



Bushfire Assessment

Kosciuszko Thredbo Pty Ltd

11 April 2022

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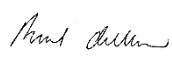
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Contents

1.	Introduction	1
1.1	Background	1
1.2	Purpose of this report	2
1.3	Scope and limitations	2
1.4	Assumptions	3
2.	Development proposal	4
2.1	Site and Planning Context	4
2.2	Legal framework	4
2.3	Proposal details	5
3.	Bushfire Assessment	7
3.1	Bushfire Prone Land classification	7
3.2	Fire weather	7
3.3	Vegetation	8
3.4	Effective slope	9
3.5	Bushfire Attack Level Assessment	9
4.	Compliance with Planning for Bushfire Protection	10
5.	Conclusions	14
5.1	Recommendations for compliance with Performance Criteria	15
6.	References	16

1. Introduction

1.1 Background

The development site is the Thredbo Alpine Hotel (TAH) located at 17 Friday Drive, Thredbo NSW 2625, an existing hotel undergoing routine external maintenance works to preserve and protect the exterior cladding material. The property identification is Lot 861 DP 1128686 (Figure 1.1). The location of the property is indicated by yellow dashed line on Figure 1.1.

The TAH was constructed in stages from the late 1960s to 1980s and the existing native hardwood cladding has deteriorated over recent years, with significant areas of cladding requiring replacement. Despite the fact that the proposed cladding replacement would be considered routine maintenance, Kosciuszko Thredbo Pty Ltd (hereafter KT) are obliged to seek Development Consent from the Department of Planning and Environment (DPE) as DPE are of the view that the TAH does not meet the Deemed to Satisfy provisions of the Building Code of Australia (BCA) and therefore do not qualify as exempt development under Chapter 4, Section 4.17 of the State Environmental Planning Policy (Precincts – Regional) 2021 (Regional Precincts SEPP).

When referenced within this report, the following applies:

- **TAH** refers to the entire building subject to the assessment (including the main Hotel building/tourist accommodation, retail and hospitality businesses and the information centre)
- **Main Hotel** refers to the main tourist accommodation area of the building.

The main Hotel provides tourist accommodation and is located within a designated bush fire prone area. Tourist accommodation is classed 'special fire protection purpose' under the provisions of the Rural Fires Act 1997.

