BUSHFIRE RISK ASSESSMENT -RESPONSE TO CLAUSE 13.02 – 4 CYPRESS LANE, TORQUAY

REF: 2021-119

March 2024 South Coast Bushfire Consultants

SURF COAST SHIRE COUNCIL Planning Department

6/03/2024

South Coast Bushfire Consultants

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	Name	Date Completed	Comments
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Disclaimer

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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 SURF COAST'STYSINGE CFA website at http://www.cfa.vic.gov.au or through your local CFA Regional office.

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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 is a provision in the planning scheme
Clause 44.06	Bushfire Management Overlay
Clause 53.02	Planning for Bushfire
Clause 13.02-15	Bushfire - Planning
DELWP	Department of Environment, Land, Water and Planning
BAL	Bushfire Attack Level
BPA	Bushfire Prone Area
вмо	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 DELWP
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

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Bushfire Risk Assessment -Response to Clause 13.02 – 4 Cypress Lane, Torquay

1. EXECUTIVE SUMMARY

This report has been prepared to accompany amended plans filed in VCAT proceedings for a proposed retirement village at 4 Cypress Lane, Torquay.

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

The retirement village proposes the following:

- 117 qty 2 bedroom houses,
- 16 qty 1 bedroom apartments,
- 58 qty 2 bedroom apartments,
- Carparking (total of 333 carparks), and
- Central Administration building.

The site is located west of the Surf Coast Highway and is surrounded by existing residential development and commercial developments to the north. Long fire runs and high fuel loads are not present in the surrounding landscape.

Small areas of unmanged vegetation are located within the surrounding landscape including Deep Creek that runs from east and supports woodland vegetation. East of the site are small areas of woodland as Deep Creek continues to the east.

The landscape is at a low risk from bushfire.

The proposed development is not within the Bushfire Management Overlay (BMO).

The bushfire hazards in the surrounding landscape can be managed and the intended use of the land for a retirement village is deemed appropriate given the surrounding bushfire hazards. The proposed development can mitigate the bushfire hazards and provide adequate separation from the surrounding hazards, meeting the life safety objectives detailed in Clause 13.02.

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2. SUMMARY

The following details the proposed development, the assessment methodology and the proposed bushfire mitigation measures.

	Application	A To	planning permit application for a retirement village at 4 Cypress Lane, orquay.
	Construction Standard	A CC	 is recommended that all construction will be compliant with AS 3959-018. ection 7.4 of this document details a complex method 2 BAL assessment. he construction standard is recommended to be as follows: All development on the eastern interface is to be constructed to a BAL of 29 as a precaution against the roadside vegetation that occurs along the Surf Coast Highway. All construction to the southern interface is recommended to be constructed to a BAL of 19. All other buildings are to be constructed to a BAL of 12.5. as a precautionary mitigation measure it is recommended that a non-ombustible fence be constructed on the eastern boundary of the site to rotect future development from an ignition in the scrub to the east that
	Bushfire Landsco Risk	ape Ti lc a th su su	he broader landscape shows the dominant hazard in the surrounding andscape is grassland vegetation. The landscape risk to the site is low nd a bushfire in the surrounding landscape is possible, however, given he location of the development and its proximity the Surf Coast Highway uppression of a bushfire in the surrounding landscape is likely to be uccessful.
	Assumptions	TI 3 w fc	 he BAL has been determined using a method 2 assessment from AS 959-2018 that measures the radiant heat from unmanaged vegetation vithin a 100m assessment zone. In undertaking the assessment, the ollowing assumptions have been made: 1. All vegetation within the site will be managed to a low threat condition in accordance with AS 3959-2018 and Clause 53.02 (see appendix 11.1).
	Bushfire Site Assessment (Bushfire Attack Level) BAL	TI p m A	he BAL for the site has been determined based on the distance from the roperty boundary to the unmanaged vegetation in accordance with a nethod 2 assessment from AS 3959-2018.
SURF COAST Planning	Protection of Human Life SHIRE COUNCIL Department	TI lit A e	he site can meet the objectives of Clause 13.02 in protection of human fe. Central areas of the site are exposed to a BAL of Low. The Central administration Building is exposed to a BAL of Low and would act as an mergency evacuation building if required.
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Vagatation	It is recommended that all landscaping within the site is managed as flow		
vegeranon			
Management	(see Appendix 11.1 for definition)		
within the site	(see Appendix 11.1 for definition).		
Access	In accordance with the CFA recommendations the following access requirements can be met:		
	 Roads must be constructed to a standard so that they are accessible in all weather conditions and capable of accommodating a vehicle of 15 tonnes for the trafficable road width. The average grade must be no more than 1 in 7 (14.4%) (8.1 degrees) with a maximum of no more than 1 in 5 (20%) (11.3 degrees) for no more than 50 meters. Dips must have no more than a 1 in 8 (12%) (7.1 degree) entry and exit angle. Curves must have a minimum inner radius of 10 metres. Have a minimum trafficable width of 3.5 metres and be clear of encroachments for at least 0.5 metres on each side and 4 metres above the access way. Roads more than 60m in length from the nearest intersection must have a turning circle with a minimum radius of 8m (including rollover kerbs if they are provided) T or Y heads of dimensions 		
	specified by CFA may be used as alternatives.		
Hydrant	In accordance with the CFA the site must have Hydrants installed within the site that meet the following requirements:		
	 Above or below ground operable hydrants must be provided. The maximum distance between these hydrants and the rear of all building envelopes (or in the absence of building envelopes, the rear of the lots) must be 90 metres and the hydrants must be no more than 120 metres apart. These distances must be measured around lot boundaries. The hydrants must be identified with marker posts and road reflectors as applicable to the satisfaction of the Country Fire Authority. 		

