

Bushfire Management Plan

Providence Estate, Wellard

Project No: EP13-011(14)

**Prepared for Wellard Residential Pty Ltd
February 2021**



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

Notwithstanding the precautions recommended in this document, it should always be remembered that bushfires burn under a wide range of conditions which can be unpredictable. An element of risk, no matter how small, will always remain. The objective of the Australian Standard AS 3959-2018 is to "prescribe particular construction details for buildings to reduce the risk of ignition from a bushfire 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

Wellard Residential Pty Ltd (the proponent) is progressing a revised subdivision application for a portion of Lots 9000 to 9003 and a portion of Lot 9027, Wellard (herein referred to as the 'site'). The site is proposed to be developed for residential purposes and will form part of the broader Providence Estate residential development. The site consists of an area of approximately 10 ha in size and located 46 km south of the Perth central business district, within the City of Kwinana. It is bounded by public open space (POS) and Wellard Road to the west, Bollard Bulrush Swamp to the north and existing residential development to the east and south (including areas of bare mineral earth where residential development is currently progressing).

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). The identification of the site within an area declared as bushfire prone necessitates that a further assessment of the determined bushfire risk affecting the site (in accordance with *Australian Standard 3959-2018 Construction of buildings in bushfire prone areas* (AS 3959)) and the satisfactory compliance of the proposal with the policy measures described in *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) (WAPC 2015) and its associated *Guidelines for Planning in Bushfire Prone Areas Version 1.3* (the Guidelines) (WAPC and DFES 2017).

The purpose of SPP 3.7 and its policy intent is best summarised as preserving life and reducing the impact of bushfire on property and infrastructure through effective risk-based land use planning. Importantly, it is required by SPP 3.7 that the determining authority is to apply its consideration to the precautionary principle (clause 6.11 in SPP 3.7) and it must be satisfied that the intent of the policy measures have been met, before it issues an approval.

This Bushfire Management Plan (BMP) examines the various responses to the identified bushfire risk (following development) that will make the ultimate use of the land suitable for its intended purpose. As part of this, a bushfire attack level (BAL) assessment has been undertaken to determine the associated bushfire risk, the applicable BAL ratings (if any), and in turn the building siting and construction response that will achieve compliance with the bushfire protection criteria and satisfy the precautionary principle.

As part of assessing the long-term bushfire risk to the site, the vegetation within 150 m of the site has been classified in accordance with AS 3959. The following bushfire hazards were identified in the post-development scenario:

- Forest (Class A) vegetation, largely associated with remnant vegetation within Bollard Bulrush Swamp immediately north of the site. This includes consideration of the wetland core and wetland buffer associated with Bollard Bulrush Swamp (and regrowth/revegetation in these areas).
- Shrubland (Class C) vegetation, associated with an area of vegetation to the north-east of the site. Portions of this area will be redeveloped as managed POS in the future, but has been assessed based on the current classification.
- Grassland (Class G) vegetation, associated with areas composed of cleared paddock areas to the east and north-west of the site.

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Overall, the outcomes of this BMP demonstrate that as development progresses, it will be possible for the intent of the bushfire protection criteria outlined in the Guidelines to be satisfied. This includes:

- **Element 1 - Location:** all habitable buildings can be located in an area subject to a low or moderate bushfire hazard, given buildings will be located within areas identified as low threat in accordance with Clause 2.2.3.2(e) of AS 3959 (as per Appendix Two of the Guidelines) and can be located in an area subject to a BAL rating of BAL-29 or less.
- **Element 2 - Siting and Design:** all new habitable buildings can be sited within the proposed development so that BAL-29 or less can be achieved based on the proposed subdivision plan and separation from identified bushfire hazards (largely associated with Bollard Bulrush Swamp and associated revegetation areas) through the provision of a managed interface within the public open space, location of public roads and front lot setbacks. The managed interface will provide for passive recreation and drainage, as well as the retention of mature trees. This area will be managed to achieve low threat in accordance with Section 2.2.3.2 of AS 3959.
- **Element 3 - Vehicular Access:** appropriate vehicle access can be provided, with the proposed development connecting to the existing public road network including existing residential development to the south and east of the site, and Wellard Road immediately west of the site. Wellard Road provides a connection both to the north-west to Bertram Road and to the south-east to Millar Road/Baldivis Road, Baldivis Road provides connection to Kulija Way and then the Kwinana Freeway, a major regional north and south connector.
- **Element 4 - Water:** the development will be connected to a permanent and reticulated water supply to support onsite firefighting requirements. It will be compliant with Water Corporation (2018) *Design Standard (DS) 63 Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250*.

The management/mitigation measures to be implemented through the proposed subdivision of the site, as discussed in this BMP, demonstrate that the acceptable solutions and/or intent of each element can be met. Accordingly, having regard to clause 6.11 of SPP 3.7, the precautionary principle has been satisfied. Following certification, the BAL ratings determined within this BMP can be used to support future building approval processes.

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Appendix A

Proposed subdivision plan (CLE Town Planning and Design 2020)

Appendix B

Additional photographs

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List of Abbreviations

Table A1: Abbreviations – General terms

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

Table A2: Abbreviations – Organisations

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

Table A3: Abbreviations – Legislation and policies

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

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Table A4: Abbreviations – Planning and building terms

Planning and building terms	
AS 3959	<i>Australian Standard 3959-2018 Construction of buildings in bushfire prone areas</i>
LPS	Town Planning Scheme
MRS	Metropolitan Region Scheme
POS	Public open space

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1 Introduction

1.1 Background

Wellard Residential Pty Ltd (the proponent) is progressing a revised subdivision application for a portion of Lot 9000 to Lot 9003 and a portion of Lot 9027, Wellard (herein referred to as the 'site'). The site is proposed to be developed for residential purposes and will form part of the broader Providence Estate residential development as shown in the attached subdivision plan in **Appendix A**. The site is shown in **Figure 1** and consists of an area of approximately 10 ha in size and is located 46 km south of the Perth central business district, within the City of Kwinana. It is bounded by Wellard Road to the west, Bollard Bulrush Swamp to the north and existing urban development to the east and south (including areas of bare mineral earth where urban development is currently progressing).

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 an area within a declared bushfire prone area necessitates a further assessment of the bushfire risk and suitability of the proposed development to be undertaken in accordance with *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) (WAPC 2015) and the *Guidelines for Planning in Bushfire Prone Areas Version 1.3* (the Guidelines) (WAPC and DFES 2017).

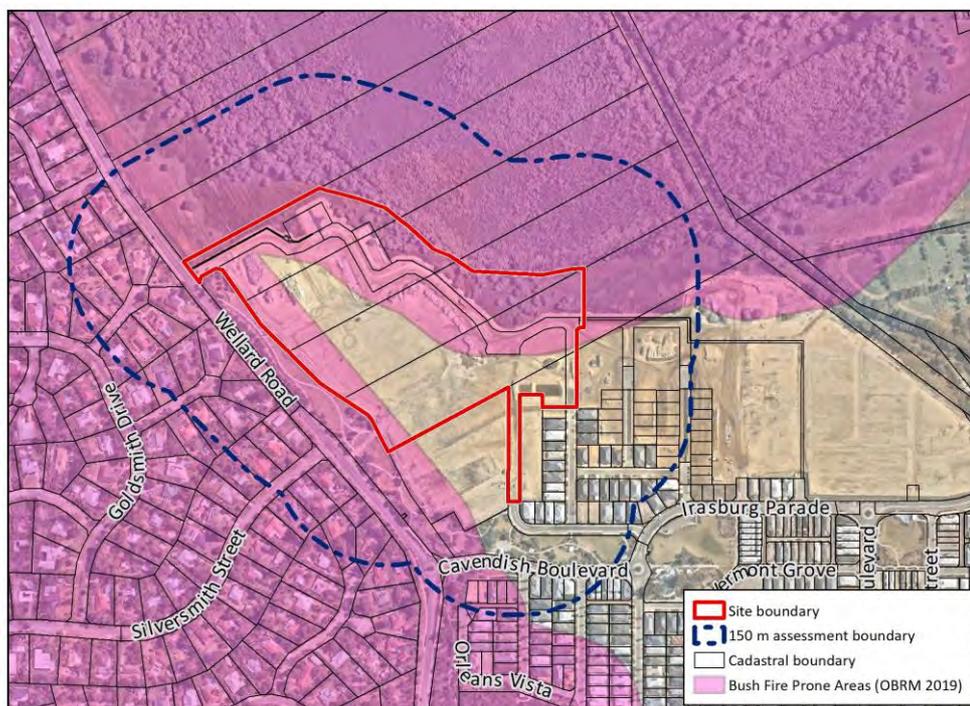


Plate 1: Areas within and surrounding the site identified as 'bushfire prone areas' (as indicated in purple) under the state-wide Map of Bush Fire Prone Areas (OBRM 2019).

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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 proposed subdivision of the site and addresses the requirements of SPP 3.7 (WAPC 2015), the Guidelines (WAPC and DFES 2017) 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 residential 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 future development can achieve the bushfire protection criteria outlined within the Guidelines (**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:

- *Fire and Emergency Services Act 1998*
- *Bush Fires Act 1954*
- *Planning and Development Act 2005* and associated regulations
- *Building Act 2011* and associated regulations
- *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (WAPC 2015)
- *Guidelines for Planning in Bushfire Prone Areas version 1.3* (WAPC and DFES 2017)
- *Australian Standard AS 3959 – 2018 Construction of buildings in bushfire prone areas* (Standards Australia 2018).

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1.4 Description of the proposed development

The site is proposed to be subdivided in accordance with the plan provided in **Appendix A**. The subdivision is proposed to include:

- 88 single residential lots, ranging in size from 380 m² to 627 m².
- An area of public open space (POS) within the northern portion of the site, which is approximately 2.5 ha in size. The POS area will include:
 - The wetland core, associated with Bollard Bulrush Swamp. This area contains remnant vegetation that is being retained and enhanced.
 - A wetland buffer, also associated with Bollard Bulrush Swamp, which is proposed to be revegetated to the same vegetation classification as the wetland core.
 - A managed interface which will provide for the retention of mature trees, passive recreation and drainage.
- An interconnected public road network.

The majority of the site is zoned 'Urban' under the Metropolitan Region Scheme (MRS), with a small portion reserved 'Parks and Recreation', as shown in **Plate 2**. The entire site is zoned 'Development' under the City of Kwinana Town Planning Scheme No. 2 (TPS 2).

