BUSHFIRE RISK ASSESSMENT - RESPONSE TO CLAUSE 13.02-1S – JETTY ROAD, CURLEWIS – STAGE 2

REF: 2022-068

29 April 2022

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Qualifications / Accreditations:

- Accredited Bushfire Consultant (BPAD level 2) with the Fire Protection Association Australia (FPA) (2014)
- Preparing and assessing an application under the Bushfire Management Overlay – Planet (Department of Planning and Community Development) (2013)
- Postgraduate Certificate in Bushfire Planning and Management – The University of Melbourne (2013)
- Postgraduate Certificate in Business – The University of Notre Dame, Broome (2002)
- Bachelor of Science, Honours – The University of Melbourne (1998)
- Native Vegetation Planning Permit Applications – Planet (Department of Planning and Community Development) Training Seminar (2013)

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Disclaimer

This report has been made with careful consideration and with the best information available to South Coast Bushfire Consultants at the time of writing. Before relying on information in this report, users should evaluate the accuracy, completeness and relevance of the information provided for their purposes. South Coast Bushfire Consultants do not guarantee that it is without flaw or omission of any kind and therefore disclaim all liability for any error, loss or other consequence that may arise from you relying on any information in this report.

Requirements detailed in this document do not guarantee survival of the buildings or the occupants. The client is strongly encouraged to develop and practice a bushfire survival plan.

Information and assistance including a template for a Bushfire Survival Plan is provided as part of the 'Fire Ready Kit' available through the CFA website at http://www.cfa.vic.gov.au or through your local CFA Regional office.

Conditions of Use

Contents

DEFINITIONS, ABBREVIATIONS AND ACRONYMS

AS 3959-2018 – Australian Standard AS 3959-2018 Construction of buildings in bushfire-prone areas.

CFA – Country Fire Authority

Clause – A clause relates to a specific piece within the planning scheme.

Clause 44.06 – Bushfire Management Overlay

Clause 53.02 – Planning for Bushfire

Clause 13.02-1S – Bushfire Planning

DELWP – Department of Environment, Land, Water and Planning

BAL – Bushfire Attack Level

BPA – Bushfire Prone Area

BMO – Bushfire Management Overlay

BMS – Bushfire Management Statement

Method 1 – refers to methodology in AS 3959-2018 for determining a BAL with a number of predetermined inputs.

Method 2 – refers to methodology in AS 3959-2018 for determining a site specific BAL

Pathway 1 – refers to an application pathway in Clause 53.02 of the planning scheme.

Pathway 2 – refers to an application pathway in Clause 53.02 of the planning scheme.

Planning Practice Note – a guide for using various sections of the planning scheme prepared by DTPI

RA – Responsible Authority

SCBC – South Coast Bushfire Consultants

Total Fire Ban Day – is declared by CFA on days when fires are likely to spread rapidly and could be difficult to control.

Bushfire Risk Assessment - Response to Clause 13.02-1S – Jetty Road, Curlewis – Stage 2

1. EXECUTIVE SUMMARY

This report has been prepared to accompany a DPO Application for Stage 2 Jetty Road, Curlewis. The site includes the following properties:

- 91-125 Coriyule Road, Curlewis
- 32-70 McDermott Road, Curlewis
- 72-100 McDermott Road, Curlewis
- 102-107 McDermott Road, Curlewis

The subject site is identified in the Jetty Road Urban Growth Plan (City of Greater Geelong 2008) as being future conventional residential (at least 14 dwellings per hectare). In June 2021 the site is identified as a growth area in the Draft Bellarine Peninsula Distinctive Area and Landscape Planning Policy.

The site is within a Bushfire Prone Area (BPA) of the state and as such all future development needs to demonstrate that it meets the objective of *Clause 13.02-1S Bushfire Planning*. The objective of *Clause 13.02-1S* is 'to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life'.

The land is located to the west of the existing Drysdale and Clifton Springs settlement boundary. New development has been undertaken east of the site in accordance with the Jetty Road Urban Growth Plan (City of Greater Geelong 2008). South of the site is the Curlewis Golf Course and the Bellarine Rail Trail.

The land to the west is not within the growth boundaries identified in the Jetty Road Urban Growth Plan (2008) and is currently grassland used predominantly for hobby farming. North of the site is the coastal reserve and ocean interface.

The site is within a landscape at a low landscape risk from bushfire as there are limited areas of high fuel loads, the dominant hazard is grassland and the site adjoins the existing residential areas and the ocean to the north.

The bushfire hazards in the surrounding landscape can be managed and the intended use of the land for conventional residential subdivision is deemed appropriate given the surrounding bushfire hazards. The site can mitigate the bushfire hazards and provide adequate separation from the surrounding hazards, meeting the life safety objectives detailed in Clause 13.02-1S.

2. SCOPE OF THE REPORT

This assessment has been prepared to demonstrate that future development of the site has regard for the surrounding bushfire hazards. The associated legislative requirements affecting the site have been identified and address.

The report considers the surrounding bushfire hazards and how a future subdivision could be designed to demonstrate compliance with the objectives of Clause 13.02-1S.

3. METHODOLOGY

The methodology used to prepare a holistic approach to assessing and mitigation the bushfire risk to the development includes the following:

- Legislative Controls Affecting the Development
- Bushfire Hazard Landscape Assessment
- Bushfire Hazard Site Assessment
- A Bushfire Attack Level (BAL) Assessment
- Vegetation Management within the site
- Response to Clause 13.02-1S