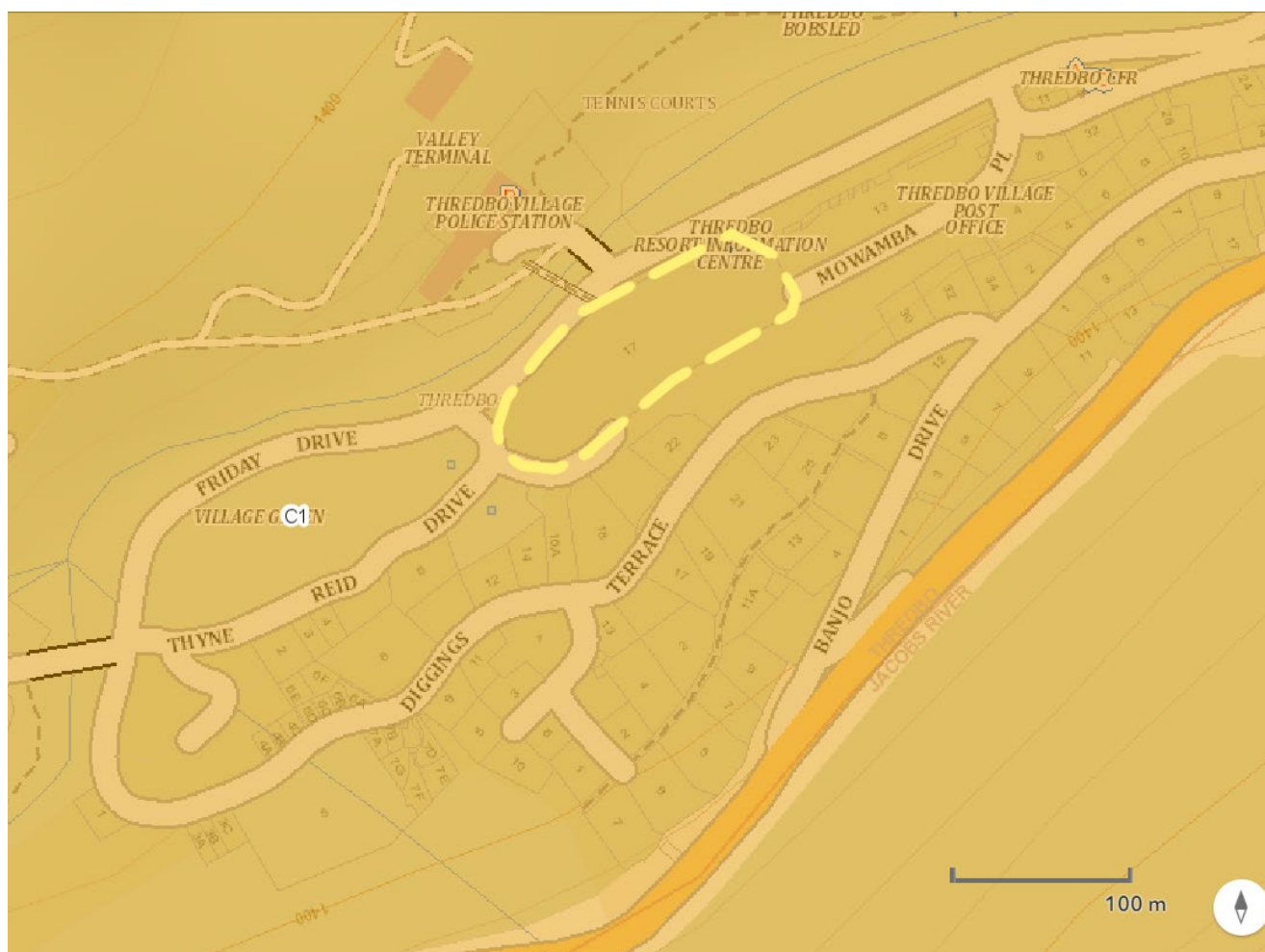


Figure 1-1 Site location and zoning (ePlanning Spatial Viewer, 2021)

The arrangement of buildings on the Thredbo Alpine Hotel site is depicted in Figure 1.2.

