BUSHFIRE MANAGEMENT STATEMENT – APOLLO BAY RESORT DEVELOPMENT

25th June 2018

South Coast Bushfire Consultants

South Coast Bushfire Consultants

P.O. Box 721, Torquay, Vic 3228

Phone: 0401 328 757 Email: kylie@scbconsult.com.au

Principal Consultant – Kylie Steel

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)

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

Version Control

	Name	Date Completed	Comments
Report Version	Kylie Steel	15/05/18 25/6/18	Version 11 Version 12
Field Assessment	Kylie Steel	4/04/17	
Report	Kylie Steel	5/05/17	
Mapping	Kylie Steel	8/05/18	

Contents

Bushfire Management Statement – Apollo Bay Resort Development

1 EXECUTIVE SUMMARY

This document analyses the surrounding bushfire hazards to the proposed Apollo Bay Resort Development. The proposed development is for the development of a Hotel, Villas, Staff Accommodation and Maintenance Facilities.

The site is in a bushfire prone landscape and the land is within the Bushfire Management Overlay (BMO). The surrounding landscape is a largely dominated by farmlands with remnant patches of forest and scrub throughout the landscape. The development site is large, enabling defendable space in accordance with Clause 52.47 Approval Measure 3.2 for buildings used for accommodation other than a dwelling.

All development within the site will be constructed to a Bushfire Attack Level (BAL) in accordance with the Australian Standard – AS 3959-2009 Construction of buildings in bushfire-prone areas.

The BMO is designed to ensure that development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level. This document includes a response to the legislative requirements of; the Bushfire Management Overlay (Clause 44.06 and 52.47) and Clause 13.05 from the State Planning Policy Framework to ensure appropriate mitigation measures to the surrounding bushfire hazards.

The surrounding land use is dominated by farming and the landscape reflects this with the major bushfire hazard being grasslands. There are a number of forested gullies and tree breaks that will influence a landscape bushfire but given the surrounding landscape risk it is not expected these will have a large impact on the tenability of the site during a bushfire attack.

Section 5.5 of this document considers the potential setbacks that the development will need to be compliant with Clause 52.47 of the Colac Otway Planning Scheme. Given the size of the development site, it is acknowledged that all buildings will meet defendable space approval measures from Clause 52.47.

2 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.

3 LEGISLATIVE CONTROLS AFFECTING THE DEVELOPMENT

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

3.1 Planning controls

Table 1 – Planning Clauses affecting the site.

Clause Number	Name	Detail
13.05	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 the Bushfire Management Overaly (BMO) and therefore the policy applies.
35.08	Rural Activity Zone (RAZ) Schedule	
44.06	Bushfire Management Overlay	*To ensure that the development of land prioritises the protection of human life and strengthens community resiliency to bushfire. To identify areas where the bushfire hazard warrants bushfire protection measures to be implemented. To ensure development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level.*

52.47	Planning for Bushfire	*To ensure that the location, design and construction of development appropriately responds to the bushfire hazard. To specify location, design and construction measures for a single dwelling that reduces the bushfire risk to life and property to an acceptable level.*
52.48	Bushfire Protection: Exemptions	None of the exemptions apply to this development.
44.01	Erosion Management Overlay Schedule 1 – EMO 1	*To protect areas prone to erosion, landslip or other land degradation processes, by minimising land disturbance and inappropriate development.*
44.04	Land Subject to Inundation Overlay (LSIO) Schedule	To ensure that all development has regard for a 1 in 100 year flood event.
42.03	Significant Landscape Overlay (SLO) Schedule 3	To identify significant landscapes and conserve and enhance the character of significant landscapes.

3.2 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 Building Act sets out the legal framework for the regulation of construction of buildings, building standards and maintenance of specific building safety features in Victoria.

The Regulations are derived from the Act and contain, among other things, the requirements relating to building permits, building inspections, occupancy permits, enforcement of the Regulations, and maintenance of buildings. The Regulations adopt the NCC as a technical reference that must be complied with and this is noted in Regulation 109.

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 – 2009 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 –
- Complies with the Performance Requirements; or
- Is shown to be at least equivalent to the Deemed-to-satisfy provisions; or
c. 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 3959-2009, 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 3959-2009 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.

4 BUSHFIRE HAZARD LANDSCAPE ASSESSMENT

The landscape assessment is important to consider as it will define the context of site assessment. The Bushfire Hazard Landscape Assessment includes a plan that describes the bushfire hazard of the general locality surrounding the site (Map 1).

4.1 Surrounding Road Network

The surrounding road network is an important consideration for the resort development, to ensure appropriate egress and access during an emergency event. The site has one main entry and exit road that requires travel through managed gardens within the property and unmanaged grasslands for 4km into the township of Apollo Bay. This is deemed an appropriate entry and exit route as it does not require travel through unmanaged forest vegetation with high fuel loads.

The resort is located at 275 Barham River Road and is located 4.3km from the central township of Apollo Bay. Apollo Bay is a popular destination along the Great Ocean Road and unlike many of the towns along the Great Ocean Road it is surrounded by a significant amount of farm land and is considered to be at a lower bushfire risk than many of the towns surrounded by unmanaged forest. The road network with Apollo Bay is excellent; however, travel outside of the region requires travel through heavily forested areas.

The characteristics of the Great Ocean Road are hazardous and this is enhanced during a time of panic or distress particularly during a bushfire. It is for this reason that all emergency management documentation associated with this development will have regard for the unique characteristics of the Great Ocean Road and recommend early evacuation or advise guests and staff to remain within the township of Apollo Bay. Further advice in relation to the Emergency Management arrangements will be documented in the supporting Bushfire Emergency Management Plan.

Although the road network is considered appropriate the site has been designed to withstand the impacts of a landscape bushfire. A number of mitigations measures have been applied to the site including the following:

1. The hotel has been modeled to be exposed to low levels of radiant heat, however, has been designed to a BAL 29. This site will provide an area for occupants of the site to gather during a bushfire attack.
2. The hotel has an internal sprinkler system, a hydrant system and will have access to a static water supply.
3. Occupants will have access to an open grassland area in the event that the hotel is compromised.
4. A Bushfire Emergency Management Plan will be developed for the site.

4.2 Bushfire History of the Area

The Barwon South West Regional Strategic Fire Management Plan: Environmental Scan lists bushfire events in the Otway Ranges. The 1939 Black Friday Fires and the 1983 Ash Wednesday fires were the most significant bushfire events in the South West region of Victoria in recent history.

In 2015 the bushfires affecting Wye River and Separation Creek show how devastating bushfires can be within the forested areas of the Great Otway National Park.

The 1939 bushfires are the only fires on record to have affected the development site. The 1939 bushfires impacted the farming areas surrounding Apollo Bay and burnt a significant area of the state of Victoria. A significant drought leading up to 1939 increased the vulnerability of the surrounding landscape.

The bushfire history maps in appendix 11.2 show the extent of bushfire in the surrounding landscape since 1970. There have been a limited number of large landscape bushfires surrounding Apollo Bay. The climatic conditions of Apollo Bay are some of the wettest in the state and as a consequence the vegetation in the wider surrounding is dominated by wet schlerophyl forests and rainforest gullies. Historically landscape bushfires within these vegetation types has been very uncommon, however, with the impacts of a changing climate, some areas of Australia (ie. the west forests of Tasmania) have seen recent destruction from large landscape bushfires.

4.3 Potential Fire Behavior

Bushfire behavior is influenced by three key factors; climate, topography and fuel availability. The landscape surrounding Apollo Bay has high fuel loads and the topography of the landscape is hilly and complex. Summits are generally rounded above steep and dissecting valleys. The complex forms and multiple aspects of the topography will have a significant impact on how a bushfire behaves in the area.

There are significant areas for a bushfire to become established and build in the Great Otway National Park. Apollo Bay is one of the few townships along the Great Ocean Road with good separation from the Great Otway National Park. The landscape surrounding Apollo Bay and the proposed development is characteristic of gentle rolling hills and has been used for grazing farm animals for generations. The change is fuel load from unmanaged forest to grassland will affect the type of landscape bushfire that would impact the proposed development site.

There are a number of water ways and creek lines in the assessment area that support remnant vegetation. These areas are not significant; however, they would create flare-ups within a landscape bushfire attack. The vegetation to the north of the Resort Villa's (60 Villa's) is an area where flareups may occur. A large proportion of this vegetation falls within the Defendable Space area and thus these areas will need to be managed in accordance with Vegetation Management Conditions detailed in the Bushfire Management Plan (Section 6)

It is important to establish the landscape risk context for the development, as this will determine the methodology for assessing the site.

