP indicates that it is possible for all lots to facilitate a habitable building within BAL-29 or less, with future residential and commercial buildings expected to be sited predominantly within BAL-LOW or BAL-12.5. Two lots in the west are subject to BAL-29 as a result of the woodland vegetation assumed within the public open space area. The BAL is achieved for all lots through the low threat (AS 3959:2018) management of residential lots and the provision of managed public open space and road reserves (existing and proposed). As outlined above, to manage impacts from temporary hazards, the proponent will manage the undeveloped portions of Lot 33 Hopkinson Road that are within 50 m of proposed lots to achieve low threat until residential development in that area progresses.
- **Element 3 Vehicular access:** All proposed public road reserves within the site will be constructed 13 m to 27.6 m wide and will meet the minimum technical requirements for public roads compliant with the Guidelines. The proposed subdivision will provide multiple access and egress points onto the existing Cardup Siding Road to the north (an east-west connector)

Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



consistent with the structure plan. Cardup Siding Road provides for access to multiple destinations, including onto Hopkinson Road to the west and Soldiers Road to the east. It is acknowledged that as part of the construction of Tonkin Highway, the Cardup Siding Road connection to Hopkinson Road to the west will be removed. Timing of this is uncertain and the road closure may not occur as part of the site's development. However, a new access from the site to the north will be constructed across Cardup Brook by Main Roads WA, providing egress to the north in addition to the egress to the east, still satisfying the requirement for access to multiple destinations. The proponent will also construct a public road to the south (which was foreshadowed in the structure plan and generally follows the future road alignment), connecting to Hopkinson Road, with a small portion of the access road to be a temporary emergency access way (based on managing staging of development and alignment with the permanent road network). The emergency access way portion is less than 500 m in length. A number of temporary no-through roads will be constructed within the site due to staged development of the broader Lot 33 Hopkinson Road Local Structure Plan. These will be less than 200 m in length and will meet the requirements of the Guidelines including the provision of suitable turning areas.

- **Element 4 Water:** The development will be provided with a permanent and reticulated water supply to support onsite firefighting requirements. Existing hydrants are located within 200 m of proposed lots, and additional hydrants will be provided where required as the reticulated water scheme is extended.

The management/mitigation measures to be implemented through the proposed subdivision and development of the site have been outlined as part of this BMP, and through these, the site can appropriately manage risk in accordance with SPP 3.7 and the Guidelines.

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Appendix A

Subdivision Plan

Appendix B

Staging Plan

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Abbreviation Tables

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
CCW	Conservation Category Wetland
ESA	Environmentally Sensitive Area
FDI	Fire Danger Index
UFI	Unique Feature Identifier

Table A2: Abbreviations – Organisations

Organisations	
DBCA	Department of Biodiversity, Conservation and Attractions
DFES	Department of Fire and Emergency Services
DWER	Department of Water and Environmental Regulation
DPLH	Department of Planning, Lands and Heritage
OBRM	Office of Bushfire Risk Management
WAPC	Western Australia Planning Commission

Table A3: Abbreviations – Legislation and policies

Legislation	
AS 3959	Australian Standard 3959:2018 Construction of buildings in bushfire prone areas
Guidelines	<i>Guidelines for Planning in Bushfire Prone Areas Version 1.4</i> (DPLH & WAPC 2021)
SPP 3.7	State Planning Policy 3.7 Planning in Bushfire Prone Areas (WAPC 2015)

Table A4: Abbreviations – Planning and building terms

Planning and building terms	
LPS	Local Planning Scheme
MRS	Metropolitan Region Scheme

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Table A4: Abbreviations – units of measurement

Units of measurement	
ha	Hectare
m AHD	m in relation to the Australian height datum

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1 Introduction

1.1 Background

Gold Estates Holdings (the proponent) are proposing to lodge a subdivision application for a portion of Lot 33 Hopkinson Road, Cardup (herein referred to as 'the site'), which comprises Precinct A of the Lot 33 Hopkinson Road Structure Plan.

The site is 32.5 hectares (ha) in area and is located within the Shire of Serpentine Jarrahdale. It is bounded by Cardup Nature Reserve to the east; Cardup Siding Road to the north, with Cardup Brook and rural residential landholdings further north; the Tonkin Highway extension and a Water Corporation corridor (undeveloped land which is within the broader Lot 33 landholding)) and Hopkinson Road to the west; and undeveloped rural land which is also within the Lot 33 landholding to the south, as shown in **Figure 1**. The site presently comprises largely cleared rural paddocks historically utilised for cattle grazing.

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

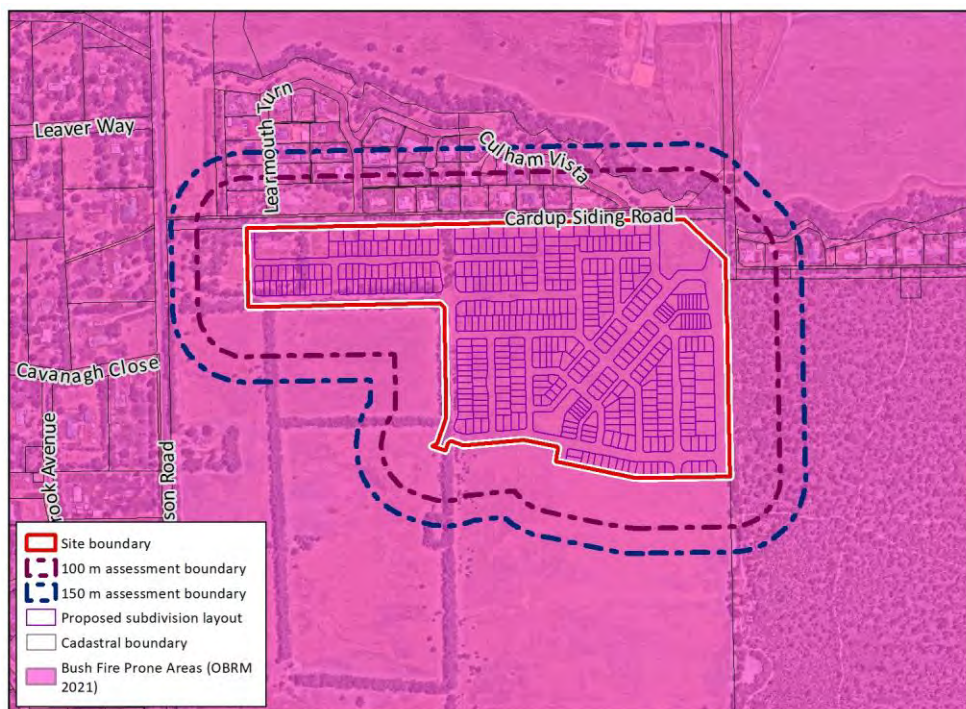


Plate 1: Areas within and surrounding the site, identified as 'bushfire prone areas' (under the state-wide Map of Bush Fire Prone Areas (OBRM 2021), is indicated in purple

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The purpose of SPP 3.7 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. This has been affirmed by the Western Australian Planning Commission (WAPC).

*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*

1.2 Aim of this report

The purpose of this BMP is to assess bushfire hazards both within the site, and nearby, and demonstrate that the threat posed by any identified hazards can be appropriately mitigated and managed. This BMP has been prepared in accordance with SPP 3.7 (WAPC 2015), the Guidelines (DPLH & WAPC 2021) and AS 3959 (Standards Australia 2018). The document 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 compliance with the bushfire protection criteria outlined within the Guidelines, including an indication of BAL ratings likely to be applicable to future buildings (**Section 5**).
- An outline of the roles and responsibilities associated with implementing this BMP (see **Section 6**).

1.3 Statutory policy and framework

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

- *Bush Fires Act 1954*
- *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 proposed to be subdivided into 435 residential lots, and a single lot proposed for commercial development, as shown in the subdivision plan provided in **Appendix A**. Additionally, multiple public open space areas are proposed within the site in accordance with the broader Lot 33

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

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Hopkinson Road Structure Plan. One of these public open space areas (in the west) contains a registered Aboriginal heritage site that will be retained in situ). The development within the site will be undertaken on a staged basis, with the staging plan provided in **Appendix B**.

In addition to the structure plan, the proposed subdivision and development within the site is consistent with the 'Urban' zoning of the site under the Metropolitan Region Scheme (MRS) and the 'Urban Development' zoning under the Shire of Serpentine Jarrahdale Local Planning Scheme No. 3 (LPS No.3), as shown in **Plate 2** below.

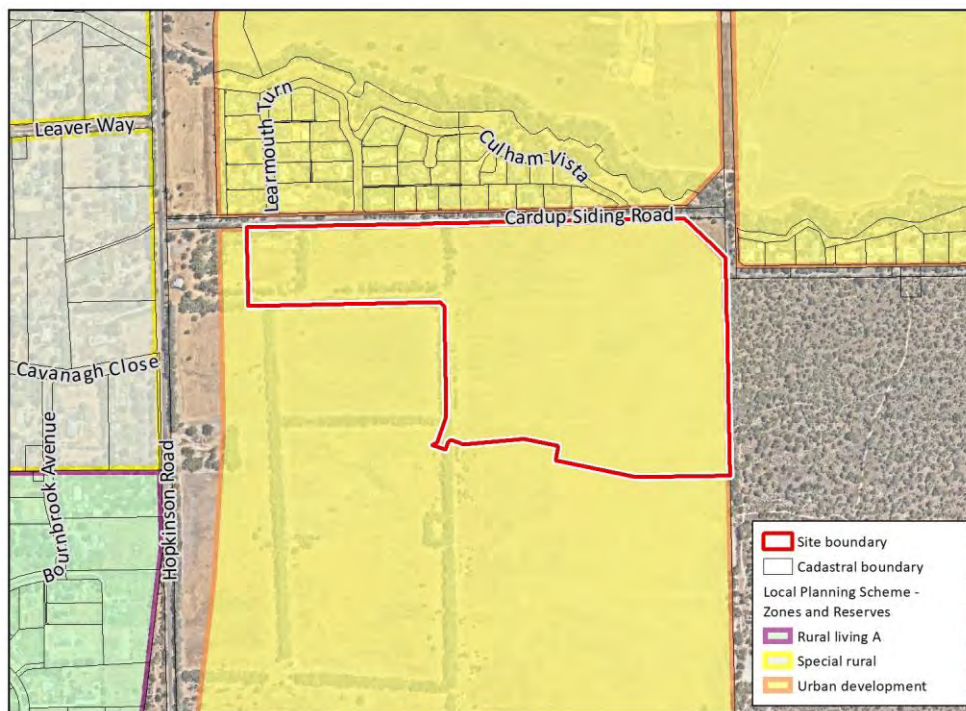


Plate 2: Local Planning Scheme Zoning, in and surrounding the site.