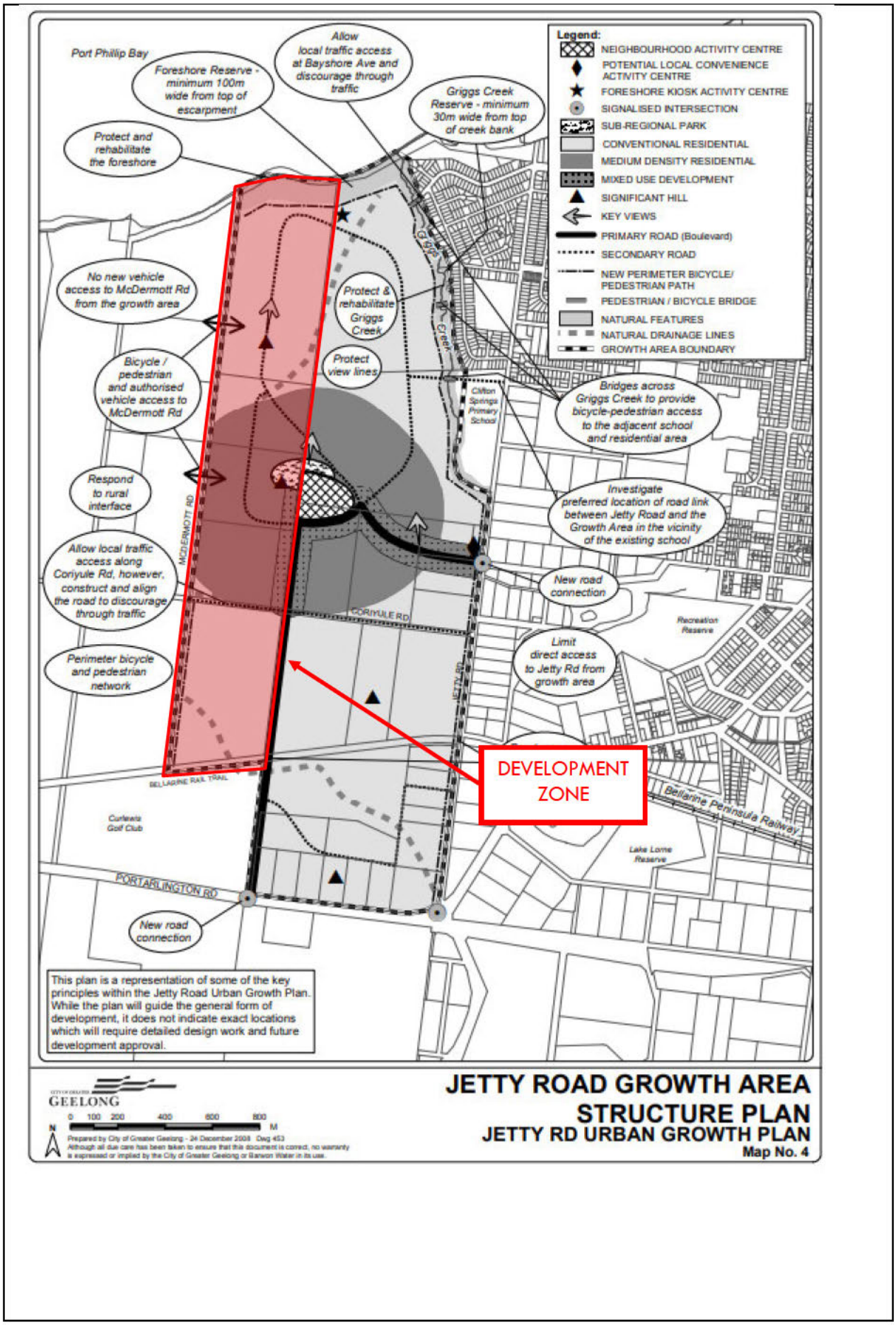
4. LEGISLATIVE CONTROLS AFFECTING THE DEVELOPMENT

The site is affected by planning, building and legislative controls.

4.1 Planning controls

Table 1 – Planning Clauses affecting the site

Clause Number	Name	Detail
State Planning Policy Framework		
13.02-1S	***Environmental Risks - Bushfire***	*Objective - To strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life.* This policy must be applied to all planning and decision making relating to land which is: • *Within a designated bushfire prone area;* • *Subject to a Bushfire Management Overlay; or* • *Proposed to be used or developed in a way that may create a bushfire hazard.* The subject site is within a designated Bushfire Prone Area and therefore the policy applies.
Local Planning Policy Framework – City of Greater Geelong Planning Scheme		
21.14-12	***Jetty Road Urban Growth Plan***	*Objectives:* • *To protect and enhance the rural and coastal environment on the Bellarine Peninsula and maintain non-urban breaks between settlements.* • *To facilitate the development of Ocean Grove, Drysdale/Clifton Springs and Leopold as hubs of development and service provision on the Bellarine Peninsula. In all other townships on the Bellarine Peninsula provide retail, commercial and community uses and facilities that serve the daily needs of the community and encourage street based activity.* • *To provide for sustainable industrial, commercial, retail, agricultural and tourism development in designated locations, to service the wider Bellarine community.* • *To preserve the individual character, identity and role of each Bellarine township.*


Port Phillip Bay
Foreshore Reserve - minimum 100m wide from top of escarpment
Allow local traffic access at Bayshore Ave and discourage through traffic
Griggs Creek Reserve - minimum 30m wide from top of creek bank
Protect and rehabilitate the foreshore
No new vehicle access to McDermott Rd from the growth area
Protect & rehabilitate Griggs Creek
Protect view lines
Bicycle / pedestrian and authorised vehicle access to McDermott Rd
Bridges across Griggs Creek to provide bicycle-pedestrian access to the adjacent school and residential area
Clifton Springs Primary School
Respond to rural interface
Investigate preferred location of road link between Jetty Road and the Growth Area in the vicinity of the existing school
Allow local traffic access along Coriyule Rd, however, construct and align the road to discourage through traffic
New road connection
Recreation Reserve
Limit direct access to Jetty Rd from growth area
Perimeter bicycle and pedestrian network
DEVELOPMENT ZONE
Bellarine Peninsula Railway
Curlewis Golf Club
Lake Lorne Reserve
New road connection
This plan is a representation of some of the key principles within the Jetty Road Urban Growth Plan. While the plan will guide the general form of development, it does not indicate exact locations which will require detailed design work and future development approval.
Legend:
NEIGHBOURHOOD ACTIVITY CENTRE
POTENTIAL LOCAL CONVENIENCE ACTIVITY CENTRE
FORESHORE KIOSK ACTIVITY CENTRE
SIGNALISED INTERSECTION
SUB-REGIONAL PARK
CONVENTIONAL RESIDENTIAL
MEDIUM DENSITY RESIDENTIAL
MIXED USE DEVELOPMENT
SIGNIFICANT HILL
KEY VIEWS
PRIMARY ROAD (Boulevard)
SECONDARY ROAD
NEW PERIMETER BICYCLE/ PEDESTRIAN PATH
PEDESTRIAN / BICYCLE BRIDGE
NATURAL FEATURES
NATURAL DRAINAGE LINES
GROWTH AREA BOUNDARY
GEELONG
0 100 200 400 600 800 M
JETTY ROAD GROWTH AREA STRUCTURE PLAN
JETTY RD URBAN GROWTH PLAN
Map No. 4

Planning Zone: (Note the current zoning will change as a result of the application)		
35.07	***Farming Zone (RLZ)*** ***Schedule*** ***Proposed to be General Residential Zone (GRZ)***	*Purpose:* *To implement the Municipal Planning Strategy and the Planning Policy Framework.* *To provide for the use of land for agriculture.* *To encourage the retention of productive agricultural land.* *To ensure that non-agricultural uses, including dwellings, do not adversely affect the use of land for agriculture.* *To encourage the retention of employment and population to support rural communities.* *To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision.* *To provide for the use and development of land for the specific purposes identified in a schedule to this zone.*
Planning Overlays:		
43.02	***Design and Development Overlay (DDO)*** ***Schedule 28***	*Relevant to 70-110 McDermott Road only* *Purpose:* *To implement the Municipal Planning Strategy and the Planning Policy Framework.* *To identify areas which are affected by specific requirements relating to the design and built form of new development.*

4.2 Building Controls

The site is within the Bushfire Prone Area (BPA) of the site and as such there are specific building controls that apply.

All building work must comply with the Building Act 1993, Building Regulations 2006 and the National Construction Code (the NCC) unless specifically exempted.

The development site is within the Bushfire Prone Area of the state and as such all construction of dwellings must address bushfire risk.

The NCC is a performance-based document and it sets out the minimum criteria which defines how buildings must perform to meet the objectives and functional statements. The NCC calls upon the *Australian Standard AS 3959–2018 Construction of Buildings in Bushfire Prone Areas*.

A building solution will comply with the NCC if it satisfies the performance requirements. Compliance with the Performance Requirements can only be achieved by:

a. Complying with the Deemed-to-satisfy Provisions; or
b. Formulating an Alternative Solution which –
c. Complies with the Performance Requirements; or
d. Is shown to be at least equivalent to the Deemed-to-satisfy provisions; or
e. A combination of a. and b.