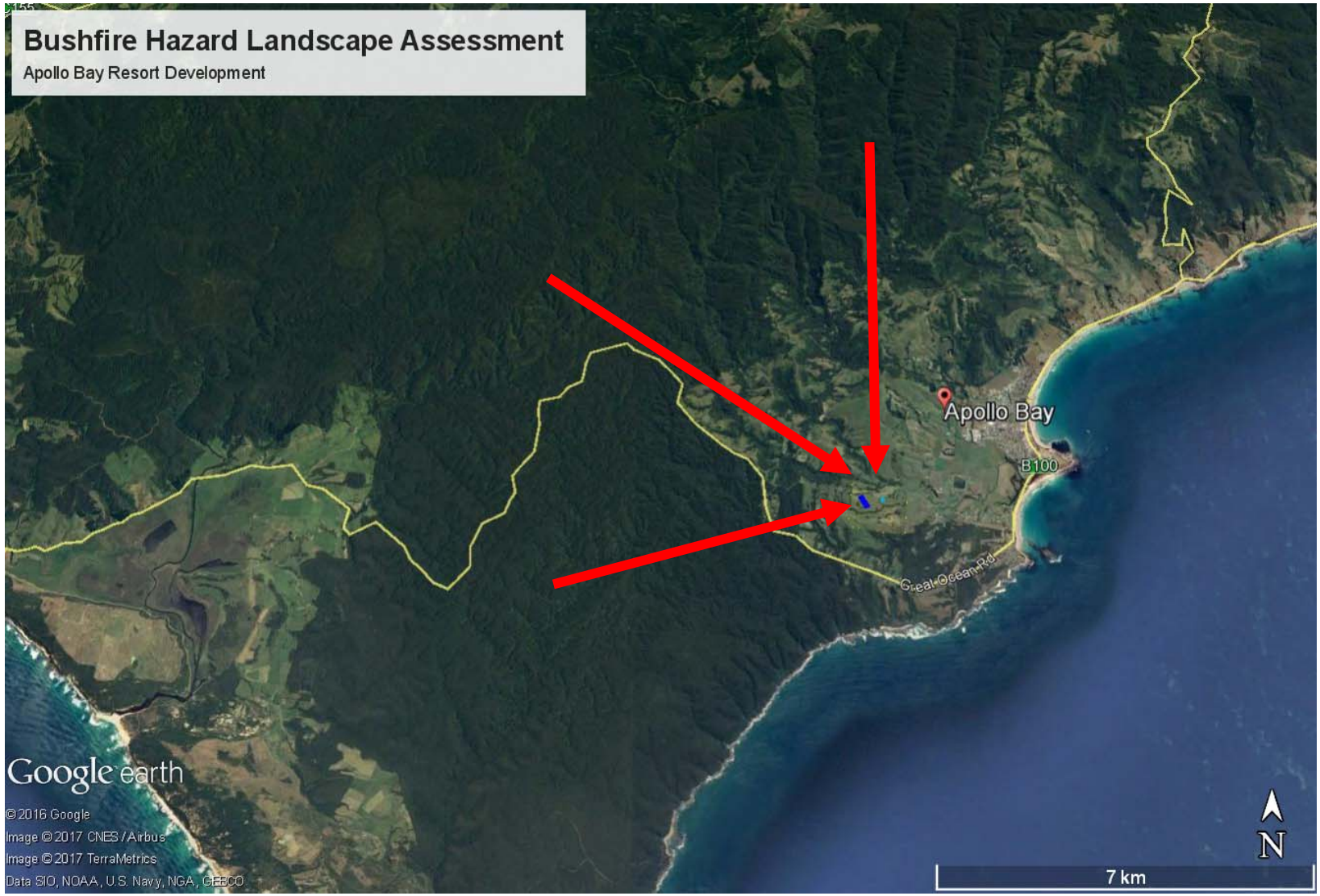
Table 2 – Bushfire attack mechanisms and appropriate inputs for models.

	Standard Assessment Inputs and Considerations	**Risk Based Assessment Inputs and Considerations**
Consideration of all bushfire mechanisms:	The AS 3959-2009 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 3959-2009 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: 1. Radiant Heat Exposure 2. Convective Heat Exposure 3. Ember Attack 4. Bushfire Induced Winds.
Analysis of the bushfire model inputs:	**1. 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 3959-2009 assumes an FFDI of 100.	The preliminary assessment has assumed an FFDI of 100 as it is the state based assumption.
	2. Flame Temperature The BMO and AS 3959-2209 assumes a flame temperature of 1090K.	Use the state-based assumption.
	3. Fuel Loads In AS 3959-2009 the assumed fuel load for 'Forest' is a total of 35 tonnes per hectare (including 25 t/ha surface fuel).	The assumed fuel loads within AS 3959-2009 for forest and grassland are deemed appropriate.

Table 3 – Bushfire Attack Mechanisms

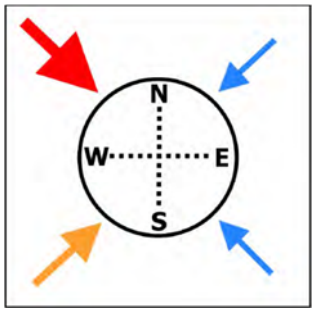
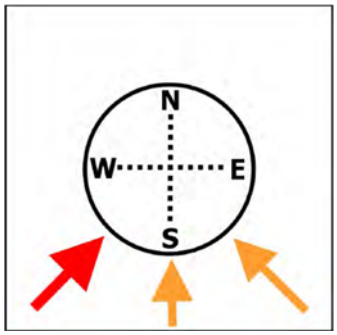
Attack Mechanism	**Sites Risk and Response**
Radiant Heat Exposure	The radiant heat exposure to the proposed development is able to be mitigated by creating a buffer zone surrounding all of the habitable structures within the site. The buffer zone which is referred to as 'defendable space' changes in accordance with the surrounding topography and classified vegetation. The radiant heat exposure to the habitable structures on site has been calculated to be between 4.5 and 9 kW/m^2. These

	exposures are below the construction requirements of a BAL of 12.5. The hotel will be exposed to low levels of radiant heat (409k/Wm^2) and will be constructed to a BAL 29.
Convective Heat Exposure	The likelihood of convection columns being developed within the site is considered moderate due to the mountainous terrain within the Great Otway National park to the north and west of the site.
Ember Attack	The edge of the unmanaged forest is approximately 1.3km from the proposed development site and thus ember attack is likely. The dominant type of bark in the surrounding forests is ribbon bark which enables embers to be launched well in advance (multiple kilometers) of a fire front.
Bushfire Induced Winds	Due to the nature of the surrounding topography the bushfire inducted winds surrounding the proposed development are likely to be extreme.



Map 1 – Bushfire Hazard Landscape Assessment

Table 4 – Bushfire Scenarios

Bushfire Scenario	Description	Site Response
North 	North of the site the vegetation is dominated by grasslands. There are a number of trees in boundary plantings and narrow strips of trees in creek lines, however, these would not enable a significant fire front to develop.	The site is able to provide defendable space for 50m to the north. The radiant heat exposure from grasslands to the north is 4.5 kW/m. This level of exposure is well within tolerable levels.
East	East of the property are extensive areas of grasslands and the developed area of Marengo.	The east does not present as a significant threat.
South 	South of the site the dominant vegetation type within the property boundary is grasslands. Beyond the property boundary are areas of forest on the southern side of the Great Ocean Road.	The site is able provide significant areas of defendable space to the south. The ocean is 3km to the south of the proposed development.
West	North West of the site is considered to be the greatest bushfire hazard in the form of the Great Otway National Park. The unmanaged forest is approximately 1.3km from the site and allows for a continuous fire run of over 20km.	There is an upslope to the west which decreases the intensity at which a bushfire will impact the site. There is over 1.3km of grassland vegetation between the development site and the unmanaged forest vegetation. The site is able to provide defendable space of 35m to the west which allows for a radiant heat exposure of 5.4kW/m^2.

4.4 Landscape Type

The determination of landscape type is a requirement of Clause 52.47 as a simplified method to establish landscape context.

The surrounding landscape is characteristic of the 'Broader Landscape Type Three' as per *Planning Practice Note 65* (DTPLI 2014).

Table 5 – Broader Landscape Type Justification

Broader Landscape Type Three Description	Sites Response
The type and extent of vegetation located more than 150m from the site may result in neighborhood-scale destruction as it interacts with the bushfire hazard on and close to a site.	There are significant areas of unmanaged vegetation surrounding the site in the form of forest and grassland.
Bushfire can approach from more than one aspect.	A bushfire can approach from the north, west and south west.
The site is located in an area that is not managed in a minimum fuel condition.	The area surrounding the site is largely classified as grasslands, however, there are small fragmented areas of forest. In the wider landscape there are significant areas of unmanaged forest with high fuel loads.
Access to an appropriate place that provides shelter from bushfire is not certain.	Access to an appropriate place that provides shelter from bushfire is highly likely as the hotel development has been constructed to a BAL of 29 with low radiant heat exposures. The landscaping of the site will incorporate an area of defendable space surrounding all development to ensure low radiant heat exposures.

5 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 3959-2009 Construction of buildings in bushfire prone areas (Standards Australia) excluding paragraph (a) of section 2.2.3.2 (Vegetation Exclusions).

5.1 Site Details

Address:	275 Barham River Rd, Apollo Bay 3233
Municipality:	Colac Otway Shire
BMO Schedule:	N/A
Existing Dwellings:	Vacant Land
Private Bushfire Shelter:	N/A
Application Pathway:	Clause 52.47-2
Assessment Date:	6/04/15
Assessor(s):	Kylie Steel

5.2 Site Overview

The development proposes a number of different developments across the site and the risk profile for each development is slightly different based on surrounding vegetation types, topography of the immediate surrounds and the aspect.

The site has 3 different zones for analysis and these include:

1. The northern development including the hotel, the 11 Hotel Villas to the north west corner and the 11 Hotel Villa's around the dam.
2. The southern development including 60 Resort Villa's, and
3. The Staff and maintenance facilities.

The site is largely surrounded by rolling hills and grassland is the dominant vegetation type. Based on this vegetation classification, defendable space objectives can be met in accordance with table 3 Clause 52.47-3.