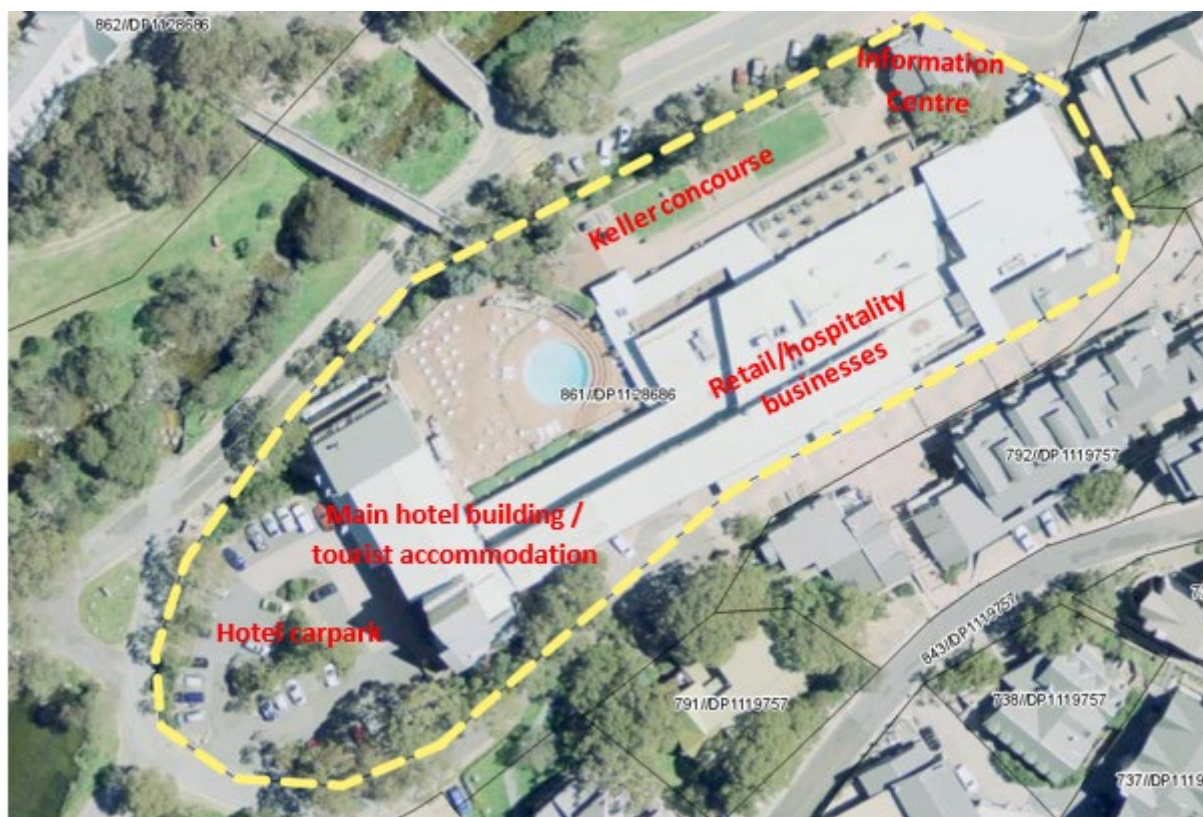


Figure 1.2 Thredbo Alpine Hotel main building location

1.2 Purpose of this report

This report forms part of a Statement of Environmental Effects (SEE) that has been prepared to accompany a development application (DA) to seek development consent for the proposal. The SEE has been prepared to address the matters for consideration under Section 4.15 of the Environmental Planning and Assessment Act 1979 and has considered the provisions of other relevant Acts, Regulations and Environmental Planning Instruments. It assesses the potential bushfire impacts of the proposal and recommends mitigation measures to minimise impacts from bushfire events and protect the environment.

1.3 Scope and limitations

This report has been prepared by GHD for Kosciuszko Thredbo Pty Ltd and may only be used and relied on by KT for the purpose agreed between GHD and Kosciuszko Thredbo Pty Ltd as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Kosciuszko Thredbo Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report based on information provided by Kosciuszko Thredbo Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.4 Assumptions

Assumptions made by GHD when undertaking services and preparing this report include (but are not limited to):

- The proposal has been assessed based on the plans contained in the report.
- The impacts of the proposal would be as presented in this report.
- The proposal has been assessed assuming the implementation of the safeguards and mitigation measures detailed in this report.

2. Development proposal

2.1 Site and Planning Context

The site is in Snowy Monaro Regional Council Local Government Area (LGA) in southern NSW. The property is situated on leasehold land within Kosciuszko National Park. The Regional Precincts SEPP applies to the site. The site is within the “Thredbo Alpine Resort”. The TAH has existed on the site since its original construction (staged construction commenced in the 1960s), and is consistent with ‘tourist accommodation’ land use which is permitted with consent under Section 4.9 (Land Use Table) of the Regional Precincts SEPP. The TAH was initially constructed in 1961-62 and has been subject to expansion and various maintenance projects over the past 60 years, including (but not limited to):

- 1961 – Initial design and stage 1 construction;
- 1962-63 – Stage 2 construction, including major design changes;
- 1967 – New west wing and extensive alterations to the original hotel section. Bistro terrace and northern courtyard area constructed;
- 1984 – new conference centre;
- 1990s – new colour scheme;
- 1994 – upgrade and refurbishment of the restaurants and Keller concourse, new food outlet in the eastern part;
- 1994 – Thredbo Information Centre;
- 2000 – upgrade of lounge bar and surrounding area after fire; and
- 2019 – refurbishment of poolside terrace and poolside bar upgrade works, erection of roof over bistro terrace

The land on which the proposed development is situated is bushfire prone land (as determined and mapped by the NSW Rural Fire Service (RFS)).