Section 3.7.4 of the BCA – Acceptable Construction, Part 3.7.4 Bushfire Prone Areas calls upon AS 3959-2018, if all the criteria in Method 1 or 2 of this document are met a building is deemed to satisfy the requirements of the VCC.

The Standard AS 3959-2018 specifies the requirements for the construction of buildings in bushfire –prone areas in order to improve their resistance to bushfire attack from burning embers, radiant heat, flame contact and combinations of the three attack forms.

5. BUSHFIRE HAZARD IDENTIFICATION AND ASSESSMENT

The landscape assessment is important to consider as it defines the context of site assessment. The Bushfire Hazard Landscape Assessment has identified risks in the surrounding landscape and has considered the assessment of bushfire hazards on the basis of:

- Landscape conditions – meaning conditions in the landscape up to 75 kilometers from a site;
- Local conditions – meaning conditions in the area within approximately 1km of a site;
- Neighbourhood conditions – meaning conditions in the area within 400m of a site; and
- The site for the development.

5.1 Vegetation in the Surrounding Landscape

The development site is located within the Bellarine Peninsula. The Bellarine Peninsula is surrounded by bays and the ocean to the south and is becoming increasingly developed. The development site is located west of the Drysdale and Clifton Springs township and the surrounding landscape outside of the township includes hobby farms and small rural holdings.

The dominant vegetation in the surrounding landscape is grassland for agricultural purposes (predominantly grazing). There are isolated plantations of wind rows and along fence lines. These isolated strips of trees would not increase the impacts of a landscape bushfire. There are no large areas of unmanaged vegetation with high fuel loads, such as woodland or forest within the surrounding landscape.

There are a number of vineyards in the west and these do not present as a bushfire hazard to the site due to the limited ground fuels associated with intensive agriculture.

The Curlewis golf course is located to the south and presents as a large low threat area of vegetation.

There is a band of coastal shrub vegetation north of the proposed development on the interface between the land and ocean. This vegetation forms a narrow strip and does not present as a significant hazard.

5.2 Ecological Vegetation Classes

Ecological Vegetation Classes (EVC) are the standard unit for classifying vegetation types in Victoria. EVCs are described through a combination of floristic, lifeforms and ecological characteristics, and through an inferred fidelity to particular environmental attributes. The EVC benchmarks contain a subset of "typical" but not comprehensive list of species for each EVC in a bioregion.

To assist with the assessment of the landscape risk a map of the surrounding EVCs has been produced from the DELWP Nature kit website. This map indicates the vegetation within the broader landscape and from this we can determine likely landscape fire attributes.

All vegetation within the assessment zone is with the Otway Plain Biroregion. The EVCs from the map below include the following:

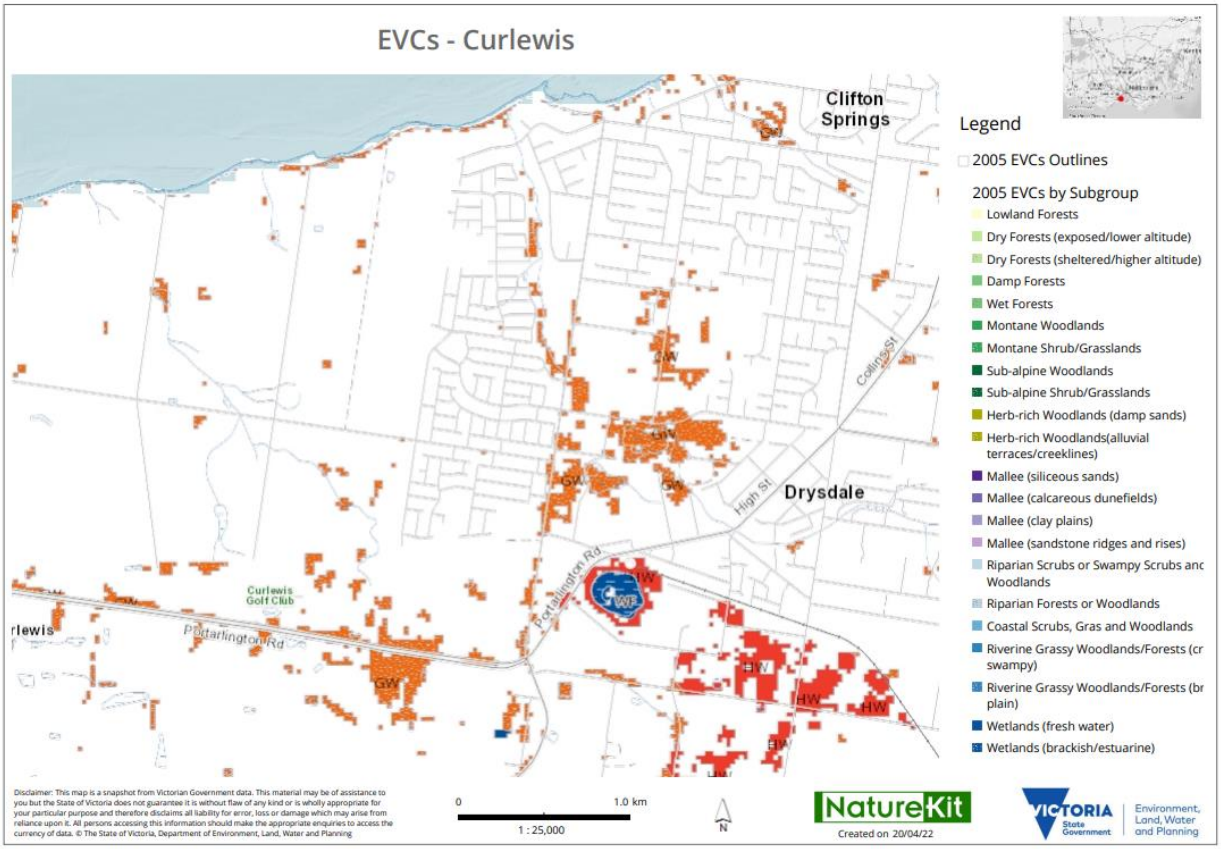
Table 2 – Dominant EVCs present in the surrounding landscape.

EVC Number & Name	Description	Dominant Species	% Tree Canopy Cover
EVC 175 – Grassy Woodland (Orange on map)	A variable open eucalypt woodland to 15 m tall or occasionally Sheoak woodland to 10 m tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies.	Eucalyptus radiata s.l. - Narrow-leaf Peppermint Eucalyptus leucoxylon ssp. Bellarinensis - Bellarine Yellow-gum Allocasuarina verticillate - Drooping Sheoak	15%

The assessment of EVC's within the surrounding landscape confirms there are no large areas of unmanaged forest or woodland vegetation within the surrounding landscape.

The EVC mapping does identify small pockets and strips of Grassy Woodland as is demonstrated in Map 1 below.

Map 1 – Location of EVCs within the surrounding landscape (Nature Kit, DELWP, 2019).



5.3 Ember storm

Ember storm is not possible within this landscape setting due to limited forest and woodland vegetation and the lack of topographical features within the landscape.

5.4 Wind Strength

Bushfires create extreme wind as they move across the landscape. Gullies and mountainous terrain can increase the wind effects and cause a significant risk to the built environment. The wind effects at this location are not influenced by any significant landscape formations that will increase the wind effects.