5.3 Vegetation

The vegetation within the 150 meter assessment area was classified according to method 1 in AS 3959-2009 for the purposes of this preliminary assessment. The assumed forest fuel loads have the potential to increase with a detailed assessment.

The method 1 assessment in AS 3959-2009 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

Forest	**AS 3959-2009 Description** *Trees 10-30 meters high; 30-70% foliage cover; (may include understorey of sclerophyllous low trees and tall scrubs or grass). Typically dominated by eucalypts.* The assumed fuel load for forest in AS 3959 is 25 t/ha ground fuel and 35 t/ha overall fuel, these assumed fuel loads are considered appropriate. **Site Description** There are areas of forest in the gullies to the north west and south. To the south east of the site are areas of plantation forests. These forested areas fall outside of the assessment zone.
Low Threat Vegetation	**Low-threat Vegetation as described in *Planning Practice Note 65 (DPCD).*** e) *Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.* f) *Low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.* **Site Description** The majority of the development site will be managed as low threat vegetation. The areas surrounding the built infrastructure, the defendable space zones and the access routes will be managed to a low threat zone.
Grassland	**AS 3959-2009 Description** *All forms, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%.*

Site Description

The surrounding farmland is considered to be grassland. The farm land is not consistently managed to a low fuel load (low threat grassland is considered grassland cropped to a nominal height of 100mm).

Figure 1 – Grassland on the site looking north west.

Figure 2 – Grassland on the site looking east.

	Figure 3 – Grassland on the site looking east. 

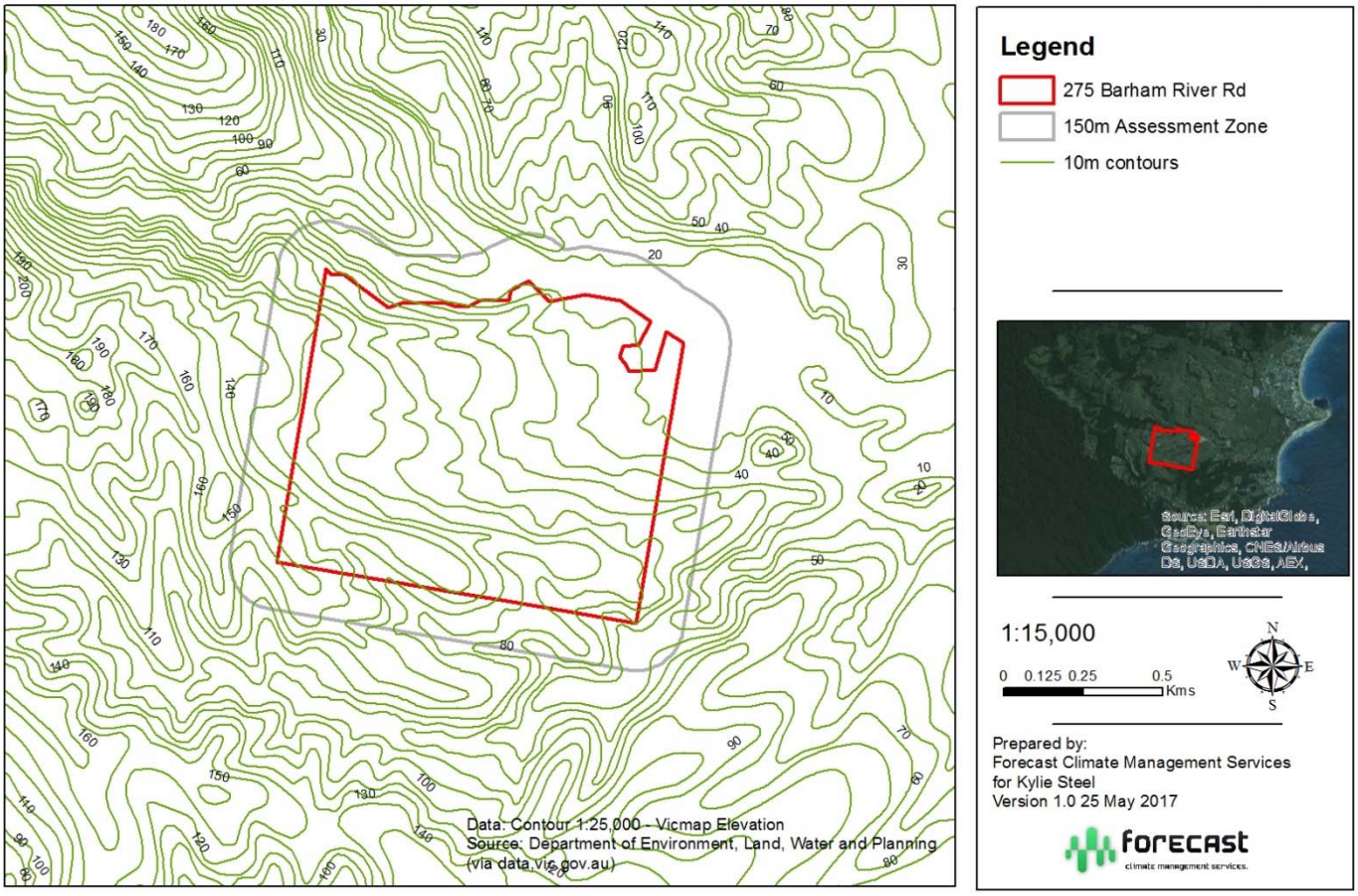
5.4 Topography

The topography of the site is gently undulating hills. There is a drainage line through the middle of the property and a dam to the west of the property to capture rainwater off the surrounding landscape.

The topography of the site within the property boundary would not significantly influence a bushfire as the slopes are generally between 5 and 10 degrees, with the dominant vegetation being grassland which is particularly influenced by wind speed rather than topography.

The slopes to the north, west and south of the site increase in steepness and there are a number of gullies with high fuel loads. These areas would increase a bushfires ability to impact the site through the forested or vegetated gullies. The topography of the wider landscape would enable embers to be launched; however, there are not significant stands of vegetation in close proximity to cause ember storms in the surrounding landscape.

275 Barham River Road - Topography of surrounding landscape



5.5 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. The BAL is also the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire.

The highest BAL determines the construction requirements for the dwelling. A reduction of one BAL level may be applied if facades of the house are shielded from the bushfire hazard. Due to the use of this site shielding is not appropriate.

The CSIRO BAL calculator was used to determine exact radiant heat exposures (Table 7). The range of expected radiant heat exposures to the proposed development have been calculated using a Method 2 BAL calculator and have not been calculated to exceed 10kW/m^2.

The construction requirements for the proposed development have thus been nominated as BAL 12.5. A BAL of 12.5 assumes that under the state based weather assumptions for a high bushfire risk day a structure built to a BAL of 12.5 should be able to withstand radiant heat exposures of 12.5kW/m^2.

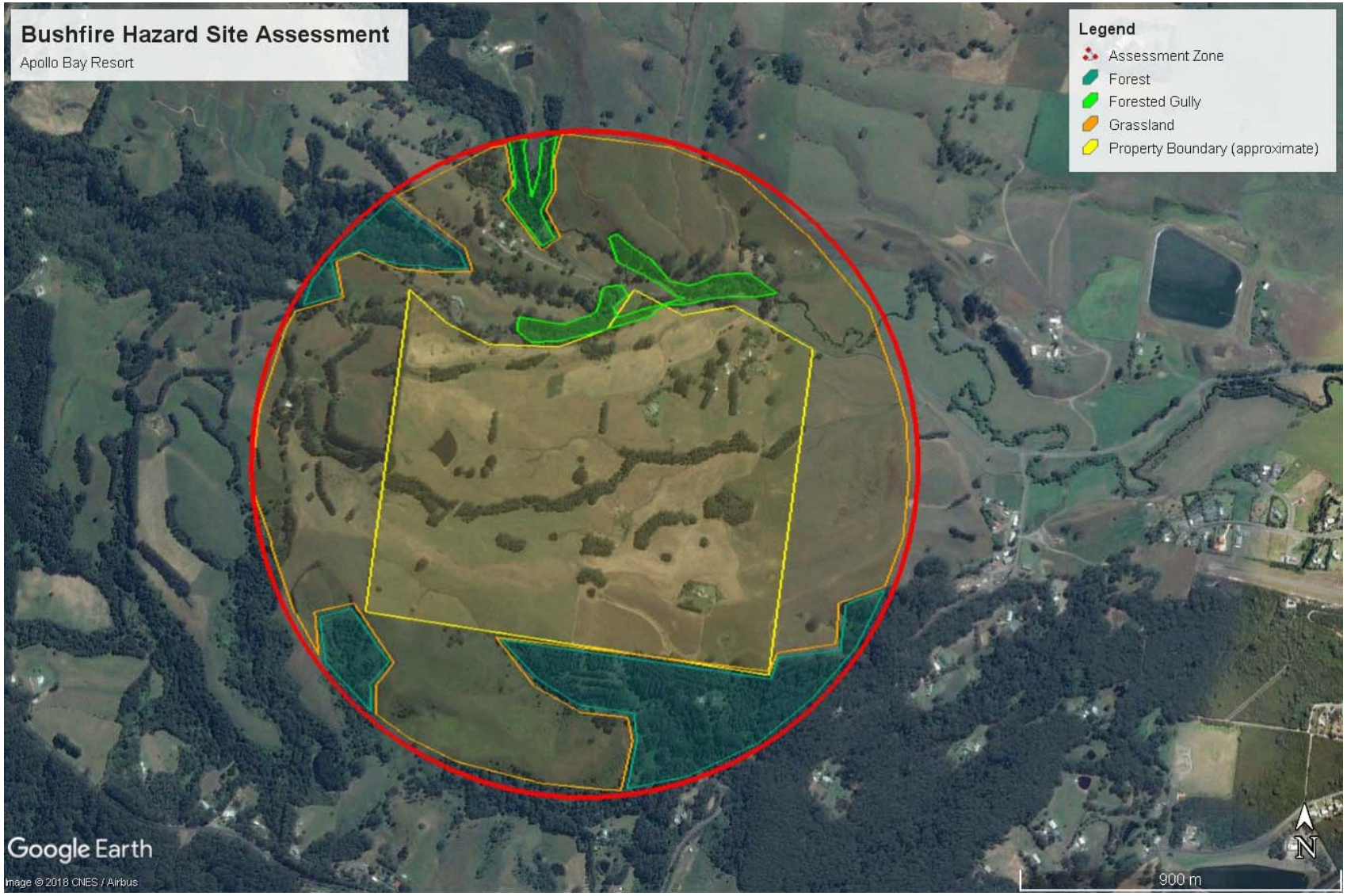
The defendable space distances surrounding the resort layout (as per drawings TP_006-F) are detailed in map 2 below. The associated defendable space distances are detailed in the bushfire management plan section 6 of this document.

