

BUSHFIRE RISK ASSESSMENT REPORT
FOR THE PROPOSED EXTENSIONS TO THE
AUSTRALIAN WAR MEMORIAL
BLOCK 3, SECTION 39 DISTRICT OF CAMPBELL,
AUSTRALIAN CAPITAL TERRITORY

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TO THE

AUSTALIAN WAR MEMORIAL

BLOCK 3, SECTION 39

DISTRICT OF CAMPBELL,

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B203438	Final	24.03.2020	25.03.2020	<i>G.L.Swain</i>

EXECUTIVE SUMMARY

Australian Bushfire Protection Planners Pty Limited has been commissioned to prepare a Bushfire Risk Assessment that determines the level of bushfire risk and the protection measures required to mitigate the risk to the proposed extensions to the Australian War Memorial on Block 3, Section 39, District of Campbell.

The advice contained within this report provides the bushfire planning principles to be used in the construction of the proposed works.

Section 1 of this report outlines the background to the assessment and describes the site and details the inspection of the site.

Section 2 of the report provides a description of the site and the precinct [study area] it is contained within. It examines the topography as well as the vegetation both within and external to the site.

Section 3 determines the bushfire risk to the proposed development by examining background information on the:

- Fire history of the area;
- Ignition and fire sources;
- Climate and weather;
- Wind and fire paths;
- Slope;
- Bushfire fuels;
- Assessment of the fuel hazard;
- Likelihood of each fire scenario;
- Description of the Asset Interface Classification;
- Risk statement; and
- Summary of the bushfire risk.

Section 3 examines the context of bushfire risk within the ACT.

Section 4 outlines a range of factors influencing bushfire risk and identifies the broad strategies to manage the risk and examines the two elements of risk – **likelihood** which is described as the chances of a bushfire occurring, and **consequence**, the impact of the bushfire when it occurs.

Section 4 also undertakes an assessment of the potential bushfire risk to the proposed development and determines the level of risk. The details of the bushfire protection measures required to be put in place and fully implemented to reduce the level of risk to the new works are provided in **Section 5**.

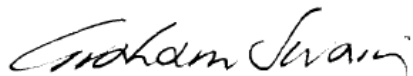
This Section describes the measures for:

- The provision of Asset Protection Zones; access and water supplies; and
- Construction standards to the new works.

Section 6 and examines the residual risk once the bushfire protection measures recommended are implemented.

The conclusions to the assessment are outlined in **Section 7** of the report. These include:

- The assessment undertaken in this report has found that the bushfire risk to the proposed development on the site, prior to the implementation, is high; and
- If the protection measures recommended in this report are fully implemented, the level of risk will reduce to moderate.



Graham Swain,
Managing Director
Australian Bushfire Protection Planners Pty Limited

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SECTION 1

INTRODUCTION

1.1 Aim of this Report.

The aim of this report is to prepare an independent bushfire risk assessment that determines the level of bushfire risk and the protection measures required to mitigate the risk to the proposed extensions to the Australian War Memorial on Block 3, Section 39, District of Campbell, ACT.

1.2 Objectives of the Report.

The objectives of the report are to:

- Identify the level of risk to the proposed development in accordance with best practice bushfire risk management, Australian Standard AS/NZS ISO 31000:2009 and the requirements of A.S. 38959 – 2009.
- Identify how levels of risk can be mitigated;
- Respond to the ACT Strategic Bushfire Management Plan – Version 3.

The Bushfire Risk Assessment will be undertaken to assess the potential bushfire risk and identify those protection measures required to mitigate the risk.

This will include specific recommendations on fuel management, the location of Asset Protection Zones and any other measures to deemed necessary to protect the proposed works against the impact of a bushfire event in the vegetation on the land adjacent to the site [within the Remembrance Nature Park/Mount Ainslie Nature Reserve].

1.3 Scope of Work.

The following is an outline of the scope of work undertaken in the assessment of bushfire risk to the proposed development:

- Identify and describe the study area environment;
- Establish the context of the bushfire risk to the future development;
- Identify measures that might assist to reduce bushfire risk to the works;
- Describe the implementation of the bushfire protection measures having regard to the site constraints.

The assessment is to be undertaken with reference to the following methodology:

(a) Identify the fire scenarios including an assessment of:

- The exposure to possible ignition/fire sources;
- Vegetation type and likely fuel loads and fire hazards arising using the “Overall Fuel Hazard Guide” – Fourth edition (DSE July 2010); and
- The impact of climate and likely fire runs during severe fire danger periods.

(b) Identify and describe the surrounding natural environment and the likelihood of each fire scenario identified (before mitigation):

- The steepness, slope/terrain; and
- Define each level of likelihood stating assumed frequency of event assigned to each level of likelihood.

(c) Identify and describe the proposed development and consequences of a bushfire (before mitigation):

- Assumed fire impacts / consequence if exposed to fire events; including during severe/catastrophic fire danger periods; and
- Define each level of consequence stating level of impacts.

(d) Risk Mitigation Measures:

❖ ***Provide risk mitigation options following consideration of:***

- The necessary bushfire protection measures in accordance with Australian Standard AS3959-2018 “*Construction of Buildings in Bushfire Prone Areas*” and any addenda or amendments;
- The *Strategic Bushfire Management Plan for the ACT*;

❖ ***Evaluate the mitigation measures with consideration of the following:***

- Protection zone requirements (inner and outer protection zone);
- Building standards;
- Access for Emergency Services Vehicles; and
- Engineering infrastructure including water supply, emergency service access.

(e) Evaluate the fire scenarios to establish the residual risk:

- Protection zone requirements (inner and outer protection zone);
- Evaluate the residual risk level following mitigation including the vulnerability of the proposed development, and possible consequences of fire during severe fire danger periods;
- Compare the residual risk level against best practice criteria; and
- Rank the fire scenarios in order of risk level.

1.4 Proposed Development.

The proposed development consists of the construction of the extensions to the Australian War Memorial on Block 3, Section 39 in the Division of Campbell.

The proposed works include the demolition of Anzac Hall, construction of a new Anzac Hall will Glazed Link; extensions to the Cew Bean Building; construction of a new southern entrance to the Main Building; reconstructed forecourt over the new southern entrance; access paths and landscaping and construction of an external Electrical Substation.

Refer to Figure 1 – Public Realm Plan on Page 9; Figure 2 – Site Plan on Page 10; Figure 3 – West Elevation on Page 11; Figure 4 – East Elevation on Page 11; Figure 5 – Section – Anzac Hall & Glazed Link on Page 12.