5.5 Potential Fire Runs

The landscape surrounding the proposed development would enable short fire runs through grassland to the south and west. It is likely that a grassland fire in this location would be able to be contained due to the high network of roads.

There is fire run potential west of the proposed subdivision with a grassland extending throughout numerous rural properties and hobby farms however the east interface is well protected by the township areas within Drysdale and Clifton Springs. In addition, extreme bushfire weather is not consistent with an easterly wind direction.

A long fire run from the north is unlikely due to the proximity of Port Phillip Bay.

5.6 Mitigating Features within the surrounding landscape

There are a number of features within the surrounding landscape that would aid in suppression of a landscape grassfire. There including the following:

- Portarlington Road and the Bellarine Highway to the south are wide unvegetated fuel breaks within the landscape.
- Curlewis Golf Club to the south is a well maintained low threat landscape
- Port Phillip Bay is located approximately 50m to the north.
- The township area within Drysdale and Clifton Springs to the east.

5.7 Surrounding Road Network

Map 2 – Surrounding Road Network

The development site is located between Mcdermott Road, Curlewis which is flagged for an upgrade to become a wide sealed road in the new development.

In the event of an emergency travel to the west is possible along Portarlington Road which enables travel to the low threat areas of Geelong or to the east into the township of Clifton Springs or Drysdale.

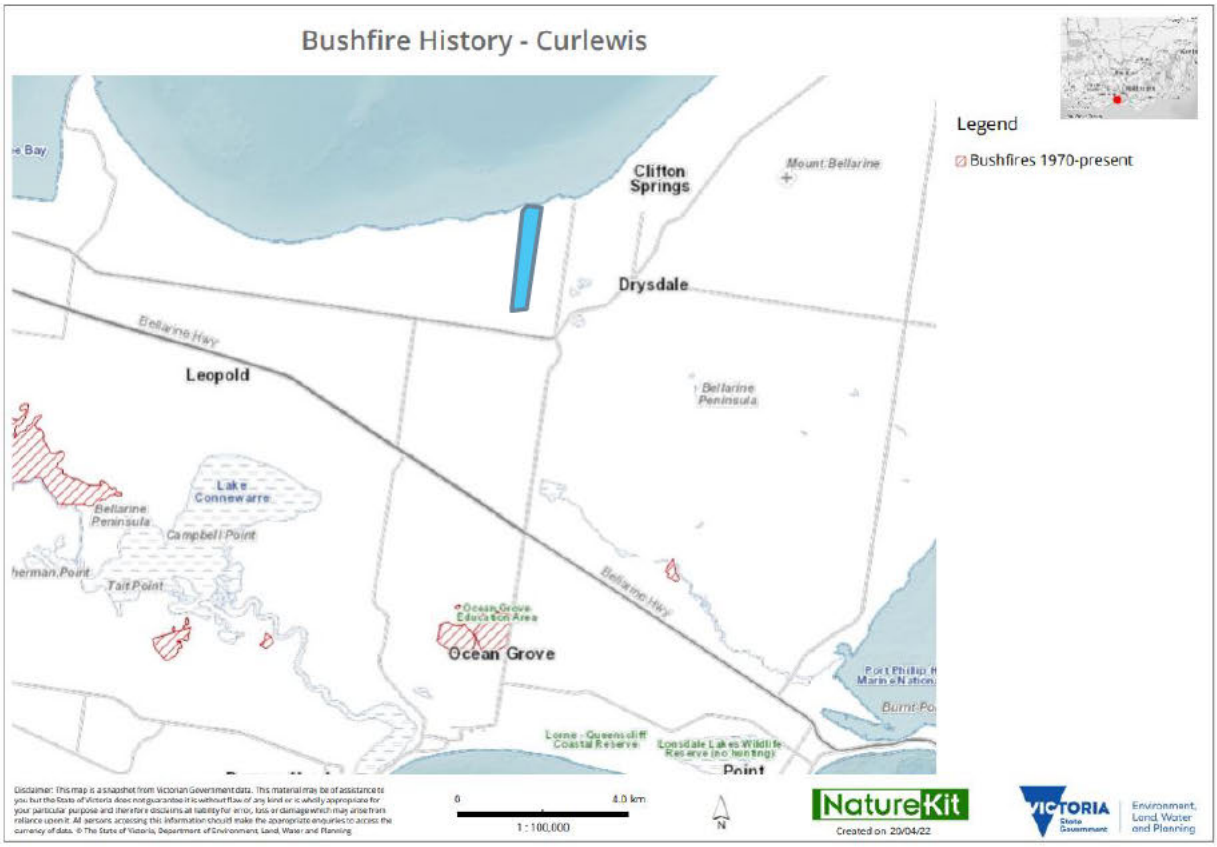
5.8 Bushfire History of the Area

The Barwon South West Regional Strategic Fire Management Plan: Environmental Scan lists bushfire events in the Otway Ranges. The map below (Map 3) sourced from NatureKit shows bushfires within the surrounding landscape since 1970.

This map shows two fires to the south-west in 2007 & 2019 along the reedy banks of Lake Connewarre.

The map identifies small bushfires in the 90s south of the site that were contained within the Ocean Grove Nature Reserve.

Map 3 – Bushfire History of the surrounding area (Nature Kit, DELWP, 2019).



5.9 Potential Fire Behavior

Bushfire behavior is influenced by three key factors; climate, topography and fuel availability. The landscape surrounding the site is dominated by grassland fuel loads and the topography of the landscape is undulating.

Table 3 – Bushfire attack mechanisms and appropriate inputs for models.

	Standard Assessment Inputs and Considerations	**Risk Based Assessment Inputs and Considerations**
Consideration of all bushfire mechanisms:	The AS 3959-2018 methodology assumes that distance to classification determines the radiant heat exposure and associated BAL. The BAL determines the construction standard. The higher the BAL the greater a developments resilience to bushfire. AS 3959-2018 does not have any regard for convective heat or bushfire induced winds.	Consider and assess each bushfire attack mechanism independently considering the unique specifics of the site. The bushfire attack mechanisms to be assessed include: • Radiant Heat Exposure • Convective Heat Exposure • Ember Attack • Bushfire Induced Winds.
Analysis of the bushfire model inputs:	**Forest Fire Danger Index (FFDI)** The FFDI is used nationally as a measure for fire weather. It uses the drought factor (seasonal dryness), relative humidity, temperature and wind speed to establish the fire weather severity. The BMO and AS 3959-2018 assumes an FFDI of 100.	The assessment has assumed an FFDI of 100 as it is the state based assumption.
	Flame Temperature The BMO and AS 3959-2018 assumes a flame temperature of 1090K.	Use the state-based assumption.
	Fuel Loads In AS 3959-2018 assumes fuel loads within grasslands.	The assumed fuel loads within AS 3959-2018 for grassland are deemed appropriate.

Table 4 – Bushfire Attack Mechanisms

Attack Mechanism	**Sites Risk and Response**
Radiant Heat Exposure	Low exposure to radiant heat as the site is able to meet a BAL of Low due to the low threat vegetation within the surrounding landscape. All construction will be in accordance with a BAL of 12.5 to mitigate the impacts of low radiant heat exposures.
Convective Heat Exposure	The site will not be affected by convective heat as the topography surrounding the site is largely flat.
Ember Attack	Ember attack will be limited due to the lack of eucalypt species within the surrounding landscape.
Bushfire Induced Winds	Bushfire induced winds are not expected to be extreme in this location due to the benign topography of the surrounding landscape.