2.2 Legal framework

Development in bushfire prone areas must comply with Planning for Bush Fire Protection 2019 (PBP 2019) (NSW RFS, 2019). Tourist accommodation is classified as Special Fire Protection Purpose (SFPP) development under PBP 2019 and requires a Bush Fire Safety Authority (BFSA) from the NSW RFS. However, **under Section 6.3 of PBP 2019, the proposed works are properly classifiable as “minor non-structural building alterations (external)” which specifically includes external cladding and painting work and replacement of external windows. As specifically stated in PBP 2019, the NSW RFS considers that a Bush Fire Safety Authority is NOT necessary for minor non-structural building alterations (external). This was confirmed with RFS during the pre-DA process, with RFS advising that it is a matter for the Consent Authority (DPE) to decide if they want to refer the DA to RFS for issue of a BFSA, noting however that this is not required by PBP 2019.**

A DA must demonstrate how the development complies with the PBP 2019. Further to this, building work on bush fire prone land must comply with the requirements of the National Construction Code (NCC). Under the Deemed to Satisfy provisions of the NCC building work on bush fire prone land must comply with AS3959:2018 Construction of buildings in bushfire-prone areas (AS3959) or the National Association of Steel Framed Housing (2014) Steel Framed Construction in Bush Fire Areas (NASH Standard).

2.3 Proposal details

The site is identified as the TAH. The TAH is centrally located within Thredbo Village, providing a range of retail, food and beverage and hospitality venues and hotel accommodation that supports and provides services to resort guests. The building is an uneven 'U' shape, with the Keller concourse located in the centre of the building, facing north towards the ski slopes. The building sits on a sloped site providing several access points at different levels.

The overall form is characterised by sloping roofs, with the long span roof of the main building and the central atrium being its strongest form.

The purpose of the recladding project (the development) is to replace deteriorated and rotting native hardwood cladding which will improve the longevity of the building whilst retaining the original aesthetic design of the building. It will also provide a better bush fire protection outcome from the existing situation by reducing vulnerability to ember attack.

Proposed works comprise the removal of existing native hardwood cladding and replacement with a like-for-like timber product.

As part of the works, some windows may require replacement if it is determined necessary upon removal of cladding and frames. Where this is required, new windows will comply with *Australian Standard 3959:2018 Construction of buildings in bushfire-prone areas*.

The Proposal involves the following key components:

- Removal and disposal of existing deteriorated painted hardwood external cladding;
- Replacement with new painted hardwood external cladding;
- Repairs as required to deteriorated fittings and fixtures on or connected to the external cladding.

A whole-of-site level plan of the Proposal is shown in Figure 2-1.



Figure 2-1 Whole of site plan showing planned location within the site of the proposed works

3. Bushfire Assessment

3.1 Bushfire Prone Land classification

The site is classified as bushfire prone land being depicted as such on the NSW Government's ePlanning Spatial Viewer (Figure 3-1). GHD notes the entire Thredbo Village and immediate surrounds, including all built assets, including the TAH, the golf course, ski runs and surrounding vegetation are currently depicted on the ePlanning Spatial Viewer as Vegetation Category 1 (in contrast to earlier bushfire prone mapping which differentiated between Vegetation Category 1, 2, 3 and bushfire prone buffer areas within the Thredbo Alpine Village and surrounds).



Figure 3-1 Bushfire Prone Land Mapping (ePlanning Spatial Viewer, 2022)

3.2 Fire weather

The site is in Snowy Monaro Regional Council LGA which falls within the Monaro Alpine fire weather district (RFS, 2017) for the purpose of determining the Forest Fire Danger Index (FFDI) to be used for bushfire assessment. The RFS-specified FFDI for Monaro Alpine fire weather district is FFDI 80.

GHD notes that the fire weather experienced at the elevation where Thredbo Alpine Resort is located is different from lower elevation area across the Monaro Alpine weather district. GHD notes that PBP 2019 acknowledges that fire danger in designated Alpine Resort Areas is lower than in other lower elevation areas – this is evidenced by the inclusion in PBP 2019 of a Bushfire Attack Level assessment table specifically for Alpine Areas, which assumes FFDI 50 (Table A1.12.7 Alpine Areas). This is consistent with Regional FDI specification incorporated in AS3959:2018 for Alpine Areas (both in NSW and VIC). GHD further notes that a Strategic Bushfire Assessment prepared in 2021 (Blackash, 2021) as part of the supporting documents for the Snowy Mountains Special

Activation Precinct Draft Master Plan has recommended FFDI 50 be used as the appropriate FFDI for bushfire assessment in the NSW Alpine Resort areas.