Figure 1 – Public Realm Plan

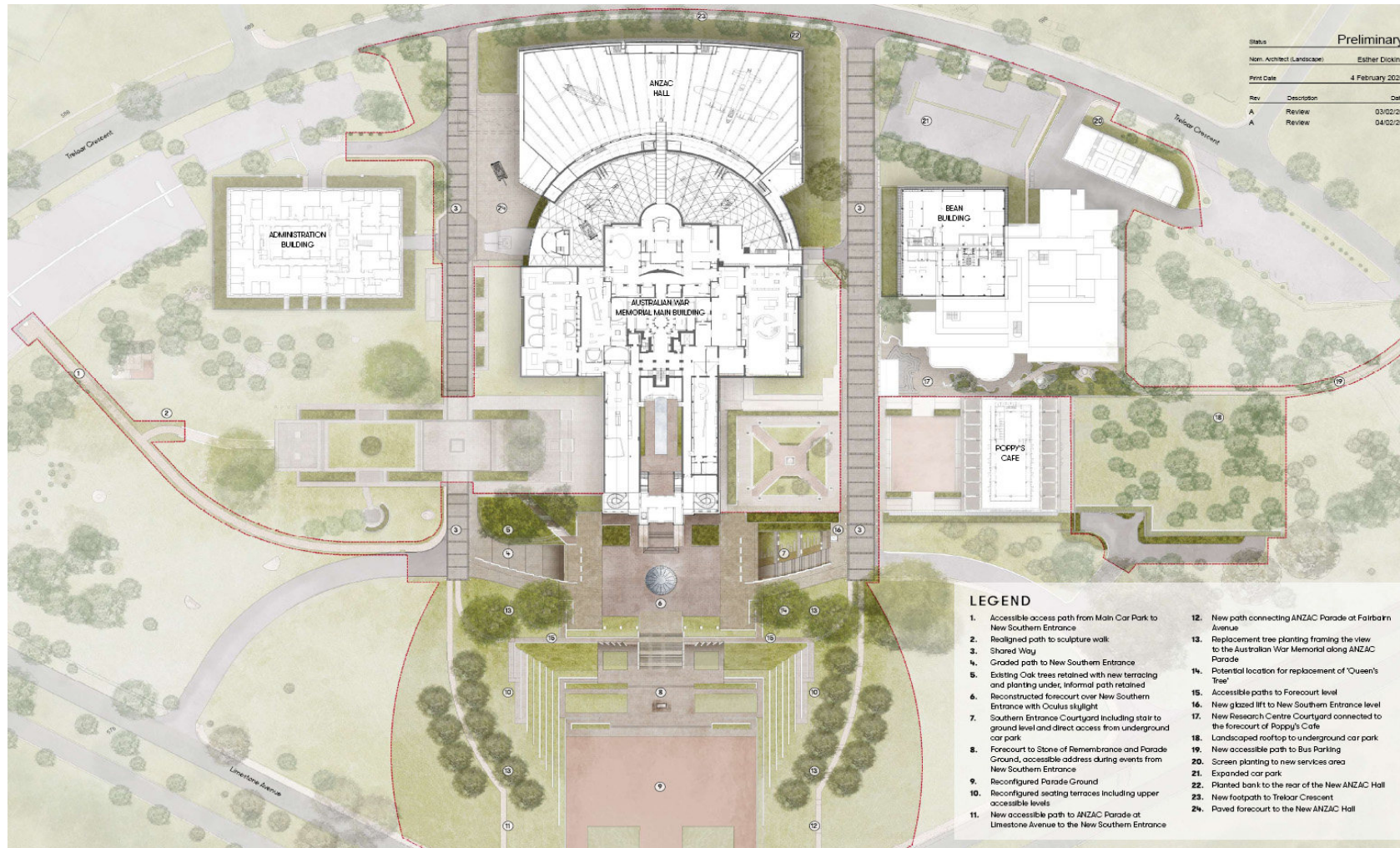


Figure 2 – Site Plan – Anzac Hall & Glazed Link

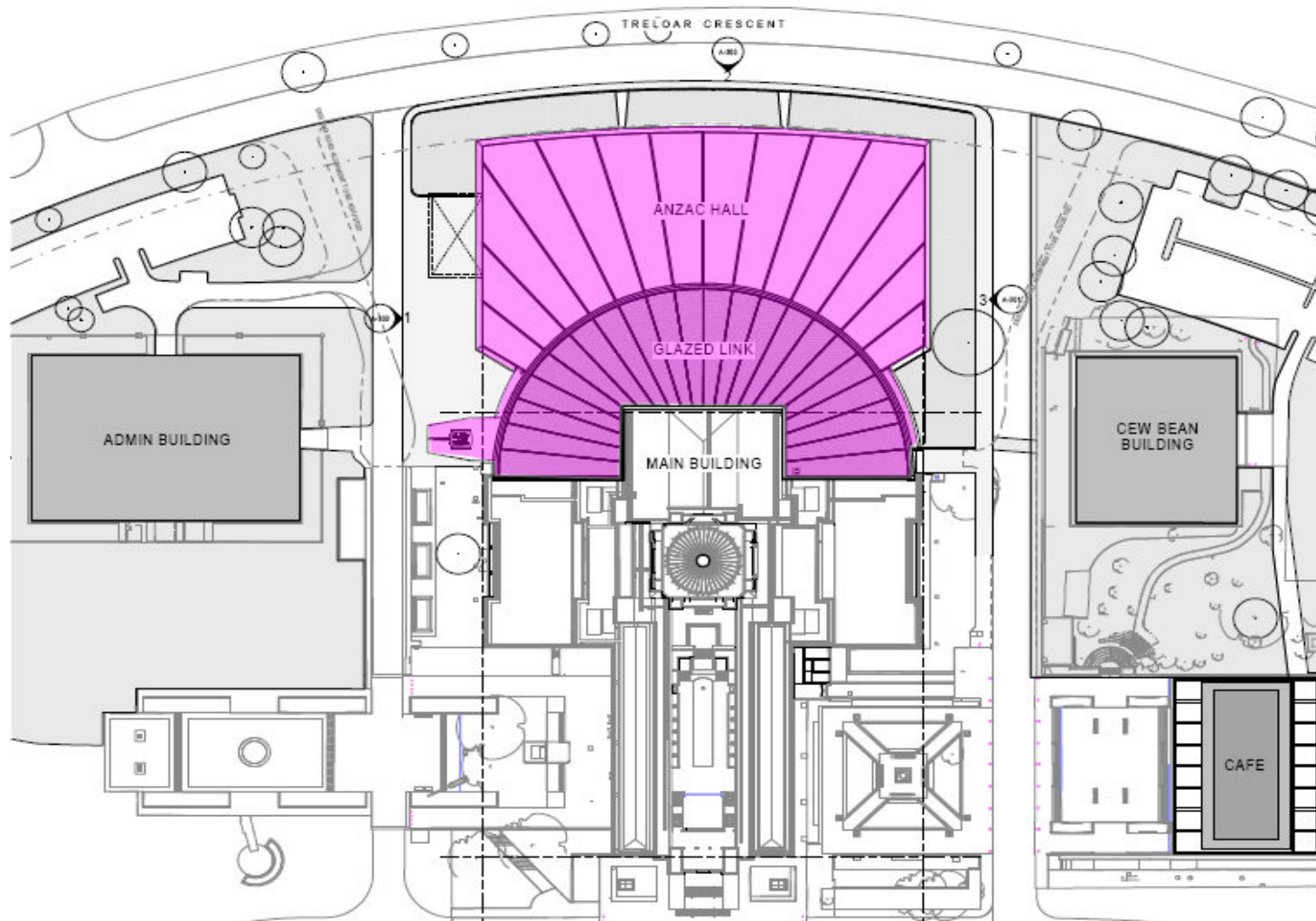