The vegetation within the resort boundary is expected to be managed to a low threat condition to ensure access through the site is appropriate in the event of a bushfire. Areas designated as Defendable Space will be managed as per the vegetation management conditions in the Bushfire Management Plan (section 6).

All development within the site can meet a BAL of low and all development with the exception of the hotel will be constructed to a BAL of 12.5 in accordance with AS 3959-2009. The hotel will be constructed to a BAL of 29 as this building will be used as an emergency assembly area in the event of a bushfire and construction to a BAL of 29 will increase the buildings ability to mitigate the surrounding bushfire hazards.

Table 7 – Defendable space setback distances from the property boundary to aid placement of development. These setbacks are detailed in map 2 below.

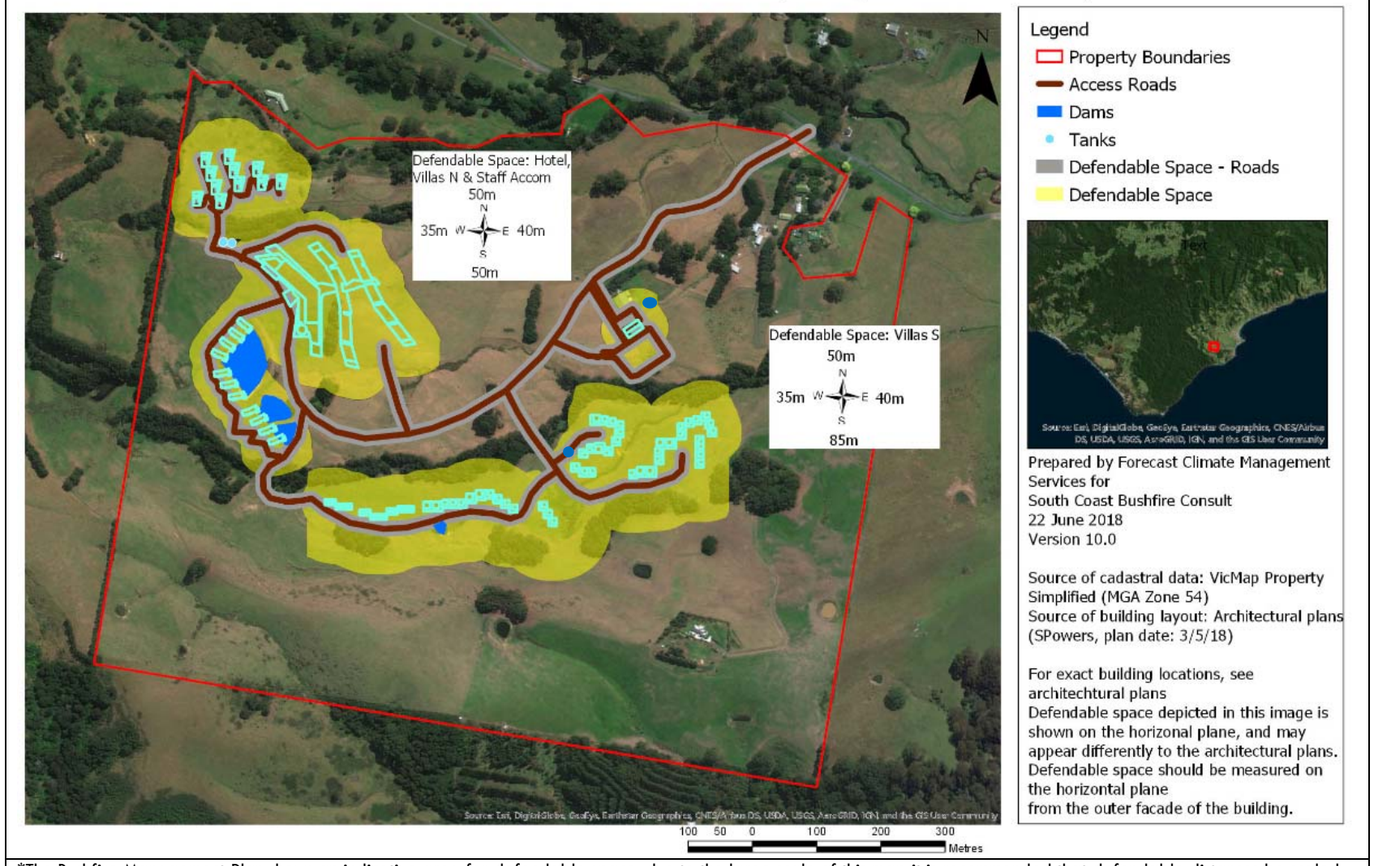
Aspect	Classified Vegetation	Slope under Classified Vegetation	Defendable Space	Radiant Heat exposure in kW/m^2	BAL – Construction Requirement
North	Grassland	0-5˚	50m	4.6 kW/m	12.5
North East	Grassland	0-5˚	40m	6.2 kW/m	12.5
East	Grassland	0-5˚	40m	6.2 kW/m	12.5
South East	Forest	5-10˚	85m	8.7 kW/m	12.5
South (Western side of site)	Grassland	0-5˚	40m	6.2 kW/m	12.5
West	Grassland	Upslope	35m	5.4 kW/m	12.5



Map 2 – Defendable Space Distances from Property Boundaries.

6 BUSHFIRE MANAGEMENT PLAN

(Prepared By – SCB Consultants 8th May 2018)



*The Bushfire Management Plan shows an indicative area for defendable space, due to the large scale of this map it is recommended that defendable distances be scaled from individual buildings on architectural plans.

Construction – All buildings will be constructed to a minimum **BAL-12.5.**

Defendable space

An area of defendable space for the designated BAL around the proposed building / or to the property boundary where vegetation (and other flammable materials) will be modified and managed in accordance with the following requirements:

- 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 meters of a building, flammable objects must not be located close to the vulnerable parts of the building.
- Plants greater than 10 cm in height must not be placed within 3m 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 5sq. metres in area and must be separated by at least 5 metres.
- Trees must not overhang or touch any elements of the building.
- Trees will be separated to ensure that canopy to canopy ignitions are prevented, the tree canopy separation distance will meet the objectives of defendable space and the distance between canopies will be negotiated with CFA.
- There must be a clearance of at least 2 metres between the lowest tree branches and ground level.

Water Supply

The site is required to have a water supply of a capacity determined by CFA. At the time of submission the water supply for the development had not been advised.

The water supply must:

- Is stored in an above ground water tank constructed of concrete or metal.
- All fixed above-ground water pipes and fittings required for fire fighting purposes must be made of corrosive resistant metal.
- Incorporate a ball or gate valve (British Standard Pipe (BSP) 65mm) and coupling (64mm CFA 3 thread per inch male fitting).
- The outlet/s of the water tank must be within 4m of the accessway and be unobstructed.
- Be readily identifiable from the building or appropriate identification signage to the satisfaction of CFA must be provided.

Any pipework and fittings must be a minimum of 65mm (excluding the CFA coupling).

Access

Where the access is greater than 30m the following design and construction requirements apply:

- All-weather construction.
- A load limit of at least 15 tonnes.
- Provide a minimum trafficable width of 3.5 meters.
- Be clear of encroachments for at least 0.5 meters on each side and at least 4 meters vertically.
- Curves must have a minimum inner radius of 10 meters.
- The average grade must be no more than 1 in 7 (14.4%) with a maximum grade of no more than 1 in 5 (20%) for no more than 50 meters.

Where the driveway is in greater than 100 meters the following design and construction requirements also apply:

- A turning circle with a minimum radius of 8 meters.
- A driveway encircling the dwelling.
- The provision of other vehicle turning heads – such as a T or Y head – which meet the specification of Austroad Design for an 8.8m Service Vehicle.

Where the length of access is greater than 200m the following requirements apply:

- Passing bays must be provided at least every 200m and must be a minimum of 20m long with a minimum trafficable width of 6m.

7 BUSHFIRE MANAGEMENT STATEMENT

Clause 52.47 contains a range of sub clauses with objectives, approved measures (AM), alternative measures (AltM) and decision guidelines. The table below details which clauses are relevant to this application. The following section demonstrates how the development responds to each of these sections.