GHD formally requested pre-DA advice from the NSW Rural Fire Service regarding the acceptability of using FFDI 50 for bushfire assessment for the TAH recladding works DA. RFS confirmed, in writing, that it is appropriate to use FFDI 50 for BAL assessment, and therefore this bushfire assessment assumes FFDI 50.

3.3 Vegetation

For bushfire assessment PBP 2019 requires assessment of vegetation formations with 140 metres (m) of the development, for each aspect of the development. Vegetation was assessed during site inspection.

The TAH is situated within the most densely developed part of Thredbo Village, which forms an extensively developed area between the Alpine Way and Thredbo River. The remnant trees retained within the village, and the short-mown public riverside reserve are classifiable as a Low Threat Vegetation exclusion under A1.10 of PBP 2019. The nearest patch of bushfire prone vegetation within 140 m of the site is a riverside patch of sub-alpine woodland approximately 100m north-west of the Hotel on the opposite (northern) side of the Thredbo River.

Table 3-1 Vegetation assessment

Direction	Vegetation within 140m	Comments
North	Nil	The area north of the TAH to a distance of 140m is occupied by carparks, Friday Drive (sealed two lane road), the Thredbo River with a maintained public reserve on both sides of the river with mown grass areas with retained native sub-alpine woodland shrubs and trees fringing the river, and then Valley Terminal (comprising offices, retail, Kosciuszko Chairlift and Merritts Gondola base stations), and car park (old tennis courts). The maintained river-front public reserve along the river edge is comprised principally of short mown grass, with BBQs, picnic tables, seats for public use and qualifies as Low Threat Vegetation – Exclusions under A1.10 of PBP.
East	Nil	Assessment area occupied by built environment. Retained trees are dispersed and qualify as Low Threat Vegetation – Exclusions under A1.10 of PBP.
South	Nil	Assessment area occupied by built environment. Retained trees are dispersed and qualify as Low Threat Vegetation – Exclusions under A1.10 of PBP.
West	Sub-alpine woodland	The area west of the main Hotel is occupied by a bitumen carpark, a pond, and Village Green (short mown grass). To the north-west across the Thredbo River, a patch of sub-alpine woodland extends to approximately 100m from the main Hotel's western elevation. The patch is larger than 1 ha and although it abuts other developed areas and the golf course, it is connected to further expanses of sub-alpine woodland. Therefore the patch is classifiable a forest vegetation formation (sub-alpine woodland).

3.4 Effective slope

Effective slope was visually assessed at the site. Due to its location adjacent to the Thredbo River, fire approach toward the TAH from the north-west (where the only area of bushfire vegetation within 140m of the TAH is located) must necessarily approach downhill, the hazard being upslope from the TAH.

Table 3-2 Effective slope assessment

Direction	Vegetation formations within 140m	Comments
North	NA	No classifiable vegetation within 140m of TAH. Managed vegetation north of the river sits on an upslope.
East	NA	No classifiable vegetation within 140m of TAH.
South	NA	No classifiable vegetation within 140m of TAH.
West	Upslope	A patch of sub-alpine woodland on the north side of the Thredbo River sits on an upslope.

3.5 Bushfire Attack Level Assessment

In accordance with pre-DA advice from NSW RFS, GHD has used PBP 2019 Table A1.12.7 (FFDI 50 – Alpine Areas) for the BAL Assessment.

Noting the absence of bushfire prone vegetation or presence of Excluded Low Threat Vegetation to the north, east and south, GHD has assessed Bushfire Attack Levels for the western fire approach direction only, with results recorded in Table 3.3.

Table 3-3 Determination of BAL and APZ using PBP 2019 Table A1.12.7 (FDI 50 – Alpine Areas)

Direction	Nearest BF prone vegetation	Effective slope class	BAL for construction	APZ based on BAL 10/ 1200K/ FDI 50	Proposed APZ application
West	Sub-alpine woodland (100m)	Upslope/flat	BAL 12.5	40.4 m	Entire area within Lot 861 DP 1128686

4. Compliance with Planning for Bushfire Protection

The following APZ and services specifications (provision of water, gas, and electricity) apply to SFPP developments and are reproduced from PBP 2019 (Tables 4-1 to 4-4).