Figure 3 – West Elevation

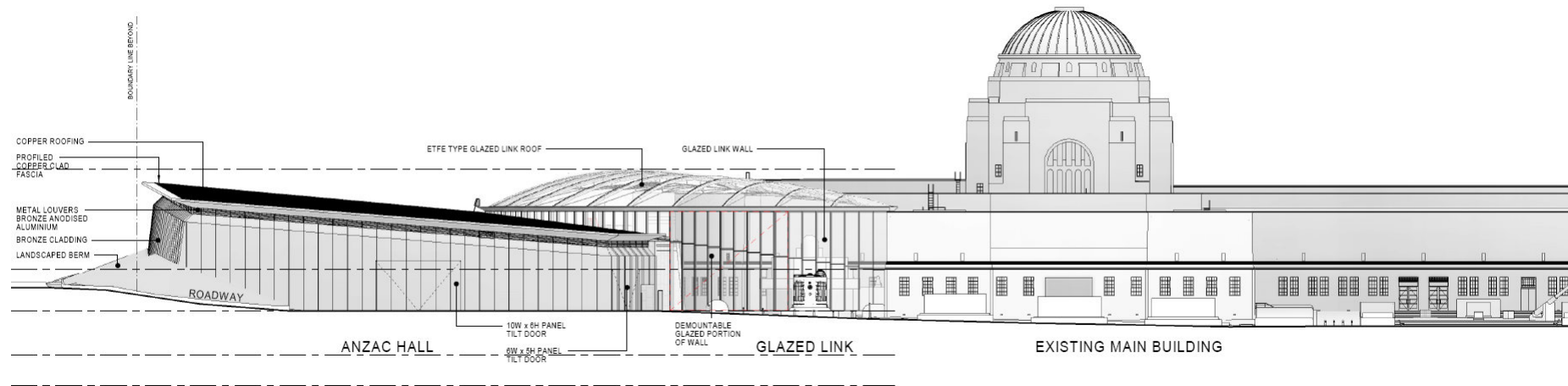


Figure 4 – East Elevation

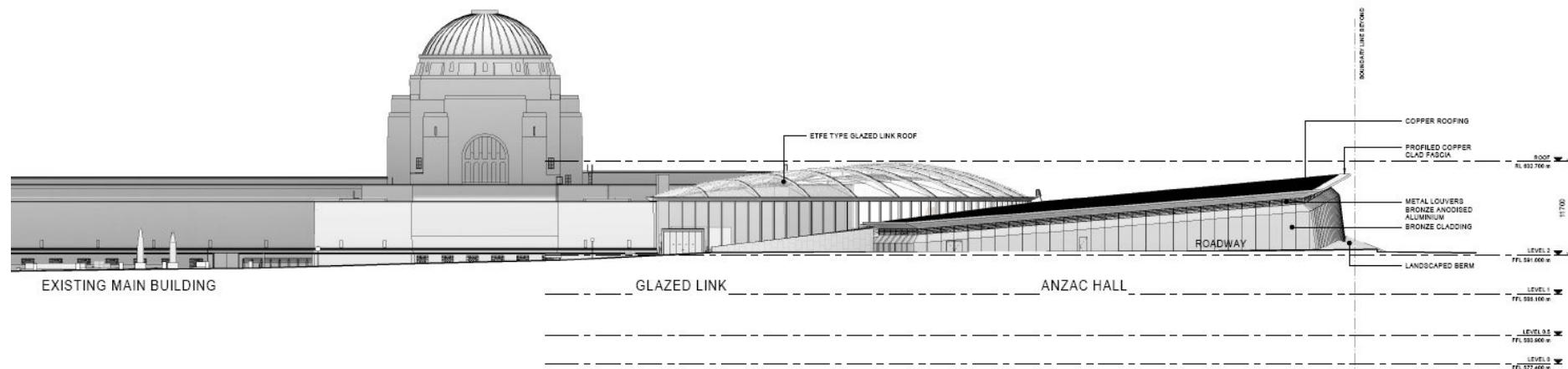
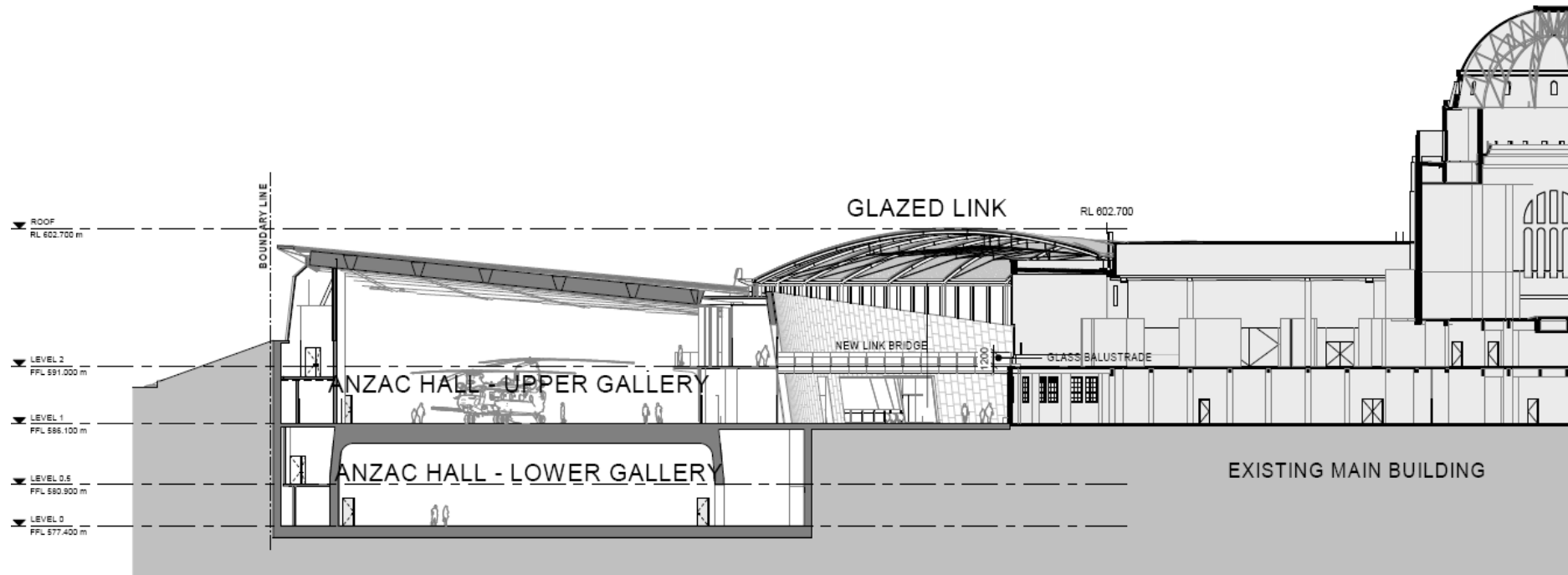