Map 4 – Bushfire Hazard Landscape Assessment

- The surrounding landscape shows that the amount of water surrounding the site and the limited fire run potential within the surrounding landscape.
- The Bellarine Peninsula is dominated by grassland and there are no large areas of forest vegetation within the Bellarine Peninsula.
- The largest areas of Forest identified are the Otway Ranges to the south west, the Brisbane Ranges to the north and the You Yangs to the north on the northern side of the Bay. A bushfire within these areas of vegetation would not impact the proposed development.

Map 5 - Bushfire Hazard Site Assessment – 1km Assessment Zone

- The dominant vegetation within 1km of the site is grazed farmlands with perimeter tree planting.
- The built-up township zone of Clifton Springs is within 1km from the proposed development to the north east.
- The 1km radius shows that the localised bushfire hazards surrounding the site do not present has a significant bushfire hazard and construction to a BAL of 12.5 and setbacks within the road reserve to the west will adequately manage these hazards.

Map 6 – Bushfire Hazard Site Assessment – 400m Assessment Zone

- The 400m radius shows the vegetation within the landscape likely to have an impact on the proposed development.
- The Bellarine Rail Trail is located to the southern interface of the proposed development. The vegetation along the rail trail is heavily modified and is approximately 20m in width. The vegetation is dominated by grassland and patches of shrubs. There is limited area for a fire run due to the established subdivision to the north.
- South of the Bellarine Rail Trail the vegetation is considered low threat within the Curlewis Gold Coarse.
- West of the site is dominated by grassland vegetation
- North of the site is a band of coastal shrub vegetation that meets the Port Phillip Bay interface.
- East of the site is the existing residential and township development areas within Curlewis, Clifton Springs and Drysdale

6. BUSHFIRE HAZARD SITE ASSESSMENT

The Bushfire Hazard Site Assessment includes a plan that describes the bushfire hazard within 150 meters of proposed development. The description of the hazard is prepared in accordance with AS 3959-2018 Construction of buildings in bushfire prone areas (Standards Australia) excluding paragraph (a) of section 2.2.3.2 (Vegetation Exclusions).

6.1 Site Details

Address:	91-125 Coriyule Road, Curlewis, 3222 32-70 McDermott Road, Curlewis, 3222 72-100 McDermott Road, Curlewis, 3222 102-107 McDermott Road, Curlewis, 3222
Lot & Plan Number:	There are 4 parcels of land referred to in this report (see map below)
Municipality:	Greater Geelong
Existing Dwellings:	Existing Dwellings on predominantly vacant land
Directory Reference:	Melway 456 C8

6.2 Vegetation

The vegetation within the 150 metre assessment area was classified according to method 1 in AS 3959-2018 for the purposes of this assessment.

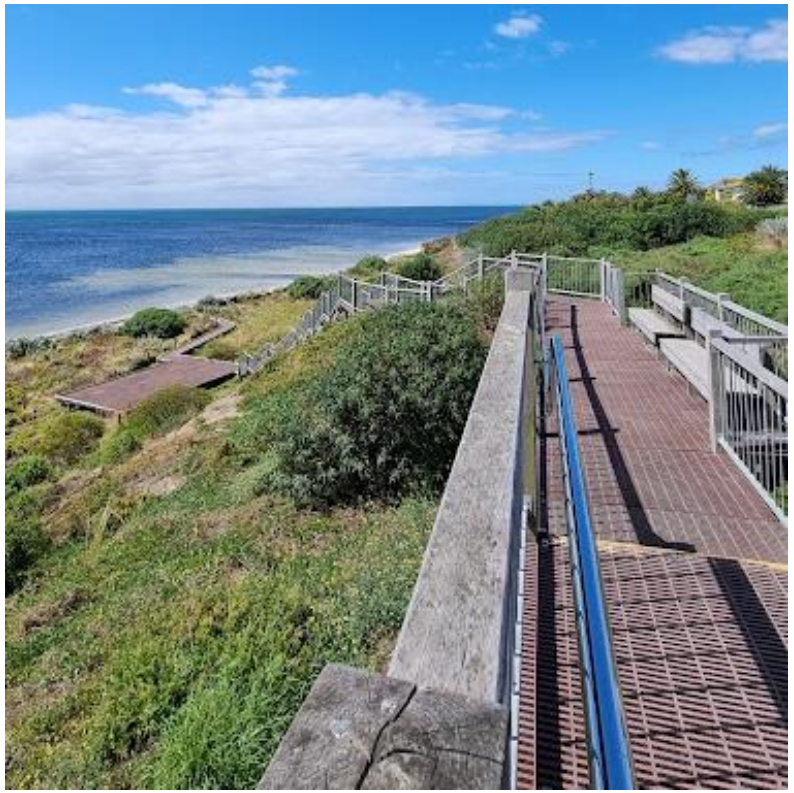
The method 1 assessment in AS 3959-2018 uses a generalised description of vegetation based on the AUSLIG (Australian Natural Resources Atlas: No.7 Native Vegetation) classification system. According to this method, vegetation can be classified into seven categories. Each category indicates a particular type of fire behavior and these categories or classifications are then used to determine bushfire intensity.

Table 6 – Vegetation Assessment

Vegetation Classification	Vegetation Type (AS 3959-2018 Description)	Site Description
Grassland	***Open Woodland/Low Open Woodland/Open Shrubland/Low Open Shrubland/Hummock Grassland/Closed Tussock Grassland/Tussock Grassland/Open Tussock/Sparse Open Tussock/Dense Sown Pasture/Sown Pasture/Open Herbfield/Spare Open Herbfield:*** *All forms (expect tussock, moorlands), including situations with shrubs and trees, if the overstorey foliage cover is less than 10%. Includes pasture and cropland.*	The surrounding landscape is dominated by grazed grasslands. The grasslands are increasing becoming fragmented as rural developments and viticulture becomes increasing popular across the Bellarine Peninsula. Figure 1 - Grassland west of the parcels of land along McDermott Road 

Low Threat	*The following vegetation shall be excluded from a BAL assessment:* *(a) Vegetation of any type that is more than 100m from the site.* *(b) Single areas of vegetation less than 1 ha in area and not within 100m of other areas of vegetation being classified.* *(c) Multiple areas of vegetation less than 0.25ha in area and not within 20m of the site, or each other of other areas of vegetation being classified vegetation.* *(d) Strips of vegetation less than 20m in width (measured perpendicular to the evaluation exposed to the strip of vegetation) regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified.* *(e) Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.* *(f) Vegetation regarded as low threat due to factors such 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, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.*	The surrounding landscape in the established and developing residential areas is managed as low threat vegetation. The Bellarine Rail Trail and Curlewis Golf Course is south of the site. Residential areas within the existing Curlewis, Clifton Springs and Drysdale townships are east of the site. Figure 2 - Low Threat vegetation in Curlewis Golf Course. 