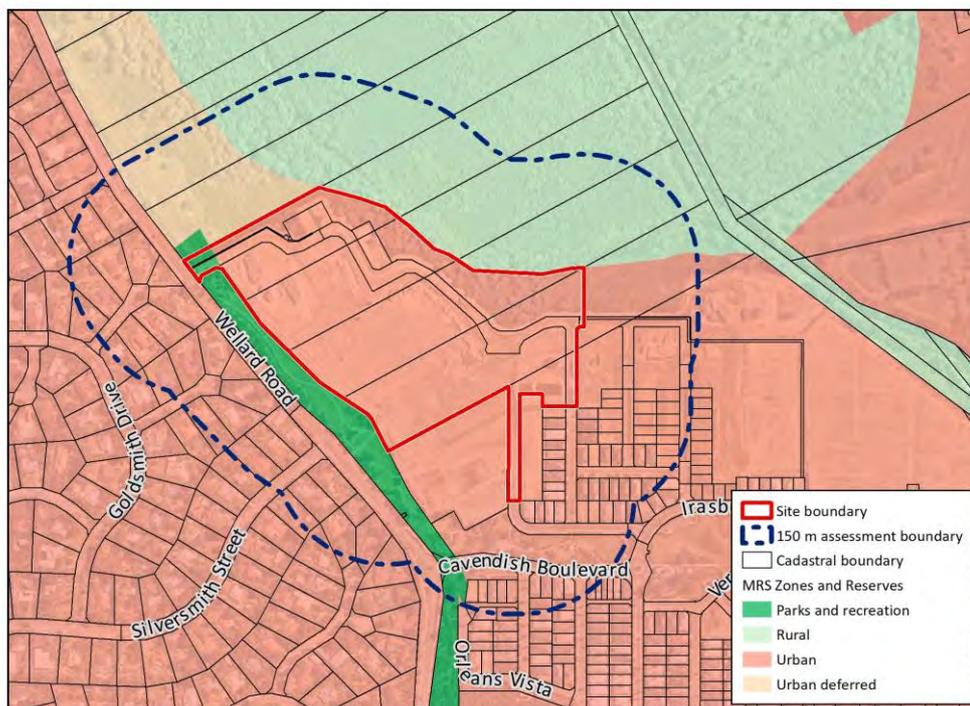


Plate 2: Existing MRS zoning for the site and surrounds.

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1.5 Description of land characteristics

The publicly available topographical contours indicate that the site has an elevation of approximately 5 m Australian Height Datum (m AHD) along the western and southern boundaries of the site decreasing to 4 m AHD in the north-western portion of the site, as shown in **Figure 1**. The natural topographic contours across the site have been altered through urban development progressing in this area (i.e. sand fill being brought in), therefore the topographic contours for areas with sand fill may vary compared to that shown in **Figure 1**.

The entire site was cleared of remnant vegetation prior to 1953 (based on available historic aerial photography). Scattered vegetation (predominantly associated with the wetland area) has regrown in the intervening time, with the areas subject to residential development remaining largely cleared of vegetation. The southern portion of the site is currently composed of bare mineral earth (associated with historic sand filling activities for residential development), with the northern portion (associated with Bollard Bulrush Swamp) composed of regrown vegetation.

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

- Bollard Bulrush Swamp immediately north of the site and existing residential development further north.
- Public open space (POS) and Wellard Road immediately west of the site, with existing rural-residential development further to the west.
- Existing residential development associated with Providence Estate to the south-east/east, including areas of bare mineral earth where development is currently progressing.

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2 Environmental Considerations

In accordance with the Department of Planning, Lands and Heritage (2018) *Bushfire Management Plan – BAL Contour* template, 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. The following previous site-specific environmental investigations were used to understand values that may be present within the site and nearby and include:

- *Environmental Assessment to Support MRS Rezoning to ‘Special Residential’ and ‘Residential’* (ENV Australia 2009)
- *Southern Bollard Bulrush Swamp Wetland Management Plan* (PGV Environmental 2014)

A conservation category wetland (CCW) (Unique Feature Identifier (UFI): 15866) exists immediately north of the site and is associated with the Bollard Bulrush Swamp. Through the approved local structure plan (CLE 2012), an area designated ‘wetland core’ has been identified to support the long-term protection and retention of the wetland values associated with Bollard Bullrush Swamp. The local structure plan also identified a ‘wetland buffer’, to be located between the wetland core and areas associated with urban development (including a managed public open space interface). The wetland buffer is proposed to be revegetated.

The entire site has previously been cleared of native vegetation (based on available historical aerial imagery) prior to 1953. Scattered vegetation has regrown over the years, with fill brought into the site intermittently since 2014, resulting in vegetation only remaining along the northern boundary of the site. This area contains environmental values associated with Bollard Bulrush Swamp and as outlined have been identified for retention and protection.

The environmental values identified within and surrounding the site have been summarised in **Table 1**.

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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)

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 (Swan Coastal Plain (DBCA-019))	Yes	A CCW wetland (UFI: 15866), associated with Bollard Bulrush Swamp, is located immediately north of the site. As part of the approved local structure plan (CLE 2012), a 30 m buffer from the boundary of the CCW has been applied and is incorporated within the POS in the northern portion of the site. The entire site is also mapped as a multiple use wetland (UFI: 13327). This wetland feature does not need to be retained, and no buffer or revegetation is required.
RAMSAR wetlands (DBCA-010)	No	Not applicable. No RAMSAR sites are located within or nearby to the site.
Waterways (DWER-031)	No	No waterways exist within the site. The Peel Main Drain is located to 270 m to the north-east of the site and runs in a north-south direction through the middle of the Bollard Bulrush Swamp.
Threatened and priority flora (ENV Australia 2009, PGV Environmental 2014).	No	No threatened or priority flora were identified within the site as part of the previous surveys (ENV Australia 2009, PGV Environmental 2014).
Threatened and priority fauna (ENV Australia 2009, PGV Environmental 2014).	Potentially	A majority of the site itself does not contain suitable habitat for conservation significant fauna species due to no vegetation being present. Remnant vegetation associated with the Bollard Bulrush Swamp is likely to contain habitat for fauna species such as the quenda (ENV Australia 2009, PGV Environmental 2014).
Threatened ecological communities (TEC) (ENV Australia 2009, PGV Environmental 2014).	No	Not applicable. The site has been historically cleared of a majority of remnant vegetation. No TECs were identified within the site as part of previous surveys (ENV Australia 2009, PGV Environmental 2014).
Department of Biodiversity Conservation and Attractions (DBCA) controlled lands or waters (DBCA-011)	No	Not applicable. No DBCA controlled lands or water exist within the site. The Leda Nature Reserve, which is a DBCA managed land, is located approximately 750 m to the south of the site.
Clearing regulations – Environmentally Sensitive Areas (DWER-046)	Yes	An environmentally sensitive area (ESA) extends into the northern portion of the site and is associated with a 50 m buffer applied to the CCW (Bollard Bulrush Swamp). The presence of an ESA will only be a relevant consideration where clearing of native vegetation not subject to a Schedule 6 exemption (of the <i>Environmental Protection Act 1986</i>) is proposed.
Conservation Covenants Western Australia (DPIRD-023)	No	Not applicable.
Aboriginal heritage (DAA-001)	No	Not applicable. No aboriginal heritage places are identified within the site. A 'Registered Aboriginal Site', Site 3568 Camp is located approximately 1 km to the south-east of the site.
Non-indigenous heritage (SHO-003)	No	Not applicable. No non-indigenous heritage sites were identified within or nearby to the site based on the available mapping.

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2.1 Native vegetation – modification and clearing

While a portion of the site is identified as an ESA, this will only be a relevant consideration where clearing of native vegetation is not subject to a Schedule 6 exemption (of the *Environmental Protection Act 1986*) is proposed. Exemptions under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* are not applicable within an ESA.

Native vegetation present within the site is located along the northern boundary, and has been subject to previous historical disturbance. A majority of the native vegetation will be retained, with portions of the existing vegetation proposed to be subject to revegetation as part of developing the public open space. A portion of the existing native vegetation may be modified as part of implementing the managed interface (i.e. asset protection zone) between the areas of retained vegetation and the proposed lots.

The remainder of vegetation located within the ESA is composed of paddock grasses and management of these areas would not be impacted by the presence of the ESA given this vegetation is not considered to be 'native vegetation'.

2.2 Revegetation and landscape plans

In accordance with the local structure plan (CLE 2012), the wetland core and wetland buffer (shown in **Figure 1**) will be retained and revegetated with local native species (and will include under storey, mid-storey and upper storey species) to protect the integrity of the wetland's flora, fauna and hydrological functions. Accordingly, for the purposes of this BMP, the wetland core and wetland buffer is considered a bushfire hazard and a relevant consideration for the assessment of bushfire risk.

The remainder of existing vegetation within the POS (immediately adjacent to the proposed lots) is proposed to be modified and then landscaped to provide a managed interface and support recreation and drainage management. This area will contain retained mature overstorey vegetation, but will provide a high level of amenity for use by the community.

The managed interface and the road reserves are proposed to be landscaped as part of future development, with the detailed landscape design to be finalised as part of subdivision implementation. These areas will be designed to achieve low threat vegetation in accordance with Section 2.2.3.2 of AS 3959. The management of these areas will be the responsibility of the proponent initially prior to handover to the City of Kwinana, with ongoing management currently proposed to include:

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

3 Bushfire Assessment Results

Bushfire risk for the site has been appropriately considered in the specific context of the Guidelines (WAPC and DFES 2017) and AS 3959. The Guidelines require the identification of the bushfire risk (using AS 3959) out to 150 m from the development site, but for determining the likely bushfire impacts upon a building, a distance of 100 m is used. The objective of AS 3959 is to reduce the risk of ignition and loss of a building to bushfire. It provides a consistent method for determining a radiant heat level (radiant heat flux) as a primary consideration of bushfire attack on a building or object. It also prescribes simple national construction responses that can resist the determined radiant heat level at a given distance from the fire and are based on six Bushfire Attack Level (BAL) ratings: BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ.

The construction requirements detailed in AS 3959 that may be indicated as part of the BAL assessment will only apply to new Class 1, 2, 3 and 10a buildings to be constructed as part of the development of the site and that are designated as bushfire prone within the state-wide Map of Bush Fire Prone Areas (as updated).

Two separate methods are outlined in AS 3959 for determining the impact of bushfire on dwellings and have been outlined below:

- **Method 1**, outlined in Section 2 and Appendix A of AS 3959, provides a basic assessment of radiant heat flux levels at various distances from classified vegetation (up to 100 m). This method assumes standard fuel loads for classified vegetation as outlined in AS 3959 and considers the effective slope beneath vegetation. This method can be used to determine appropriate setbacks to dwellings to achieve different levels of radiant heat exposure (i.e. BAL-12.5 to BAL-FZ).
- **Method 2**, outlined in Appendix B of AS 3959, provides access to the formula used to derive the Method 1 values. Where justified it enables the inputs used in Method 1 to be varied, to reflect true site conditions to provide a site-specific assessment of the radiant heat level at any given distance from the fire.

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

- a) Vegetation of any type that is more than 100 m from the site.
- b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified.
- c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other, or of other areas of vegetation being classified.
- d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified.
- e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

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- 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.

3.1 Bushfire attack level (BAL) assessment

In accordance with Appendix Five of the Guidelines, a method 1 BAL assessment has been undertaken to support the proposed subdivision within the site in order to determine the BAL ratings potentially applicable to the habitable buildings based on the vegetation classification and effective slope, and to prepare the associated BAL contour plan.