Table 8 – Summary of relevant sections of Clause 52.47.

Clause	Approved Measure	Achieved	Justification
Clause 52.47-1 – Dwellings in existing settlements – Bushfire protection objective	AM 1.1	Not Applicable	Not an existing settlement
	AM 1.2	Not Applicable	
	AM 1.3	Not Applicable	
Clause 52.47-2.1 Landscape, siting and design objectives	AM 2.1	Applicable	Applicable
	AM 2.2	Applicable	Applicable
	AM 2.3	Applicable	Applicable
Clause 52.47-2.2 Landscape, siting and design objectives	AM 3.1	Not Applicable	This AM is for a dwelling.
	AM 3.2	Applicable	Applicable
	AltM 3.3	Applicable	Defendable space is within the property boundary
	AltM 3.4	Applicable	Defendable space has also been calculated using a method 2 assessment as a precautionary measure.
	AltM 3.5	Not Applicable	Not for a dwelling.
	AltM 3.6	Not Applicable	Not required as AM 3.2 can be achieved.
Clause 52.47-2.3 Landscape, siting and design objectives	AM 4.1	Not Applicable	
	AM 4.2	Applicable	Site can meet water requirements.
Clause 52.47-2.4 Subdivision objectives	AM 5.1	Not Applicable	Development is not a subdivision
	AM 5.2	Not Applicable	
	AM 5.3	Not Applicable	
	AM 5.4	Not Applicable	
	AM 5.5	Not Applicable	

52.47-2.1 Landscape, siting and design objectives

Development is appropriate having regard to the nature of the bushfire risk arising from the surrounding landscape.

Development is sited to minimise the risk from bushfire.

Development is sited to provide safe access for vehicles, including emergency vehicles.

Building design minimises vulnerability to bushfire attack.

Approved Measure	Requirement
AM 2.1	**The bushfire risk to the development from the landscape beyond the site can be mitigated to an acceptable level.** **Response:** The landscape beyond the 150m assessment has a high bushfire risk. The immediate surrounds for over 1km are dominated by grasslands and this will be the likely impact to the site under extreme bushfire conditions. The forest vegetation to the south west is considered the greatest threat and there is over 1.5km to the unmanaged forest vegetation to the south west. The site is able to provide significant areas of defendable space in accordance with table 3 to clause 52.47-3. These areas of defendable space enable radiant heat exposures to be less than 10kw/m^2. The bushfire hazard landscape assessment within this document looks in detail at the landscape risk and how the proposed development is able to mitigate these risks. The Resort will establish a 'Bushfire Emergency Management Plan' and have appropriate levels of water storage on site to mitigate a landscape bushfire attack. The development is within 4.3km of the main township of Apollo Bay and the access to the township is through grassland vegetation along a creek line.
AM 2.2	**A building is sited to ensure the site best achieves the following:** • **The maximum separation distance between the building and the bushfire hazard.** • **The building is in close proximity to a public road.** • **Access can be provided to the building for emergency service vehicles.** **Response:** The development is able to meet defendable space objectives for all habitable structures within the development. The surrounding landscape

risk has been considered and a conservative approach has been taken to determining the defendable space distances.

A method 2 BAL calculation has been undertaken using the CSIRO BAL calculator to establish a more accurate reflection of the radiant heat exposure to the development and the exposures are all below 10kW/m^2, which is well below the tolerability of materials used within a BAL 12.5 compliant structure.

The access roads within the site will be gravel roads and will enable access for emergency service vehicles. There will be passing bays and adequate turning facilities.

The resort will access Barham River Road which is a sealed road that runs along the river to the north east of the site.

AM 2.3 **A building is designed to reduce the accumulation of debris and entry of embers.**

Response:

The Villa's, staff accommodation and maintenance facilities will be constructed to a BAL of 12.5 and the Hotel will be constructed to a BAL of 29 in compliance with AS 3959-2009.

Ember attack is the most common cause of house loss associated with bushfire attack. The design of the structures will have regard for ember attack and attempt to minimise the points of ember entry throughout the design and construction phase of the development.

52.47-2.2 Defendable space and construction objective

Approved Measure	Requirement
AM 3.2	**A building used for accommodation (other than a dwelling or dependant person's unit), a child care centre, an education centre, a hospital, leisure and recreation or a place of assembly is:** • **Provided with defendable space in accordance with Table 3 to Clause 52.47-3 wholly within the title boundaries of the land.** • **Constructed to a bushfire attack level of BAL 12.5.** **Response:** The development is able to meet the requirements in Table 3 to Clause 52.47-3 wholly within the title boundaries. The development will be constructed to a BAL of 12.5 and 29 in accordance with AS 3959-2009.

Alternative measures

Measure	Requirement
AM 3.4	**Defendable space and the bushfire attack level is determined using Method 2 of AS 3959-2009 Construction of buildings in bushfire prone areas (Standards Australia) subject to any guidance published by the relevant fire authority.** **Response:** The defendable space calculations in this report have been calculated from table 3 in Clause 52.47-3. A method 2 BAL assessment using the CSIRO calculator has been used to determine the exact radiant heat exposures to the proposed structures as precautionary measure.

52.47-2.3 Water supply and access objectives

Approved Measure	Requirement
AM 4.2	**A building used for accommodation (other than a dwelling or dependent person's unit), child care centre, education centre, hospital, leisure and recreation or place of assembly is provided with:** • **A static water supply for fire fighting and property protection purposes of 10,000 litres per 1,500 square meters of floor space up to 40,000 litres.**

- **Vehicle access that is designed and constructed as specified in Table 5 to Clause 52.47-3.**
- **An integrated approach to risk management that ensures the water supply and access arrangements will be effective based on the characteristics of the likely future occupants including their age, mobility and capacity to evacuate during a bushfire emergency.**

The water supply may be in the same tank as other water supplies provided that a separate outlet is reserved for firefighting water supplies.

Response:

It is proposed that the site will have 3 sources of static water:

1. 40,000L to the north east of the hotel.
2. 5,000L at the Staff Accommodation facility
3. 10,000L located within the Resort Villa precinct.

The CFA requires on site hydrants and hose reels to ensure coverage across all building developments. The water holding capacity required for the site and the associated water infrastructure (pumps, tanks etc.) will be determined when the development is finalized.

There are a number of dams on the property and although these static water supplies can not be used as a formal water supply they do offer an added supply of static water supply if required. The dam currently has a depth of 7m and the total holding capacity is unknown, however, it is estimated to be over 50,000L.

The final road layout on the site will need to be confirmed with the CFA with particular emphasis on passing bays, turnaround points for heavy vehicles and the location of onsite hydrants.

A 'Bushfire Emergency Management Plan' will need to be developed that is to the satisfaction of the relevant referral authorities for this site.

8 RESPONSE TO CLAUSE 13.05 – ENVIRONMENTAL RISK – BUSHFIRE

8.1 Demonstrate the Protection of Human Life

Bushfire planning policy at Clause 13.05-1 of the Colac Otway Planning Scheme gives priority to the *Protection of Human Life*.

The proposal is considered against the policy strategies as follows:

Strategy	**Consideration**
Prioritising the protection of human life over all other policy considerations.	There are no conflicting policy considerations relevant to this application that represent risk to human life.
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 not a new settlement. The site is large and can manage appropriate areas of defendable space within the property boundary where human life can be protected from the effects of bushfire.

Strategy	**Consideration**
Reduce the vulnerability of communities to bushfire through the consideration of bushfire risk in decision making at all stages of the planning process.	The site is within the BMO and the details within the body of this report demonstrates the proposed development has considered the implication of bushfire risk and is appropriate.

8.2 Recommended Bushfire Mitigation Measures

The site is within the Bushfire Management Overlay (BMO) and in meeting the requirements of Clause 52.47 the development is deemed to have met the appropriate bushfire mitigation measures including:

- Apply construction standard to all development in accordance with a BAL of 12.5 for the Villas, staff accommodation and maintenance facilities and a BAL of 29 for the Hotel from AS 3959-2009.
- Meet defendable space objectives.
- Provide adequate water supply to the site for fire fighting.
- Provide appropriate access for Emergency services.
- Develop an Emergency Management Plan.

8.3 Bushfire Hazard Identification & Assessment

Bushfire planning policy at Clause 13.05-1 of the Greater Geelong Planning Scheme requires a *Bushfire Hazard Identification and Assessment.*

The proposal is considered against the policy strategies as follows:

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.
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 been applied to this site.
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 been consulted and did not raise any concerns.
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.
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.

9 EMERGENCY MANAGEMENT (EMP)

An 'Emergency Management Plan' will be required to ensure that the whole site has a holistic approach to bushfire risk. The EMP will form part of the alternative solution for the site to demonstrate that the risk has been mitigated to an acceptable level and the site meets the objective of the planning scheme to protect human life (Clause 13.05 and 44.06).

The Emergency Planning / Bushfire Emergency plans should satisfactorily address the following matters:

- The Fire Danger Rating triggers for the closure of the facility.
- Monitoring and notifying staff and visitors of forecast Fire Danger Rating and any consequential actions.
- Details of the location/s for emergency assembly, evacuation and shelter-in-place (in the event that evacuation from the site is not practicable).
- Transport arrangements for staff and visitors
- The need for any additional arrangements for persons with special needs.
- Training of staff, visitors on emergency procedures.
- The nature and frequency of emergency procedure exercises.
- Emergency procedures (bushfire action statements) including the assignment of roles and responsibilities to staff. This must include assigning responsibility for the:
    - Management and oversight of emergency procedures.
    - Training of employees in emergency procedures.
    - Reviewing the effectiveness of emergency procedure exercises and implementing procedure improvements.
    - Accounting for all persons during the emergency procedures.
    - Monitoring and review of the Emergency Plains at least annually.