		Figure 3 – Low threat conditions east of the proposed development in the existing residential areas in Curlewis 
Shrubland	***Closed (low) Heath/Open Heath***: *Found in wet areas and/or areas affected by poor soil fertility or shallow soils. Shrubs 1m-2m high. Wet heaths occur in sands adjoining dunes of the littoral (shore) zone. Montane heaths occur on shallow or water-logged soils.* ***Low Shrubland***: *Shrubs <2m high; greater that 30% foliage cover. Understoreys may contain grasses, Aacacia, Casuarina often dominated in the arid and semi-arid zones.*	There is a band of shrubland vegetation north of the proposed development between the site and ocean interface.

		Figure 4 – Shrubland vegetation in Griggs Creek Reserve to the northeast. 

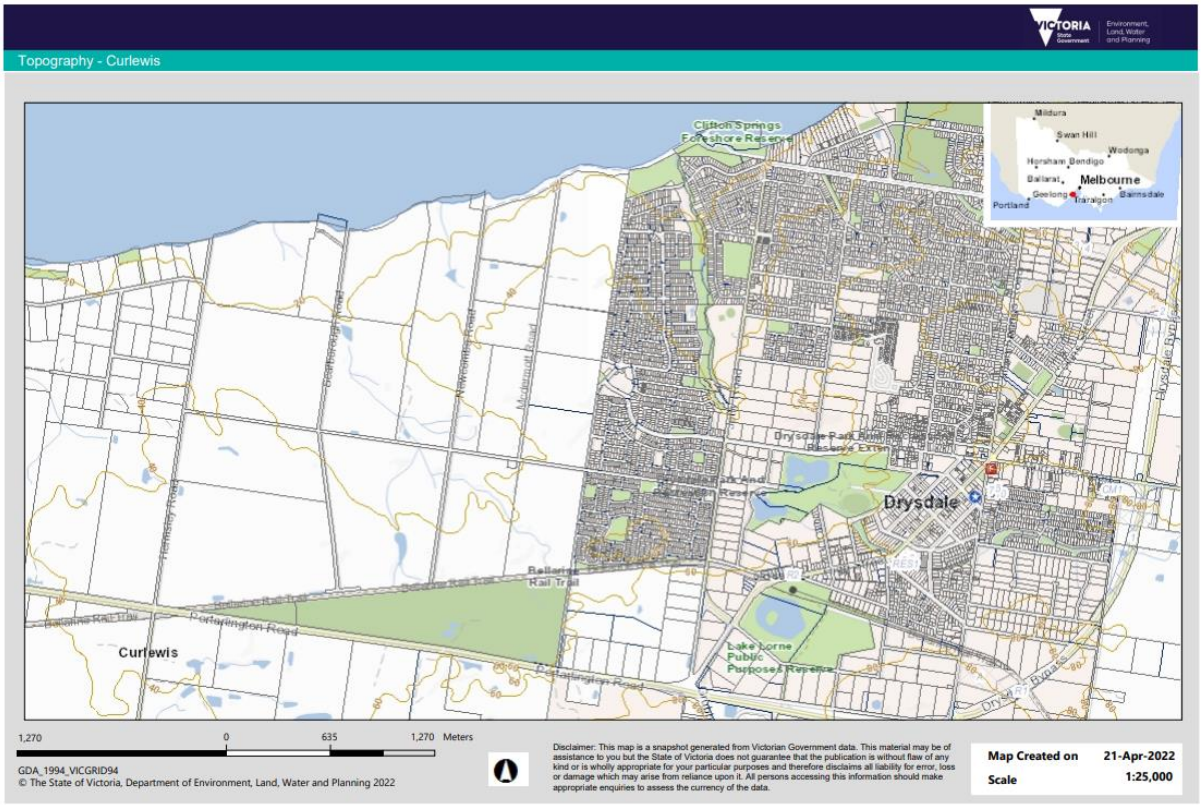
6.3 Topography

Topography of the land surrounding a site is particularly important as the topography influences the rate of spread and intensity of a fire. Fire burns faster uphill, as the slope increases so does the speed of the fire and its intensity. As a general rule for every increase 10° up a slope, the fire will double its speed and conversely down a slope. Fires tend to move more slowly as the slope decreases.

The topography of the surrounding landscape is gently undulating with small depressions into dams and shallow drainage lines. The surrounding topography would not intensify a landscape bushfire.

Grassland fires are predominantly influenced by wind speed and the cured (dryness) nature of the grassland rather than topography.

Map 7 – Topography of the site.



6.4 Bushfire Attack Level (BAL) for the proposed developments

The bushfire attack level (BAL) is a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per meter squared, and the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire.

The BAL for this site has been calculated to assess the radiant heat exposure to the site. The BAL inputs include a 'Forest Fire Danger Index' (FFDI) of 100 and a Flame Temperature of 1090K. These parameters are in accordance with the risk parameters set in Clause 53.02.

Table 7 – Summary of BAL assessment for proposed Subdivision – North of Bellarine Rail Trail.

Orientation	Highest threat vegetation	Slope under classifiable vegetation	Distance to unmanged vegetation.	Bushfire Attack Level (BAL)
North	Shrubland	Downslope >0-5°	22m	BAL 12.5
East	Low Threat	-	-	BAL 12.5
South	Low Threat	-	-	BAL 12.5
West	Grassland	Downslope >0-5°	22m	BAL 12.5

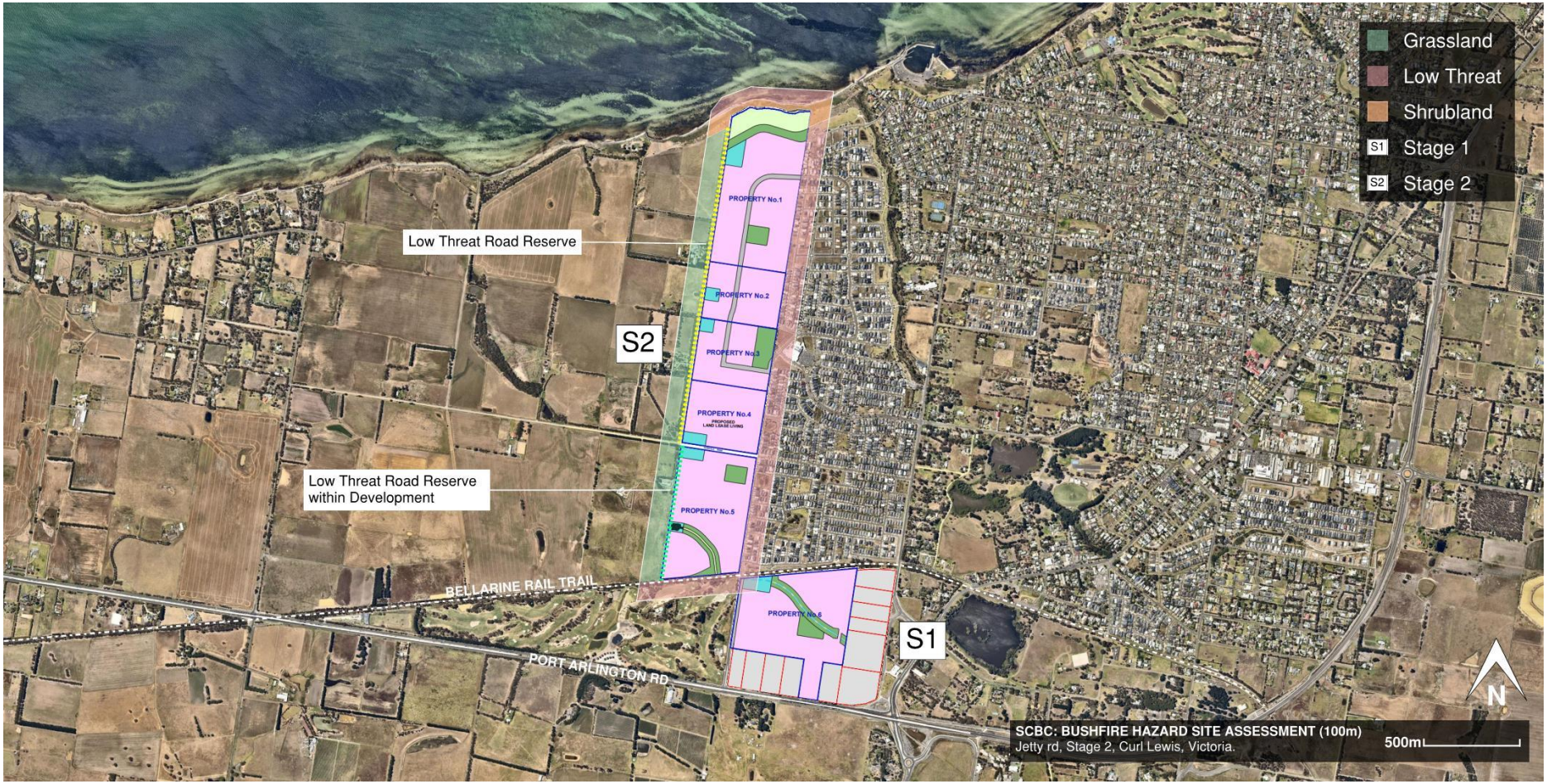
Internal areas within the subdivision greater than 50m from the grassland hazards are considered to be exposed to low levels of radiant heat and are considered to be a BAL-Low. The minimum construction standard within the Bushfire Prone Area of the state is BAL 12.5.