Table 4-1 - APZs and construction for SFPP development (adapted from Table 6.8a of PBP 2019).

Performance Criteria		Acceptable Solutions	Compliance notes
The intent may be achieved where:			
ASSET PROTECTION ZONES (APZ)	Radiant heat levels of greater than 10kW/m² (calculated at 1200K) will not be experienced on any part of the building	The existing building is provided with an APZ in accordance with table A1.12.7 in Appendix 1.	Complies 40 m APZ provided (consistent with Table A1.12.7). At the western end of the TAH, the APZ can be fully contained within Lot 861 DP 1128686 – noting the TAH carpark extends 45 m from the western elevation of the TAH.
	APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	The APZ is located on lands with a slope less than 18 degrees.	Complies APZs are not located on slopes greater than 18°. Crown fire is not possible within 100m.
	APZs are managed and maintained to prevent the spread of fire to the building. the APZ is provided in perpetuity.	The APZ is managed in accordance with the requirements of Appendix 4 of this document and is wholly within the boundaries of the development site. APZ are wholly within the boundaries of the development site; and Other structures located within the APZ need to be located further than 6m from the refuge building.	Complies APZ is existing and consistent with PBP, and managed in accordance with RFS-endorsed Thredbo Bushfire Preparedness Map. Complies APZ located wholly within Thredbo Village head lease area.
LANDSCAPING	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions	Landscaping is in accordance with Appendix4; and	Complies To be managed in accordance with PBP Appendix 4
CONSTRUCTION	The proposed building can withstand bush fire attack in the form of wind, embers, radiant heat, and flame contact	A construction level of BAL-12.5 under AS 3959:2018 or NASH and section 7.5 is applied.	Complies BAL determined using Table A1.12.7 of PBP
All APZ modelling for the purposes of SFPP development is based on flame temperature of 1200 Kelvin (K).			

Table 4-2 : Performance criteria and acceptable solutions for access for SFPP development (adapted from Table 6.8b of PBP 2019).

Performance Criteria		Acceptable Solutions	Compliance notes
The intent may be achieved where:			
FIREFIGHTING VEHICLES	<p>firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation</p>	<p>SFPP access roads are two-wheel drive, all-weather roads, and</p> <p>Access is provided to all structures.</p> <p>Traffic management devices are constructed to not prohibit access by emergency services vehicles</p> <p>Access roads must provide suitable turning areas in accordance with Appendix 3; and</p> <p>One way only public access roads are no less than 3.5 m wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.</p>	<p>Complies</p> <p>The site has existing access off Friday Drive and Mowamba Place.</p> <p>The existing TAH carpark provides a turning area at the western end (main entrance) in accordance with Appendix 3 of PBP</p>
ACCESS ROAD CAPACITY	<p>the capacity of access roads is adequate for firefighting vehicles</p>	<p>the capacity of road surfaces and any bridges/ causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges and causeways are to clearly indicate load rating</p>	<p>Complies</p> <p>No bridges within Lot 861 DP 1128686. The public road network (Friday Drive and Mowamba Place) provides access for firefighting vehicles.</p>
ACCESS TO WATER	<p>there is appropriate access to water supply</p>	<p>Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression, and</p> <p>Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005; and</p>	<p>Complies</p> <p>Existing hydrant points are located outside of parking reserves and road carriageways.</p>
NON-PERIMETER ROADS	<p>Non-perimeter access roads are designed to allow safe access and egress for firefighting vehicles while occupants are evacuating</p>	<p>Minimum 5.5m width kerb to kerb.</p> <p>parking is provided outside of the carriageway width.</p> <p>Hydrants are located clear of parking areas.</p> <p>There are through roads, and these are linked to the internal road system at an interval of no greater than 500m.</p> <p>Curves of roads have a minimum inner radius of 6m.</p> <p>The maximum grade road is 15° and average grade of not more than 10°.</p> <p>The road crossfall does not exceed 3°.</p> <p>A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.</p>	<p>Not Applicable</p> <p>No internal roads – external public road network provides site access to carpark for firefighting and site evacuation.</p>