3.1.1 Assessment inputs

Assessing bushfire hazards takes into account the classes of vegetation within the site and surrounding area for a minimum of 100 m, in accordance with 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 and associated bushfire hazard levels.

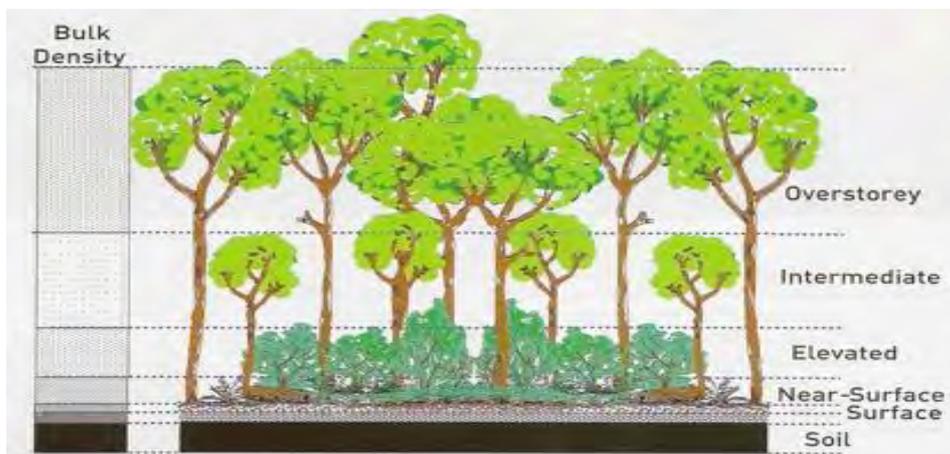


Plate 3: The five fuel layers in a forest environment that could be associated with fire behaviour (Gould et al. 2007)

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An assessment of existing vegetation within the site and surrounding 150 m as well as the effective slope was undertaken on 31st July 2020 in accordance with AS 3959 and the Guidelines.

Table 2 below outlines:

- The pre-development AS 3959 vegetation classifications (and associated photo locations), which are also shown in **Figure 2**. Additional photos not shown in **Table 2** are provided in **Appendix B**.
- The post-development AS 3959 vegetation classifications, which are also shown in **Figure 3**.
- The effective slope for each area of classified vegetation present in the post-development scenario, which is also shown in **Figure 4**.

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Table 2: Vegetation classification, effective slope and future management

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
1	<p>Forest vegetation has been identified within the northern portion of the site. This is associated with the southern edge of vegetation associated with the Bollard Bulrush Swamp, located immediately north of the site. The vegetation is associated with stands of <i>Melaleuca raphiophylla</i>.</p> <p>This area of vegetation is not managed and is generally associated overstorey fuels over sedges (or similar), however due to the presence of ‘paperbark’ with the trees, has been considered to have elevated and overstorey fuel layers.</p> <p>AS 3959 classification (Figure 2): Forest (Class A)</p> <p>Photo points: 7, 8, 9, 11</p>	 <p><i>Photo location 7: forest vegetation extending into the northern portion of the site, looking north-east.</i></p>  <p><i>Photo location 9: forest vegetation associated with Bollard Bulrush Swamp, looking north-east.</i></p>	 <p><i>Photo location 8: vegetation associated with Bollard Bulrush Swamp extending into the site, looking north-east.</i></p>  <p><i>Photo location 11: forest vegetation within the northern portion of the site, looking north.</i></p>	<p>9</p> <p>Portions of the forest vegetation will be modified to achieve low threat vegetation as part of the implementation and maintenance of the managed interface. This area will provide for an asset protection zone, enabling appropriate separation from the area of retained vegetation and the proposed development so BAL-29 or less is achieved at future habitable buildings. The area will be utilised by the public and provide for recreation and drainage.</p> <p>AS 3959 classification (Figure 3): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Effective slope (Figure 4): Not applicable</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
1	Continued from above.	Continued from above.	10	<p>As part of the proposed development, portions of the existing forest vegetation within the northern portion of the site will be retained and enhanced. This area of vegetation will be protected and no fuel management of this area is proposed.</p> <p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Effective slope (Figure 4): Flat/upslope</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
2	<p>A large area of forest vegetation has been identified immediately north of the site associated with the Bollard Bulrush Swamp. The vegetation within the wetland area is largely composed of species such as <i>Melaleuca raphiophylla</i> and <i>Eucalyptus rudis</i>.</p> <p>This area of vegetation is not managed and is associated with multiple fuel layers, including near-surface, understorey, elevated and overstorey.</p> <p>AS 3959 classification (Figure 2): Forest (Class A)</p> <p>Photo points: 2, 12, 36</p>	 <p>Photo location 2: forest vegetation (Plot 2) in the background of the photo, looking north.</p>  <p>Photo location 36: forest vegetation (in the background) outside the site, looking north.</p>	2	<p>It is assumed that the areas of forest vegetation outside the site will remain in the same condition as the pre-development assessment and no fuel management of these areas has been assumed. Therefore, these areas will remain a bushfire hazard to future development within the site.</p> <p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Effective slope (Figure 4): Flat/upslope</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
3, 4	<p>A small area of shrubland vegetation has been identified within the northern portion of the site (Plot 3), and immediately east of the site (Plot 4).</p> <p>Both areas of vegetation are associated with stands of vegetation such as typha, cotton bush and castor oil plant. Due to the height and structure of this vegetation (generally below 2 m), it has been assessed as 'shrubland'.</p> <p>AS 3959 classification (Figure 2): Shrubland (Class C)</p> <p>Photo points: 1, 3, 5, 6</p>	 <p><i>Photo location 1: shrubland vegetation located to the east of the site, looking north.</i></p>  <p><i>Photo location 5: shrubland vegetation located within the northern portion of the site, looking north-west.</i></p>	 <p><i>Photo location 3: shrubland vegetation to the east of the site, looking north.</i></p>  <p><i>Photo location 6: stands of typha located within the northern portion of the site, looking east.</i></p>	<p>4</p> <p>The majority of shrubland vegetation to the east of the site (Plot 4) forms part of future development stages for Providence Estate. This area will be redeveloped in the future and form part of a future managed interface, however, the timing for development is currently not known. On this basis, this area has been assumed to remain in its current condition and has been assessed as a temporary bushfire hazard.</p> <p>AS 3959 classification (Figure 3): Shrubland (Class C)</p> <p>Effective slope (Figure 4): Flat/upslope</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
3, 4	Continued from above.	Continued from above.	9	<p>The area of shrubland located within the site (Plot 3) will be modified to achieve low threat vegetation as part of the implementation and maintenance of the POS and the managed interface. This area will provide for an asset protection zone, enabling appropriate separation from the area of retained vegetation and the proposed development so BAL-29 or less is achieved at future habitable buildings. The area will be utilised by the public and provide for recreation and drainage.</p> <p>AS 3959 classification (Figure 3): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Effective slope (Figure 4): Not applicable</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
3, 4	Continued from above.	Continued from above.	10	<p>Portions of the existing shrubland vegetation adjacent to the northern boundary of the site and a small area to the east of the site will be revegetated in support of the wetland buffer. To provide a conservative assessment this BMP has assumed the wetland buffer will be forest in the post-development scenario.</p> <p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Effective slope (Figure 4): Flat/upslope</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
5, 6	<p>Grassland vegetation has been identified within private landholdings to the east and north-west of the site (Plot 6) and along the northern and north-western boundaries of the site (Plot 5).</p> <p>AS 3959 classification (Figure 2): Grassland (Class G)</p> <p>Photo points: 4, 10, 13, 15, 16, 17</p>	 <p><i>Photo location 4: patches of grassland vegetation within the northern portion of the site, looking north.</i></p>  <p><i>Photo location 10: grassland vegetation in the foreground, looking north-east.</i></p>  <p><i>Photo location 13: grassland vegetation to the north of the site, looking west.</i></p>  <p><i>Photo location 15: grassland vegetation to the north-west of the site, looking north-west.</i></p>	6	<p>The majority of grassland vegetation outside the site has been assumed to remain in the same condition as the pre-development assessment and therefore has been assessed as a bushfire hazard.</p> <p>It is relevant to note, the area of grassland vegetation to the east of the site will be removed as part of future development, however, the timing for development is currently not known it has been identified as a temporary bushfire hazard.</p> <p>AS 3959 classification (Figure 3): Grassland (Class G)</p> <p>Effective slope (Figure 4): Flat/upslope</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
5, 6	Continued from above.	 <p><i>Photo location 16: grassland vegetation within neighbouring landholdings to the north, looking north-west.</i></p>  <p><i>Photo location 17: grassland vegetation (in the foreground) to the north of the site, looking east.</i></p>	9	<p>A portion of the grassland vegetation (associated with Plot 5) will be modified to achieve low threat vegetation as part of the implementation and maintenance of the POS and managed interface. This area will provide for an asset protection zone enabling appropriate separation to achieve BAL-29 or less at future habitable buildings. The area will be utilised by the public and provide for recreation and drainage.</p> <p>AS 3959 classification (Figure 3): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Effective slope (Figure 4): Not applicable</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
5, 6	Continued from above.		10	<p>Portions of the existing grassland vegetation adjacent to the northern boundary of the site (associated with Plot 5) and a small area immediately east of the site will be revegetated in support of the wetland buffer. To provide a conservative assessment this BMP has assumed the wetland buffer will be forest in the post-development scenario.</p> <p>AS 3959 classification (Figure 3): Forest (Class A)</p> <p>Effective slope (Figure 4): Flat/upslope</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)		
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions	
7	<p>Three small areas of vegetation exist within separate drainage reserves to the west of Wellard Road. Vegetation within the reserves is composed of a mix of scrub and grassland. Each drainage reserve is less than 0.25 ha in size and is located more than 20 m from each other, the site and other areas of classified vegetation, and therefore have been excluded in accordance with Clause 2.2.3.2 (c) of AS 3959.</p> <p>AS 3959 classification (Figure 2): Multiple areas of vegetation <0.25 ha in size and >20 m of the site, each other, or other areas of classified vegetation (exclusion clause 2.2.3.2 (c)).</p> <p>Photo points: 18, 19, 22, 25</p>	 <p><i>Photo location 18: unmanaged vegetation within the northern drainage reserve, looking south-west.</i></p>  <p><i>Photo location 22: unmanaged vegetation within one of the drainage reserves, looking west.</i></p>	 <p><i>Photo location 19: vegetation within the drainage reserve to the west of the site, looking west.</i></p>  <p><i>Photo location 25: vegetation within the southern drainage reserve, looking west.</i></p>	7	<p>The vegetation within the drainage reserves is expected to remain in the same condition as the pre-development assessment. Based on the current surrounding land management practices (in accordance with the City of Kwinana firebreak notice) and distance to nearby classified vegetation, the drainage reserves can continue to be excluded in accordance with Clause 2.2.3.2 (c) of AS 3959.</p> <p>AS 3959 classification (Figure 3): Multiple areas of vegetation <0.25 ha in size and >20 m of the site, each other, or other areas of classified vegetation (exclusion clause 2.2.3.2 (c)).</p> <p>Effective slope (Figure 4): Not applicable</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
8	<p>Non-vegetated areas such as roads, driveways, existing residential building/structures 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 2): Non-vegetated (exclusion clause 2.2.3.2(e))</p> <p>Photo points: 14, 24, 27, 28, 29, 32, 34, 35</p>	 <p>Photo location 24: Silversmith Street located outside the site, looking south-west.</p>  <p>Photo location 32: non-vegetated areas within the POS adjacent to the south-western boundary of the site, looking west.</p>	 <p>Photo location 28: areas of bare mineral earth located within the southern portion of the site, looking south-east.</p>  <p>Photo location 34: existing residential buildings and roads east of the site, looking south.</p>	<p>8</p> <p>The existing maintenance regimes for all existing non-vegetated areas surrounding the site are assumed to continue in the long-term based on current land uses and management arrangements and/or fire break notice requirements.</p> <p>The non-vegetated areas within the site are expected to remain non-vegetated when converted to hardstand areas in the form of buildings, driveways and roads. It is noted that some of these areas may contain managed grass, garden areas or verges in the future (as development is completed), however, for the ease of reference have been excluded as non-vegetated on the basis that these will form part of developed lots.</p> <p>AS 3959 classification (Figure 3): Non-vegetated (exclusion clause 2.2.3.2(e))</p> <p>Effective slope (Figure 4): Not applicable</p>