Areas considered as BAL-Low provide an important area of retreat in the event of a grassland fire.

The western and northern interface of the site are the township boundary of Curlewis. The western boundary is exposed to grassland hazards in the surrounding landscape and as detailed in table 7 a setback distance of 22m to the hazard is required to ensure future development is not exposed to radiant heat loads greater than 12.5 kW/m^2 as required by Clause 13.02-1S for settlement development.

Future subdivision design can ensure a 22m setback from the hazards to the west and north through subdivision design. The 22m setback can including, McDermott Road, public open space and setbacks within individual lots as these all represent a low threat landscape.

Map 8 – Bushfire Hazard Site Assessment – 100m Assessment Zone



Note – a 22m buffer of low threat vegetation is required to the northern and western boundaries to mitigate the hazards to the north and west. The buffer can include the road and road reserve, public open space and individual lot setbacks.

7. DEFENDABLE SPACE AND VEGETATION MANAGEMENT OBJECTIVES

Map 8 shows areas of defendable space around the development. The defendable space nominated is along the interface areas to the south, east and in the north west corner. It is important to note that open space within the proposed development must be manged in accordance with Defendable Space (as detailed below) from Clause 53.02 – Table 6 to mitigate the impacts of a grassfire in the surrounding landscape.

The vegetation management requirements associated with Defendable Space are detailed below.

Vegetation Management Requirements	**Sites Response**
1. Grass must be short cropped and maintained during the declared fire danger period.	Grass will me managed to a low threat condition.
2. All leaves and vegetation debris must be removed at regular intervals during the declared fire danger period.	Regular debris removal will be undertaken during and prior to the declared fire danger period.
3. Within 10 metres of a building, flammable objects must not be located close to the vulnerable parts of the building.	Not Applicable to proposed subdivision.
4. Plants greater than 10 centimetres in height must not be placed within 3 metres of a window or glass feature of the building.	Not Applicable to proposed subdivision.
5. Shrubs must not be located under the canopy of trees.	Shrubs will not be located under the canopy of trees.
6. Individual and clumps of shrubs must not exceed 5 square metres in area and must be separated by at least 5 metres.	Any planting of shrubs will ensure that they are not planted in densities greater than $5m^2$ and will be separated by at least 5m.
7. Trees must not overhang or touch any elements of the building.	Trees must not overhang or touch any elements of buildings.
8. The canopy of trees must be separated by at least 5 metre	The canopy of trees will be separated by at least 5 meters.
9. There must be a clearance of at least 2 metres between the lowest tree branches and ground level.	There will be a clearance of at least 2 metres between the lowest tree branches and ground level.

8. RESPONSE TO CLAUSE 13.02-1S – BUSHFIRE

8.1 Policy Application

Clause 13.02-1S must be applied to all planning and decision making under the Planning and Environment Act 1987 relating to land that is:

- Within a designated bushfire prone area,
- Subject to a Bushfire Management Overlay, or
- Proposed to be used or developed in a way that may create a bushfire hazard.

8.2 Objective

To strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life.

8.3 Strategies

8.3.1 Protection of Human Life

Give priority to the protection of human life by:

Strategy	**Consideration**
Prioritising the protection of human life over all other policy considerations.	There are no conflicting policy considerations.
Directing population growth and development to low risk locations and ensuring the availability of, and safe access to, areas where human life can be better protected from the effects of bushfire.	The site is within a landscape that is considered to be at a low landscape risk to bushfire. The future development of the site for a residential subdivision can adequately mitigate the surrounding hazards to protect human life.
Reducing the vulnerability of communities to bushfire through the consideration of bushfire risk in decision making at all stages of the planning process.	The vulnerability of future development is being considered at the DPO Application stage. The bushfire risk to future development will also be considered at the subdivision and building permit stage of development.

8.3.2 Bushfire Hazard Identification and Assessment

The bushfire hazard identification and assessment has been detailed in Section 5 – Bushfire Hazard Landscape Assessment and Section 6 – Bushfire Hazard Site Assessment of this document.

Strategy	**Consideration**
Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard	The best available science is used as the basis for this report. Sections 5 and 6 of this report detail the risk posed to the proposal from the surrounding hazards.
Considering the best available information about bushfire hazard including the map of designated bushfire prone areas prepared under the Building Act 1993 or regulations made under that Act	The best available bushfire hazard information is used as the basis for this report.
Applying the Bushfire Management Overlay in planning schemes to areas where the extent of vegetation can create an extreme bushfire hazard	The BMO has not been applied to this site as there are no large areas of unmanaged vegetation with high fuel loads within the surrounding landscape.
Considering and assessing the bushfire hazard on the basis of: - *Landscape conditions – meaning conditions in the landscape within 20 km (and potentially up to 75km) of a site.* - *Local conditions – meaning conditions in the area within approximately 1km of a site.* - *Neighbourhood conditions – meaning conditions in the area within 400m of a site.* - *The site for the development.*	The landscape and local conditions have been assessed in section 5 and 6 of this document. Section 5 assesses the bushfire risk to the proposed development from the vegetation within the surrounding landscape and considers the possible bushfire scenarios. The scenarios consider the broader landscape (up to 75km) and the local conditions included 1km and 400m from the site. The site-based risk (100m from the proposed development) is assessed in section 6 of this document. The site based risk determines the radiant heat exposure to the proposed interface of the subdivision through a BAL assessment consistent with the methodology in AS 3959-2018.
Consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.	The CFA has not been consulted as the landscape risk to the proposed development is considered to be low and

	the proposal can meet the objectives of Clause 13.02-1S.
Ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development plan approvals properly assess bushfire risk and include appropriate bushfire protection measures.	This report incorporates assessment of bushfire risk and recommendations for bushfire protection measures. The bushfire protection measures include the management of all 'public open space' within the development be managed in accordance with 'Low Threat Vegetation' from AS 3959-2018 (see appendix 1).
Not approving development where a landowner or proponent has not satisfactorily demonstrated that the relevant policies have been addressed, performance measures satisfied or bushfire protection measures can be adequately implemented.	This report demonstrates satisfactory compliance with policy and bushfire measures.