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3. SCOPE OF THE REPORT

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

The report considers the existing use of the site and how the proposed industrial subdivision can demonstrate compliance with the objectives of Clause 13.02.

4. 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

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5. LEGISLATIVE CONTROLS AFFECTING THE DEVELOPMENT

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

5.1 Planning controls

Table 1 – Planning Clauses affecting the site

Clause Number	Name	Detail
State Planning Policy	/ Framework	
13.02	Bushfire planning	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.
Planning Zone:		
32.03	Low Density Residential Zone (LDRZ) Schedule	To implement the Municipal Planning Strategy and the Planning Policy Framework. To provide for low-density residential development on lots which, in the absence of reticulated sewerage, can treat and retain all wastewater.
Planning Overlays:		
45.06	Development Contributions Plan Overlay (DCPO) Schedule 2	To implement the Municipal Planning Strategy and the Planning Policy Framework. To identify areas which require the preparation of a development contributions plan for the purpose of levying contributions for the provision of works, services and facilities before development can commence.

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5.2 Building Controls

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 construction is required to 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.

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 NCC.

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.

The proposed development is required to be constructed in accordance with AS 3959-2018.

6. 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.

6.1 Vegetation in the Surrounding Landscape

The vegetation in the surrounding landscape is highly modified and there are no large areas of unmanaged forest or woodland that would impact the proposed development.

North of the site is a low density residential development comprising of 0.5 to 1 acre allotments and further north is the large industrial area of Torquay. Beyond the township boundary is a small area of native vegetation called 'Grass Tree Park' that would not have the potential to impact the proposed development.

Beyond the township boundary to the north is a large turf farm that has irrigated grass. This type of farming practice is not considered to present as a bushfire hazard.

The unmanaged grassland is approximately 2.4km to the north of the site.

East of the site are a number of small areas of remnant native vegetation along the edge of the Surf Coast Highway and along Deep Creek. These areas of vegetation are not extensive and would not enable a significant fire to establish or run through the township.

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South of the site is a narrow (approximately 40m) strip of woodland vegetation within Deep Creek. This area of vegetation would not enable a significant fire front as assumed in AS 3959-2018 when calculating the radiant heat exposure to the proposed development.

West of the site is low density residential development for approximately 3km. The vegetation in properties to the west is highly modified and would not enable a bushfire to continue through the landscape.

South and south west of the site is residential development for approximately 1km. At the south western interface of the residential zone are large areas of open grassland along Spring Creek.

The greatest landscape risk is from a fire in the surrounding grassland or in The Great Otway National Park approximately 8km to the southwest. The surrounding area is highly populated and regional areas beyond the residential areas have high densities of lifestyle properties creating a highly modified landscape.

6.2 Potential Fire Runs

Long fire runs through grassland are possible in the surrounding landscape, however, there are large numbers of lifestyle properties and large numbers of transecting roads that would facilitate a firefighting response.