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

Pre-development (see Figure 2)			Post development (see Figure 3 and Figure 4)	
Plot no.	AS 3959 classification	Site photo/s (location points shown in Figure 2)	Plot no.	AS 3959 classification, effective slope and assumptions
9	<p>Within the site and surrounds, areas of low threat vegetation have been identified and are largely associated with a large strip of POS adjacent to the site, managed lots and existing managed road verges.</p> <p>The road verges appear to be well managed and include regular weeding/removal of dead material, application of mulch and/or mowing of the grass.</p> <p>AS 3959 classification (Figure 2): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Photo points: 20, 21, 23, 26, 30, 31, 33</p>	 <p><i>Photo location 20: low threat vegetation within Wellard Road reserve, looking south-east.</i></p>  <p><i>Photo location 30: managed garden beds associated with the Providence Estate entry statement, looking east.</i></p>	 <p><i>Photo location 23: managed POS adjacent to the western boundary of the site, looking north-west.</i></p>  <p><i>Photo location 33: low threat vegetation within POS outside the site, looking south.</i></p>	<p>9</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 City of Kwinana, the fire break notice and community expectations for urban areas.</p> <p>AS 3959 classification (Figure 3): Low threat vegetation (exclusion clause 2.2.3.2(f))</p> <p>Effective slope (Figure 4): Not applicable</p>

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3.1.1.1 Post development assumptions

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

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

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

- In accordance with the local structure plan (CLE 2012), the existing vegetation associated with the wetland core and wetland buffer (for Bollard Bulrush Swamp) will be retained and revegetated with local native species. Accordingly, for the purposes of this BMP it has been assumed that no management of fuel loads will occur and this area will achieve a 'forest' classification, as shown on **Figure 3**.
- The managed interface within the POS will be designed and landscaped to achieve low threat in accordance with Section 2.2.3.2 of AS 3959. This will include (but is not limited to):
 - Modification of existing vegetation to achieve low threat, which will include pruning and where required thinning/removal (i.e. particularly for the grassland areas).
 - Ongoing maintenance including:
 - Regular mowing/slashing of grass to less than 100 mm in height.
 - Irrigation of grass and garden beds.
 - Regular maintenance including removal of weeds and dead material.
 - Application of ground covers such as mulch or non-flammable materials.
- Areas of low threat vegetation outside of the site will continue to be managed and/or considered to achieve low threat (in accordance with Section 2.2.3.2 of AS 3959) based on the existing maintenance regimes, and/or as per the City of Kwinana's firebreak notice.
- Classified vegetation that has been identified outside of the site has been assumed to remain in its current state (unless stated otherwise), and will, therefore, remain a bushfire hazard to development within the site for the foreseeable future.

3.1.2 Assessment outputs

The BAL assessment completed for the site indicates that a BAL rating of BAL-29 or less can be achieved at future habitable buildings based on the indicated spatial layout for the subdivision (**Appendix A**). A number of lots within the northern portion of the site will be subject to a BAL rating of BAL-40, however front lot setbacks can be accommodated within these lots to ensure built form will not be exposed to a BAL rating exceeding BAL-29. The majority of the lots within the site will achieve a BAL rating of BAL-12.5 and BAL-LOW based on the separation provided through the managed interface within the POS, as well as the proposed road reserves.

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Table 3 provides a summary of the setback distances necessary from classified vegetation to achieve the indicated BAL ratings, with the BAL Contour Plan (**Figure 5**) being a visual representation of these distances. The setback distances are based on the post-development classified vegetation (**Figure 3**), effective slope (**Figure 4**) and are taken from Table 2.5 of AS 3959.

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

Post development plot number (see Figure 3)	Vegetation classification (see Figure 3)	Effective slope (see Figure 4)	Distance to vegetation (from Table 2.5 of AS 3959)	BAL rating (see Figure 5)
Plot 2 and 10	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 4	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 6	Grassland (Class G)	Flat/upslope	< 6 m	BAL-FZ
			6 - < 8 m	BAL-40
			8 - < 12 m	BAL-29
			12 - < 17 m	BAL-19
			17 - < 50 m	BAL-12.5
			> 50 m	BAL-LOW

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4 Identification of Bushfire Hazard Issues

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

- Provision of appropriate separation distance from permanent bushfire hazards within or surrounding the site (i.e. the areas of vegetation proposed to be retained and revegetated within the POS and areas of classified vegetation to the north, east and west of the site) to ensure a BAL rating of BAL-29 or less can be achieved at new buildings.
- Ensuring that the managed interface within the POS is appropriately designed and implemented to achieve low threat standards in accordance with AS 3959, to support the use of this area as part of an asset protection zone.
- Provision of appropriate vehicular access to ensure that when development within the site is fully constructed, egress to at least two different destinations will be available to future residents and emergency personnel. This will be particularly relevant if development is staged.
- Provision of appropriate water supply and associated infrastructure.

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

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5 Assessment Against the Bushfire Protection Criteria

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

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

As part of future development, the intent of the bushfire protection criteria can be satisfied through an acceptable solution. A summary of how this can be achieved and an associated compliance statement for each has been provided in **Table 4**.

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Table 4: Summary of bushfire protection criteria and compliance statement

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 1: Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.	A1.1 Development location		<p>It is possible for all future habitable buildings to be located in an area of developable land¹ subject to a low or moderate bushfire hazard, given buildings can be located within areas identified as a low threat in accordance with Clause 2.2.3.2(e) of AS 3959. Appendix Two of the Guidelines (WAPC and DFES 2017) states that non-vegetated or low threat areas will be considered a 'low' hazard, except where within 100 m of a moderate or extreme hazard (associated with areas of classified vegetation), and in that case would be subject to a 'moderate' hazard.</p> <p>Sufficient separation is provided to enable each proposed lot to achieve a BAL rating of BAL-29 or less. This is discussed further below.</p>	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 1: Location. Suitable developable land is available to accommodate habitable buildings that achieve BAL-29 or less.
		Yes.	N/A		

¹ Position Statement: Planning in bushfire prone areas - Demonstrating Elements 1: Location and Element 2: Siting and design (DPLH 2019) has outlined that 'developable land' is "land that can accommodate a habitable dwelling and would not generally include areas of BAL-40 and/or BAL-FZ, areas within the local government setback and areas subject to environmental constraints".

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

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 2: Siting and design	To ensure the siting and design of development minimises the level of bushfire impact.	A2.1 Asset Protection Zone Yes.	N/A	<p>Asset protection zones (APZ) around buildings are an important bushfire protection measure influencing the safety of people and property. The APZ is a low fuel area immediately surrounding a building, and can include non-flammable features such as irrigated landscapes, gardens, driveways, public roads and managed public open space.</p> <p>The main bushfire hazards for the proposed development is associated with classified vegetation related to Bollard Bulrush Swamp to the north of the site, and areas that form part of the buffer where they are proposed to be revegetated. Other bushfire hazards include temporary shrubland vegetation to the east, and grassland vegetation to the east and west of the site.</p> <p>The outcomes of the BAL assessment (see Figure 5) indicates that all proposed habitable buildings can be located in areas subject to a BAL rating of BAL-29 or less, with the majority of the proposed lots likely to be subject to a BAL rating of BAL-12.5 or BAL-LOW. Three lots within the northern portion of the site will be subject to a BAL rating of BAL-40, however based on a minimum front lot setback of 5 m the habitable buildings will not exceed BAL-29.</p> <p>Appropriate separation can be provided between habitable buildings and areas of bushfire hazard through the provision of an APZ. The APZ, in accordance with the Guidelines, is composed of:</p> <ul style="list-style-type: none"> • Areas of managed POS, in the form of a managed interface between the proposed lots and Bollard Bulrush Swamp (and the associated wetland buffer). This interface is shown in Figure 5, and will support passive recreation, drainage and tree retention. • Managed road reserves, which includes footpaths. <p>Overall, the acceptable solution can be satisfied for all future lots and associated habitable buildings. Class 1, 2, 3 and 10a buildings, where located within a designated bushfire prone area and an area subject to a BAL rating of BAL-12.5 or higher will need to satisfy higher construction standards in accordance with AS 3959.</p>	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 2: Siting and design. The asset protection zone for all lots has been accommodated through the provision of managed POS areas and public road reserves.