10 REFERENCES

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 Transport, Planning and Local Infrastructure (2014) Planning Practice Note 65 – Preparing and Assessing a Planning Application under the Bushfire Provisions in Planning Schemes. Victorian Government, Melbourne

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.

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

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

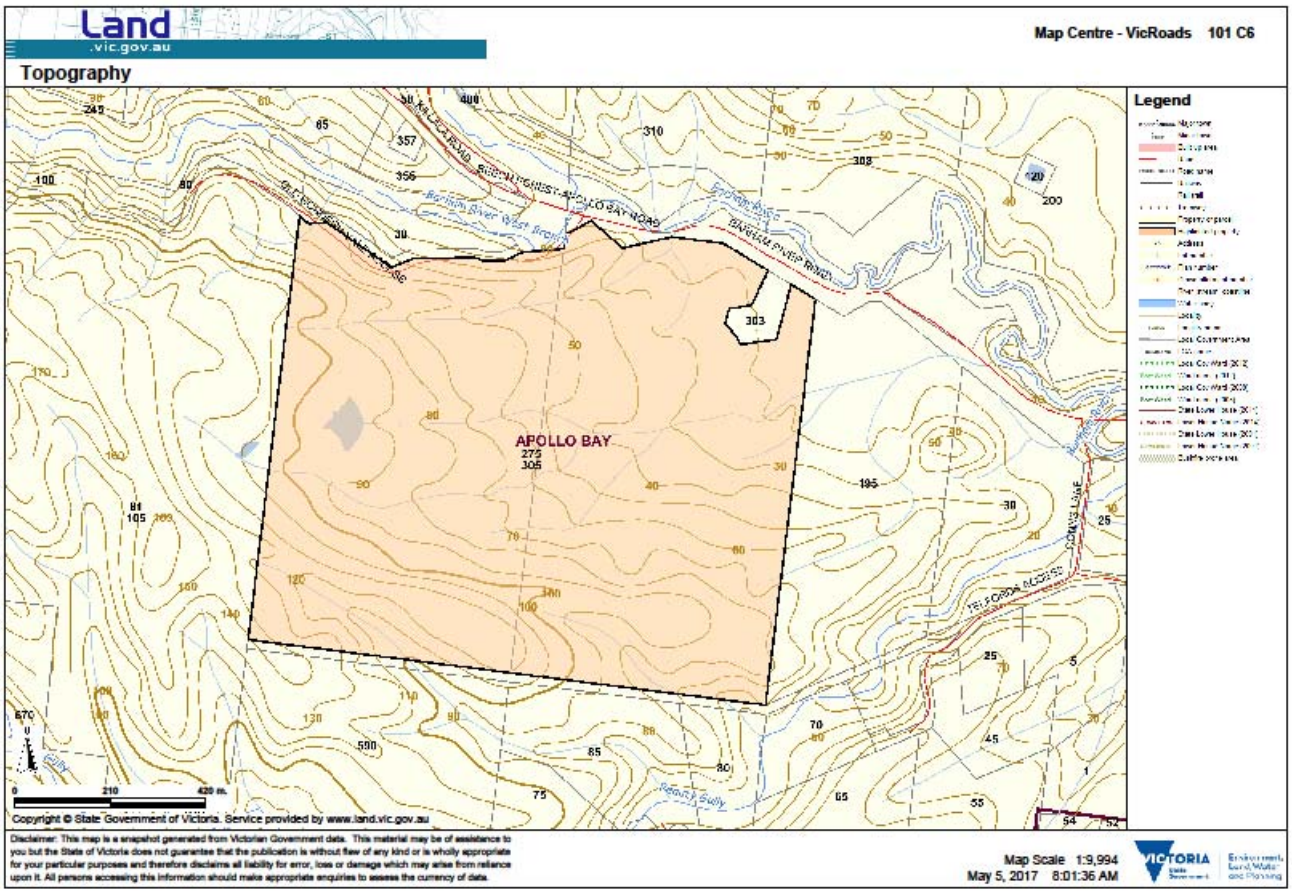
Sullivan, A.L, Ellias, P.F, Knight, I.K. (2003) A review of radiant heat flux models used in bushfire applications. International Journal of Wildland Fire 12, 101-120.

Standards Australia (2009). AS 39359-2009 Construction of Buildings in Bushfire Prone Areas. Standards Australia, North Sydney, New South Wales.

Tolhurst, K. (2014) Unpublished – Estimating reduced flame height in narrow bands of fuel.

11 APPENDICES

11.1 Topographic map from Land Channel website showing contours around the site.



11.2 Bushfire History and Prescribed Burns in the Area

(DEPI – Biodiversity Interactive Map – showing bushfire history).

The maps below show the extent of bushfire footprints surrounding Apollo Bay. Figure 2 below demonstrates the areas where prescribed burns have been undertaken, as indicated in grey. Prescribed burns are undertaken with a strategic intent to minimise the impact of a large landscape bushfire. As figure 2 indicates, there have been a limited number of prescribed burns surrounding the Apollo Bay township.

Figure 1 – Natural Bushfires in the area since 1970. Pink areas on the map indicate wildfires.

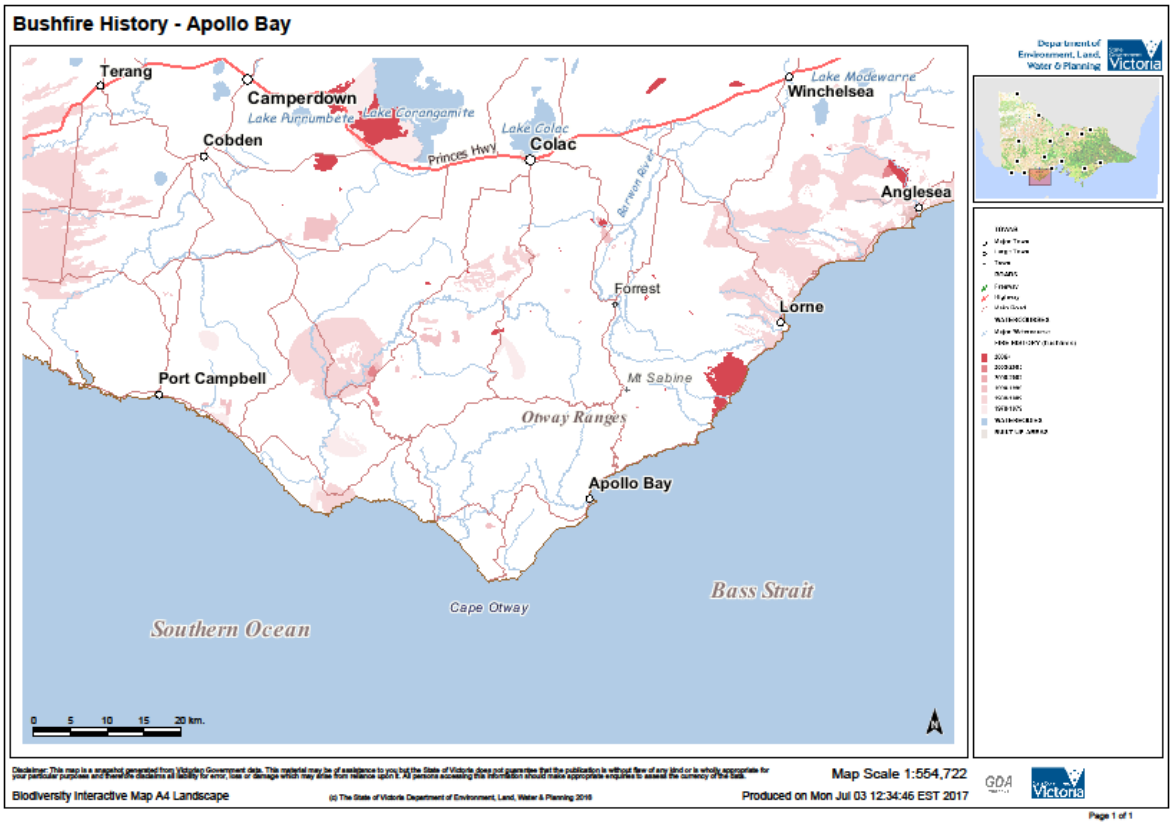
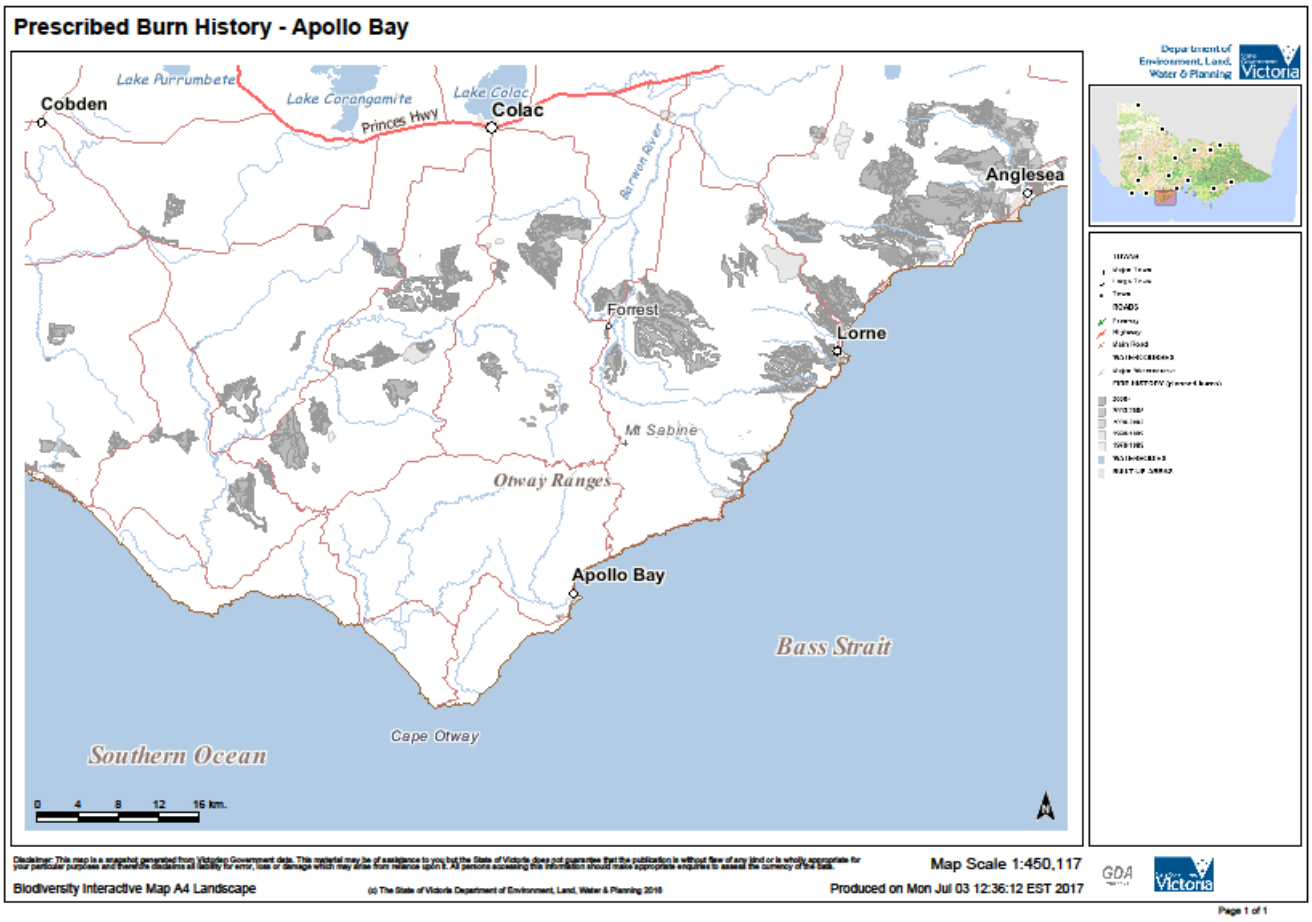