8.3.3 Settlement Planning

Plan to strengthen the resilience of settlements and communities and prioritise protection of human life by:

Strategy	**Consideration**
Directing population growth and development to low risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2018).	The subject site is identified in the Jetty Road Urban Growth Plan (City of Greater Geelong 2008) as being future conventional residential (at least 14 dwellings per hectare). The subject site is within a landscape with a low bushfire risk. The bushfire hazard can be managed to ensure radiant heat exposures are less than 12.5kW/m^2. This can be achieved through subdivision design that ensures a 22m setback from hazards to the north and west. The setback can be achieved through the road at McDermotts Road, the location of public open space managed to a low threat condition and through individual property setbacks. Future subdivision design can ensure that dwellings will not be exposed to radiant heat levels in excess of 12.5kW/m^2.

Ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2009) where human life can be better protected from the effects of bushfire.	The internal areas greater than 50m from the interface of grassland will be exposed to radiant heat loads of BAL-Low.
Ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development.	The proposed subdivision does not propose to increase the risk to future land use or development. Further development will decrease the existing grassfire runs within the landscape and improve the protection of existing development.
Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection Measures and where possible reducing bushfire risk overall.	The subdivision is located in a landscape considered to be at a low threat from bushfire. The surrounding hazards are grasslands and can be managed adequately through vegetation management and BAL construction standards. The proposed subdivision will not increase the existing risk and there is no net increase to risk from the proposed subdivision
Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behavior it will produce at a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale destruction.	The likely bushfire behavior has been discussed in section 5 of this document and has been considered at the landscape, local, neighbourhood and site scale.
Assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis.	Alternative locations have not been considered. The proposed location is considered to be at a low threat to bushfire and it is not deemed necessary.
Not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL 12.5 rating under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2018).	The proposed development will not be exposed to a radiant heat loads greater than a BAL 12.5 from AS 3959-2018.

8.3.4 Areas of Biodiversity Conservation Value

Strategy	Consideration
Ensure settlement growth and development approvals can implement bushfire protection measures without unacceptable biodiversity impacts by discouraging settlement growth and development in bushfire affected areas that are important areas of biodiversity.	The site is currently an open pasture grassland paddocks and the biodiversity impacts associated with the proposed development have not been considered at this stage of the development.

8.3.5 Use and Development Control in a Bushfire Prone Area

In a bushfire prone area designated in accordance with regulations made under the Building Act 1993, bushfire risk should be considered when assessing planning applications for the following uses and development:

- Subdivisions of more than 10 lots.
- Accommodation.
- Child care centre.
- Education centre.
- Emergency services facility.
- Hospital.
- Indoor recreation facility.
- Major sports and recreation facility.
- Place of assembly.
- Any application for development that will result in people congregating in large numbers.

When assessing a planning permit application for the above uses and development:

Strategy	Consideration
Consider the risk of bushfire to people, property and community infrastructure.	The risk has been considered and was found to be low.
Require the implementation of appropriate bushfire protection measures to address the identified bushfire risk.	This document proposes a number of bushfire mitigation measures to address the identified bushfire risk including: 1. The management of a low threat buffer to the north and west for a distance of 22m. This can include the road and road reserve of McDermott Road, managed public open space in road reserves and individual lot setbacks. 2. Management of all public open space areas within a future subdivision to a low threat condition in accordance with AS 3959-2018 (see appendix 1). 3. Construction to a BAL of 12.5.
Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts.	The biodiversity impacts associated with the development have not been considered at the time of preparing this report.

8.4 Policy Guidelines

Consider as relevant:

- Any applicable approved state, regional and municipal fire prevention plan.

8.5 Policy Documents

Consider as relevant:

- AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2018).
- Building in bushfire-prone areas – CSIRO and Standards Australia (SAA HB36-1993, 1993)
- A bushfire prone area map prepared under the Building Act 1993 or regulations made under the Act.

9. REFERENCES

Australian Building Codes Board (2019) National Construction Code.

Biodiversity Interactive Mapping Tool – www.depi.vic.gov.au

Cheney, N.P. and Sullivan, A. (2008). Grassfires – fuel, weather and fire behaviour. 2nd Edition. CSIRO Publishing, Collingwood, Australia. 150pp.

CFA (2011). FSG LUP 0003 Assessing vegetation in a bushfire management overlay (BMO. Country Fire Authority, Burwood East, Victoria.

CFA (2011). Landscaping for Bushfire: Garden design and plant selection. Country Fire Authority, Burwood East, Victoria.

CFA (2012). FSG LUP 0002 Requirements for water supply and access in the Bushfire Management Overlay (BMO). Country Fire Authority, Burwood East, Victoria.

Department of Environment, Land, Water and Planning (DELWP) (2017). Planning Permit Applications Bushfire Management Overlay Technical Guide. Melbourne Victoria.

Gould, J.S., McCaw, W.L., Cheney, N.P., Ellis, P.F., Knight, I.K, and Sullivan, A.L. (2007). Project VESTA – fire in dry eucalypt forest: fuel structure, fuel dynamics and fire behavior.

Hines. F, Tolhurst. K, Wilson. A, and McCarthy, G. (2010) Overall Fuel Hazard Assessment Guide 4th Edition. Victorian Department of Sustainability and Environment, Melbourne, Victoria.

Leonard, J. (2014) CSIRO Calculator for determining Bushfire Attack Level (BAL).

Nagel, C. and Ashton, P. (2016) Strategic fire management Plan Otway District 2017-2020. Shires of Corangamite, Colac Otway and Surf Coast.

Planning Schemes online – www.planningschemes.dpcd.vic.gov.au

Sullivan, A.L, Ellias, P.F, Knight, I.K. (2003) A review of radiant heat flux models used in bushfire applications. International Journal of Wildland Fire 12, 101-120.

Standards Australia (2018). AS 39359-2018 Construction of Buildings in Bushfire Prone Areas. Standards Australia, North Sydney, New South Wales.

10. APPENDIX 1

The definition of 'Low Threat Vegetation'.

The definition of 'Low Threat' vegetation as detailed in AS 3959-2018 is as follows:

Low threat vegetation – AS 3959-2018

The definition in AS 3959-2018 includes the following:

a. Multiple areas of vegetation less than 0.25ha in area and not within 20m of the site, or each other of other areas of vegetation being classified vegetation.
b. Strips of vegetation less than 20m in width (measured perpendicular to the evaluation exposed to the strip of vegetation) regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified.
c. Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.

Vegetation regarded as low threat due to factors such 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, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.