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

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement																																																
		Acceptable solution	Performance principle																																																		
Element 3: Vehicular access	To ensure vehicular access serving a subdivision/development is available and safe during a bushfire event.	A3.1 Two access routes		<p>The site provides connections to multiple destinations, namely:</p> <ul style="list-style-type: none"> • A direct connection to Wellard Drive to the west of the site, which then provides egress to the north-west to Bertram Road, and to the south-east to Millar Road/Baldivis Road, Baldivis Road provides connection to Kulija Way and then the Kwinana Freeway, a major regional north and south connector. • Three direct connections to existing residential development to the east and south of the site, providing egress to the broader road network. • An internal interconnected public road network supporting egress, shown in Figure 6. 	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 3: Vehicular access. In particular, the site has an interconnected road network (shown in Figure 6) that connects with the existing public road network. A road interface is provided between proposed lots and the main area of bushfire risk.																																																
		Yes.	N/A																																																		
		A3.2 Public road		<p>Existing roads surrounding the site, in addition to the proposed new public roads within the site, can and will comply with the minimum standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) or as agreed with the City of Kwinana and includes a minimum 6 m-wide trafficable surface. An excerpt of the requirements (from Table 6 of the Guidelines) has been provided below.</p> <p><i>Excerpt of Table 6 from The Guidelines (WAPC & DFES 2017)</i></p> <table border="1"> <thead> <tr> <th>TECHNICAL REQUIREMENTS</th> <th>1 Public road</th> <th>2 Cul-de-sac</th> <th>3 Private driveway</th> <th>4 Emergency access way</th> <th>5 Fire service access routes</th> </tr> </thead> <tbody> <tr> <td>Minimum trafficable surface (m)</td> <td>6*</td> <td>6</td> <td>4</td> <td>6*</td> <td>6*</td> </tr> <tr> <td>Horizontal clearance (m)</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> </tr> <tr> <td>Vertical clearance (m)</td> <td>4.5</td> <td>N/A</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> </tr> <tr> <td>Maximum grade <50 metres</td> <td>1 in 10</td> </tr> <tr> <td>Minimum weight capacity (t)</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> <td>15</td> </tr> <tr> <td>Maximum crossfall</td> <td>1 in 33</td> </tr> <tr> <td>Curves minimum inner radius (m)</td> <td>8.5</td> <td>8.5</td> <td>8.5</td> <td>8.5</td> <td>8.5</td> </tr> </tbody> </table> <p>*Refer to E3.2 Public roads: Trafficable surface</p>	TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway	4 Emergency access way	5 Fire service access routes	Minimum trafficable surface (m)	6*	6	4	6*	6*	Horizontal clearance (m)	6	6	6	6	6	Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5	Maximum grade <50 metres	1 in 10	Minimum weight capacity (t)	15	15	15	15	15	Maximum crossfall	1 in 33	Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5									
TECHNICAL REQUIREMENTS	1 Public road	2 Cul-de-sac	3 Private driveway		4 Emergency access way	5 Fire service access routes																																															
Minimum trafficable surface (m)	6*	6	4	6*	6*																																																
Horizontal clearance (m)	6	6	6	6	6																																																
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5																																																
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10																																																
Minimum weight capacity (t)	15	15	15	15	15																																																
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33																																																
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5																																																
		Yes	N/A																																																		

Bushfire Management Plan

Providence Estate, Wellard



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

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 3: Vehicular access (continued from above)	Continued from above.	A3.3 Cul-de-sac (including dead-end-road)		Not applicable. No permanent cul-de-sacs are proposed as part of the development within the site. If temporary cul-de-sacs are required as part of staged development, these should be provided with appropriate turnaround areas (with a minimum 17.5 m-wide diameter head and trafficable surface (i.e. compacted limestone, gravel or similar)) until the full public road network is constructed as part of future development.	Continued from above.
		Yes (temporary)	N/A		
		A3.4 Battle-axe		Not applicable. No battle-axe properties are proposed as part of the development within the site.	
		N/A	N/A		
		A3.5 Private driveway longer than 50 m		Not applicable. No private driveways longer than 50 m are proposed based on the subdivision plan and the density of the proposed development.	
		N/A	N/A		
		A3.6 Emergency access way		Not applicable. Given the proposed subdivision plan provides for egress to at least two different destinations, emergency access ways are not required as part of the proposed development within the site. If development is staged, a temporary secondary access option to the public road network may be required and can be determined in consultation with the City of Kwinana at the time of development. If required, these should meet the requirements outlined within Appendix Four of the Guidelines.	
		N/A	N/A		
A3.7 Fire service access routes (perimeter roads)		Future development within the site will be provided with appropriate vehicular access, as outlined above, and therefore fire service access routes are not required. The proposed public road network provides a perimeter road between proposed lots and Bollard Bulrush Swamp, the main source of bushfire risk.			
N/A	N/A				

Bushfire Management Plan

Providence Estate, Wellard



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

Bushfire protection criteria	Intent	Method of compliance		Proposed bushfire management strategies	Compliance statement
		Acceptable solution	Performance principle		
Element 3: Vehicular access (continued from above)	Continued from above.	A3.8 Firebreak width		Once development is progressed within the site, in accordance with the City of Kwinana fire break notice (or as specified by the City of Kwinana in accordance with Section 33 of the <i>Bush Fires Act 1954</i>), firebreaks are unlikely to be required within future lots. All private lots will be required to be maintained as low threat and have all 'unmanaged' grass maintained to a height no greater than 50 mm across the lot.	Continued from above.
		Yes	N/A		
Element 4: Water	To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	A4.1 Reticulated areas		Bushfire events in this area are responded to by a network of career Fire and Rescue Service stations and the State Emergency Service (SES). Fire response services require ready access to an adequate water supply during bushfire emergencies. The site will connect with a reticulated water supply and will include fire hydrants installed by the developer to meet the specifications of Water Corporation (<i>Design Standard (DS) 63 Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250</i>) and DFES. Fire hydrants on land zoned for residential purposes are generally required such that the rear of a building is no more than 120 m from a public hydrant.	Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 4: Water given it will be connected to a reticulated water supply and will be provided with hydrants.
		Yes	N/A		
		A4.2 Non-reticulated areas		Not applicable.	
		N/A	N/A		
		A4.3 Individual lots within non-reticulated areas (only for use if creating 1 additional lot and cannot be applied cumulatively)		Not applicable.	
N/A	N/A				

Bushfire Management Plan

Providence Estate, Wellard



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Bushfire Management Plan

Providence Estate, Wellard



5.1 Additional management strategies

5.1.1 Future approval considerations

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

Following the creation of lot titles, a building licence will be required to construct any new habitable building (dwelling). This BMP and the predicted BAL ratings (see **Figure 5**) are expected to inform the construction requirements for future dwellings, with the results of the BAL assessment undertaken to support this BMP to be confirmed/certified to support the building licence process as part of the lot title clearance process.

All future habitable buildings will be located within future lots able to achieve a BAL rating of BAL-29 or less. As no future new habitable buildings are likely to exceed BAL-29, additional planning or development approval will not be required to address bushfire considerations.

5.1.2 Landscape management

5.1.2.1 Within the site

Managed interface in the POS and road reserves

As outlined within **Section 2.2**, a portion of the POS, will be designed, implemented and maintained to achieve low threat vegetation in accordance with Section 2.2.3.2 of AS 3959. This area will form a 'managed interface' between proposed lots and Bollard Bulrush Swamp (and the wetland buffer area) and will be used by the public for recreation purposes. The detailed landscape design for the managed interface will be determined as a condition of subdivision approval. Where required, existing vegetation in this area will be modified, and may include removal and/or pruning. It is expected that some of the overstorey tree species will be retained. Road reserves will be landscaped as a low threat.

The management of the landscaped areas (including the managed interface and road reserves) will be the responsibility of the proponent/landowner initially and following handover, long term the City of Kwinana. Ongoing management of low threat areas will include (but not be limited to):

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

Bushfire Management Plan

Providence Estate, Wellard



Wetland core and wetland buffer within the POS

The existing remnant vegetation associated with the wetland core and wetland buffer areas within the POS will be retained and protected. These areas will be subject to revegetation where required/appropriate. No future fuel load management is required (or assumed) in this area for the purposes of this BMP.

Future lots

All lots will be managed to a low threat standard by the proponent initially, and once sold, will be managed by the applicable landowners in accordance with the City of Kwinana fire control notice (as published).

5.1.2.2 Surrounding the site

Within existing private landholdings

Where indicated as a low threat in **Figure 3**, 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 City of Kwinana fire control notice (as published).

Existing POS and road reserves

The existing POS and public road reserves are assumed to continue to achieve low threat in accordance with Section 2.2.3.2 of AS 3959, in line with existing maintenance regimes, exclusions and/or City of Kwinana requirements for residential areas.

5.1.3 City of Kwinana Fire Break Notice

The City of Kwinana releases a fire break notice annually (or as required) to provide a framework for bushfire management within the City. The City of Kwinana 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 fire break notice, as published, or any directions provided by the City of Kwinana.

In particular, in accordance with the fire break notice, where land is 1,499 m² or less, all long grass, weeds etc. should be slashed, mowed or trimmed down to a height no greater than 50 mm across the entire 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 subdivision. 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).

Bushfire Management Plan

Providence Estate, Wellard



Currently, it is possible for all proposed lots to be located in an area with appropriate vehicle access to support emergency evacuation and BAL-29 or less to be achieved at habitable buildings, enabling the requirements of SPP 3.7 to be satisfied.

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 City of Kwinana provides bushfire safety advice to residents available from their website <https://www.kwinana.wa.gov.au/our-services/emergency-services/bushfires-fire-control/Pages/default.aspx>. 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 businesses by DFES, the Department of Biodiversity Conservation and Attractions (DBCA) and/or the City of Kwinana on any specific recommendations with regard to responding to the bushfire, including evacuation if required. However, it is highly recommended that residents make themselves aware of their responsibilities with regard to preparing for and responding to a potential bushfire that may impact upon them, their property and their visitors at the time, regardless of the BAL rating the building is subject to.

Bushfire Management Plan

Providence Estate, Wellard



6 Responsibilities for Implementation and Management of Bushfire Measures

Table 5 outlines the future responsibilities of the proponent (developer), future landowners and the City of Kwinana associated with implementing this BMP with reference to ongoing bushfire risk mitigation measures for existing land uses (through compliance with the City of Kwinana fire break notice) or future mitigation measures to be accommodated as part of the development process. These responsibilities will need to be considered as part of the subsequent development and implementation process.

Table 5: Responsibilities for the implementation of this BMP

Management action	Timing
Developer	
The managed interface within the POS should be designed, implemented and maintained (for the period agreed with the City of Kwinana, which is likely to be a minimum of two years) to achieve a low threat standard in accordance with Section 2.2.3.2 of AS 3959. This will include modifying existing vegetation through the removal/thinning of vegetation and where appropriate retention of mature trees. Ongoing management is likely to include (but is not limited to): <ul style="list-style-type: none"> • 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 100mm in height. 	As part of subdivision and development, and ongoing as required during the developer maintenance period.
Install the public roads to the standards outlined in Appendix Four of the Guidelines (WAPC and DFES 2017) or as agreed with the City of Kwinana. Public roads should be designed and maintained to achieve low threat in accordance with Section 2.2.3.2 of AS 3959.	To support the creation of lot titles
Reticulated water supply and hydrants to be installed as per standard Water Corporation requirements, unless otherwise agreed.	To support the creation of lot titles.
Certify BAL ratings for the lots designated bushfire prone within the <i>Map of Bush Fire Prone Areas</i> at the time lot titles are created, based on the BAL Contour Plan (Figure 6) and/or in accordance with a revised BAL assessment if the vegetation classifications are different to those identified within this BMP (in particular if vegetation classifications change as a result of the detailed landscape design and assumptions regarding the wetland buffer). It is recommended that BAL certification be carried out for all lots identified in Figure 6 of this BMP as achieving BAL-12.5 or above, even if not in a designated bushfire prone area, but this is at the discretion of the developer. The certified BAL ratings can then be submitted to the City of Kwinana to support future building licenses.	To support the creation of lot titles.
For each new lot created within areas exposed to a BAL rating exceeding BAL-LOW, lodge a Section 165 Notification on the Certificate of Title in order to alert purchasers and successors in title of the existence of the overarching BMP and the requirements associated with meeting AS 3959 construction standards. This should be based on the outcomes of the BAL certification process.	To support the creation of lot titles.
Make a copy of the BMP and BAL certification/assessment available to each lot owner within a designated bushfire prone area.	During the lot sale process, and ongoing as required.