1.5 Description of land characteristics

Based on the observed site conditions and a review of publicly available historical aerial photography, the site was predominantly cleared of native vegetation by circa 1953 and utilised for agricultural purposes, likely cattle grazing (Landgate 2024). The site was cleared in its entirety during the 1970s. Tree planting in form of windrows is evident within the site from throughout the late 1990s, with the planted trees remaining to this date. Surrounding land uses have not changed significantly since the early 2000s with rural residential landholdings present to the north (north of Cardup Siding Road) and west of the site (west of Hopkinson Road), whilst the balance of Lot 33 Hopkinson Road has remained unchanged and is still largely utilised for cattle grazing.

Elevation across the site is gently rising from 29 m Australian Height Datum (m AHD) in the western portion to approximately 37 m AHD in the eastern portion of the site, as shown in **Figure 1**.

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Precinct A - Lot 33 Hopkinson Road, Cardup



2 Environmental Considerations

In accordance with the *Bushfire Management Plan – BAL Contour* template prepared by the Department of Planning, Lands and Heritage (DPLH) (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 has been undertaken and supporting structure plan documentation, with particular reference to the Shared Location Information Platform (SLIP) databases. A summary of the search results has been provided in **Table 1**.

As outlined, the site has been historically cleared of native vegetation and presently comprises pasture grasses and planted trees in the form of windrows. As a result, the site contains limited environmental values of conservation significance. Notwithstanding, it is acknowledged that the site comprises a number of mature trees that potentially provide suitable habitat for conservation significant fauna such as black cockatoo; however, this habitat is marginal, has limited value and is not significant from a conservation perspective.

Table 1: Summary of potential environmental considerations that may be associated with the site.

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	A review of the <i>Geomorphic Wetlands of the Swan Coastal Plain</i> dataset indicates that no conservation category wetland (CCW) occurs within the site. One mapped CCW (unique feature identifier (UFI) #14504) is mapped directly to the east of the site within Cardup Nature Reserve. An appropriate separation between the CCW and residential development within the site will be provided through the provision of the proposed road reserve along the eastern boundary of the site in addition to other appropriate interface treatments as outlined in the <i>Environmental Assessment and Management Strategy</i> (Emerge Associates 2022). Furthermore, a large multiple use wetland (UFI #15797) expands across the majority of the site, however, does not require buffers or revegetation that would influence a bushfire.
RAMSAR wetlands (DBCA- 010)	No	No RAMSAR wetlands are identified as occurring within the site or in close proximity.
Threatened and priority flora (DBCA-036) (Emerge Associates 2022)	No	No threatened or priority flora have been identified in public mapping within or nearby to the site. Emerge Associates (2022) have undertaken a flora and vegetation survey across the site and concluded that no threatened or priority flora occur within the site as a result of significant historical clearing and agricultural land uses.
Threatened and priority fauna (DBCA-037) (Emerge Associates 2022)	Potentially	Emerge Associates (2022) have undertaken basic fauna and targeted black cockatoo surveys across the site. No suitable habitat trees (potential nesting trees) have been identified within the site. The existing vegetation within the site is not considered to provide significant foraging habitat for the three black cockatoo (or other fauna) species. It is noted that the proponent will retain the majority of existing mature trees within the site, however, these trees can be retained without creating a bushfire hazard. No other threatened or priority fauna are likely to occur within the site.

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Table 1: Summary of potential environmental considerations that may be associated with the site (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 (DBCA-038) (Emerge Associates 2022)	No	Emerge Associates (2022) have undertaken flora and vegetation surveys across the site and concluded that no threatened or priority ecological communities occur within the site as a result of the significant historical clearing and agricultural land use of the site.
Bush Forever areas (DPLH-019) (Emerge Associates 2022)	No	The site is not identified within a Bush Forever area. Bush Forever Site 352 (Cardup Nature Reserve) is located directly east of the site. Bush Forever Site 351 (Cardup Brook) is located directly to the north-east of the site.
Clearing regulations – Environmentally sensitive areas (DWER-046)	Yes	A large portion of the site is situated within an environmentally sensitive area (ESA) identified in association with the threatened ecological community and CCW found within Bush Forever Site 352 (Cardup Nature Reserve) to the east. It is noted that no remnant native vegetation occurs within the site and those areas comprising the ESA have been historically completely cleared of vegetation presently comprising paddock grasses.
Swan Bioplan Regionally Significant Natural Areas 2010 (DWER-070)	No	Not applicable. No Regionally Significant Natural Areas are identified within the site or nearby.

2.1 Native vegetation – modification and clearing

As outlined above, the majority of the site has been previously cleared and now comprises predominantly cleared paddocks and non-native vegetation comprising planted trees in the form of windrows.

The proponent has committed to the retention of the majority of mature trees within the site through the strategic location of public open space areas and road reserves in accordance with the subdivision concept (**Appendix A**). It is acknowledged that with regard to bushfire management and to enable subdivision, some vegetation management such as tree thinning and pruning, and/or removal of understorey vegetation will be required, whilst some individual trees may require removal based on future detailed road designs and/or where trees have been identified as a safety risk (health of tree) for future residents.

Where clearing of native vegetation is undertaken in accordance with a subdivision approval under the *Planning and Development Act 2005*, it is exempt from requiring a clearing permit under Schedule 6 of the *Environmental Protection Act 1986* (EP Act) (unless where within an environmentally sensitive area). Additionally, a clearing permit would not be required where vegetation is not considered 'native vegetation' pursuant to Division 2 Section 51A of the EP Act, including trees that have been sown, planted or propagated such as within the site.

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2.2 Revegetation and landscape plans

No revegetation is proposed as part of this subdivision and proposed development.

Landscape treatments that are proposed will be associated with future public open space areas, residential gardens and verge planting within road reserves. Apart from the public open space area with the registered Aboriginal heritage site, these areas will be able to achieve low threat in accordance with Section 2.2.3.2 of AS 3959, based on standard treatments for urban areas and the requirements of the Shire of Serpentine Jarrahdale firebreak notice.

Landscape treatments within the site would need to achieve low threat vegetation in accordance with Section 2.2.3.2 of AS 3959. This is likely to include:

- Irrigation of grass and garden beds (where required).
- Regular removal of weeds and built-up dead material (such as fallen branches, leaf litter etc.)
- Low pruning of trees (branches below 2 m in height removed where appropriate).
- Application of ground/surface covers such as mulch or non-flammable materials as required.
- Regular mowing/slashing of grass to less than 50 mm in height.

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3 Bushfire Assessment Results

Bushfire risk for the site has been appropriately considered with regard to the 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/m²) 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.

A BAL contour plan has been prepared in accordance with Appendix Three of the Guidelines and Method 1 of AS 3959 to determine the BAL ratings likely to be applicable to future buildings. This has been based on the vegetation classifications and the effective slope under the vegetation (post-development scenario).

3.1 Assessment inputs

The bushfire attack level (BAL) assessment was undertaken in accordance with Method 1 of AS 3959. Vegetation classifications and effective slope have been detailed in **Table 2** and **Figure 2** and a site assessment was completed on 8 March 2024.

3.1.1 Inputs and assumptions

The BAL assessment is based on the following inputs and assumptions:

- **Designated Fire Danger Index (FDI):** 80
- **Flame temperature:** 1090 K
- **Effective slope beneath classified vegetation:** flat/upslope (see **Figure 2**)
- Apart from the area identified as woodland (Plot 8), vegetation to be retained within the site in future public open space areas and road reserves (mature trees) will be modified to achieve low threat in accordance with Section 2.2.3.2 of AS 3959 and will be maintained as detailed in **Section 2.2**.
- Areas of land identified as low threat that are external to the site are assumed to continue to be managed in accordance with existing land management practices and the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice in the long-term (unless stated otherwise).
- Classified vegetation that has been identified outside of the proponent's landholdings to the north and east of the site (Cardup Brook and Cardup Nature Reserve) including undeveloped areas to the west (future Tonkin Highway Extension and Water Corporation Corridor) have been assumed to remain in its current state and will therefore continue to be a bushfire hazard to development within the site.
- Grassland vegetation that has been identified within 50 m to the south and south-west of the site within the proponent's broader landholdings (future development precincts of the Lot 33 Hopkinson Road Local Structure Plan) will be managed by the proponent to low threat in

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Precinct A - Lot 33 Hopkinson Road, Cardup



accordance with Section 2.2.3.2 of AS 3959, as shown in **Figure 2**. The 50 m managed interface will minimise the impacts of the temporary hazards from the undeveloped portion (future precincts) of Lot 33.

- Areas of grassland can include up to 10% foliage cover from shrubs and trees, as per AS 3959.

3.1.2 Vegetation classification

All vegetation within 150 m of the site was classified in accordance with Section 2.2.3 of AS 3959. The assignment of vegetation classifications is based on an assessment of vegetation structure, including consideration of the various fuel layers of different vegetation types, as outlined in **Plate 3**. Each distinguishable vegetation plot is described in **Table 2** and shown in **Figure 2**.

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:

- Vegetation of any type that is more than 100 m from the site.*
- Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified.*
- 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.*
- 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.*
- Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings, and rocky outcrops.*
- 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.*



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

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Table 2: AS 3959 vegetation classifications (refer to **Figure 2**)

Photo ID:	1	Plot:	1
Vegetation classification or exclusion clause (and effective slope)			
Class A - Forest (Flat/upslope)			
Description / Justification for Classification			
Forest (Class A) vegetation has been identified to the east of the site (within Cardup Nature Reserve) comprising tall mature trees 10 – 15 m in height with greater than 30% foliage cover over an understorey of shrubs and grasses. This vegetation is assumed to remain post-development of the site.			
			
Photo ID:	2	Plot:	1
Vegetation classification or exclusion clause (and effective slope)			
Class A - Forest (Flat/upslope)			
Description / Justification for Classification			
Alternative view of forest (Class A) vegetation identified to the east of the site (within Cardup Nature Reserve) comprising tall mature trees 10 – 15 m in height over an understorey of shrubs and grasses with greater than 30% foliage cover. This vegetation is assumed to remain post-development of the site.			
			
Photo ID:	3	Plot:	2
Vegetation classification or exclusion clause (and effective slope)			
Class A - Forest (Flat/upslope)			
Description / Justification for Classification			
Forest (Class A) vegetation has been identified to the north of the site (associated with Cardup Brook) comprising tall mature trees 10 – 15 m in height over a dense understorey of small shrubs and grasses with greater than 30% foliage cover. This vegetation is assumed to remain post-development of the site.			
			