Figure 5 – Section Anzac Hall & Glazed Link



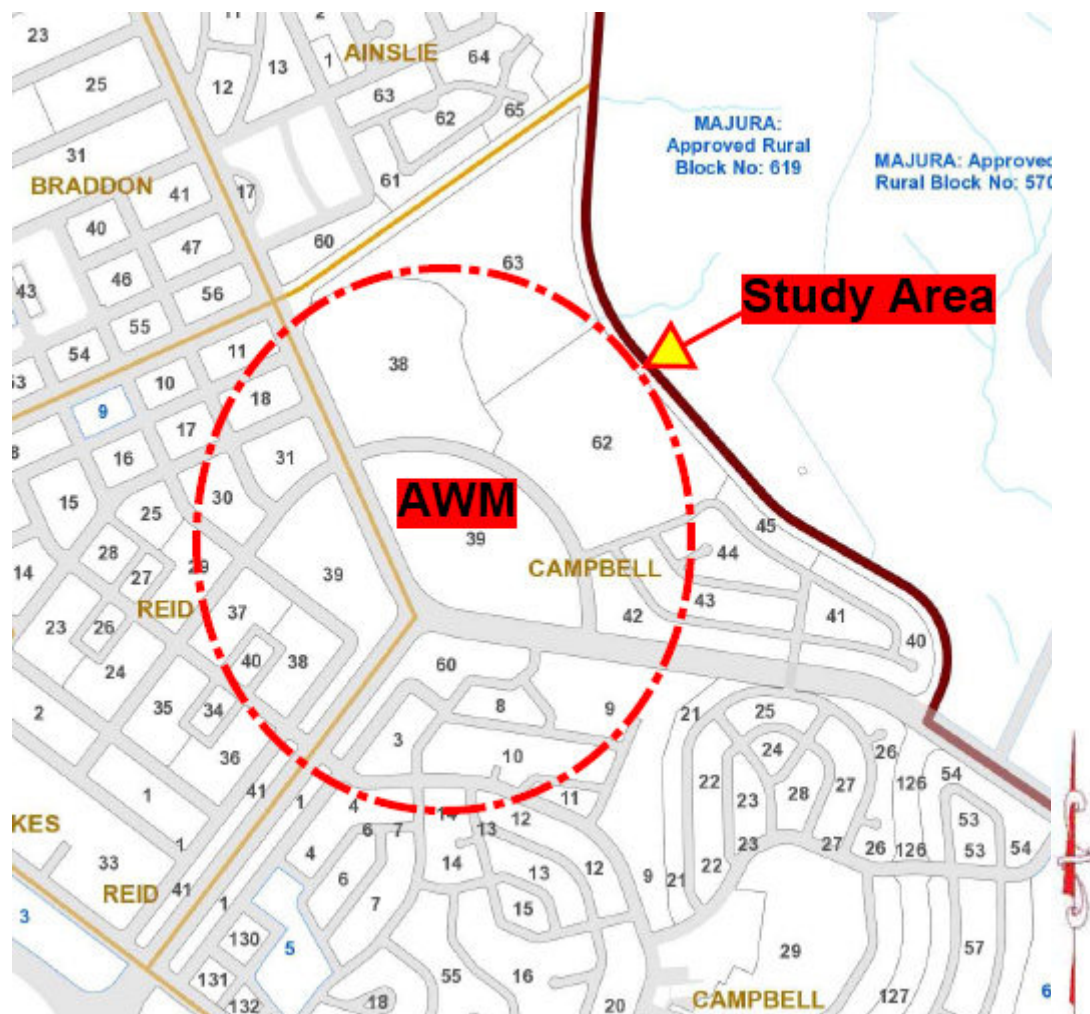
SECTION 2

DESCRIPTION OF THE BUSHFIRE STUDY AREA

2.1 The Study Area.

For the purpose of examining the potential bushfire risk to the site a study area has been established which includes the land surrounding the site for a distance of 300 metres. Figure 6 below provides a graphical representation of the 'Study Area'.

Figure 6 – Bushfire Risk Assessment Study Area.



2.2 Site Assessment.

Graham Swain undertook an inspection of the site and surrounding land on the 19th February 2020. The inspection reviewed the general topography and gradients of the land and vegetation classification within the site and study area. A desk-top review of the site and surrounding development was completed for the preparation of this report.

The ACT Bushfire Prone Land Map, aerial photography and contour maps were also reviewed.

2.3 Existing Land Use.

The site is occupied by the Australian War Memorial and ancillary buildings, carparks and landscaped areas.

2.4 Adjoining Land Use.

The Australian War Memorial occupies Block 3 Section 39 and is bound to the northwest, northeast and east by Treloar Crescent and to the southwest by Limestone Avenue and to the south by Fairbairn Avenue.

The land to the northwest of Treloar Crescent contains Campbell High School.

The land to the northeast of Treloar Crescent contains the Remembrance Nature Park with Mount Ainslie Nature Park extending further to the northeast and northwest. A small area of open space occupies the land to the east of Treloar Crescent with residential development extending further to the east

Reid Park and residential development extend to the southwest beyond Limestone Avenue. Residential development occupies the land to the south of Fairbairn Avenue.

Figure 7 – Aerial Photograph of War Memorial site and surrounding landuse.