Bushfire Management Plan

Providence Estate, Wellard



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

Management action	Timing
Property owner/occupier	
Where in a designated bushfire prone area, ensuring construction of new dwelling/s complies with AS 3959, as per the applicable BAL rating, determined as part of this BMP (outlined within Section 5 of this BMP) or through a separate BAL assessment. The BAL rating for a new dwelling should not exceed BAL-29.	As part of building design and construction
If dwellings are subject to additional construction in the future, such as renovations, compliance with AS 3959 is required (i.e. where located within a designated bushfire prone area and identified to have a BAL rating greater than BAL-LOW).	As part of building design and construction
Ensuring that their property complies with the City of Kwinana fire break notice/s as published and/or in accordance with directions given by the local government. This includes maintaining the entire lot to a low threat standard until a house is constructed.	Ongoing, as required.
Ensuring fire hydrants are accessible at all times.	Ongoing, as required.
City of Kwinana	
Providing fire prevention and preparedness advice to landowners upon request, including the <i>Homeowners Bush Fire Survival Manual: Prepare, Act, Survive</i> (or similar suitable documentation) and the latest City of Kwinana fire break notice.	Ongoing, as required
Maintain all areas of POS identified as a low threat that is under their management to a low threat standard in accordance with Section 2.2.3.2 of AS 3959, where required/applicable in accordance with approved designs and/or existing maintenance regimes.	Ongoing, as required
Monitoring vegetation fuel loads in public reserves and liaising with relevant stakeholders to maintain fuel loads at minimal fuel levels, where required/applicable.	Ongoing, as required
Maintaining public road reserves under their management to appropriate standards, where required/applicable.	Ongoing, as required
Monitoring compliance with the City of Kwinana fire break notice and enforcing requirements as required.	Ongoing, as required
Water Corporation	
The Water Corporation is responsible for the ongoing maintenance and repair of water hydrants.	Ongoing, as required.

Bushfire Management Plan

Providence Estate, Wellard



7 Applicant Declaration

7.1 Accreditation

This BMP has been prepared by Emerge Associates who have a number of team members who have undertaken BPAD Level 1 and Level 2 training and are in the processing of gaining formal accreditation. Emerge have been providing bushfire risk management advice for more than seven years, undertaking detailed bushfire assessments (and associated approvals) to support the land use development industry.

Anthony Rowe is a Fire Protection Association of Australia (FPAA) Level 3 Bushfire Planning and Design (BPAD) accredited practitioner (BPAD no. 36690) with over nine years' experience and has provided review of this BMP.

7.2 Declaration

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

Signature:

Name: Anthony Rowe

Company: Emerge Associates/ Envision Bushfire Protection

Date: 17/02/2021

BPAD Accreditation: Level 3 BPAD no. 36690

Signature:

Name: Kirsten Knox

Company: Emerge Associates

Date: 17/02/2021

Bushfire Management Plan

Providence Estate, Wellard



8 References

8.1 General references

Department of Fire and Emergency Services (DFES) 2014, *Prepare. Act. Survive.*, Perth. August 2014.

Department of Planning, Lands and Heritage (DPLH) 2019, *Position Statement: Planning in bushfire prone areas - Demonstrating Element 1: Location and Element 2: Siting and design*, Western Australian Planning Commission.

ENV Australia 2009, *Environmental Assessment to Support MRS Rezoning to 'Special Residential' and 'Residential'*.

PGV Environmental 2014, *Southern Bollard Bulrush Swamp Wetland Management Plan*, 4.

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

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

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

8.2 Online references

Landgate 2019, Locate V5, viewed August 2020, <<https://maps.slip.wa.gov.au/landgate/locate/>>

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

Bushfire Management Plan

Providence Estate, Wellard



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Figures



Figure 1: Site Plan and Topographic Contours

Figure 2: Existing Site Conditions – AS 3959 Vegetation Classifications

Figure 3: Post Development Conditions-AS 3959 Vegetation Classifications

Figure 4: Post Development Conditions – Effective Slope

Figure 5: Bushfire Attack Level Contours

Figure 6: Vehicle Access Plan

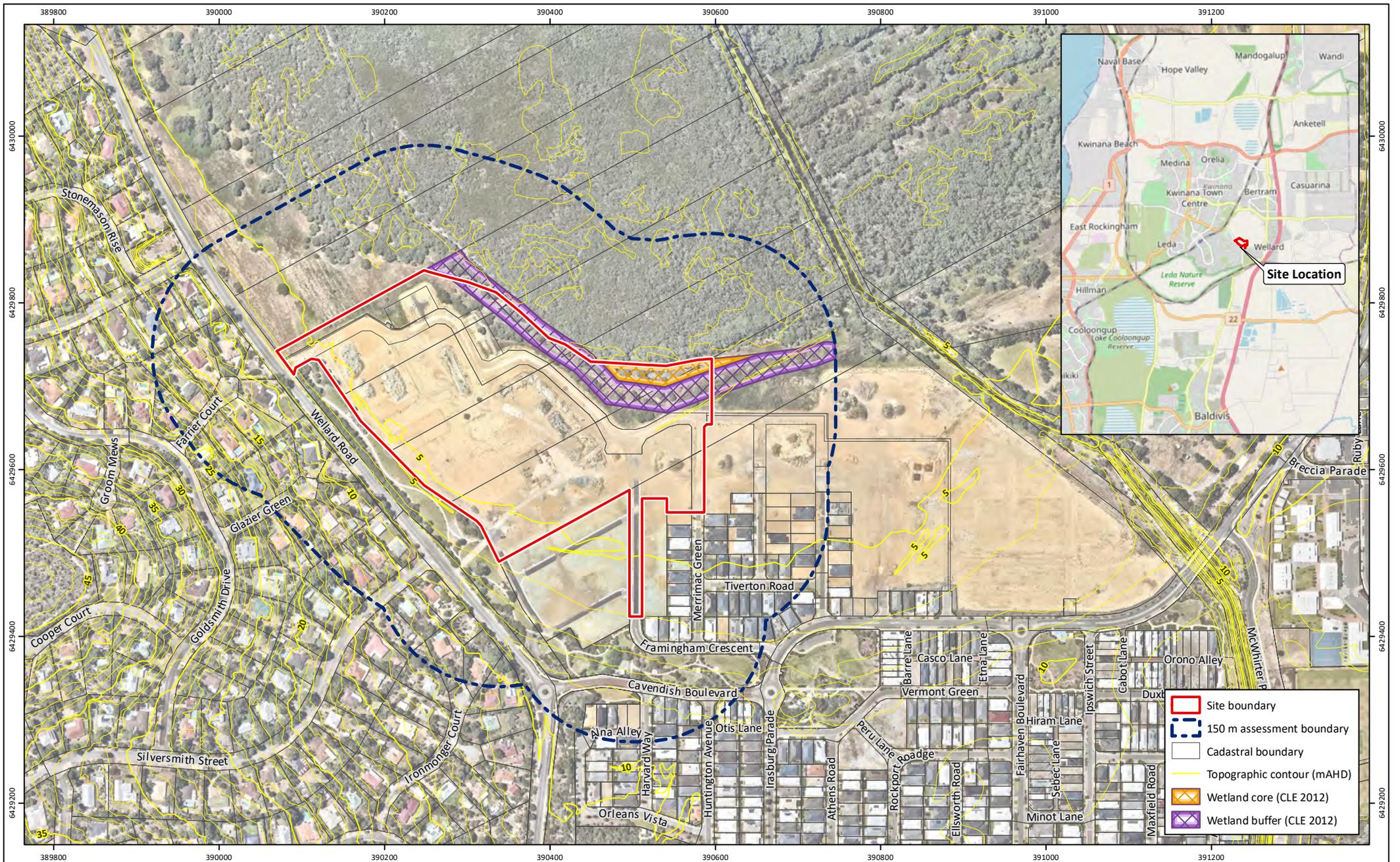


Figure 1: Site Plan and Topographic Contours

Project: Bushfire Management Plan
Providence Estate, Wellard
Client: Wellard Residential Pty Ltd

Plan Number:
EP13-011(14)-F94a
Drawn: AFF
Date: 11/02/2021
Checked: HPB
Approved: KK
Date: 12/02/2021



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Metres
Scale: 1:6,000@A4
GDA 1994 MGA Zone 50



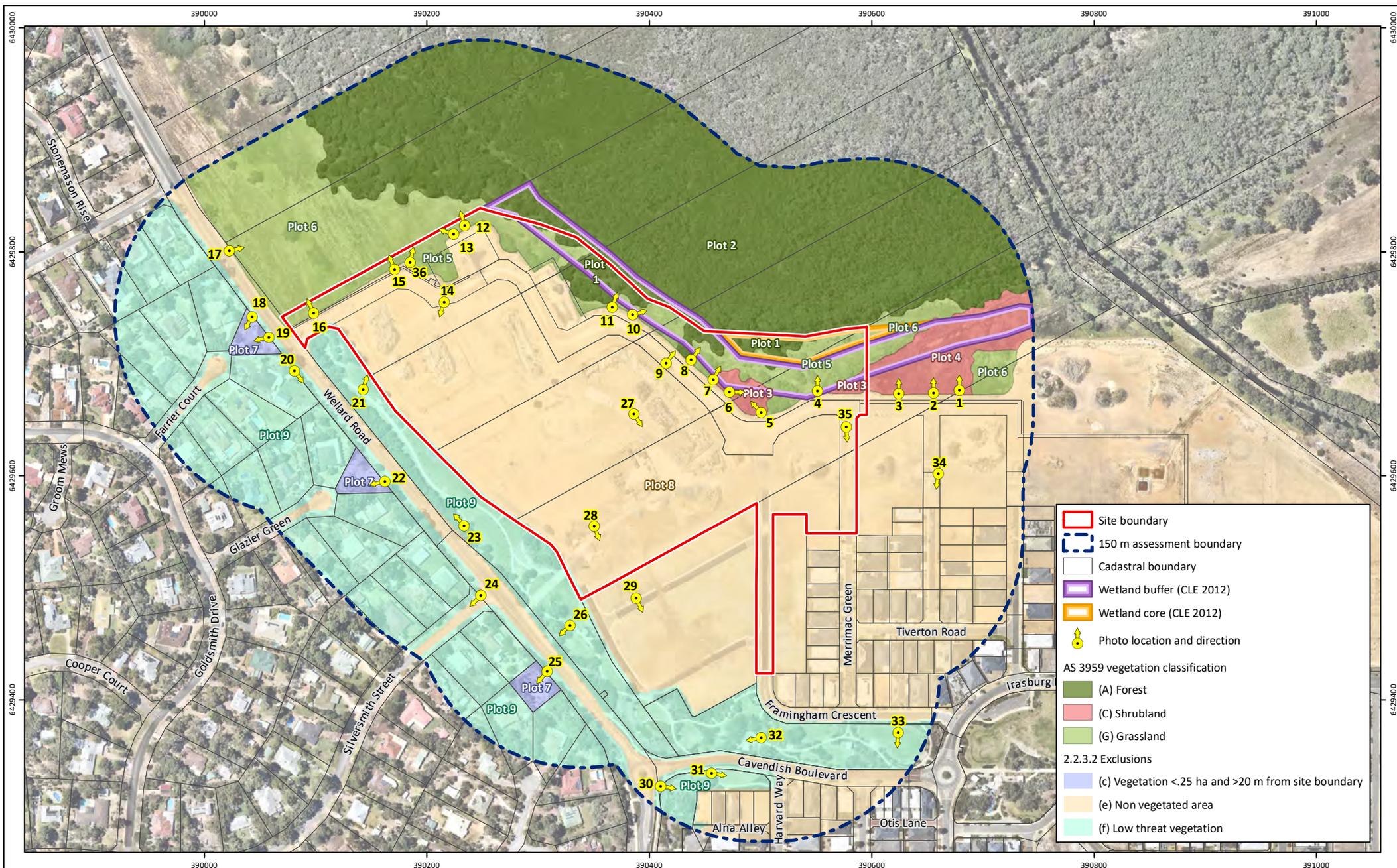


Figure 2: Existing Site Conditions - AS 3959 Vegetation Classification

Project: Bushfire Management Plan
 Providence Estate, Wellard
Client: Wellard Residential Pty Ltd