6.3 Mitigating Features within the surrounding landscape

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

- The site is surrounded by residential development with well managed gardens. The township of Torquay has had significant growth to the north and west since the introduction of bushfire planning and building controls and all new development has been constructed in accordance with AS 3959. Some areas to the west and north west are also in the Bushfire Management Overlay and are required to manage vegetation on their properties in accordance with defendable space. This gives new development assurance that fuel loads with the landscape will not increase over time.
- The surrounding landscape includes large areas of grassland on small rural holdings. Many properties have large areas of managed grassland that would mitigate a fire front.
- The network of roads with the surrounding landscape is excellent and would contribute positively to suppression efforts.
- The Surf Coast Highway is located to the east of the site, is a four lane bitumen road and presents as a significant fuel break if the vegetation along Deep Creek to the east was ignited.

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6.4 Bushfire History of the Area

The map below (Map 3) sourced from NatureKit shows bushfires within the surrounding landscape since 1970. This map shows a historical fire in the surrounding landscape.

The map below shows the bushfire footprint of the 1983 Ash Wednesday Bushfire that was suppressed at the interface of the Bells Beach settlement to the south west of Torquay.

There have been a number of small grassfires in the surrounding landscape that are not shown on the map and they have been successfully suppressed before impacting any of the surrounding townships.



6.4.1 Map 3 - Bushfire History of the surrounding area

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6.5 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 4 – Bushfire A	Attack Mechanisms
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Attack Mechanism	Sites Risk and Response
Radiant Heat Exposure	The radiant heat exposure to the site has been assessed in section 7.4 of this document. The radiant heat to the majority of development within the site is 12.5kW/m^2 . Some of the units to the south are exposed to radiant heat loads of 15.4 kW/m^2 and a number of enhanced construction measures are proposed for the site.
	All development within the retirement village will be constructed in accordance with AS 3959-2018.
	The radiant heat to the site is compled to assess with accuracy due to the fragmented nature of the surrounding vegetation and the topographical impacts of the gully (Deep Creek) to the south. It is likely the radiant heat exposure to the development from the vegetation within the gully will be reduced due to the form and arrangement of the gully.
	All areas of vegetation within the surrounding area are significantly fragmented and are unable to sustain a fire front as assumed in AS 3959-2018. They would enable small flareups within the landscape.
Convective Heat Exposure	The landscape does not have the topography or fuel loads to enable the formation of convection columns.
Ember Attack	Ember attack is not likely to have a large influence as there are a limited number of eucalypt tree species within the surrounding landscape.
Bushfire Induced Winds	The development is not likely to be impacted by bushfire induced winds due to the density of development surrounding the site and the surrounding topography.

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6.6 Map 4 - Bushfire Hazard Landscape Assessment



The broader landscape shows the dominant hazard in the surrounding landscape is grassland vegetation. The Great Otway National Park is located to

the South-west of the si SURF COAST SHIRE COUNCIL	te.
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6.7 Map 5 - Bushfire Hazard Site Assessment – 1km Assessment Zone

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SURF COAST SHIRE CONSTRUCT shows the extent of development in the surrounding landscape. The proposed development site is surrounded by residential development and the Planting Department but is in the north. There are a number of small areas of remnant vegetation within the surrounding landscape including vegetation along Deep Creek and Grass Tree Park to the north of the industrial estate.

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

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7. 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).

7.1 Site Details

Address:	4 Cypress Lane, Torquay 3228
Lot and Plan Number:	Lot 36A PS305011
Council Property Number	186333
Municipality:	Surf Coast
BMO Schedule:	N/A
Existing Dwellings:	Vacant land
Private Bushfire Shelter:	N/A
Melways Reference:	Melway 505 K1
Site Area:	4109 sq. m

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7.2 Vegetation

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The vegetation within the 100 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.

 igh; 10- and/or May The vegetation along Deep Creek to the south of the site comprises of woodland. The vegetation is narrow in width (approximately 40m) and fire run modeling has been undertaken to consider the narrow fuel load. The vegetation in the creek line has an understorey of bracken and grass's with scattered established trees. The edges of the vegetation are dominated by large shrubs such wattle species. Figure 1 – Vegetation in Deep Creek to the south.
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Table 6 – Vegetation Assessment