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Table 2: AS 3959 vegetation classifications (refer to **Figure 2**)(continued)

Photo ID:	4	Plot:	2
Vegetation classification or exclusion clause (and effective slope)			
Class A - Forest (Flat/upslope)			
Description / Justification for Classification			
Alternative view of forest (Class A) vegetation identified to the north of the site (adjacent to Cardup Brook) comprising tall mature trees 10 – 12 m in height over an understorey of shrubs and grasses with greater than 30% foliage cover. This vegetation is assumed to remain post-development of the site.			
 -32°14'24", 115°59'6", 6.7m, 308° 8 Mar 2024 9:03:22 am			
Photo ID:	5	Plot:	2
Vegetation classification or exclusion clause (and effective slope)			
Class A - Forest (Flat/upslope)			
Description / Justification for Classification			
Forest (Class A) vegetation has been identified to the north of the site (associated with Cardup Brook) comprising tall mature trees 10 – 12 m in height over an understorey of shrubs and grasses with greater than 30% foliage cover. This vegetation is assumed to remain post-development of the site.			
 -32°14'23", 115°59'0", 5.6m, 1° 8 Mar 2024 9:07:34 am			
Photo ID:	6	Plot:	3
Vegetation classification or exclusion clause (and effective slope)			
Class B – Woodland (Flat/upslope)			
Description / Justification for Classification			
Woodland (Class B) vegetation has been identified to the east of the site within the future Tonkin Highway extension and Water Corporation corridor. This vegetation comprises trees predominantly with a height of between 6 – 15 m, with less than 30% foliage cover over a predominantly grassy understorey. This vegetation is likely to be removed in the long-term, but is assumed to remain post-development of the site for the purpose of this assessment.			
 -32°14'25", 115°58'28", 2.6m, 212° 8 Mar 2024 9:39:03 am			

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Table 2: AS 3959 vegetation classifications (refer to **Figure 2**)(continued)

Photo ID:	7	Plot:	3
Vegetation classification or exclusion clause (and effective slope)			
Class B - Woodland (Flat/upslope)			
Description / Justification for Classification			
Alternative view of the woodland (Class B) vegetation identified to the east of the site within the future Tonkin Highway extension and Water Corporation corridor. This vegetation comprises tall mature trees predominantly with a height of 15 m, with less than 30% foliage cover over a predominantly grassy understorey. This vegetation is likely to be removed in the long-term, but is assumed to remain post-development of the site for the purpose of this assessment.			
			
Photo ID:	8	Plot:	4
Vegetation classification or exclusion clause (and effective slope)			
Class G - Grassland (Flat/upslope)			
Description / Justification for Classification			
Grassland vegetation has been identified to the south of the site. Although at the time of the assessment the grass vegetation was being grazed by cattle, with a height below 100 mm and would achieve low threat, this vegetation is assumed to not be routinely grazed and/or managed and has therefore been classified as grassland (Class G). Where within 50 m of the site boundary, this vegetation will be managed by the proponent and achieve low threat, refer to Figure 2).			
			
Photo ID:	9	Plot:	4
Vegetation classification or exclusion clause (and effective slope)			
Class G - Grassland (Flat/upslope)			
Description / Justification for Classification			
Grassland vegetation has been identified to the west of the site. Although at the time of the assessment the grass was being grazed by cattle, with a height of below 100 mm and would achieve low threat, this vegetation is assumed to not be routinely grazed and/or managed and has therefore been classified as grassland (Class G). Where within 50 m of the site boundary, this vegetation will be managed by the proponent and achieve low threat, refer to Figure 2).			
			

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Table 2: AS 3959 vegetation classifications (refer to **Figure 2**)(continued)

Photo ID:	10	Plot:	5
Vegetation classification or exclusion clause (and effective slope)			
Class G - Grassland (Flat/upslope)			
Description / Justification for Classification			
Grassland vegetation has been identified to the north of the site (north of Cardup Brook). This vegetation is in an area proposed for future urban development. At the time of the assessment, the grass had been slashed to a height of below 100 mm and would be considered low threat, however, this vegetation is assumed to not be routinely managed and has therefore been classified as grassland (Class G) post-development of the site.			
			
-32°14'24", 115°59'7", 6.5m, 63° 8 Mar 2024 9:03:52 am			
Photo ID:	11	Plot:	6
Vegetation classification or exclusion clause (and effective slope)			
Exclusion clause 2.2.3.2(e) (Non-vegetated)			
Description / Justification for Classification			
Non-vegetated areas (foreground) to the north of the site (i.e. existing roads (Cardup Siding Road)) have been excluded in accordance with clause 2.2.3.2(e) of AS 3959. Single rows of trees within the managed road reserve (background) are excluded in accordance with clause 2.2.3.2(f) of AS 3959.			
			
-32°14'25", 115°58'28", 2.4m, 37° 8 Mar 2024 9:42:35 am			
Photo ID:	12	Plot:	6
Vegetation classification or exclusion clause (and effective slope)			
Exclusion clause 2.2.3.2(e) (Non-vegetated)			
Description / Justification for Classification			
Non-vegetated areas to the north-east of the site (i.e. existing roads (Cardup Siding Road)) have been excluded in accordance with clause 2.2.3.2(e) of AS 3959.			
			
-32°14'28", 115°59'6", 9.1m, 69° 8 Mar 2024 9:00:20 am			

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Table 2: AS 3959 vegetation classifications (refer to **Figure 2**)(continued)

Photo ID:	13	Plot:	7
Vegetation classification or exclusion clause (and effective slope)			
Exclusion clause 2.2.3.2(f) (Low threat vegetation)			
Description / Justification for Classification			
Low threat vegetation has been identified to the north of the site within the Cardup Brook Trail Network public open space area. This area is subject to regular ongoing maintenance, with trees pruned and grass below 100 mm in height with no evidence of built-up dead material. This area has been assumed to continue to be managed by the Shire of Serpentine Jarrahdale.			
			
Photo ID:	14	Plot:	7
Vegetation classification or exclusion clause (and effective slope)			
Exclusion clause 2.2.3.2(f) (Low threat vegetation)			
Description / Justification for Classification			
Low threat vegetation has been identified to the north of the site within the Cardup Siding Road reserve (the site is to the left of the photo). This area is subject to regular ongoing maintenance, with trees pruned and grass below 100 mm in height with no evidence of built-up dead material. This area has been assumed to continue to be managed by new landowners adjacent to the road and/or the Shire of Serpentine Jarrahdale.			
			
Photo ID:	15	Plot:	7
Vegetation classification or exclusion clause (and effective slope)			
Exclusion clause 2.2.3.2(f) (Low threat vegetation)			
Description / Justification for Classification			
Low threat vegetation has been identified to the north of the site within the Cardup Brook Trail Network public open space area. This area is subject to regular ongoing maintenance, with trees pruned and grass below 100 mm in height with no evidence of built-up dead material. This area has been assumed to continue to be managed by the Shire of Serpentine Jarrahdale.			
			

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Table 2: AS 3959 vegetation classifications (refer to **Figure 2**)(continued)

Photo ID:	16	Plot:	7
Vegetation classification or exclusion clause (and effective slope)			
Exclusion clause 2.2.3.2(f) (Low threat vegetation)			
Description / Justification for Classification			
Low threat vegetation has been identified to the north of the site within the Cardup Siding Road reserve (foreground) and within rural residential landholdings (background). The road reserve is subject to regular ongoing maintenance, with trees pruned and no evidence of built-up dead material. Rural residential landholdings and associated gardens are assumed to be continuously managed in accordance with the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice. These areas may contain non-vegetated areas such as buildings, private driveways and carparks that achieve low threat as per clause 2.2.3.2 (e), but for ease of reference and given the relatively large size of the rural residential lots have been excluded as low-threat vegetation (f).			
Photo ID:	17	Plot:	7
Vegetation classification or exclusion clause (and effective slope)			
Exclusion clause 2.2.3.2(f) (Low threat vegetation)			
Description / Justification for Classification			
Low threat vegetation has been identified to the north of the site within Learmouth Reserve. This area is subject to regular ongoing maintenance, with trees pruned and grass below 100 mm in height with no evidence of built-up dead material. This area has been assumed to continue to be managed by the Shire of Serpentine Jarrahdale.			



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3.2 Assessment outputs

The vegetation classifications determined in **Section 3.1** are summarised in **Table 3** and shown in **Figure 2** and incorporate the known changes to vegetation post-development within the site and the determined effective slope.

The resultant BAL ratings for the site are shown in **Figure 3**. The BAL ratings are based on the minimum distance outlined in Table 2.5 of AS 3959 for the applicable vegetation classifications and effective slope. The relevant setback distances for the BAL ratings have been summarised for ease of reference in **Table 4**.

All habitable buildings within lots will be able to achieve BAL-29 or below.

Table 3: AS 3959 vegetation classification and effective slope applicable to the site

Plot	Applied vegetation classification	Effective slope
1	Class A – Forest	Flat/upslope
2	Class A – Forest	Flat/upslope
3	Class B – Woodland	Flat/upslope
4	Class G – Grassland	Flat/upslope
5	Class G – Grassland	Flat/upslope
6	Exclusion 2.2.3.2(e)	N/A
7	Exclusion 2.2.3.2(f)	N/A
8	Class B – Woodland (associated with the public open space area that contains the registered Aboriginal heriatge site, and aligns with the landscape design).	Flat/upslope

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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.

Plot number (see Figure 2)	Vegetation classification (see Figure 2)	Effective slope (see Figure 2)	Distance to vegetation (from Table 2.5 of AS 3959)	BAL rating
Plot 1 and Plot 2	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 3	Woodland (Class B)	Flat/upslope	< 10 m	BAL-FZ
			10 - < 14 m	BAL-40
			14 - < 20 m	BAL-29
			20 - < 29 m	BAL-19
			29 - < 100 m	BAL-12.5
			> 100 m	BAL-LOW
			19 - < 27 m	BAL-19
			27 - < 100 m	BAL-12.5
Plot 4 and 5	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, particularly the construction of new habitable buildings, include:

- Provision of appropriate separation distance from bushfire hazards to ensure a BAL rating of BAL-29 or less can be achieved at buildings (built form). This includes the management of temporary hazards (grassland vegetation) to the south and south-west of the site i.e. management of grassland vegetation up to a 50 m wide strip, as shown in **Figure 2**. The managed strip could be reduced to 8 m-wide, and would still ensure lots achieve BAL-29 or less.
- Ensuring that the site has access to a road network that supports egress to multiple destinations and that temporary no through roads due to staging of development are less than 200 m long with suitable turn-around areas or are provided with temporary emergency access ways.
- Ensuring that site landscaping is designed, implemented, and managed to achieve low threat to reduce the impact of bushfire and risk of fires starting onsite.
- Ensuring that the provision of water for firefighting is sufficient and accessible by firefighting services will require each lot to provide a standalone water supply.

4.1 Permanent hazards

The land surrounding the site comprises a mix of uses, including nature reserves with remnant native vegetation (Bush Forever Sites), existing rural-residential development and undeveloped land zoned for future residential development (future stages of the Lot 33 Hopkinson Road Structure Plan) and the Tonkin Highway extension and Water Corporation corridor.

The predominant bushfire hazards relevant to the site are the forest (Class A), woodland (Class B) and grassland (Class G) vegetation (where within 50 m of proposed lots) to the north and east, west, and south respectively.

Classified forest vegetation is expected to remain to the north within Cardup Brook and east within the Cardup Nature Reserve in the long-term. The woodland and grassland vegetation to the west of the site (Tonkin highway extension and Water Corporation corridor) is expected to be removed when this area is developed in the future. Notwithstanding, any timing of development is uncertain and therefore for the purposes of this BMP all classified vegetation within those areas has been assumed to comprise a permanent hazard.