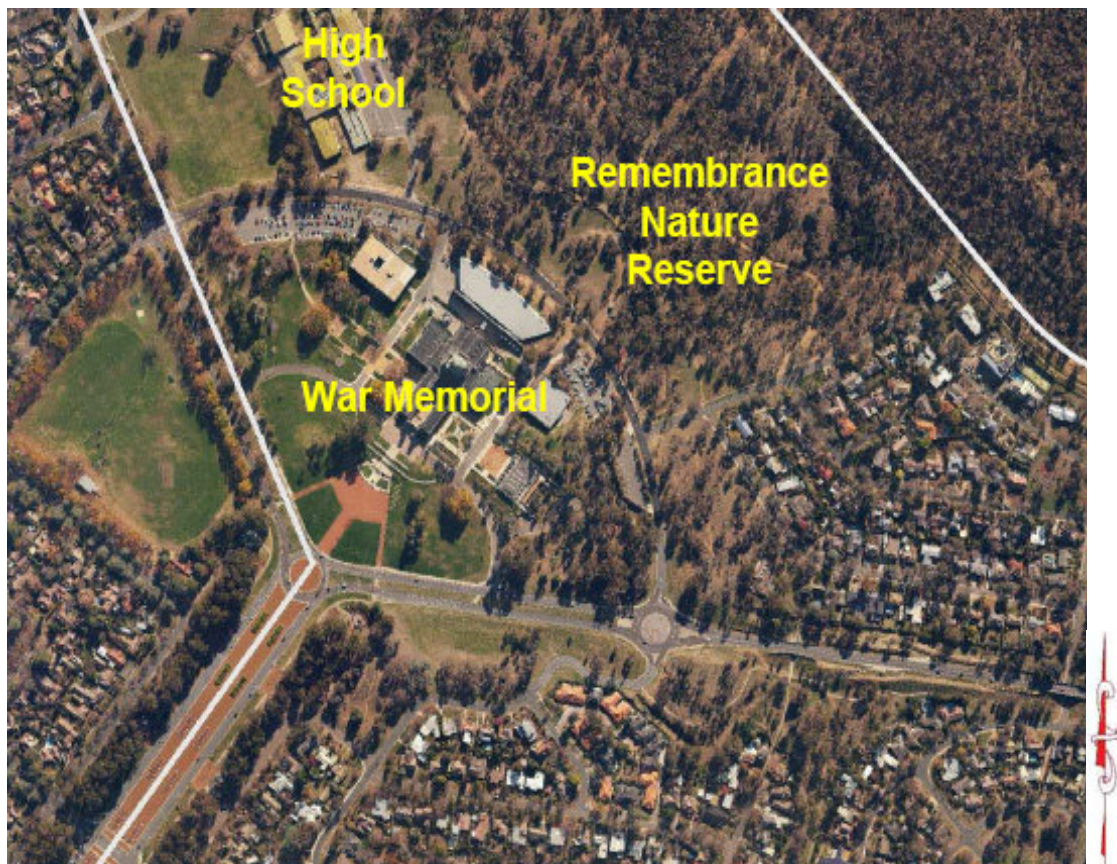


Figure 8 – Copy of ACT Bushfire Prone Land Map



2.5 Topography.

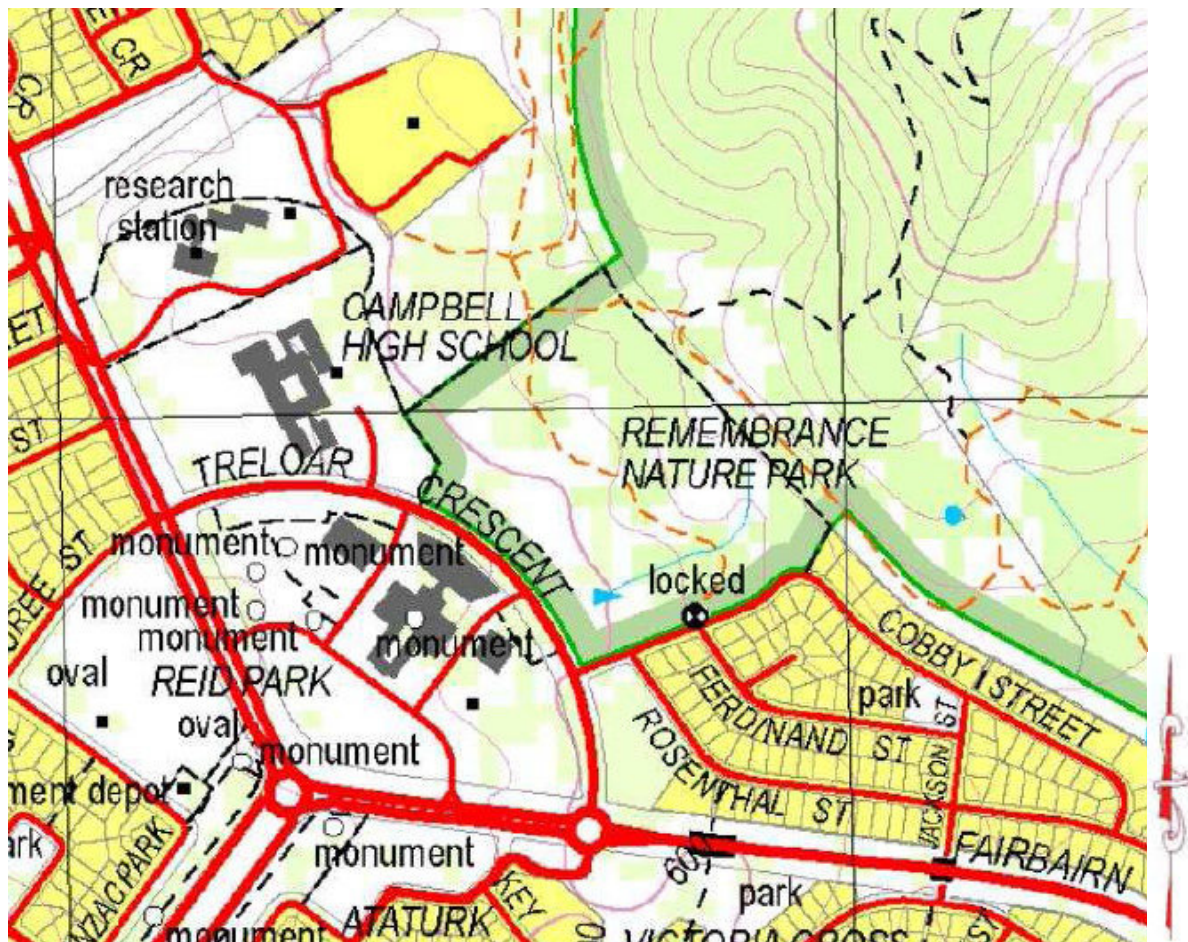
The land within the Australian War Memorial falls from Treloar Crescent towards Fairbairn Avenue and Limestone Avenue.

The bushfire prone land to the northeast of Treloar Crescent rises to the northeast toward Mount Ainslie.

The land to the northwest follows the contours.

Refer to Figure 9 – Topographic Plan on Page 16.

Figure 9 – Topographic Plan



2.6 Vegetation within the Site.

The vegetation on the War Memorial site consists of managed landscaped gardens.

2.7 Vegetation on land adjoining the Site.

The Campbell High School to the northwest of the War Memorial site contains managed woodland vegetation. The residential development to the west, southwest, south and east of the War Memorial site contains managed landscaped gardens.

The Remembrance Nature Park to the northeast contains Southern Tablelands Grassy Woodland.

Refer to Figure 10 – Plan of Southern Tableland Grassy Woodland on Page 17.

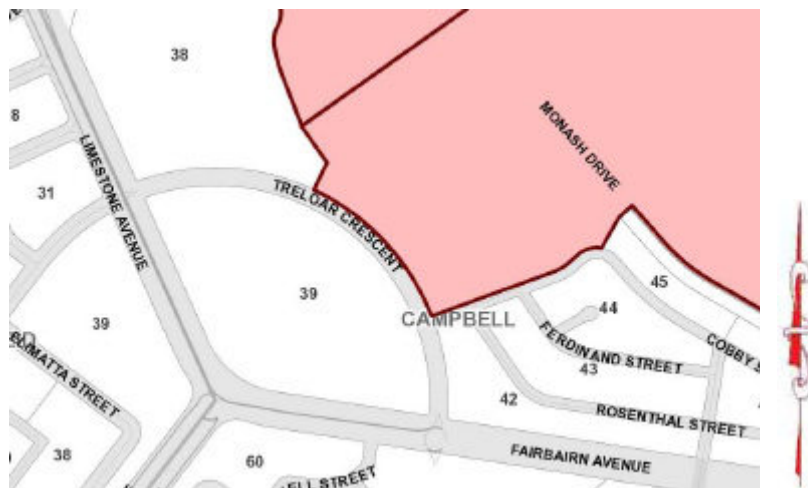
Figure 10 – Plan of Southern Tableland Grassy Woodland.