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,	Vegetation to the north has been classified as grassland, this vegetation will likely become low threat vegetation as this area is developed.
Low Threat	 In the overstorey toliage cover is less than 10%. Includes pasture and cropland. 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 	The vegetation in the surrounding residential areas has been classified as low threat. The lawns are well managed, garden beds are managed, and debris is removed during the fire danger period. East of the site is a narrow strip of vegetation between the development and the Surf Coast Highway. The vegetation comprises of a narrow band of shrubs either side of a walking track. The density of shrubs increases to the south, however, it has a maximum width of 15m at the widest point. It is separated by the larger area of vegetation to the east by the Surf Coast Highway which is a 4 lane highway approximately 35m in width. The vegetation to the east of the Surf Coast Highway is also limited in area and although it must be classified it would not enable a fire front as assumed by AS 3959-2018.
SURF COAST SHIRE COUNCIL Planning Department 6/03/2024 21/0333 / D24/42571	 (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 	

SURF COAST SI Planning D	HIRE COUNCIL epartment	saline wetlands, maintained lawns, golf cou (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, marke gardens (and other non-curing crops), culti gardens, commercial nurseries, nature strip windbreaks.	Inses Figure 4 – Residential development interface to If ivated is and Image: Sigure 5 – Residential development to the south. Image: Sigure 5 – Residential development to the south.
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to Deep Creek to the south.

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7.3 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 has gentle undulations and would not influence the intensity of a landscape bushfire.

The topography within the 100m assessment area was gently undulating with gentle fall down to the creek line to the south (Deep Creek) and another gentle downslope to the north into another drainage line.

The topography surrounding the site will not intensify a bushfires behavior.

There were no topographical features of the broader landscape that would increase the intensity of a landscape bushfire or grassfire.



7.3.1 Map 7 – Topography of the site.

7.4 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.

The minimum construction standard in a Bushfire Prone Area is a BAL of 12.5 from AS 3959-2018.

The BAL assessment assumes that vegetation within the site will be managed to a low threat condition in accordance with the 'defendable space' vegetation management conditions from Table 6 to Clause 53.02 from the Surf Coast Planning Scheme. The definition of low threat vegetation is detailed in Appendix 1.

A method 2 BAL assessment has been undertaken for the proposed development due to the fragmented nature of the vegetation within the 100m assessment zone. A method 2 assessment allows a more accurate, site specific, radiant heat exposure to be calculated.

The BAL considers a number of different scenarios including the following:

 Scenario 1 – A head fire approaching from the south through Deep Creek under the influence of a southerly wind. This would occur if a fire was started on the southern side of the creek. Deep creek has a topographical formation similar to a gully with a short steep downslope and a steep upslope. There is limited fuel beyond the gully. The fire modeling based on scenario 1 includes a woodland fuel load and a 40m fire run.

Forest, Woodlands & Rainforest					
FDI	100				
Vegetation classification	Woodlands				
Surface Fuel Load (t/ha)	20	*1			
Overall Fuel Load (t/ha)	25	*1			
Effective slope under the classified vegetation (degrees)	0	Flat			
Slope between the site and classified vegetation (degrees)	5				
Distance of the site from classified vegetation (m)	16.2		Rate of spread	0.68808	(km/h)
Flame Width (m)	100	*2	Slope ROS	0.68808	(km/h)
Flame Temperature (K)	1090	*3	Flame length	7.47252	(m)
Flame Emissivity	0.95	*4	Flame angle	81	
Ambient Temperature (K)	308	*4	View Factor	0.224275	
Relative humidity (%)	25%	*4	Height of Receiver	2.272944	(m)
Direction	S		Path length	15.61552	(m)
Assessment date	31/05/2021		Atmospheric Transmissivity	0.844561	
Assessment performed by	Kylie Steel		Radiant heat flux	14.40	(kW/m^2)
Site Location Fire in	n Deep Creek to	the south	BUSHFIRE ATTACK LEVEL	BAL -19	



- 2. Scenario 2 A fire starting west of the site and being pushed under a westerly wind direction along Deep Creek. The fire would impact the site as a 'flank' fire and due to the narrow width of the vegetation available for combustion the radiant heat exposure would be reduced. The radiant heat of the fire detailed in scenario 1 would be reduced by ½ due to the nature of a flank fire. A fire within the gully influenced by a westerly wind is likely to be retatined within the gully due to the steep nature of the gully and the availability of fuel. The radiant heat exposure in scenario 1 is 14.4 kW/m² and the radiant heat from a flank fire would be 7.2 kW/m² which would require a BAL 12.5 construction standard.
- 3. Scenario 3 A fire within the woodland vegetation to the east of the Surf Coast Highway is possible, however, it is highly unlikely a fire would jump the Surf Coast Highway under an easterly wind direction. Easterly winds come off the ocean and do not correspond with hazardous bushfire weather as easterly winds have a high moisture content. The extent of vegetation to the east is limited and highly modified contributing to the low-risk scenario.