Table 4-3 : Performance criteria and acceptable solutions for water, electricity, and gas services for SFPP development (Adapted from Table 6.8c of PBP 2019)

Performance Criteria	Acceptable Solutions	Compliance notes
The intent may be achieved where:		
WATER SUPPLY	An adequate water supply for firefighting purposes is installed and maintained.	Complies TAH site is serviced by a reticulated water.
	Water supplies are located at regular intervals the water supply is accessible and reliable for firefighting operations	Complies Existing reticulated water supply – no new water supply work proposed.
	Flows and pressure are appropriate	
	The integrity of the water supply is maintained	
ELECTRICITY SERVICES	Where practicable, electrical transmission lines are underground.	Complies Electricity services are located underground.
GAS SERVICES	reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 and the requirements of relevant authorities, and metal piping is used; and all fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; and connections to and from gas cylinders are metal; and if gas cylinders need to be kept close to the building, safety valves are directed away from the building and at least 2m away from any combustible material, so they do not act as a catalyst to combustion; and polymer-sheathed flexible gas supply lines to gas meters adjacent to buildings are not used; and above-ground gas service pipes external to the building are metal, including and up to any outlets.	Complies Existing gas services – no new gas supply points proposed.

Table 4-4 : Performance criteria and acceptable solutions for emergency management plans for SFPP development (adapted from Table 6.8d of PBP 2019)

Performance Criteria		Acceptable Solutions	Compliance notes
The intent may be achieved where:			
EMERGENCY MANAGEMENT	A Bush Fire Emergency and Evacuation management plan is prepared	<p>bush fire emergency management and evacuation plan are prepared consistent with the:</p> <p>The NSW RFS document: <i>A Guide to Developing a Bush Fire Emergency Management and Evacuation Plan</i>;</p> <p><i>Australian Standard AS 3745:2010 Planning for emergencies in facilities</i>;</p> <p>The bushfire emergency and evacuation management plan should include a mechanism for the early relocation of occupants.</p> <p>Note: A copy of the bush fire emergency management plan should be provided to the Local Emergency Management Committee for its information prior to occupation of the development.</p>	<p>Complies</p> <p>Existing emergency management plan prepared and maintained by KT (TAH owner/operator) in place</p>
	Appropriate and adequate management arrangements are established for consultation and implementation of the bush fire emergency and evacuation management plan.	<p>An Emergency Planning Committee is established to consult with residents and staff in developing and implementing an Emergency Procedures Manual; and</p> <p>Detailed plans of all emergency assembly areas including 'on-site' and 'off-site' arrangements as stated in AS 3745:2010 are clearly displayed, and an annual (as a minimum) emergency evacuation is conducted.</p>	<p>Complies</p> <p>Existing emergency management arrangements and plan (prepared in consultation with NSW fire authorities) to remain in place</p>

5. Conclusions

The requirements of, and the acceptable solutions identified in PBP 2019 in relation to APZs, public roads and accessibility, provision of services can be met in full for the proposed development, noting that pre-DA advice sought from NSW RFS has confirmed the application of FDI 50 (Alpine Areas) for BAL assessment for the proposed works. The requirements are summarised in Table 5.1.

The aim of PBP 2019 in respect of development on bushfire prone land is “to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to the development potential, site characteristics and protection of the environment”.

The PBP objectives for development of existing SFPP facilities are (PBP 2019 – Section 6.4):