Plan Number:
 EP13-011(14)-F95a
Drawn: AFF
Date: 11/02/2021
Checked: HPB
Approved: KK
Date: 12/02/2021



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 GDA 1994 MGA Zone 50



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 ©Landgate (2020). Nearmap Imagery date: 19/10/2019

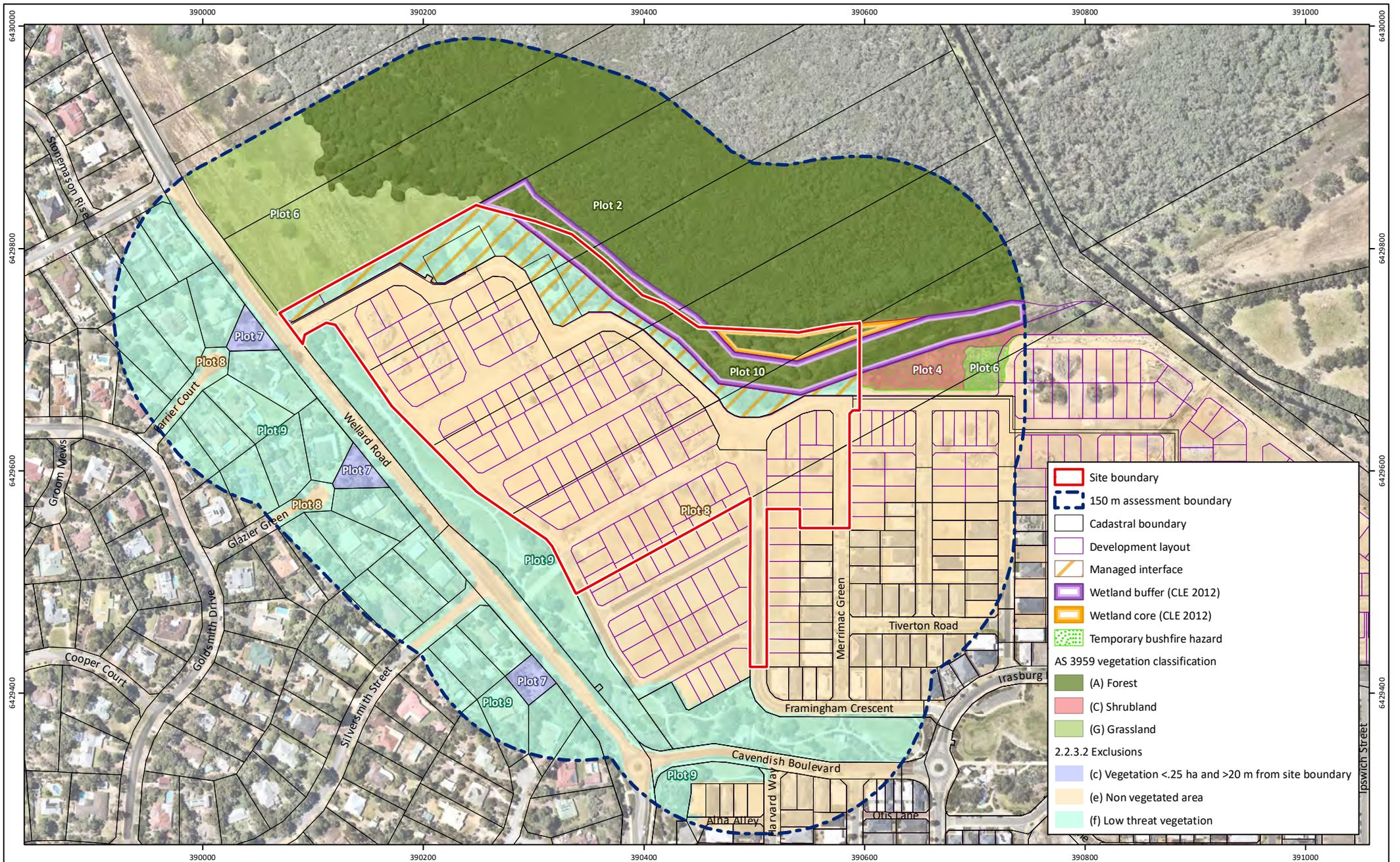
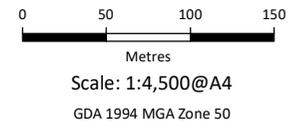


Figure 3: Post Development Conditions - AS 3959 Vegetation Classification

Project: Bushfire Management Plan
 Providence Estate, Wellard
Client: Wellard Residential Pty Ltd

Plan Number:
 EP13-011(14)-F96a
Drawn: AFF
Date: 11/02/2021
Checked: HPB
Approved: KK
Date: 12/02/2021



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 ©Landgate (2020). Nearmap Imagery date: 4/01/2021