Forest, Woodlands & Rainforest					
FDI	100				
Vegetation classification	Woodlands				
Surface Fuel Load (t/ha)	20	*1			
Overall Fuel Load (t/ha)	25	*1			
Effective slope under the classified vegetation (degrees)	0	Flat			
Slope between the site and classified vegetation (degrees)	0				
Distance of the site from classified vegetation (m)	60		Rate of spread	1.464	(km/h)
Flame Width (m)	100	*2	Slope ROS	1.464	(km/h)
Flame Temperature (K)	1090	*3	Flame length	12.516	(m)
Flame Emissivity	0.95	*4	Flame angle	81	
Ambient Temperature (K)	308	*4	View Factor	0.079237	
Relative humidity (%)	25%	*4	Height of Receiver	6.180954	(m)
Direction	E		Path length	59.02103	(m)
Assessment date	31/05/2021		Atmospheric Transmissivity	0.756219	
Assessment performed by	Kylie Steel		Radiant heat flux	4.56	(kW/m^2)
Site Location Fire in the wood	land east of the S	Surf Coast Highway	BUSHFIRE ATTACK LEVEL	BAL -12.5	

4. Scenario 4 – The strip of vegetation along the western side of the Surf Coast Highway is ignited. This vegetation has been classified as low threat as it is narrow (less than 20m in width for the majority of the interface) and is fragmented by a wide open gravel walking track.

IF a flare up did occur within this vegetation it would be a very quick intense fire and is highly likely to be suppressed given the proximity to the local CFA station and the busy nature of the Surf Coast Highway.

5. Scenario 5 - A grassfire coming from the north through the Industrial estate. This is an unlikely scenario due to the Turf farm to the north and the built up nature of the Industrial Estate.

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Orientation	Highest threat vegetation	Slope under classifiable vegetation	Distance to unmanaged vegetation from the property boundary.	Bushfire Attack Level (BAL)
North	Grassland	Downslope 0-5°	30m	BAL 12.5
East	Woodland	Upslope / Flat	60m	BAL 12.5
South – Scenario 1	Woodland	*Flat	16m	BAL 19
South – Scenario 2	Woodland	Flat	16m	BAL 12.5
West	Low Threat	Flat	-	BAL 12.5

Table 7 – Summary BAL assessment for the development based on a method 2 assessment.

*The slope calculation to the south is complicated as the woodland vegetation in in a gully formation along the creek line. There is a short (approximately 20m) steep downslope followed by a steep upslope. Due to the nature of the gully the slope has been assumed to be zero.

7.5 Recommended Construction Standard

The detailed BAL assessment above considers a number of scenarios under which the proposed development could be impacted by a landscape bushfire. Given the site is proposed to be a retirement village additional consideration has been made to the resilience of the proposed development in the context of the surrounding vegetation.

This report recommends a number of measures to mitigate the surrounding bushfire hazards, including the flowing:

- 1. Construct a non-combustible fence along the eastern interface of the site to provide shielding from the vegetation along the eastern boundary.
- 2. All development along the eastern interface of the site be constructed to a BAL of 29.
- 3. All development at the southern interface should be constructed to a BAL of 19.
- 4. All other development within the site should be constructed to a BAL of 12.5.

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7.6 Map 8 – Bushfire Attack Level (BAL) Assessment – 100m Assessment Zone



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8. RESPONSE TO CLAUSE 13.02-15 – BUSHFIRE PLANNING

8.1 Policy Application

Clause 13.02 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: Protection of human life

Strategy	Consideration	
Prioritising the protection of human life over all other policy considerations.	There are no conflicting policy considerations identified during the assessment of this development.	
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 considered to be at a low risk from bushfire as it is located centrally within the Torquay township and is surrounded by existing development to all aspects. Where unmanaged vegetation does occur within the assessment zone the vegetation is limited in area and would not enable fire fronts as assumed by AS 3959- 2018. The largest area of vegetation is located to the east, a direction that does not correspond with extreme bushfire weather in coastal locations in South West Victoria. The central buildings with the site would enable an area to retreat to in the unlikely event of a fire in the surrounding landscape.	
Reducing the vulnerability of communities to bushfire through the consideration of bushfire risk in decision making at all stages of the planning DAST SHIRE COUNCIL phing Department	The bushfire risk of the proposed site is being considered at the planning permit stage.	
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Give priority to the protection of human life by:

8.4 Strategies: Bushfire Hazard Identification and Assessment

Identify bushfire hazard and undertake appropriate risk assessment by:

Strategy	Consideration
Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard	The best available science has been applied to thi application.
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 site is within the Bushfire Prone Area of the sta
Applying the Bushfire Management Overlay in planning schemes to areas where the extent of vegetation can create an extreme bushfire hazard	The BMO is not applied to the site.
Considering and assessing the bushfire hazard on the basis of:	Section 5, 6 and 7 of this report address the landscape, local and neighborhood conditions.
 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 1 km of a site. Neighbourhood conditions – meaning conditions in the area within 400m of a site. The site for the development. 	Emorgancy convices have not been consulted at this
Consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures.	Emergency services have not been consulted at this stage.
Ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development plan approvals	The application includes appropriate bushfire protection measures, including: construction requirements and recommended vegetation management conditions within the site.

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appropriate bushfire protection	
measures.	
appropriate bushfire protection measures. 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.	 All construction works within the site will comply with AS 3959-2018. Additional measures are proposed to reflect the vulnerability of future residents and these including: 1. A non-combustible fence along the eastern property boundary to mitigate the impacts of a fire in the scrub vegetation along the Surf Coast Highway. 2. Construction to a BAL of 29 along the eastern interface to mitigate the impacts of an unlikely fire in the scrub vegetation along the Surf Coast
	 Highway. Construction to a BAL of 19 along the southern interface to mitigate a bushfire in Deep Creek. The management of vegetation within the site meet the vegetation management conditions of defendable space as per Table 6 to Clause 53.02 (see Appendix 1 for a detailed description).

8.5 Strategies: Settlement Planning

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

Strategy	Consideration
Directing population growth and	A The development is located in the central township
development to low risk locations, being	area of Torquay. The township of Torquay has had
those locations assessed as having a	significant growth in the past 5 years and much of it
radiant heat flux of less than 12.5	has been to the north and north east.
kilowatts/square metre under AS 3959- 2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia, 2018).	A method 2 BAL assessment has been undertaken to establish the radiant heat exposure of the development within the site.
	The method 2 BAL assessment found that the development is likely to be impacted by a BAL of 12.5 to the north, east and west and a BAL of 19 to the south.
	The likelihood of the unmanaged vegetation within the landscape being ignited and not being suppressed is considered highly unlikely due to the central location, the location of the Surf Coast Highway (the main thorough fare between Geelong

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	and the Surf Coast) and the extent of residential
	development around the proposed development site.
	A BAL of 19 was determined to be the radiant heat exposure if the vegetation within the creek line to the south (Deep Creek) was ignited. This creek line has a similar topography to a deep gully and if ignited the fire would likely be contained within the gully.
	Central areas of the development will not be exposed to radiant heat levels that exceed 12.5kW/m ² as demonstrated in the BAL assessment in section 6 of this report.
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 central areas of the site greater than 50m from the grassland and 100m from the woodland hazards are exposed to a BAL Low in accordance with AS 3959-2018.
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 site currently contains a number of established Cypress trees and is an open grassland site with an existing residential garden around the dwelling. The site does not currently pose as a bushfire hazard, however, the enhanced management of the site and the removal of highly flammable Cypress species will further mitigate the bushfire hazards within the site impacting neighbouring properties.
Achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection	The proposed development presents a decreased risk for development surrounding the site as the gardens of the property will be managed to a low threat condition.
Measures and where possible reducing bushfire risk overall.	The construction standard will enable protection from radiant heat and ember attack and provide an appropriate construction response to the surrounding hazards.
Assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behavior it will produce at	The bushfire hazards to the proposed development have been assessed and addressed conservatively given the proposed vulnerability of future residents.
a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale	A number of enhanced mitigation measures have been proposed to ensure the protection of life and property.
destruction.	

municipal, settlement, local and neighbourhood basis.	and the surrounding hazards can be appropriately mitigated.
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 proposal is for a planning permit not a strategic planning document, local planning policy or planning scheme amendment.