Table 5-1 Meeting PBP objectives for development of existing SFPP facilities

PBP Objective	Compliance
Provide for a defensible space to be located around buildings	Existing defensible space in place – Main Hotel carpark and adjacent open space on the Village Green provide ample defensible space at the western end of the TAH, exceeding SFPP requirements. Vegetation strips to the north are excludable being within existing APZs.
Site the building in a location which ensures appropriate separation from the hazard to minimize potential for material ignition;	Building location is existing and not expanded or moved, and provides 100m separation from classifiable vegetation
Provide better bush fire protection outcomes for existing buildings	Replacement of deteriorated and rotting hardwood cladding with new will provide improved fire protection outcomes by reducing building vulnerability to ember attack
New buildings (not applicable) should be located as far from the hazard as possible and should not extend towards or be situated closer to the hazard than the existing buildings;	Not applicable – no new buildings
Ensure there is no increase in bush fire management and maintenance responsibility on adjoining land owners (not applicable) without their written confirmation	Not applicable – no burden on adjoining land owners
Ensure building design and construction enhances the chances of occupant and building survival	No new buildings requiring design. Proposed external cladding construction to BAL 12.5 enhances chances of occupant and building survival
Provide for safe emergency evacuation procedures including capacity of existing infrastructure (such as roads	Existing Thredbo Evacuation Plan in place and successfully applied in operational conditions in 2019/20.

The aims and objectives of PBP 2019 can be met for the proposed development.

5.1 Recommendations for compliance with Performance Criteria

The bushfire protection measures, and standard identified in this report are aligned to the acceptable solutions for each performance measure within Chapter 6 of PBP 2019. These performance criteria are summarised in Table 5.1.

Table 5-2 Recommendations and summary of performance criteria – PBP 2019

Measures	Performance criteria
Asset Protection Zones	<p>Thredbo Alpine Hotel</p> <ul style="list-style-type: none"> Existing 45 m APZ at the western end (carpark and main entrance area) of the TAH. The entire area within Lot 861 DP 1128686 is to continue to be managed to inner APZ specification, including the main Hotel carpark at main entrance (western end of TAH).
Construction requirements	All building work must comply with the requirements of the National Construction Code (NCC). Under the Deemed to Satisfy provisions of the NCC building work must comply with BAL-12.5 construction requirements in AS3959:2018 Construction of buildings in bushfire-prone areas (AS3959) or the National Association of Steel Framed Housing (2014) Steel Framed Construction in Bush Fire Areas (NASH Standard).
Access	<ul style="list-style-type: none"> No changes required – maintain existing access to main Hotel carpark at main entrance (western end of TAH)
Services – water, electricity, and gas	<p>Water:</p> <ul style="list-style-type: none"> Reticulated water is provided to the development. No additional fire hydrants are required <p>Electricity:</p> <ul style="list-style-type: none"> Existing electrical services are underground <p>Gas:</p> <ul style="list-style-type: none"> No changes to existing gas supply Gas supply locations are to be maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas, the requirements of relevant authorities, and metal piping is used All fixed gas cylinders are to be kept clear of all flammable materials to a distance of 10 m and shielded on the hazard side Connections to and from gas cylinders are to be metal Polymer-sheathed flexible gas supply lines are not to be used Above-ground gas service pipes are to be metal, including and up to any outlets

6. References

Australian Standard (AS) AS3959:2018 – Construction of buildings in bushfire prone areas. Standards Australia.

Blackash (2021), Bushfire Strategic Study – snowy Mountains Special Activation Precinct, prepared for WSP. Blackash Bushfire Pty Ltd.

Nearmap (2021). Aerial Imagery.

New South Wales Rural Fire Service (2019). Planning for Bushfire Protection – A guide for councils, planners, fire authorities and developers. NSW Government.

New South Wales ePlanning Spatial Viewer (2021). NSW Government.



Calculated February 18, 2022, 7:44 pm (MDC v.4.9)

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	50	Rate of spread	1.08 km/h
Vegetation classification	Forest	Flame length	10.29 m
Understorey fuel load	18 t/ha	Flame angle	65 °, 72 °, 77 °, 80 °, 81 ° & 85 °
Total fuel load	27.3 t/ha	Elevation of receiver	4.66 m, 4.89 m, 5.01 m, 5.06 m, 5.08 m & 5.12 m
Vegetation height	n/a	Fire intensity	15,233 kW/m
Effective slope	0 °	Transmissivity	0.869, 0.853, 0.83, 0.806, 0.794 & 0.736
Site slope	0 °	Viewfactor	0.4102, 0.3029, 0.2046, 0.1382, 0.1124 & 0.0303
Flame width	100 m	Minimum distance to < 40 kW/m²	12.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	16.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	24.3 m
Flame temperature	1,200 K	Minimum distance to < 12.5 kW/m²	34.2 m
		Minimum distance to < 10 kW/m²	40.4 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