Woodland vegetation has also been assumed to apply to the public open space area within the western portion of the site which contains the registered Aboriginal heritage site. This is to accommodate the potential for limited modification to the vegetation.

4.2 Temporary hazards

Once vegetation is removed within the site (where not to be retained and managed to low threat) and subdivision commences, the entire site will need to be managed by the proponent to achieve low threat at all times until the lots are sold and/or construction of buildings and landscape

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treatments commence. This will include regular slashing/mowing of grass/weedy regrowth within the newly created lots.

The grassland vegetation to the south and south-west of the site (within areas under the control of the proponent) is expected to be removed when this area is developed in the future in accordance with the Lot 33 Hopkinson Road Local Structure Plan. Therefore, this vegetation is considered a temporary hazard. To minimise the impacts of the temporary hazards on proposed lots within the site, the proponent will implement and maintain a 50 m-wide (or the minimum width to achieve BAL-29) strip of grassland vegetation to a low threat standard in accordance with Section 2.2.3.2 of AS 3959 until urban development in this area progresses. This will include the slashing of grasses to a height of below 100 mm and the removal of any regrowth vegetation and dead plant material.

4.3 Vulnerable or high risk land use

The definition of a vulnerable land use is where occupants are less able to respond in an emergency. The types of land uses considered vulnerable include *“facilities that, due to the building design or use, or the number of people accommodated, are likely to present evacuation challenges.”* This generally includes (but is not limited to) schools, hospitals, aged care facilities and similar. The identification of a land use as a vulnerable use is at the discretion of the decision maker.

A high-risk land use is one where practices that occur within the site may lead to a potential ignition and spread of a fire from the site or could prolong the duration or intensity of a bushfire should a fire arrive from outside the site.

No vulnerable or high-risk land uses are currently proposed as part of the subdivision.

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5 Assessment Against the Bushfire Protection Criteria

The bushfire protection criteria provided in the Guidelines represent the risk treatments applicable to achieving the intent and the objectives listed in SPP 3.7. The bushfire protection criteria are divided into four subsystems (elements), plus a standalone element for tourism. Each subsystem is provided with an intent and solution methods, either performance principle or acceptable solution (one predetermined solution). Compliance with each subsystem (as a risk treatment) is required to demonstrate to the decision maker that the risk is within acceptance.

The bushfire protection criteria identified in the Guidelines and addressed as part of this BMP are:

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

The proposed subdivision is compared with bushfire protection criteria in **Table 5**. The assessment demonstrates that the development can achieve the objectives of SPP 3.7 and addresses these through acceptable solutions detailed in the Guidelines.

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 subdivision is in accordance with the approved structure plan, which included a bushfire management plan addressing bushfire risk. The BAL assessment, discussed in Section 3.2, has indicated that all proposed lots are able to provide an area where future habitable buildings can achieve BAL-29 or less. The proposal complies with A1.1.
Element 2: Siting and design	
A2.1 Asset Protection Zone (APZ)	All lots are required to be managed to a low threat condition with a minimum Asset Protection Zone (APZ) equivalent to enable BAL-29 to be achieved at the habitable building. APZs are typically contained within a lot but can also include areas external to a lot that achieve low threat in accordance with Section 2.2.3.2 of AS 3959 where the APZ cannot be contained within the lot boundaries (such as managed road reserves or public open space). As outlined in Section 3.1, classified forest, woodland and grassland vegetation occurs to the north, east, west and south of the site; however, separation provided by the existing and proposed public road network, residential lots and the managed 50 m interface (shown in Figure 4) to the south of the site (managed by the proponent until urban development in these areas progresses) is sufficient for all lots (and future buildings) to achieve BAL-29 or below. As noted previously, while this BMP shows a managed 50 m interface, this is to ensure the interfacing housing has a long term BAL rating of BAL-LOW. This only needs to be the minimum to ensure lots achieve BAL-29, which is 8 m-wide and for the majority of lots is provided by the proposed public roads. The proposal complies with A2.1.

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

Bushfire protection criteria	Proposed bushfire management strategies
Element 3: Vehicular access	
A3.1 Public roads	The site will connect to public roads Cardup Siding Road to the north and Hopkinson Road to the west of the site, which meet the minimum technical requirements for public roads compliant with the local government standards and with A3.1 Table 6 column 1 of the Guidelines (Plate 4 below). The proposal complies with A3.1.
A3.2a Multiple access routes	The proposed subdivision will provide multiple access and egress points onto the existing Cardup Siding Road to the north (an east-west connector), which is in accordance with the structure plan, as well as providing a connector to the south that generally follows the road layout detailed in the structure plan (except a small portion where a temporary emergency access way will be provided). Cardup Siding Road provides multiple connections to different destinations, as does Hopkinson Road, with connections to Byford in the north and Mundijong in the south. The road network is shown in Figure 4. It is acknowledged that as part of the construction of Tonkin Highway, the Cardup Siding Road connection to the west will be removed. The timing of this is unknown and may not occur during the construction of the site. Notwithstanding, a new access directly from the site to the north will be constructed across Cardup Brook by Main Roads WA, providing egress to the north in addition to the egress to the east, still satisfying the requirement for access to multiple destinations, as well as the connection to the south within the structure plan, connecting to Hopkinson Road. As the future development stages in accordance with the Lot 33 Hopkinson Road Local Structure Plan are constructed, additional road connections will be provided to the south of the site. The proposal complies with A3.2a.
A3.2b Emergency access way	A road connecting the site to Hopkinson Road in the south (following the future road alignment proposed in the structure plan) is proposed. A small portion of this road, which does not follow the permanent road alignment, will be a temporary emergency access way until the permanent road network is constructed. The portion that will be a temporary emergency access way is illustrated in Figure 4 and is less than 500 m in length. The proposal is compliant with A3.2b.
A3.3 Through-roads	The majority of the proposed roads within the site are through-roads and will meet the minimum technical requirements for public roads compliant with the local government standards and with A3.1 Table 6 column 1 of the Guidelines (Plate 4 below). The development of the site is part of a broader staged development in accordance with the Lot 33 Hopkinson Road Local Structure Plan. Accordingly, a number of temporary no-through roads will be required within the southern portion of the site (refer to Figure 4). All temporary no-through roads within the site are less than 200 m in length to the closest intersection and will meet the requirements of a public road including suitable turning areas as per Appendix Four of the Guidelines and/or as agreed with the Shire of Serpentine Jarrahdale. Where temporary no through roads are required as part of the staged subdivision within the site (in accordance with the staging plan (Appendix B)), any no-through roads will be temporary but will be developed in accordance with A3.3. The proposal complies with A3.3

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

Bushfire protection criteria	Proposed bushfire management strategies
Element 3: Vehicular access	
A3.4a Perimeter roads	A perimeter road may not be required where the lot's adjoining vegetation is grassland (Class G) and where all lots have frontage to a public road. Due to staged development within the Lot 33 Hopkinson Road Local Structure Plan area, no perimeter road is proposed for a row of lots proposed adjacent to the southern site boundary and grassland vegetation. However, as an interim measure to provide separation between proposed lots within the site and the grassland vegetation (temporary hazards), the proponent will manage a minimum interface to achieve low threat and enable lots to achieve BAL-29 or less. This is currently proposed to be a managed 50 m-wide interface (but could be reduced to 8 m-wide) to provide separation from these hazards (refer to Figure 4). The proposal complies with A3.4a.
A3.4b Fire service access route	No fire service access route is proposed or required to achieve compliance as the proposal complies with A3.4a. Therefore A3.4b is not applicable.
A3.5 Battle-axe access legs	No battle-axe legs are proposed and therefore A3.5 is not applicable.
A3.6 Private driveway longer than 70 metres	Not applicable to subdivision. Furthermore, no portion of any proposed lot (including the commercial lot) is more than 70 m from a public road and is also within an area where the speed limit will be less than 70 km/h and will be serviced by a reticulated water supply. Accordingly, lots within the site are not required to comply with the private driveway technical requirements of the Guidelines.
Element 4: Water	
A4.1 Reticulated areas	Not applicable to subdivision and development applications.
A4.2 Provision of water for firefighting purposes	The site is located in a reticulated water supply area. Hydrants exist along Cardup Siding Road within 200 m of the site, as shown in Figure 4 . Additional hydrants will be supplied as part of subdivision in accordance with the water authority requirements.

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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

5.1 Additional management strategies

5.1.1 Future approval considerations

The BAL assessment in this BMP assesses the potential bushfire risk posed to future habitable buildings within the site, based on the assumptions outlined in **Section 3**.

Following the creation of lot titles, a building licence will be required before the dwelling construction can commence.

Future Class 1, 2, 3 and 10a buildings designated bushfire prone and within an area subject to a BAL rating of BAL-12.5 or higher, will need to satisfy construction standards in accordance with the National Construction Code (NCC) (e.g., AS 3959 or the National Association for Steel-framed Housing).

5.1.2 Vegetation management

5.1.2.1 Within the site

All lots, once created, are required to be managed by the relevant landowner to a minimal fuel condition and achieve low threat as per Section 2.2.3.2 of AS 3959, in accordance with this BMP and the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice (as published).

Unless indicated otherwise (e.g. western public open space area assumed to be woodland), road reserves and public open space areas will be managed to achieve low threat conditions in accordance with Section 2.2.3.2 of AS 3959 (and described in **Section 2.2** of this BMP) and will be the

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responsibility of the proponent initially, and following handover, will be the responsibility of the Shire of Serpentine Jarrahdale. This includes road verges (nature strips) which do not require specific management to be considered low threat as per AS 3959.

5.1.2.2 Surrounding the site

Low threat area management by proponent

Where within the proponent's landholdings and the Lot 33 Hopkinson Road Local Structure Plan, a minimum 50 m-wide area of vegetation, directly adjacent to the southern and south-western boundaries of the site (see **Figure 4**) will be managed to achieve a low threat condition in accordance with Section 2.2.3.2 of AS 3959. This will include regular slashing/removal of vegetation and/or removal of built-up dead material (or similar type treatments). This area will be maintained by the proponent until future residential development in this area progresses in accordance with the Lot 33 Hopkinson Road Local Structure Plan.

Alternatively, the proponent could also manage a narrower strip, 8 m wide, which would still ensure affected lots achieve BAL-29. The BAL ratings affecting lots within this BMP would be different to that currently shown in the BAL Contour Plan (**Figure 3**), but could still achieve BAL-29 or less. If the management strip was narrower, an updated BAL assessment would be required to support the building licence.

Private landholdings and public open space areas

Where indicated as a low threat in **Figure 2**, the areas surrounding the site will be managed by the applicable landowners/land managers in accordance with the Shire of Serpentine Jarrahdale Fire Hazard Reduction Notice (as published) and/or in accordance with existing maintenance regimes.