8.6 Strategies: Areas of biodiversity conservation value

Strategy	Consideration
Ensure settlement growth and	There are no significant biodiversity impacts
development approvals can implement	associated with this development. The site is
bushfire protection measures without	dominated by pasture grass, a residential garden
unacceptable biodiversity impacts by	and a number of boundary plantings of cypress trees.
discouraging settlement growth and	
development in bushfire affected areas	
that are important areas of biodiversity.	

8.7 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:

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Consider the risk of bushfire to people, property and community infrastructure.	The bushfire risk to people and property has been addressed as part of this application.
Require the implementation of appropriate bushfire protection measures to address the identified bushfire risk.	The proposal includes appropriate bushfire protection from the surrounding hazards.
Ensure new development can implement bushfire protection measures without unacceptable biodiversity impacts.	There are no biodiversity impacts identified at this stage of the proposed development.

8.8 Policy Guidelines

Consider as relevant:

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

8.9 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)
- An bushfire prone area map prepared under the Building Act 1993 or regulations made under the Act.

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10.APPENDICES

10.1 Appendix 1 - The definition of 'Low Threat Vegetation'.

There are two different definitions of 'Low Threat' vegetation. One is detailed within the planning scheme (Clause 53.02 Bushfire Planning) and another in AS 3959-2018.

Within the body of this report the surrounding vegetation is assessed in accordance with AS 3959-2018 and the recommended low threat vegetation management within the site is recommended to be managed in accordance with the definition from Clause 53.02 for defendable space.

Low threat vegetation - AS 3959-2018

The definition in AS 3959-2018 includes the following:

- (g) 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.
- (h) 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.
- (i) 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.

Low threat vegetation (Defendable Space) – Clause 53.02

The definition of 'Low Threat' vegetation is detailed in Clause 53.02 for sites within the Bushfire Management Overlay (BMO). Clause 53.02 refers to areas of low fuel loads around buildings as areas of Defendable Space. The vegetation management criteria of defendable space include the following:

- Grass must be short cropped and maintained during the declared fire danger period.
- All leaves and vegetation debris must be removed at regular intervals during the declared fire danger period.
- Within 10 metres of a building, flammable objects must not be located close to the vulnerable parts of the building.
- Plants greater than 10 centimetres in height must not be placed within 3 metres of a window or glass feature of the building.
- Shrubs must not be located under the canopy of trees.
- Individual and clumps of shrubs must not exceed 5 square metres in area and must be separated by at least 5 metres.
- Trees must not overhang or touch any elements of the building.
- The canopy of trees must be separated by at least 5 metres.
- There must be a clearance of at least 2 metres between the lowest tree branches and ground level.

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10.2 Appendix 2 - Methodology for Calculating Radiant Heat Exposure

The site has the ability for a fire run of approximately 40m through the woodland vegetation in Deep Creek to the south.

The methodology to reduced radiant heat flux exposures associated with narrow bands of vegetation has been used as the fire run potential would enable a quasi-equilibrium (or steady state).

To calculate the quasi-steady state the methodology by Tolhurst (2014) 'Estimating reduced flame height in narrow bands of fuel' have been used. Tolhurst draws on research undertaken by Cheney and Sullivan (2008) and Gould et. al. (2007) for his methodology.



The vegetation under investigation for this site is the area of vegetation to the south of the site as the other aspects of the development are reasonably protected from the surrounding bushfire hazards. The important features of the bushfire hazard to the south include:

Experimental research has shown that fires do not spread at their full potential until they are at least 100m wide. Under severe conditions, it is likely that they will have to be considerably wider than 100m and details in step 1 above indicates that for this site a fire would need to be 360m wide to reach augsi-equilibrium or 'its full potential' under an EEDI of 100.

wide to reach quasi-ec	uilibrium or its tull potential under an FFDI of 100.
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The predominant wind direction under bushfire winds are from the N, NW, W and SW. Based on an FFDI of 100 the wind speed in forest is expected to be 45 km/h, research by Tolhurst (pers. com. 2014).

A reduction for classifying the fire as a backing or flank fire as per Catchpole et al.'s research (1992) where 70% of the heat of a fire was established to be in the head has not been used due to the potential for updraft effects from a potentially larger fire to the north or west.



Figure 1 – Relative fire intensity from around a fire perimeter (Source – Catchpole et al. 1992).

Section 7.4 of this document shows the results from the CSIRO BAL Calculator to determine the radiant heat exposure from the south.

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