Figure 2 – Prescribed Burn History.



11.3 Bushfire Landscape Assessment

To gain a broad scale understanding of the setting in which the development is proposed a series of maps prepared by Kevin Tolhurst (2014) were assessed. These maps consider one weather scenario (FFDI 100) which is consistent with the state planning framework and AS 3959-2009. The maps are not accurate at a specific point but can give a broad landscape picture of potential fire behavior.

The maps consider the following elements of the environment; Terrain Ruggedness, Convective Strength, House Loss Probability and Ember Storm Potential.

In summary all of the maps indicate that the area surrounding Apollo Bay does not have the potential to be exposed to extreme bushfires including the development of convection columns and ember storms. The ember storm potential is low.

This model does not consider any vegetation management or mitigation measures (ie. fuel reduction burns across the state).

For the development site it is important to establish the landscape risk context, as this will determine the methodology for assessing the site. The Australian Standard AS 3959-2009 considers the radiant heat exposure (BAL) but does not specifically assess other bushfire attack mechanisms in detail. Due to the nature of the landscape risk a more detailed risk assessment in addition to AS 3959-2009 is required.

Due to the anticipated use of the site a detailed landscape risk and site analysis of all the bushfire mechanisms is required and these include:

- Direct Flame Contact
- Radiant Heat Exposure
- Convective Heat Exposure
- Bushfire Induced Winds
- Ember Attack

Table 1 – Ratings for the development site.

Variable	Rating	Description
Ruggedness	Low	The ruggedness is the difference in elevation across an area. The greater the variance the greater the ruggedness. The ruggedness influences a fires ability to project embers and for convection columns.
Convective Strength	High	The convective strength is likely to be high due to the hilliness or ruggedness of the terrain.
House Loss Probability	High	This is predicted to be high due to the proximity to large areas of unmanaged vegetation.
Ember Storm Potential	Low	Ember storm potential considers the elevations and if there are any launching sites. The hills surrounding Apollo Bay are dominated by grassland vegetation and the forested areas are set well back from the township and development site.

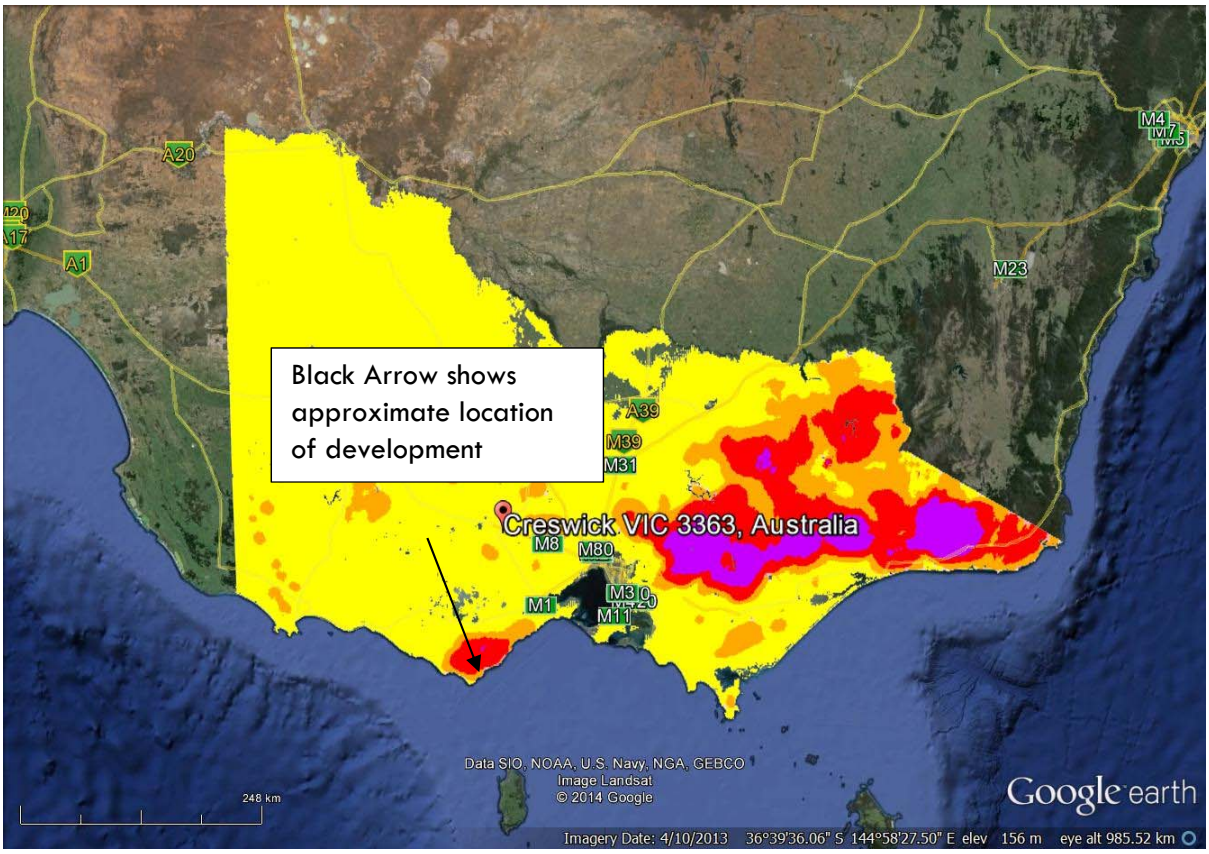


Figure 1 – Convective Strength

Rating	Size of 'forest' within 2km of site (ha)	Convective Strength (MW)
Low	<1,000	<200
Moderate	1,000-3,000	200-600
High	3,000-10,000	600-1,000
Extreme	>10,000	>1,000