Where indicated as classified vegetation in **Figure 2**, areas have been assumed to remain a bushfire hazard in the long-term.

5.1.3 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 advice to residents available from their website <https://www.sjshire.wa.gov.au/community/services/ranger-services/animals/bushfire-ready.aspx>. Professional, qualified consultants also offer bushfire safety advice and relevant services to residents and businesses in high-risk areas in addition to that provided in this BMP.

In the case of a bushfire in the area, advice would be provided to occupants by DFES, and/or the Shire of Serpentine Jarrahdale on any specific recommendations with regard to responding to the bushfire, including evacuation if required.

6 Responsibilities for Implementation and Management of Bushfire Measures

Table 6 outlines the future responsibilities of the proponent/developer to be undertaken to support the clearance of titles. These items will be certified by a bushfire consultant.

Bushfire Management Plan

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Table 7 outlines the future responsibilities of the proponent, future land owners and the Shire of Serpentine Jarrahdale associated with implementing this BMP with reference to ongoing bushfire risk mitigation measures for existing land uses (through compliance with the Shire's fire hazard reduction notice) or future mitigation measures to be accommodated as part of the development process but not necessarily for title clearances. These responsibilities will need to be considered as part of the subsequent development and implementation process.

Table 6: Responsibilities for the implementation of this BMP prior to issue of titles

Developer/landowner	
No.	Implementation action
1	Ensure all classified vegetation in the site is either removed or is modified to a low threat condition, and each lot is maintained as low threat in accordance with section 2.2.3.2 of AS 3959 until the lot is sold.
2	Implement and maintain the 50 m wide low threat managed interface (or minimum width to achieve BAL-29 or less at future lots) to the south and south-west of the site (where under the control of the proponent and within the structure plan area) (refer to Figure 4) until future development in accordance with the broader Lot 33 Hopkinson Road Local Structure Plan progresses. This includes (but is not limited to): • Ongoing slashing/removal of vegetation; and/or • Herbicide treatment (or similar) and removal of built-up dead matter.
3	Install the public roads to the standards outlined in Appendix Four of the Guidelines or as agreed with the Shire of Serpentine Jarrahdale. Public roads reserves should be designed and maintained to achieve low threat in accordance with Section 2.2.3.2 of AS 3959. This includes the road to the south and the portion of temporary emergency access way or as agreed with the Shire of Serpentine Jarrahdale.
4	Install (temporary) no-through roads in accordance with Appendix Four of the Guidelines and as agreed with the Shire of Serpentine Jarrahdale. This includes the provision of appropriate turn-around areas at the terminus of the no through road.
5	Reticulated water supply and hydrants are to be installed as per standard water authority requirements, unless otherwise agreed.
6	As part of staged development, two access routes must be provided at all times other than: • Temporary no-through roads that meet the requirements of the Guidelines with suitable turning heads. • If emergency access ways are required temporarily to provide two access routes during staging, they must be provided in accordance with the minimum technical requirements of Appendix Four and Table 6 of the Guidelines.

Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



Table 7: Responsibilities for the implementation of this BMP during development (building construction) and ongoing

Developer/landowner	
No.	Implementation action
1	Management of the site to achieve low threat is specified in Table 6, Item 1 to support creation of titles. As part of the development works, where assumed low threat, the areas of public open space and road reserves within the site (including the southern side of Cardup Siding Road) should be designed, implemented to achieve a low threat standard in accordance with Section 2.2.3.2 of AS 3959. Where present, mature trees can be retained. Ongoing management is likely to include (but is not limited to): • Irrigation of grass and garden beds (where required) • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.) • Low pruning of trees. • Application of ground/surface covers such as mulch or non-flammable materials as required. • Regular mowing/slashing of grass to less than 100 mm in height Maintenance will be the responsibility of the proponent until handover to the Shire of Serpentine Jarrahdale, and the Shire thereafter.
Property (lot) owners	
No.	Implementation action
1	Design, construct, and maintain the building compliant with the National Construction Code, commensurate to the BAL rating determined in accordance with AS 3959.
2	Ensure access to fire hydrants is maintained.
3	Maintain the lot to a low threat standard in accordance with Section 2.2.3.2(e) and (f) of AS 3959 and the principles of the Asset Protection Zones Standard of Schedule 1 of the Guidelines and/or the Shire of Serpentine Jarrahdale fire hazard reduction notice requirements, whichever is the higher standard.
Shire of Serpentine Jarrahdale	
No.	Management action
1	Maintaining fuel loads in existing public road reserves and public open space (under their management) to appropriate standards to minimise fuel loads.
2	Monitoring vegetation fuel loads in private landholdings against the requirements of the Shire's fire hazard reduction notice (and/or existing maintenance regimes outlined in this BMP) and liaising with relevant stakeholders to maintain fuel loads at minimal/appropriate fuel levels, in accordance with the Shire's responsibilities under the <i>Bush Fires Act 1954</i> .
Water Corporation	
No.	Management action
1	Ensure water hydrants in adjacent road reserve are maintained and accessible to fire services at all times.

Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



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.

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: 06/11/2024

BPAD Accreditation: BPAD No. 36690

Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



8 References

8.1 General references

The references listed below have been considered as part of preparing this document.

Department of Biodiversity, Conservation and Attractions (DBCA) 2017, *Ramsar Sites (DBCA-010)*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2022a, *Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)*, Western Australia, <<https://catalogue.data.wa.gov.au/dataset/geomorphic-wetlands-swan-coastal-plain>>.

Department of Biodiversity, Conservation and Attractions (DBCA) 2022b, *Threatened Ecological Communities (DBCA-038)*, Perth, Western Australia <<https://catalogue.data.wa.gov.au/dataset/threatened-ecological-communities>>.

Department of Water (DoW) 2008, *LiDAR Elevation Dataset, Swan Coastal Plain*, Perth.

Department of Planning, Lands and Heritage (DPLH) 2019, *Bush Forever Areas 2000 (DPLH-019)*, <<https://catalogue.data.wa.gov.au/org/departments-of-planning-lands-and-heritage>>.

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.

Department of Water and Environmental Regulation (DWER) 2021, *Clearing Regulations - Environmentally Sensitive Areas (DWER-046)*, <<https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046>>.

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.

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

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

Western Australian Land Information Authority (WALIA) 2023, *Landgate Map Viewer Plus*.

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

Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



Department of Biodiversity, Conservation and Attractions (DBCA) 2017, *Ramsar Sites (DBCA-010)*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2022a, *Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)*, Western Australia, <<https://catalogue.data.wa.gov.au/dataset/geomorphic-wetlands-swan-coastal-plain>>.

Department of Biodiversity, Conservation and Attractions (DBCA) 2022b, *Threatened Ecological Communities (DBCA-038)*, Perth, Western Australia <<https://catalogue.data.wa.gov.au/dataset/threatened-ecological-communities>>.

Department of Planning, Lands and Heritage (DPLH) 2019, *Bush Forever Areas 2000 (DPLH-019)*, <<https://catalogue.data.wa.gov.au/org/departments-of-planning-lands-and-heritage>>.

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.

Department of Water and Environmental Regulation (DWER) 2021, *Clearing Regulations - Environmentally Sensitive Areas (DWER-046)*, <<https://catalogue.data.wa.gov.au/dataset/clearing-regulations-environmentally-sensitive-areas-dwer-046>>.

Emerge Associates 2022, *Environmental Assessment and Management Strategy Lot 33 Hopkinson Road Local Structure Plan Support*, EP20-092(05)--001A PPS, A.

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.

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

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.

Bushfire Management Plan

Precinct A - Lot 33 Hopkinson Road, Cardup



8.2 Online references

The online resources that have been utilised in the preparation of this report are referenced in **Section 8.1**, with access date information provided in **Table R-1**.

Table R 1 Access dates for online references

Reference	Date accessed	Website or dataset name
Landgate 2024	12.03.2024	https://map-viewer-plus.app.landgate.wa.gov.au/index.html
(OBRM 2021)	12.03.2024	Bush Fire Prone Areas
(DBCA 2022a)	12.03.2024	Geomorphic Wetlands, Swan Coastal Plain
(DBCA 2017)	12.03.2024	Ramsar Sites
(DBCA 2022b)	12.03.2024	Threatened ecological communities
(DWER 2021)	12.03.2024	Environmentally Sensitive Areas
(DPLH 2019)	12.03.2024	Bush Forever areas