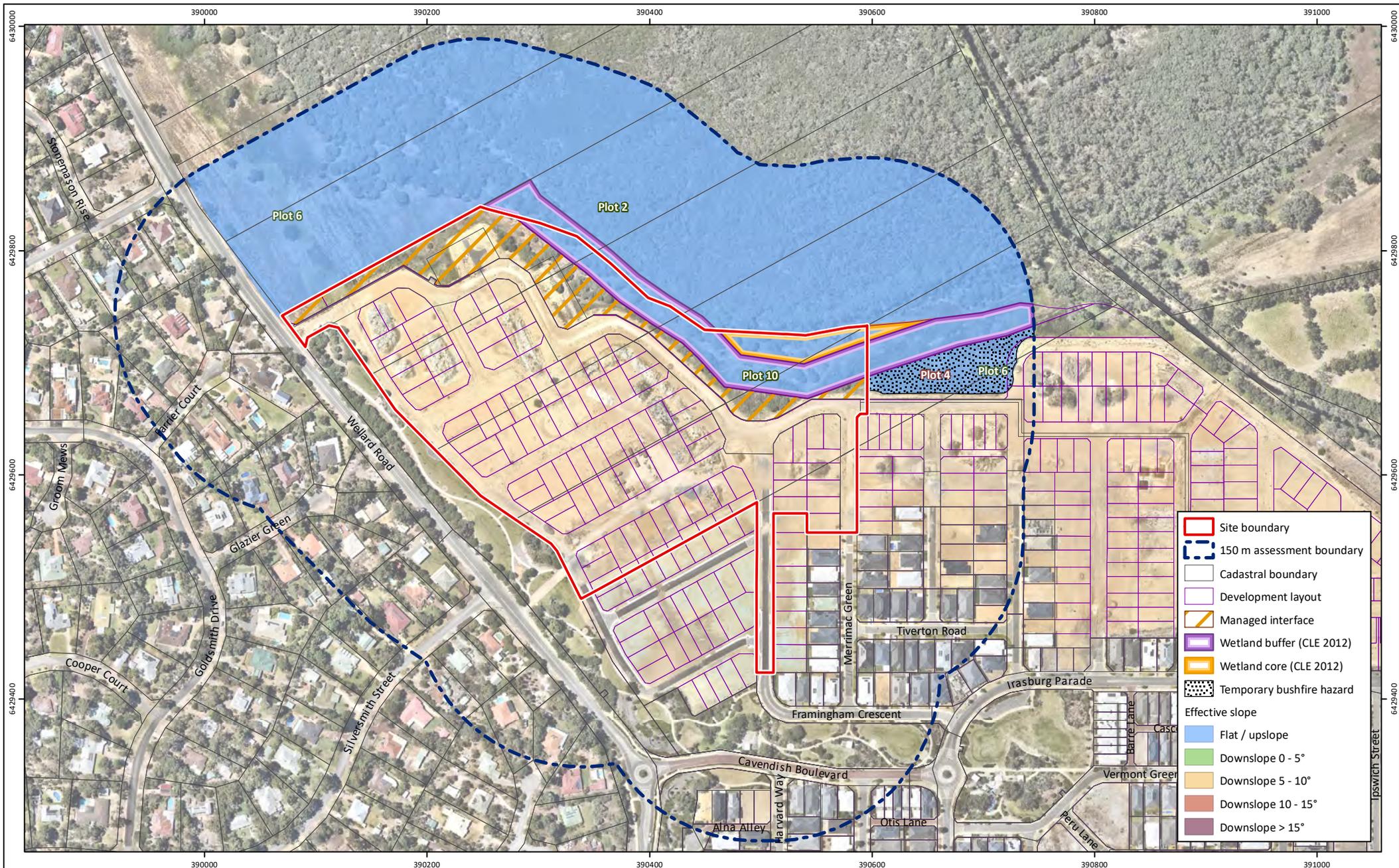


Figure 4: Post Development Conditions - Effective Slope

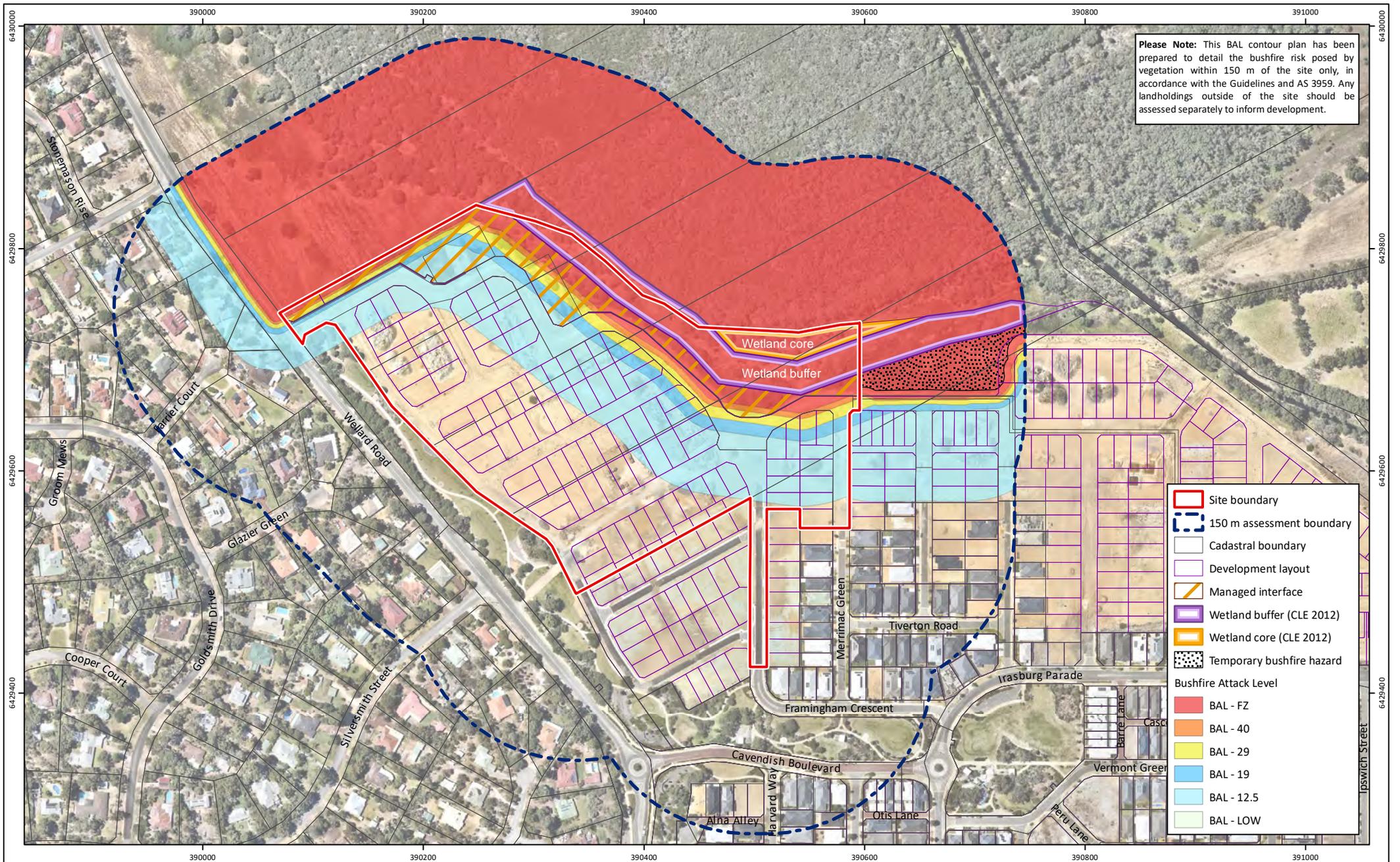
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Providence Estate, Wellard
Client: Wellard Residential Pty Ltd

Plan Number:
EP13-011(14)-F97a
Drawn: AFF
Date: 11/02/2021
Checked: HPB
Approved: KK
Date: 12/02/2021



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GDA 1994 MGA Zone 50





Please Note: This BAL contour plan has been prepared to detail the bushfire risk posed by vegetation within 150 m of the site only, in accordance with the Guidelines and AS 3959. Any landholdings outside of the site should be assessed separately to inform development.

	Site boundary
	150 m assessment boundary
	Cadastral boundary
	Development layout
	Managed interface
	Wetland buffer (CLE 2012)
	Wetland core (CLE 2012)
	Temporary bushfire hazard
Bushfire Attack Level	
	BAL - FZ
	BAL - 40
	BAL - 29
	BAL - 19
	BAL - 12.5
	BAL - LOW

Figure 5: Bushfire Attack Level Contours

Project:	Bushfire Management Plan Providence Estate, Wellard
Client:	Wellard Residential Pty Ltd

Plan Number:	EP13-011(14)-F98a
Drawn:	AFF
Date:	11/02/2021
Checked:	HPB
Approved:	KK
Date:	12/02/2021

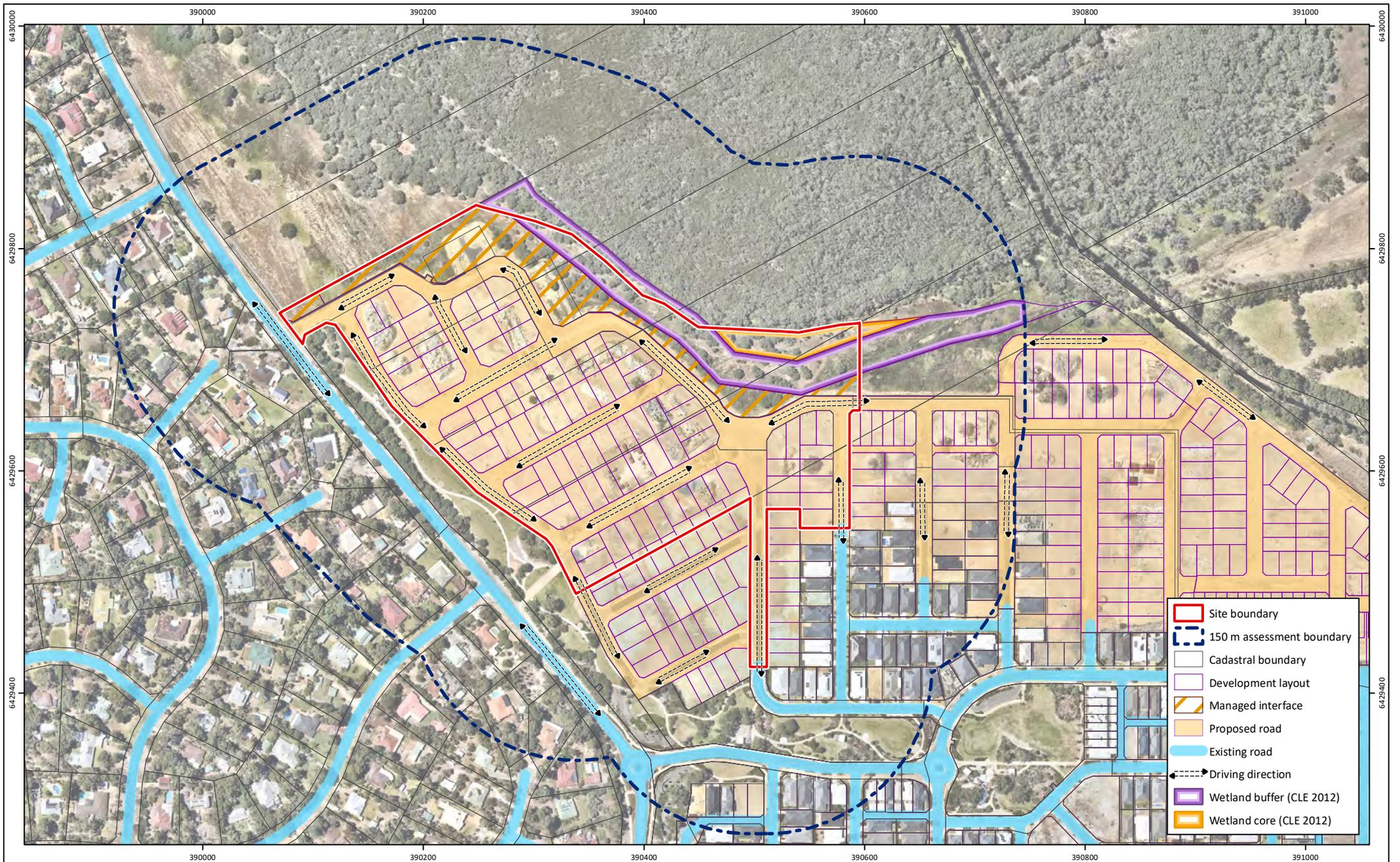
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GDA 1994 MGA Zone 50



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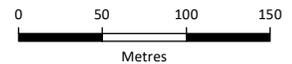


- Site boundary
- 150 m assessment boundary
- Cadastral boundary
- Development layout
- Managed interface
- Proposed road
- Existing road
- Driving direction
- Wetland buffer (CLE 2012)
- Wetland core (CLE 2012)

Figure 6: Vehicle Access Plan

Project: Bushfire Management Plan
 Providence Estate, Wellard
Client: Wellard Residential Pty Ltd

Plan Number:
 EP13-011(14)-F99a
Drawn: AFF
Date: 11/02/2021
Checked: HPB
Approved: KK
Date: 12/02/2021



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 GDA 1994 MGA Zone 50



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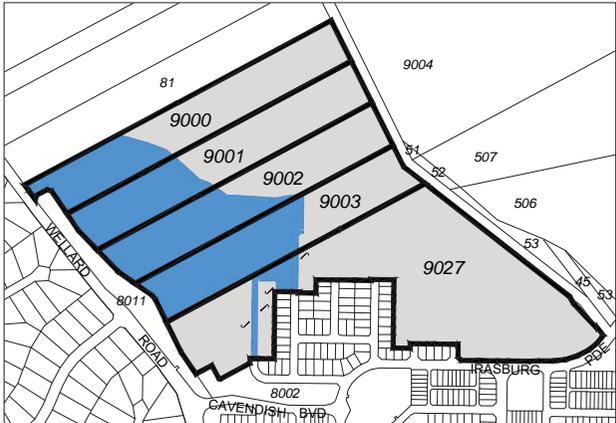
Appendix A

Proposed subdivision plan (CLE Town Planning and Design 2020)



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.

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.



Lot 9000 - 5.2642ha	Yield Residential - 88 lots Balance - 5 lots Total - 93 lots
Lot 9001 - 5.1524ha	
Lot 9002 - 5.0254ha	
Lot 9003 - 4.8822ha	
Lot 9027 - 12.7400ha	
Subject Area - 9.9813ha	
Balance of	
Lot 9000 - 3.4357ha	
Lot 9001 - 3.0721ha	
Lot 9002 - 2.4430ha	
Lot 9003 - 1.9925ha	
Lot 9027 - 12.1396ha	



Appendix B

Additional photographs



Bushfire Management Plan

Providence Estate, Wellard



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

Plot 8

AS 3959 classification (Figure 2): Non-vegetated (e)



Photo location 14: areas of bare mineral earth within the site, looking south.



Photo location 27: non-vegetated areas of bare mineral earth and construction office buildings within the site, looking south-east.



Photo location 29: areas of mineral earth located to the south of the site, looking south-east.



Photo location 35: areas of mineral earth and existing residential development to the south-east of the site, looking south.

Bushfire Management Plan

Providence Estate, Wellard



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

Plot 9	
AS 3959 classification (Figure 2): Low threat vegetation (f)	
 <p><i>Photo location 21: managed POS to the west of the site, looking north.</i></p>	 <p><i>Photo location 26: mulched garden beds and managed turf within POS, looking south-west.</i></p>
 <p><i>Photo location 31: managed low threat vegetation to the south of the site, looking east.</i></p>	