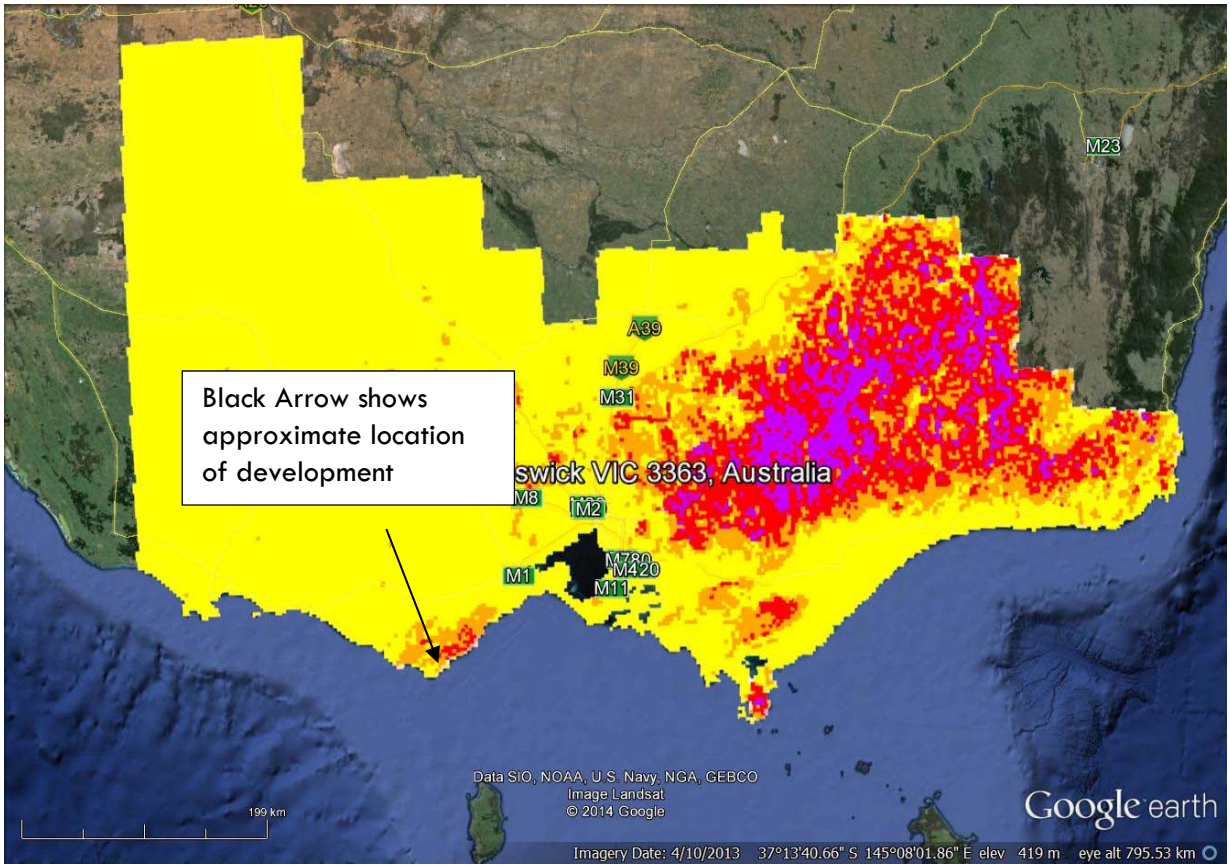


Figure 2 - Ruggedness

Rating	Elevation Range in 1500 m radius (m)
Low	0-150
Moderate	151-300
High	301-500
Extreme	>500

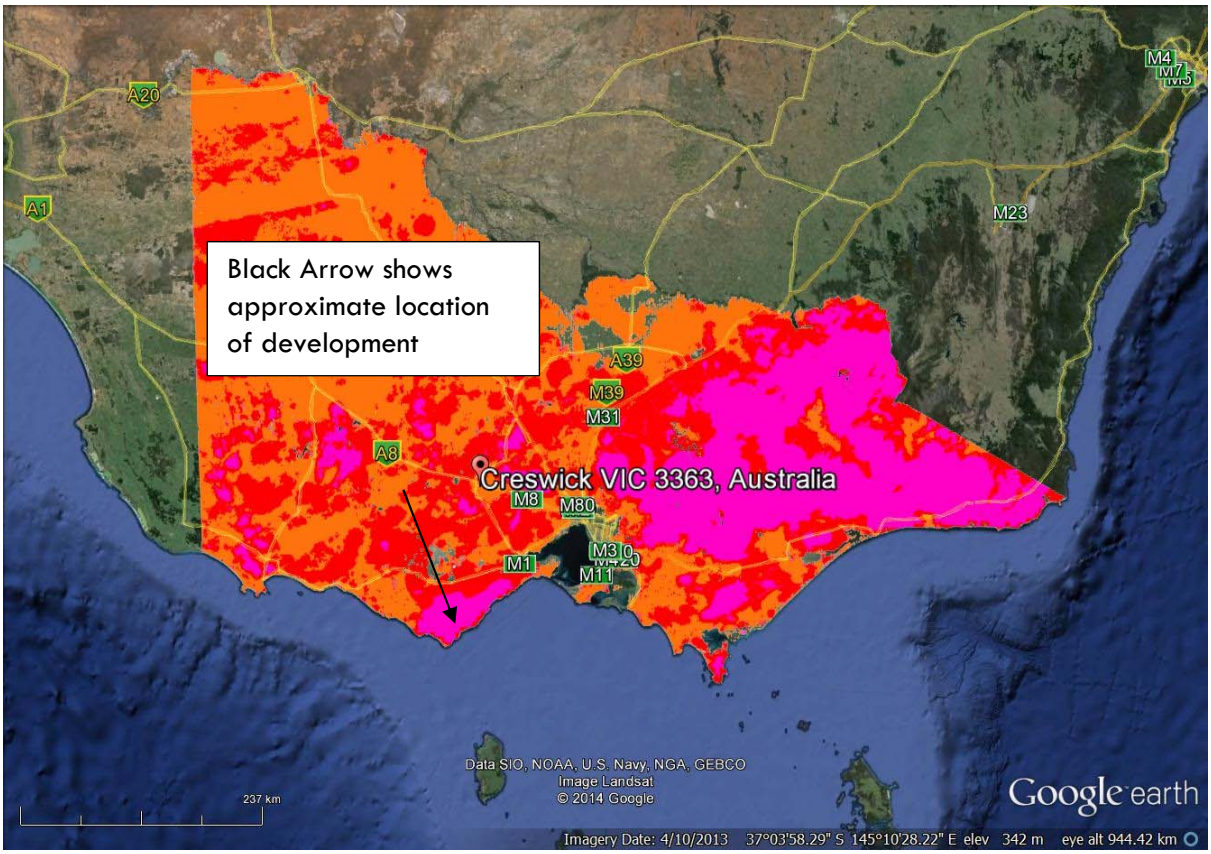


Figure 3 – House Loss Probability

Rating	Distance to Forest area >0.4 ha (m)	Computed average house loss probability (0-1)
Low	>700	<0.4
Moderate	200-700	0.4-0.6
High	50-200	0.6-0.8
Extreme	<50	>0.8

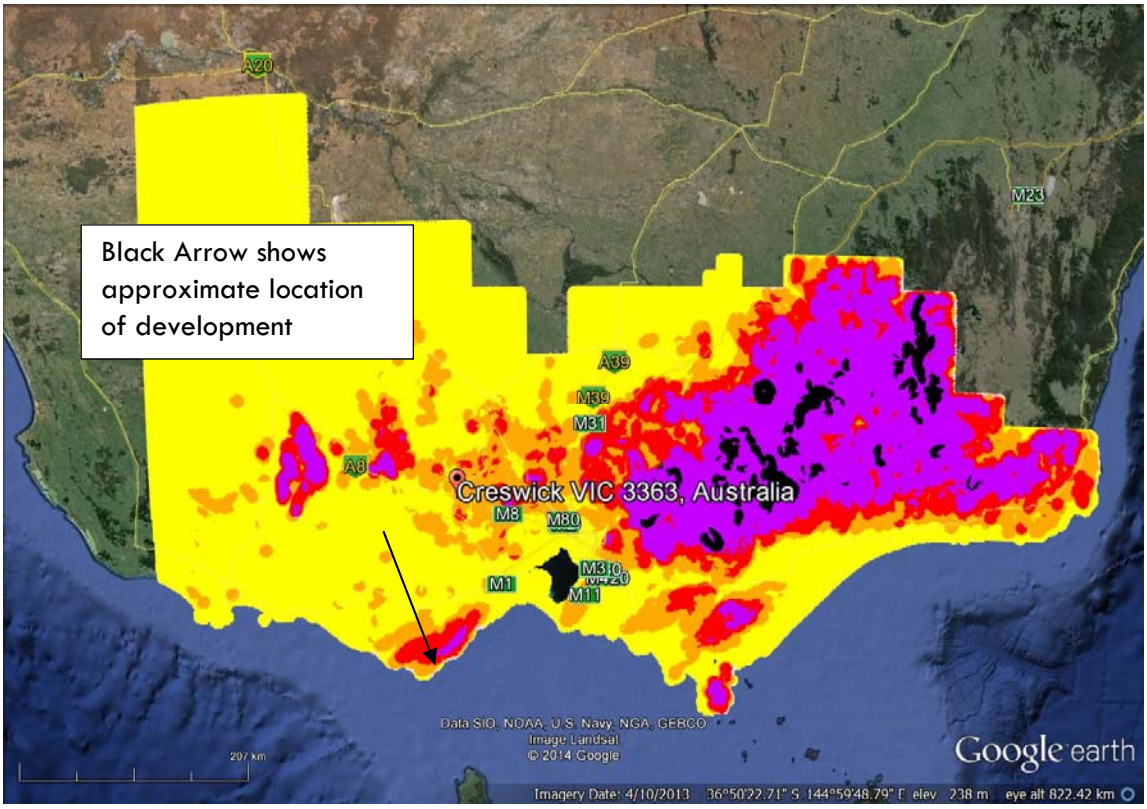


Figure 4 – Ember Storm Potential "Drop Zone"

Rating	Height of nearby hills (m)
Low	<150
Moderate	150-300
High	300-500
Extreme	>500