Figures

Figure 1: Site Location and Topographic Contours

Figure 2: AS 3959 Vegetation Classification and Effective Slope

Figure 3: Bushfire Attack Level Contour Plan

Figure 4: Spatial Representation of Bushfire Management Strategies

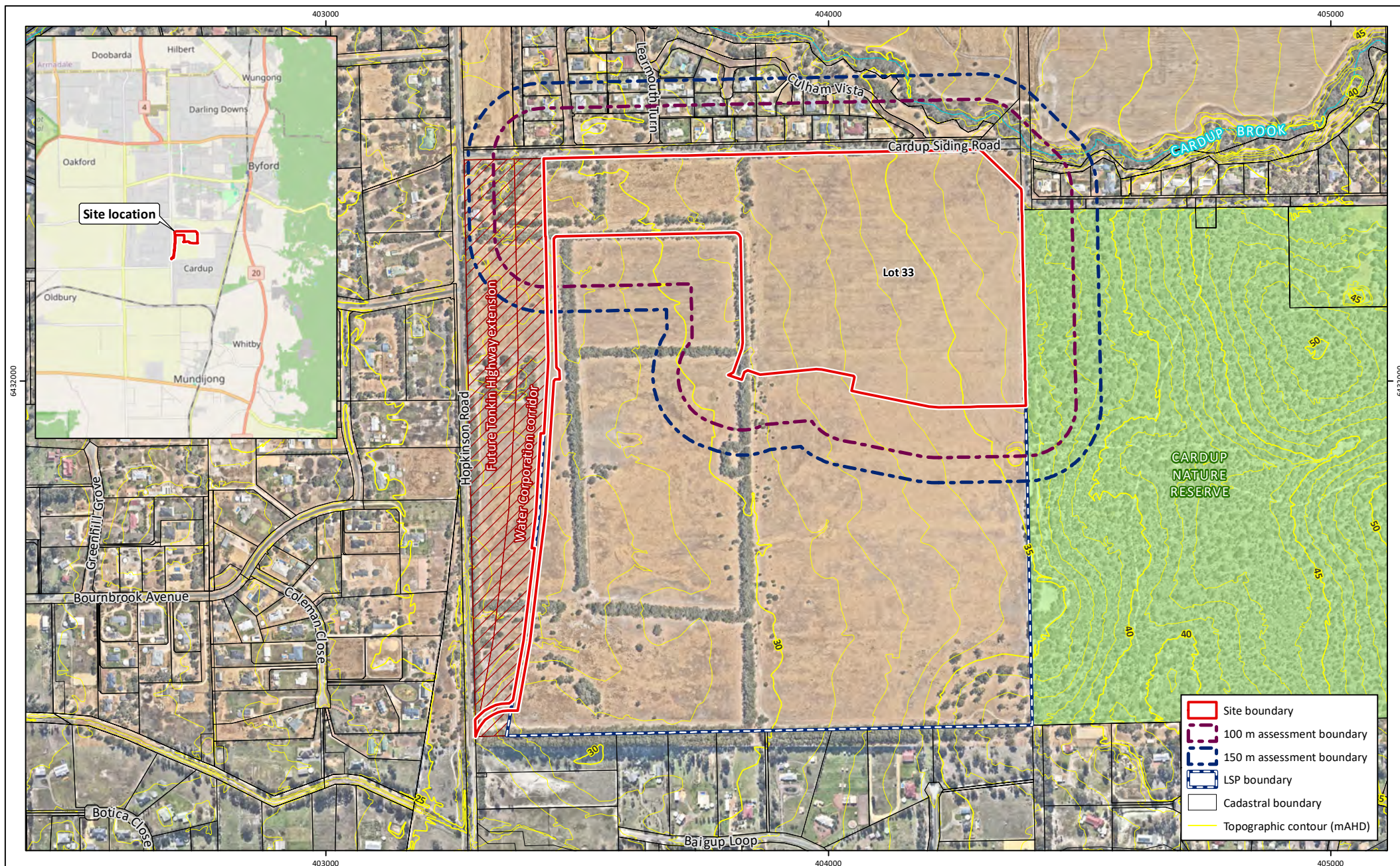


Figure 1: Site Location and Topographic Contours

Project: Bushfire Management Plan
Precinct A - Lot 33 Hopkinson Road, Cardup

Client: Gold Estate Holdings

Plan Number:
EP20-092(12)--F86a

Drawn: GAR

Date: 06/11/2024

Checked: PPS

Approved: KK

Date: 06/11/2024



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Metres
Scale: 1:10,000@A4
GDA 1994 MGA Zone 50