2.8 Ecological Constraints found on the land external to the site.

The Southern Tableland Grassy Woodland within the Remembrance Nature Park is classified as a threatened vegetation community.

Figure 11 – Threatened Vegetation Community Map.



SECTION 3.

CONTEXT OF THE BUSHFIRE RISK ASSESSMENT WITHIN THE AUSTRALIAN CAPITAL TERRITORY

The ACT Government enacted the *Emergencies Act 2004*, as part of its response to the needs identified by the McLeod Inquiry to replace the *Bushfire Act 1936* and sets the legislative basis for bushfire related planning.

Resulting from the changes in legislation, the ACT Planning & Land Authority prepared “*Planning for Bushfire Risk Mitigation*”, a guideline adopted under the Territory Plan, that provides guidance to mitigate adverse impacts from bushfires in the ACT.

The Guideline is one of many documents that informs planning and development in the ACT and is taken into account by the ACT Rural Fire Service, ACT Fire & Rescue and the Emergency Services Authority [ESA] when determining development applications and is complementary to the ACT Emergency Services Authority’s *Strategic Bushfire Management Plan – Version 3*, a strategic document outlining measures for the Prevention, Preparedness, Response and Recovery from bushfire in the ACT.

A *Bushfire Prone Area* for the ACT was declared through the *Building Regulations* and came into effect on the 1st September 2004. Under the declaration, all parts of the ACT outside the defined urban area have been designated bushfire prone and the Authority, under Part A (Consideration of Land Use and Development Proposals) of the Territory Plan, can require a site specific bushfire risk assessment to be undertaken during the planning/design process.

This report determines the bushfire risk to the development using the *Australian Standard for Risk Management AS/NZS ISO 31000:2009* and A.S. 3959 – 2009 and provides recommendations on the provision of bushfire protection measures to satisfy the requirements of the ACT Strategic Bushfire Management Plan – Version 3.

SECTION 4

BUSHFIRE RISK ASSESSMENT – PROPOSED EXTENSIONS TO THE AUSTRALIAN WAR MUSEUM

4.1 Introduction.

The Australian Standard AS/NZS ISO 31000:2009 and the Emergency Management Australia (EMA) emergency risk management process provide the framework for establishing the context, analysis, evaluation, treatment, monitoring and communication of risk.

Risk has two elements: likelihood, the chances of a bushfire occurring and consequence, the impact of a bushfire when it occurs.

Bushfire risk is defined as the chance of a bushfire occurring that will have harmful consequences to human communities and the environment. Bushfire risk is usually assessed through consideration of the likelihood of ignition and consequences of a bushfire occurring. Risk reduction can be achieved by reducing the likelihood of a bushfire, the opportunity for a bushfire to spread or the consequence of a bushfire (on natural and built assets).

Bushfire management should have a clear objective to reduce both the likelihood of bushfires and reduce the negative impacts of bushfires. It should also consider the costs, inconvenience and dangers of measures taken to reduce the risk of bushfires.

The consequences of bushfire management activities and the failure to implement programs also need to be considered. A range of factors influence bushfire risk – these include:

- The likelihood of human and natural fire ignitions, as influenced by time, space and demographics;
- The potential spread and severity of a bushfire, as determined by fuel, topography and weather conditions;
- The proximity of assets vulnerable to bushfire fuels, and likely bushfire paths; and
- The vulnerability of assets including natural assets, or their capacity to cope with, and recover from bushfire.

4.2 Management Strategies.

Broad strategies to manage bushfire risk include:

- Eliminate the bushfire risk (make the land-use decision first by asking the question about whether development should or should not proceed in a given area);
- Design or substitution (review boundary locations and shape, change the types of land-use policy);
- Engineering controls (infrastructure, building standards and landscaping) and
- Administration and organisation; (community preparedness measures).

4.3 Risk Assessment.

An assessment of bushfire risk must firstly define the problem. This involves the identification of the nature and scope of issues to be addressed and defining the possible boundaries for the assessment (*Emergency Risk Management – Applications Guide*. (EMA Echo Press, 2000), and AS/NZS ISO 31000:2009).

For the purpose of analysing fire risks that might emerge in the ACT, a dangerous and damaging fire has the potential to occur when the following conditions prevail:

- Continuous available fuel – fuel at moisture content sufficiently low to enable rapid combustion, arising from drought effects or the maturing and drying, of grasslands;
- Exposure of vulnerable assets. The ‘catchment’ for such fires may be within several hundred metres or many (60-70) kilometres from the asset/s;
- A combination of weather conditions that generate a forest or grass fire danger index of Very High (24) or greater. Typically in the ACT, prevailing adverse fire weather will have a strong northerly, through to south-westerly wind influence;
- A fire in the landscape which is not effectively suppressed.

The assessment of the risk to the development site was undertaken during the site assessment and identified that the works will be exposed to the risk of:

- A north-westerly fire path, burning through the Southern Tableland Grassy Woodland east of the Campbell High School;
- A northerly fire path, burning through the Southern Tableland Grassy Woodland within the Mount Ainslie Nature Reserve;
- A north-easterly fire path, burning through the Southern Tableland Grassy Woodland within the adjoining Remembrance Nature Park and Mount Ainslie Nature Reserve.

The following Risk Assessment and resultant recommendations seek to address the protection of the proposed development from the impact of unplanned fire events identified above by examining:

- Fire History;
- Exposure to possible ignition / fire sources;
- Vegetation type and likely fuel loads and fire hazards arising using the “Overall Fuel Hazard Guide” – Fourth Edition (DSE July 2010);
- The impact of climate and likely fire runs during severe fire danger periods;
- Wind effects; and
- The impact of surrounding land uses and fuel loads.

4.4 Fire History.

The Strategic Bushfire Management Plan for the ACT [version one] states:

“The ACT has a history of severe damaging bushfires with large areas burnt in the bushfire seasons of 1919/20; 1925/26; 1938/39; 1951/52; 1978/79; 1982/83; 1984/85; 2000/01 and in 2002/03”.

“Intervals between recorded severe fire seasons range from two years to twenty seven years”. “Planning to reduce the likelihood and consequence of bushfires in the ACT must take into account the full range from small grass fires to landscape-wide severe fires”.

A review of the large fire history data within the Strategic Fire Management Plan for the ACT, for the Mount Ainslie area has identified that the last large scale fire event occurred in 1985, impacting the northern portion of the Mount Ainslie Nature Reserve, spreading to the east under westerly winds.

