

BUSHFIRE ATTACK LEVEL (BAL) ASSESSMENT

Mount Lofty Golf Estate
35 Golf Links Road
STIRLING SA 5152



Owners : Mount Lofty Golf Estate Pty Ltd

Client : Mount Lofty Golf Estate Pty Ltd

Architect : R Architecture

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EXECUTIVE SUMMARY

B.S.P. Design Pty Ltd has been engaged to assess the Bushfire Attack Levels appropriate to the construction of the Mount Lofty Golf Estate development at Stirling, South Australia.

In consideration of all factors associated with the development location, the exposure to bushfire attack varies as a result of the new buildings relationship with vegetation, and, with the acceptance that non-native vegetation can be removed and non-significant native vegetation can be either removed or lessened to reduce the fire load that can eventuate in a bushfire event. With such application and management an achievable result for the development reducing concerns for the safety of guests and staff.

Regardless of any considerations relative to radiation from flames, attack from embers must always be considered to be a major concern for any development within a bushfire prone location.

The outcome and conclusion of this assessment in determining the minimum attack levels is based on the *specified minimum clearances to predominant vegetation* to be achieved prior to construction, and *maintained at this minimum distance* with confirmation verified prior to each bushfire season.

BUSH FIRE RISK ASSESSMENT

The property is located within the Adelaide Hills Council in the Hundred of Onkaparinga, and in order to assess the risk to the property there are reference documents that need to be considered.

Bushfire Protection Area – Bushfire Risk

With reference to the South Australian Property & Planning Atlas (SAPPA) within the Planning and Design Code (PDC), the property is located within a district with a *High Bushfire Risk*

Adelaide Mount Lofty Ranges Bushfire Management Committee - Area Plan

Under the Adelaide Mount Lofty Ranges Bushfire Management Area plan, the area of the property is rated Extreme.

Although this assessment is in conflict with the SAPPA, the Risk Rating as assessed by SAPPA is accepted for the purposes of the proposed development on the property as referenced in the PDC.

ADDITIONAL REQUIREMENTS OF THE PLANNING and DESIGN CODE

The PDC requires that developments within bushfire prone areas must additionally comply with the requirements of the Ministerial Building Standard MBS 008 *Designated bushfire prone areas – additional requirements*.

Additional requirements under the Standard are related to the Bushfire Attack Level (BAL) determined for the development calculated in accordance with AS 3959 – *Construction of Buildings in bush-fire prone areas*.

CONSEQUENCE OF A BUSH FIRE

The consequence of a bush fire relates to various elements that are identified by a measurement of radiant heat that can be imposed in a bush fire event, and either the susceptibility of occupants in human settlement assets or susceptibility of built structures.

The determination of a Bushfire Attack Level, or BAL rating, for a property, assesses the possible radiant heat that can be possible generated from the burning of surrounding vegetation and impingement of strong, hot and ember-laden fire winds. The construction of the asset, in this case the form, methods and materials used to construct the buildings, taking into account the recommendations of the associated Australian Standard, *reduces* the susceptibility of the structure to a bush fire event (*not eliminate, as although a structure may be fully compliant with the recommendations of a Standard, there can never be a guarantee that a structure will not be affected by any bush fire event*).

BUSHFIRE ATTACK LEVEL ASSESSMENT

Introduction

The determination of a measure of a level of attack on a structure is provided by a method of measurement and reference to tabulated data contained within the Australian Standard AS 3959 *Construction of buildings in bushfire-prone areas*.

The Standard provides two methods of calculation of BALs – a simplified procedure that is only useable where the downslope under vegetation is less than 20 degrees, and a detailed method that considers more deeply parameters that affect the intensity of a bushfire attack. The detailed method has limitations in that the effective slope under the classified vegetation can be no greater than 30 degrees downslope or 15 degrees upslope, and the slope of the land between the site and the classified vegetation is no more than 20 degrees upslope or downslope. It is also of note that the calculations for Forest and Woodland, as applicable to this site, use a combined or total fuel load for calculating, and the vegetation height is not a requirement entering into the calculation models.

The calculations and assessments are based on 'continuous' vegetation zones, however where the vegetation is 'discontinuous' and / or areas are small such that there is reduced risk from a bushfire due to the availability of only short fire runs or restricted fuel load, dispensations are available reducing the effect on the buildings.