emerge
ASSOCIATES

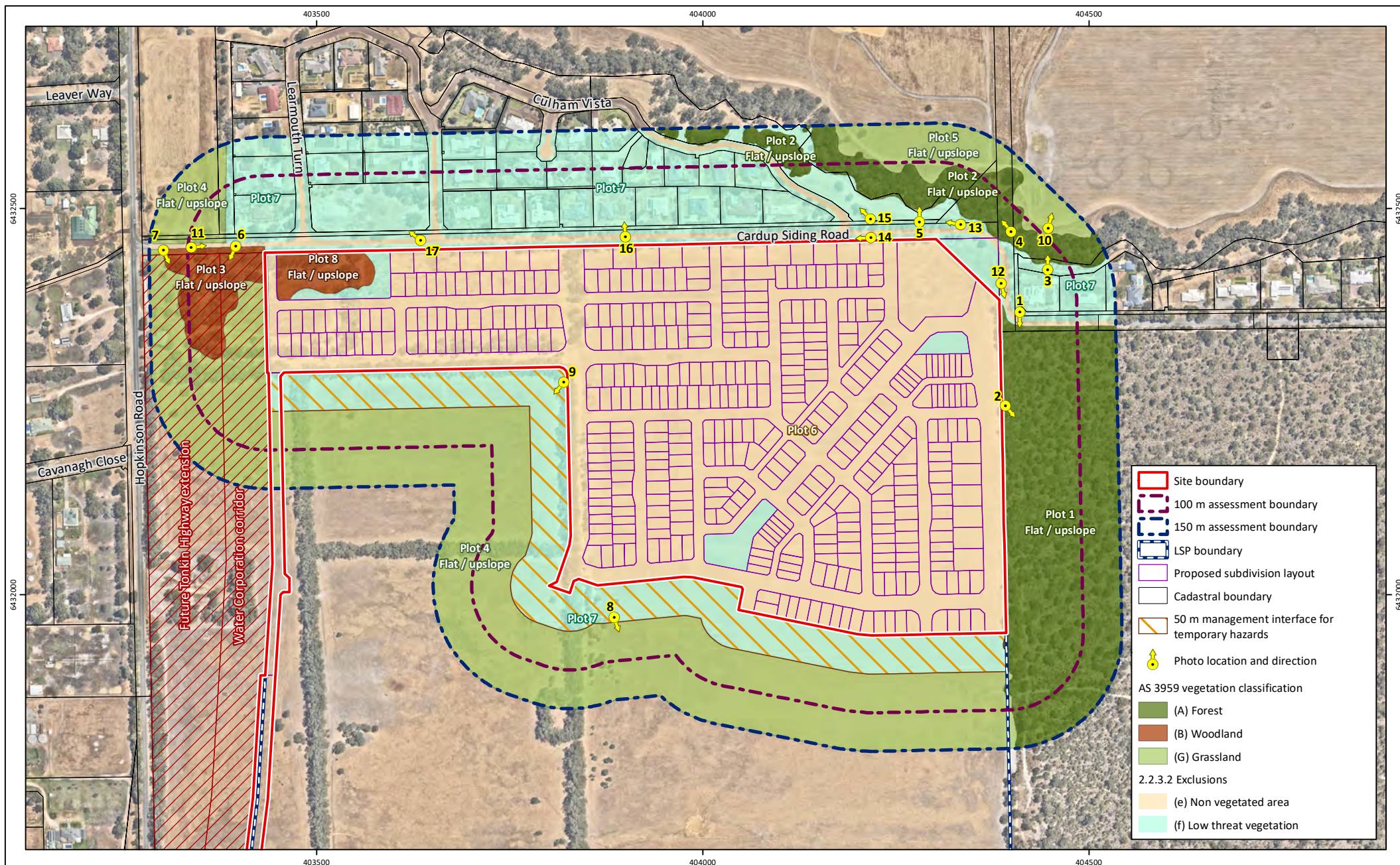


Figure 2: AS 3959 Vegetation Classification and Effective Slope

Project: Bushfire Management Plan
Precinct A - Lot 33 Hopkinson Road, Cardup

Client: Gold Estate Holdings

Plan Number:
EP20-092(12)-F87a

Drawn: GAR

Date: 06/11/2024

Checked: PPS

Approved: KK

Date: 06/11/2024



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Metres

Scale: 1:6,500@A4

GDA 1994 MGA Zone 50

emerge
ASSOCIATES

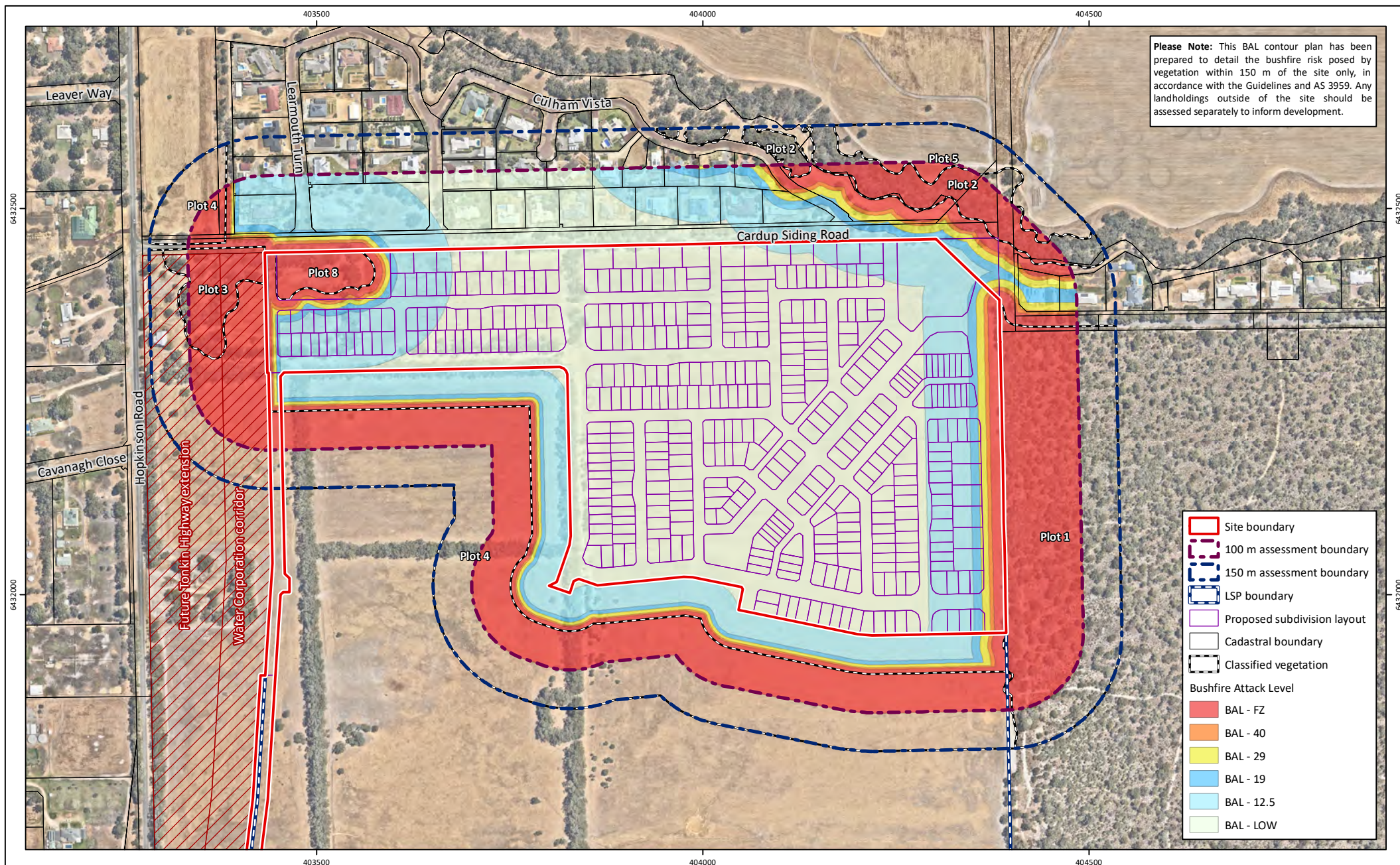


Figure 3: Bushfire Attack Level Contour Plan

Project: Bushfire Management Plan
Precinct A - Lot 33 Hopkinson Road, Cardup

Client: Gold Estate Holdings

Plan Number:
EP20-092(12)--F88a

Drawn: GAR

Date: 06/11/2024

Checked: PPS

Approved: KK

Date: 06/11/2024

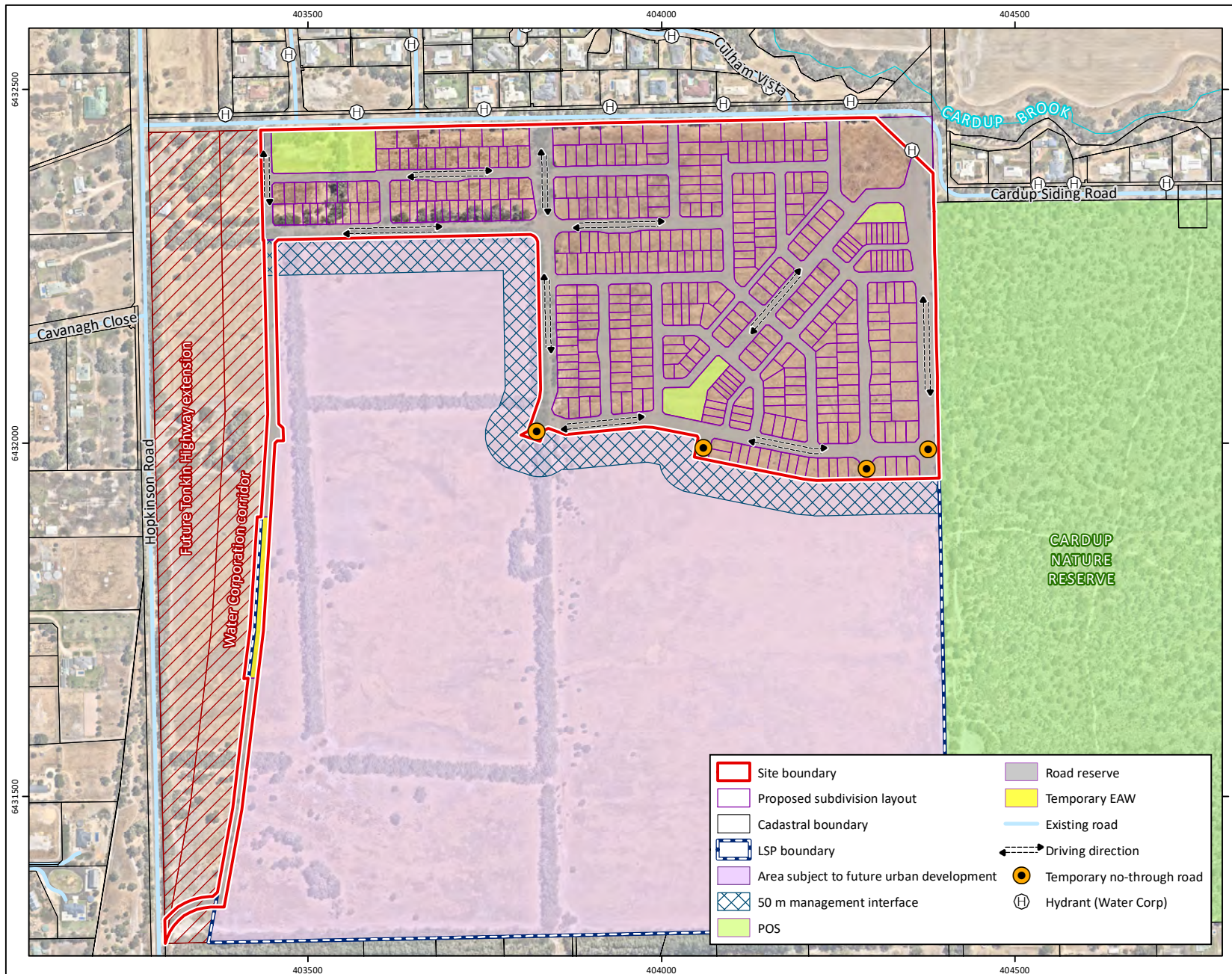


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Metres

Scale: 1:6,500@A4

GDA 1994 MGA Zone 50

emerge
ASSOCIATES



Area management by proponent

Until development progresses to the south of the site in accordance with the Lot 33 Hopkinson Road Local Structure Plan, the proponent will manage a minimum 50 m wide interface or minimum width to ensure lots achieve BAL-29 to ensure it meets low threat in accordance with Section 2.2.3.2 of AS 3959. This will include (but not limited to) regular slashing (below 100 mm) of grasses and removal of vegetation such as regrowth and dead material.

Development Location

All new buildings are to be located in an area that can achieve BAL-29 or less.

Asset Protection Zone

The site is to be managed to achieve low threat in accordance with Section 2.2.3.2 of AS 3959. This will be the responsibility of the proponent until lots are sold and until management of public open space areas and road reserves is handed over to the Shire of Serpentine Jarrahdale. After this it will be the responsibility of the lot owners and the Shire, respectively.

Building construction requirements

Where designated bushfire prone within the Map of Bushfire Prone Areas, future Class 1, 2, 3 and associated 10a buildings will need to be constructed in compliance with the BAL ratings determined in accordance with AS 3959.

Vehicle Access

All future development will be able to achieve two access routes upon completion of development. Where required as part of stage development, temporary no through roads are to meet the requirements of Appendix Four of the Guidelines including:

- A maximum length of 200 m, unless agreed otherwise with the Shire.
- Meet public road requirements as per A3.2 of Appendix Four in the Guidelines.
- Meet the turnaround dimensions at outlined in Figure 24 of Appendix Four of the Guidelines.
- A temporary emergency access way (EAW) is to be installed in accordance with the requirements of the Guidelines of as agreed with the Shire of Serpentine Jarrahdale, connecting the two portions of public road in the southern portion of the site. The temporary EAW will remain in place until the permanent public road network in future stages is constructed.

Water Supply

The development will be serviced by a network of existing and future network of reticulated water hydrants.

Figure 4: Spatial Representation of Bushfire Management Strategies

Project: Bushfire Management Plan
Precinct A - Lot 33 Hopkinson Road, Cardup

Client: Gold Estate Holdings

Plan Number:
EP20-092(12)~F89a

Drawn: GAR

Date: 06/11/2024

Checked: PPS

Approved: KK

Date: 06/11/2024



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Metres

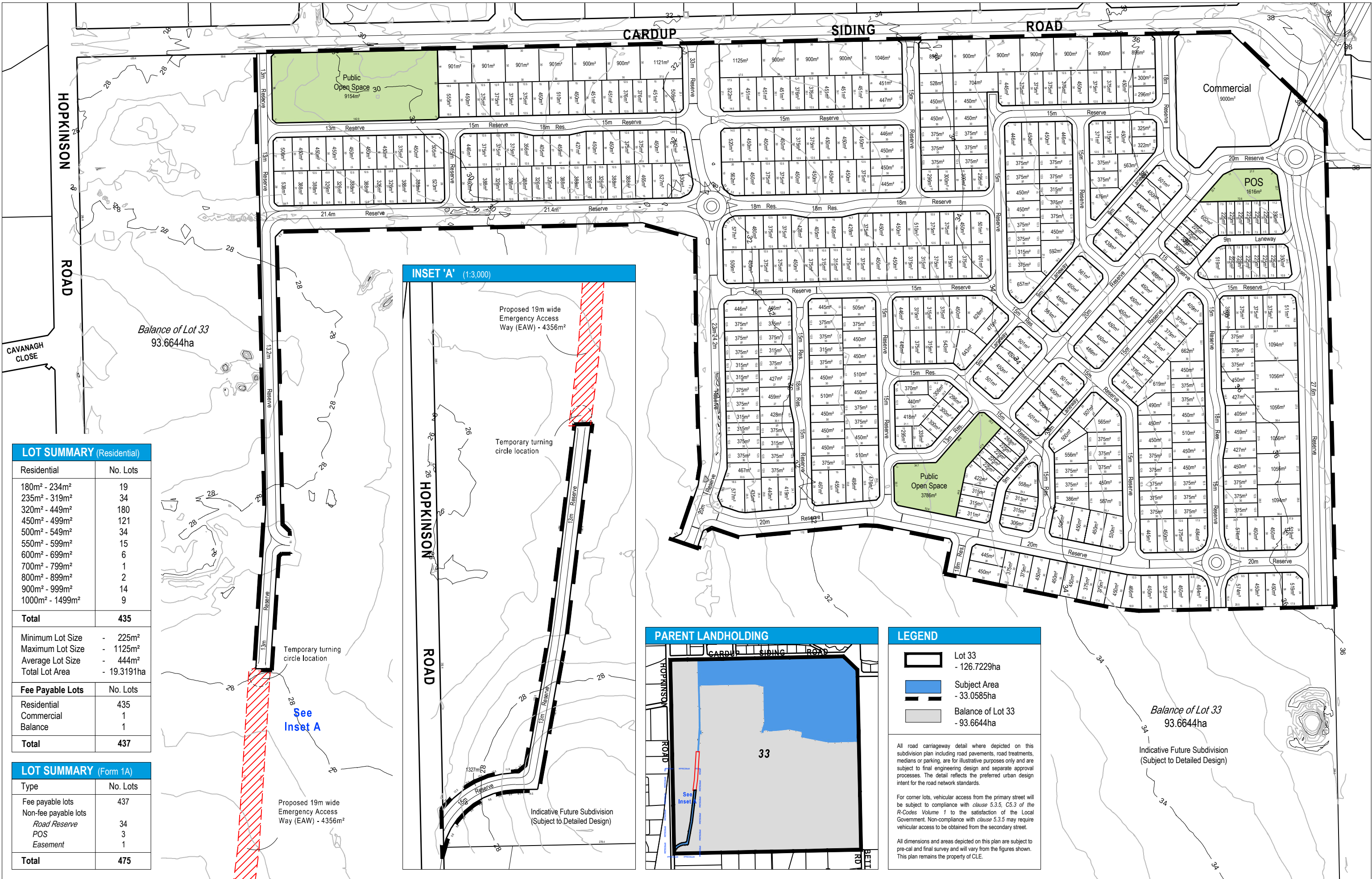
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GDA 1994 MGA Zone 50



Appendix A

Subdivision Plan



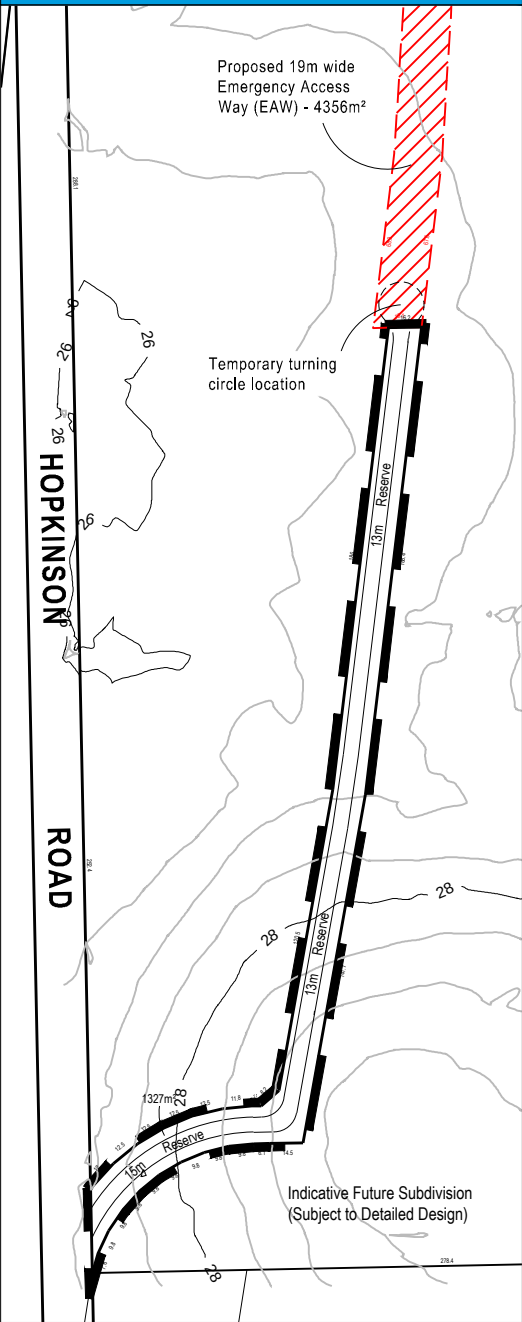
LOT SUMMARY (Residential)