4.5 Ignition / Fire Sources.

Causes of bushfires, including those in the ACT, are natural or human caused. Fires caused by humans can be categorised as:

- Malicious – including arson;
- Careless – such as escaped campfires, children and burning off without a permit; and
- Accidental – uncommon but includes motor vehicle and industrial accidents.

The only common natural cause of bushfires in the ACT is lightning. The majority of fire ignitions in the ACT are arson, and arson ignitions are correlated to the demographics of the ACT. People are the major source of bushfire ignitions and where people concentrate, bushfires occur most frequently. Most bushfires occur in or near the built-up areas of Canberra.

The largest areas burnt are attributed to lightning ignitions, which are dispersed across the landscape.

Accidental ignition of vegetation, especially from agricultural landuse practices on the land to the east of Mount Ainslie [e.g. slashing] may provide an ignition source to the northeast during periods of drought, spreading under prevailing winds from the northeast.

Malicious fire ignition can occur wherever humans operate. Deliberately lit (arson) fires are probable within the grasslands vegetation, including within the adjacent Nature Reserves.

4.6 Climate and Weather.

The ACT has a relatively dry, continental climate with warm to hot summers and cool to cold winters. The climate of Canberra is strongly influenced by a band of high pressure systems located around the globe at about 30 – 40S, known as the sub-tropical ridge.

During summer, the sub-tropical ridge is located over southern Australia resulting in warm to hot conditions with winds generally from the east through to northwest.

The average annual rainfall is 629 mm with an average of 108 rain days per year with rainfall reasonably evenly distributed throughout the year with the wettest month being October and the driest being June.

Rainfall tends to be influenced by cold fronts during the winter 6 months and thunderstorm activity during the summer 6 months. While rainfall in most years is reasonably reliable, drier than average years are closely related to ENSO events in the Pacific Ocean and all significant droughts have occurred in El Nino years and these years tend to be significant bushfire seasons as well.

Rainfall across the ACT varies considerably, with much higher rainfall occurring in the ranges to the west and less rainfall to the east.

January is the hottest month with a mean daily maximum temperature of 27°C and an average of 10 days of 30°C or more with 2 days of 35°C or more. Canberra tends to get cooler easterly winds penetrating from the coast during many summer evenings which can sometimes bring cloud in with the moister air.

The highest recorded maximum temperature was 42.2°C on February 1st 1968 followed closely by 41.4°C on the previous day [31st January 1968]. Relative humidity in Canberra is around 37 – 40% at 3pm in summer.

The fire season in the ACT corresponds with the summer months' high temperatures and low rainfall, and can occur from September to April with a proclaimed bushfire danger period from October to March. There is significant variability from year to year. Fire seasons may be serious in three out of every 15 years, but this can vary considerably.

Extreme and uncontrollable bushfires typically occur when the fire danger rating is over 50, a rating of Extreme. Many of the major house loss events have occurred at fire danger ratings over 70, on a scale of 0 to 100.

Analysis of 1951 – 2004 meteorological records identified 105 days of Extreme fire danger from the Forest Fire Danger Index (FFDI) at Canberra airport. These were broken down into the following FFDI ratings:

- 61 days 50 – 59 FFDI;
- 25 days 60 – 69 FFDI;
- 9 days 70 – 79 FFDI;
- 4 days 80 – 89 FFDI; and
- 6 days 90 – 100.

Eighteen percent [18%] of January days had Very High FFDI and 2% of January days had Extreme FFDI.

The Very High and Extreme Forest Fire Danger conditions mainly occur between November and March.

[Source SBMP for the ACT].

[The (McArthur) Forest Fire Danger Index (FFDI) was developed in the 1960s by CSIRO scientist A.G. McArthur to measure the degree of danger of fire in Australian forests. The index combines a record of dryness, based on rainfall and evaporation, with daily meteorological variables for wind-speed, temperature and humidity. A fire danger rating of between 12 and 25 on the index is considered a "high" degree of danger, while a day having a danger rating of over 50 is considered an "Extreme" fire danger day.

McArthur used the conditions of the Black Friday fires of 1939 as his example of a 100 rating. The FFDI on Black Saturday, 7th of February, 2009, reached as high as 180, the worst fire conditions ever recorded].

Canberra generally is not very windy with, on average, 25 days of strong winds a year. Late Winter/Spring tends to be the windiest time with just over half of these days [13 days] occurring in the four [4] months between August and November.

Wind is an important factor in bushfire behaviour as it influences the rate of spread of the fire front and spreads burning embers / sparks, providing ignition sources for spot fires ahead of the main fire front.

The vegetation on the south-western face of Mount Ainslie – within the Mount Ainslie Nature Reserve – is exposed to strong, hot and dry north-northwest and northerly wind influences which cause extreme to catastrophic fire weather conditions.

The Nature Reserve is also exposed to north-easterly wind influences, travelling upslope to the apex of the ridgeline before travelling down the western/south-western face of the ridge toward the War Memorial site.

Such wind driven fire events are normally more easily controlled by fire authorities however ember penetration beyond the Nature Reserve can be extensive.

4.7 Slope & Fire Paths.

Slope is a critically important factor when assessing fire risk and likely behaviour. The rate of fire propagation doubles up a slope of 10 degrees (18%) and increases almost fourfold up a slope of 20 degrees (40%). The rate of progress downslope tends to slow at a corresponding rate.

The topography of the land within the adjoining Nature Reserve is undulating with a slight rise to the northwest.

Figure 12 provides a diagram of the potential northerly fire path. Figure 13 provides a diagram of the potential north-easterly fire path.