The buildings at the Mount Lofty Golf Estate can be summarised as:

- Golf Club
- Hotel
- Tourist Accommodation Pods

The Golf Club and Hotel are co-joined, with the pods separately positioned within the vegetated area to the West of the main buildings.

In analysis of the risk to each of the sections of the Estate, the following is recorded:

The main buildings are located within a band between the Second and Eighteenth fairways of the Golf Course, with the fairways providing a buffer from major vegetation to the North and South. To the East there is an area of forestation that presents the major area of concern to the Golf Club due to the relationship between the building and vegetation.

For the Hotel, there will be only minor vegetation in the form of a 'clump' of established trees adjacent to the building when completed.

The tourist accommodation pods are situated within an area of natural vegetation that will be partially cleared to provide adequate clearance from the elevated vegetation with the understorey cleared to reduce fuel loads.

Refer below for more detailed descriptions.

Parameters for BAL Assessments

Relevant Fire Danger Index (FDI)

The FDI for South Australia is scheduled in AS3959-2018 as **80**. The FDI has since been upgraded to **100**. For Grasslands, the Grassland Fire Danger Index (GFDI), used in the detailed method only, is **130**

Vegetation Classification

The current existing natural vegetation can be best described as *Forest*, with trees in the range of 30m height and a dense understorey of low trees and shrubs along with infestation of blackberry bushes and other non-native species.

With the removal of the non-native vegetation in areas that have an impact of the fuel loading for assessments of attack, with possible retention of isolated shrubs, these 'cleared' areas can then be classified as *Woodland* for the purposes of BAL assessments.

To the West of the accommodation pods, the general vegetation can be considered to be grassland. This spans down to a creek and can be considered as managed vegetation although not to an extent where the height would be maintained below 100 mm so that it can be excluded from any assessments.

Refer to Table 2.3 in AS 3959 for additional description and explanations.

Distance from classified vegetation

The distances of structures from classified vegetation are considered as detailed in Table T1.

TABLE T1 Distances from buildings to Classified Vegetation

LOCATION	VEGETATION	DETAILS
Golf Club	East of the building	<p>The existing vegetation is Forest extending from the lower level rising on an upslope. The current vegetation is nominally 18m from the eastern face of the cart storage building.</p> <p>The understorey will be cleared to a distance of 35m from the face of the new Clubhouse building allowing the reduction in fuel load to that of a <i>Woodland</i> classification A <i>Forest</i> classification will remain outside the 35m zone.</p> <p>The proposed location of the new Clubhouse building relates to the vegetation as 13m from the Cart Storage section at the Lower Level. and 22m from the set-back upper levels</p>
Hotel	North West	<p>The trees remaining following the development will be limited in number and lie between the Hotel wing and the 2nd fairway and green. A band of trees will remain to the West flanked by the 2nd and 18th holes.</p> <p>The significant tree to remain adjacent to the West (Tree 5) has a height <20m and a spread of <5m and positioned 15m from the lower level of the Hotel Wing and 21m from the upper level. The tree will not overhang the building.</p>
Tourist Accommodation Pods	West / Surrounding / South East	<p>The pods sit within an area that is generally classified as Forest with the western-most pods open to the managed vegetation area of the golf course to the West. Placement of the pods amongst the trees with clearance of non-significant trees and dense understorey, and the minimum clearance of pods from trees is 5m. Trees do not overhang the pods. Vegetation in the APZ will be controlled for minimum flammability.</p>

Effective slope of land under the classified vegetation

With reference to Figure 2.2 of AS 3959, and survey plans and topographical maps, the effective slope under classified vegetation is determined as below.

Golf Club	East	Upslope	15 degrees (Woodland), 26 degrees (Forest)
Hotel	North West	Flat	
Pods	South East	Upslope	9 degrees
	West	Downslope	15 degrees

Slope of land from site to classified vegetation * used in the Detailed Method of Calculation only

The slope of the land from the building line to the classified vegetation is assessed as follows:-

Golf Club	East	Flat (Lower Level), Downslope 11 degrees (Ground Floor)
Hotel	North West	Flat (Lower Level), Downslope 8 degrees (Level 2)
Pods	South East	Upslope 9 degrees
	West	Downslope 15 degrees

Determination of Bushfire Attack Level (BAL)

Assessment Methodology

As noted above there are two methods that can be adopted in the calculation of BALs, a simplified method (Method 1 - conservative), or a detailed method (Method 2) that takes into account several additional factors relating to parameters such as the slope of the land between the site and the classified vegetation, and fuel loads.