Residential	No. Lots
180m ² - 234m ²	19
235m ² - 319m ²	34
320m ² - 449m ²	180
450m ² - 499m ²	121
500m ² - 549m ²	34
550m ² - 599m ²	15
600m ² - 699m ²	6
700m ² - 799m ²	1
800m ² - 899m ²	2
900m ² - 999m ²	14
1000m ² - 1499m ²	9
Total	435
Minimum Lot Size	- 225m ²
Maximum Lot Size	- 1125m ²
Average Lot Size	- 444m ²
Total Lot Area	- 19.3191ha
Fee Payable Lots	No. Lots
Residential	435
Commercial	1
Balance	1
Total	437

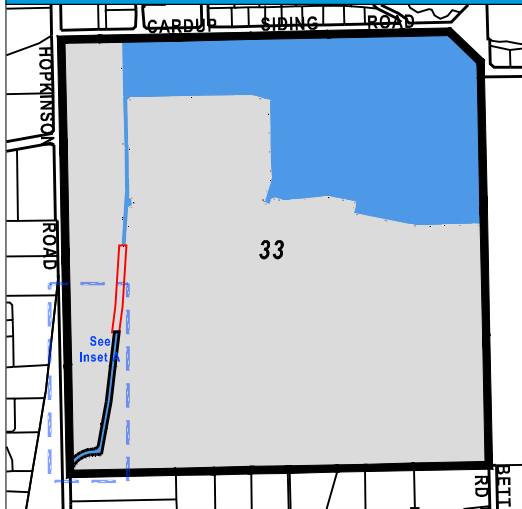
LOT SUMMARY (Form 1A)

Type	No. Lots
Fee payable lots	437
Non-fee payable lots	
Road Reserve	34
POS	3
Easement	1
Total	475

INSET 'A' (1:3,000)



PARENT LANDHOLDING



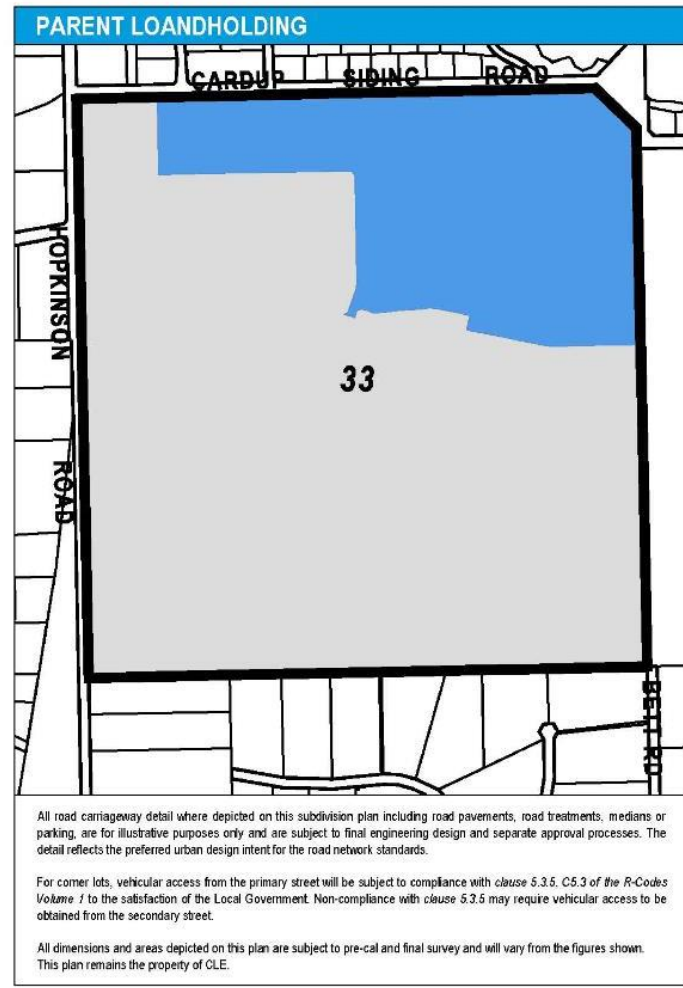
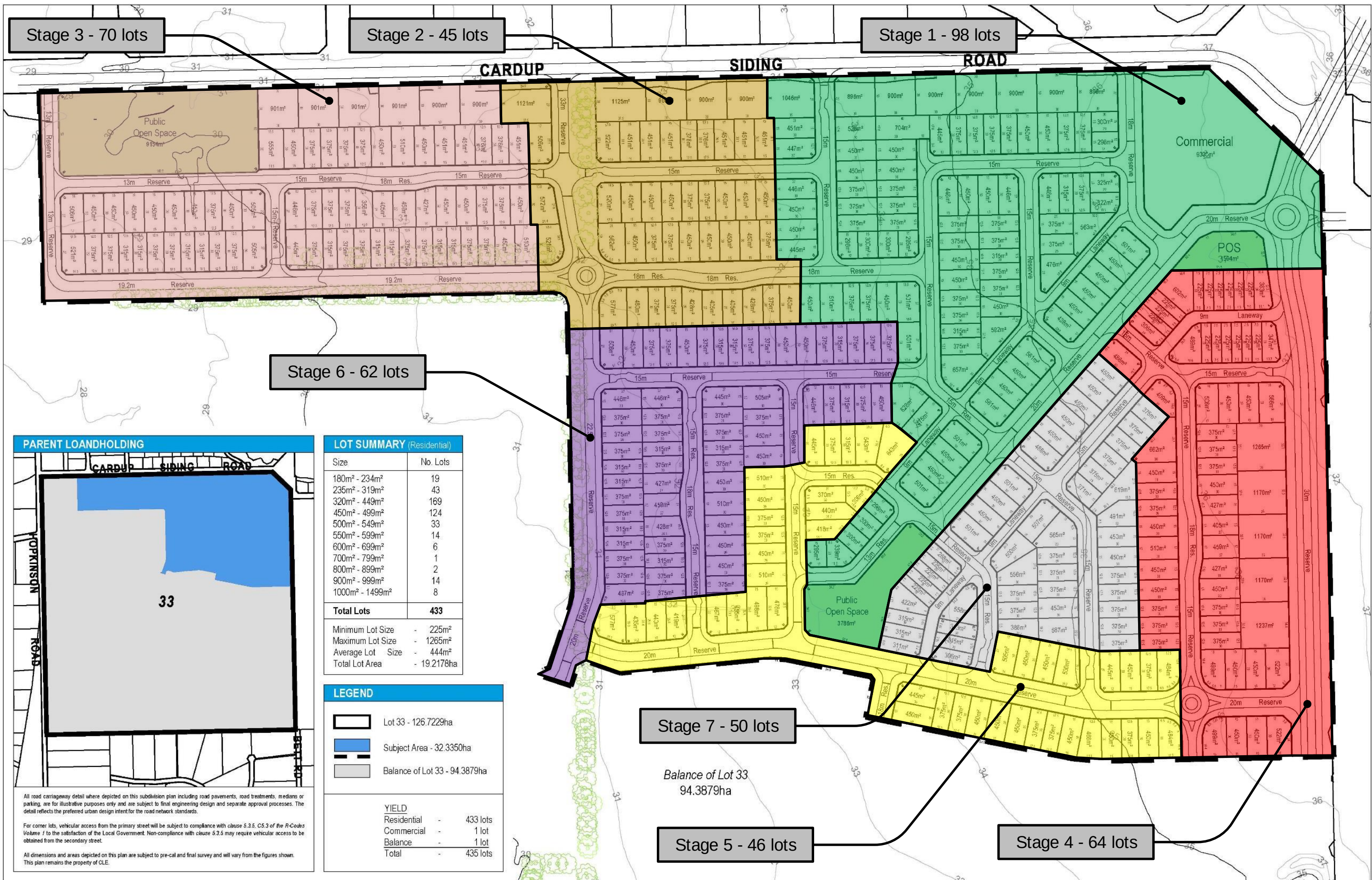
LEGEND

- Lot 33 - 126.7229ha
 - Subject Area - 33.0585ha
 - Balance of Lot 33 - 93.6644ha
- All road carriageway detail where depicted on this subdivision plan including road pavements, road treatments, medians or parking, are for illustrative purposes only and are subject to final engineering design and separate approval processes. The detail reflects the preferred urban design intent for the road network standards.
- For corner lots, vehicular access from the primary street will be subject to compliance with clause 5.3.5, C5.3 of the R-Codes Volume 1 to the satisfaction of the Local Government. Non-compliance with clause 5.3.5 may require vehicular access to be obtained from the secondary street.
- All dimensions and areas depicted on this plan are subject to pre-cal and final survey and will vary from the figures shown. This plan remains the property of CLE.

Appendix B

Staging Plan





LOT SUMMARY (Residential)	
Size	No. Lots
180m ² - 234m ²	19
235m ² - 319m ²	43
320m ² - 449m ²	169
450m ² - 499m ²	124
500m ² - 549m ²	33
550m ² - 599m ²	14
600m ² - 699m ²	6
700m ² - 799m ²	1
800m ² - 899m ²	2
900m ² - 999m ²	14
1000m ² - 1499m ²	8
Total Lots	433
Minimum Lot Size	- 225m ²
Maximum Lot Size	- 1265m ²
Average Lot Size	- 444m ²
Total Lot Area	- 19.2178ha

LEGEND	
	Lot 33 - 126.7229ha
	Subject Area - 32.3350ha
	Balance of Lot 33 - 94.3879ha
YIELD	
Residential	- 433 lots
Commercial	- 1 lot
Balance	- 1 lot
Total	- 435 lots

All road carriageway detail where depicted on this subdivision plan including road pavements, road treatments, medians or parking, are for illustrative purposes only and are subject to final engineering design and separate approval processes. The detail reflects the preferred urban design intent for the road network standards.

For corner lots, vehicular access from the primary street will be subject to compliance with clause 5.3.5, C5.3 of the R-Codes Volume 1 to the satisfaction of the Local Government. Non-compliance with clause 5.3.5 may require vehicular access to be obtained from the secondary street.

All dimensions and areas depicted on this plan are subject to pre-cal and final survey and will vary from the figures shown. This plan remains the property of CLE.