As noted in the Introduction to this section of the report, there are limitations relating to slopes that need to be considered in determining the method selected to perform a BAL calculation. The slopes encountered on the site are varied, resulting in the possibility that one of the calculation methods may not be suitable / applicable.

With comparative reference to the calculated slopes above, the range is close to being outside the limitations for Method 2 calculations, and one considerably outside the range.

Where a fuel load assessment can normally be conducted as presented by a site evaluation, this site in particular does not lend to assessment readily. and with the additional knowledge that fuel reduction will be undertaken during the course of the development.

For the purposes of the development assessment, with the understanding that with design and documentation there will be the opportunity of closer assessment, BAL determinations are currently determined under the Method 1.

Assessment Determination

With reference to Table 2.4 in AS3959 for Method 1, and FireCode Australia program for Method 2, the assessed BAL values for each of the determined locations are :-

TABLE T2 CALCULATED BUSHFIRE ATTACK LEVELS

LOCATION	ZONE	AS3959 CALCULATION METHOD	
		METHOD 1	METHOD 2
Golf Club	East	BAL 40 (Lower Level), BAL 29 (Upper Levels)	BAL 12.5 (Lower Level), BAL 12.5 (Upper Levels)
Hotel	North West	BAL 40 (Lower Level), BAL 29 (Upper Levels)	BAL 29 (Lower Level), BAL 12.5 (Upper Levels)
Pods	South East	BAL FZ	BAL 29
	West	BAL 40	BAL 40

Note is made that considering the Forest beyond 35 metres from the East face of the new Clubhouse, Method 1 indicates a BAL of 19 from the Forest.

DISCUSSION and CONCLUSION

The Mount Lofty Golf Estate is located in a high risk bushfire prone area.

The Estate comprises three areas that can be seen to be prone to direct attack from a bushfire event, with other areas mainly affected by embers and smoke. These main areas can be generally identified as a Golf Club, a Hotel, and Tourist Pod Accommodation.

The Golf Club and Hotel are multi-storey and co-joined, with the individual Pods located in a group separated from the other buildings.

The location of the Golf Club and Hotel positioned between two fairways of the golf club results in little exposure to a bushfire attack from the North and South. At the eastern end the Golf Club is close to a native vegetation forest that presents a high risk for bushfire attack, but it has been determined that this risk may be lessened by reduction of the understorey vegetation and thus reducing the degree of attack. This reduction in vegetation is only permitted within 35 metres of the East face of the new building. Beyond this distance the existing Forest with dense understorey must remain.

The Hotel building has exposure only at the western end where it nears the existing trees.

The positioning of the accommodation pods amongst the trees to the West presents the need for reduction of the fuel load presented by the vegetation. With the permitted removal of trees and understorey vegetation and the maintaining of clearance from significant trees, the bushfire attack level can be reduced from a very high to a more manageable level. Under the Bushfire Management Strategy, the ground cover and understorey vegetation around and under the pods is of extreme importance in reducing the risk from a bushfire event.

As can be seen from the Table T2, the methodology of assessment of Bushfire Attack Levels is at variance and as a integral part of the any further development and in the design and documentation of the buildings it is extremely necessary to accurately assess each aspect of the vegetation and the resistance to bushfire attack. As can be seen, the simplified method of AS 3959 is very conservative resulting in higher BALs than the results achieved using the more detailed calculations adopted in Method 2.

As part of the development there are other considerations that can be made, such as application of shading from the flame front. Additionally, it is the writer's opinion, and principle previously accepted, that building sections only need to be constructed to withstand the radiation levels imposed on the structure and that the whole building does not need to be constructed to the highest BAL level that is applied to only a section.

It would be recommended that a full re-assessment be conducted once the site has been firmed during documentation.

REFERENCES

Government of South Australia, Adelaide Mount Lofty Ranges *Bushfire Management Area Plan*, July 2016

Government of South Australia, *Bushfire Management Zone Standard and Guidance for Use*, State Bushfire Coordination Committee, Approval Date June 2017

Government of South Australia, Department for Environment and Water, *Nature Maps*

Government of South Australia, Planning, Development and Infrastructure (General) Regulations 2017 Version 12.5.2021

Nearmaps, High Resolution Aerial Map, accessed November 2022

Standards Australia Limited, Australian Standard AS 3959 – 2018 *Construction of buildings in bushfire-prone areas*.