Figure 12 – Northerly Fire Path

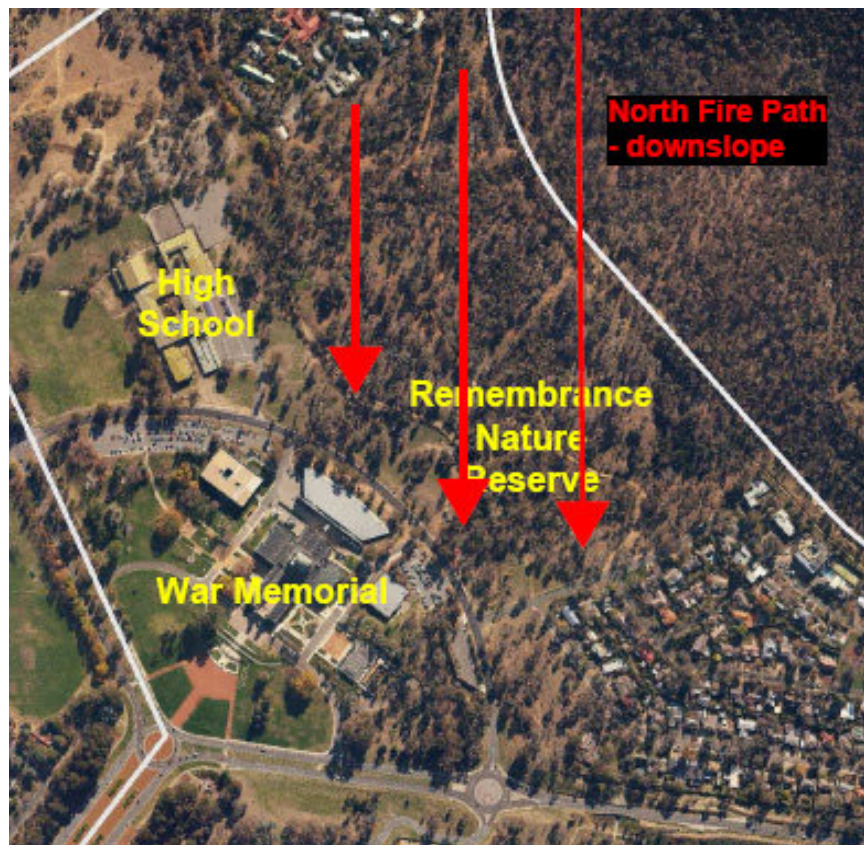
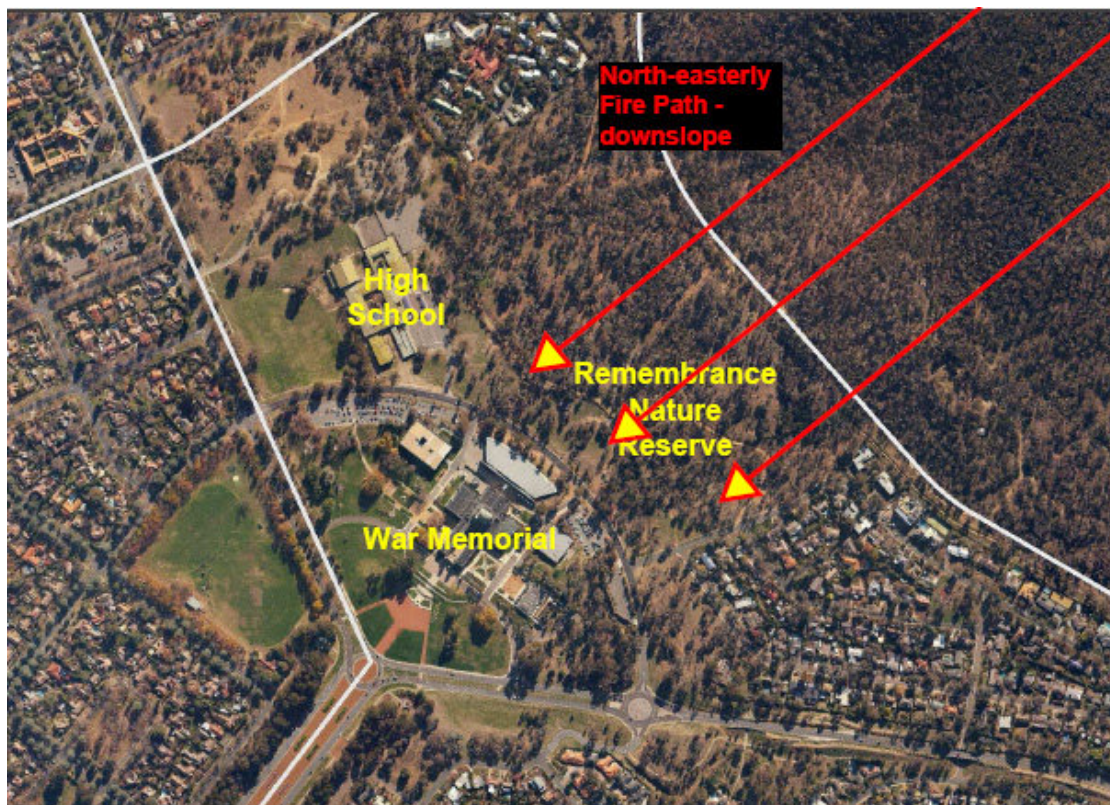


Figure 13 – North-easterly Fire Path



4.8 Bushfire Fuels.

Fuel is a critical element in bushfire risk management, as it is the one factor relating to fire behaviour that can be managed.

There are four 'types' of fuel that contribute to bushfire hazard. They relate to the distribution and nature of combustible material within a vegetated environment and are defined by the Overall Fuel Hazard Guide – Fourth Edition (DSE July 2010), as:

- Bark;
- Elevated fuel load;
- Near Surface fine fuels; and
- Surface fine fuels;

Elevated material is defined as shrubs, heath and suspended material greater than 0.5 metres above ground. The level of bushfire hazard depends on fuel continuity, height, amount of dead material, foliage thickness and flammability of live foliage.

Flammability of vegetation is at the highest when composition is fine, it contains a lot of dead material, is dense vertically and horizontally and has low moisture content.

Surface fine fuels are defined as the litter bed and vegetation up to 0.5 metres above the ground. Grasses add to the surface fine fuels and therefore need to be taken into account when assessing the hazard. The risk is higher where greater depth and volume of litter and surface material are present.

Bark has the potential to travel significant distances in a fire situation (spotting) and act as a ladder between surface fuels and the forest crown. Bark contributes to fire hazard when it is loose and fibrous, present in large quantities and in long loose ribbon forms.

4.9 Assessment of Bushfire Fuel Hazard.

An overall Fuel Hazard for vegetation within the land adjoining the site can be determined using the DSE Overall Fuel Hazard Guide.

The vegetation which will create the most significant fire impact on the development site will be the cured, unmanaged Southern Tableland Grassy Woodland within the Memorial Nature Park due to this vegetation being exposed to the effects of hot, dry northerly and north-easterly winds.

An overall Fuel Hazard for the grassy woodland can be determined from an assessment of the contributing fuel hazards.

(a) Bark Hazard:

The woodland vegetation includes species which have a smooth trunk and long ribbons of bark into the crown of the tree. Therefore this vegetation has a High Bark hazard.

(b) Elevated Fuel Hazard:

Elevated fuel comprises shrub, heath and suspended material.

The level of hazard depends on the fuel continuity (horizontal and vertical), height, and proportion of dead material, thickness of the foliage and twigs and flammability of the live foliage.

The flammability of the elevated fuel is highest when:

- The foliage, twigs and other fuel particles are very fine (e.g. maximum thickness 1-2 mm)
- The proportion of dead material is high.
- The fuels are arranged with a high level of density and horizontal and vertical continuity that promotes the spread of flame.
- The live foliage has low, live fuel moisture content.

The vegetation type and time lapse since the most recent fire substantially determines the level of elevated fuel hazard.

Site investigation was undertaken to determine the structure of the elevated fuel and an estimated Elevated Fuel Hazard of High – Very High, was determined for the grassy woodland vegetation within the adjacent Nature Reserve.

(c) Surface and Near Surface Fine Fuel Hazard:

Surface and Near Surface Fine Fuel Hazard is assessed by measuring litter-bed height. The Surface and Near Surface Fine Fuel in the grassy woodland vegetation consists predominantly of grass or shrubs with accumulated leaf litter beneath trees.

The estimated Surface and Near Surface Fine Fuel Hazard Rating can range from low during periods of drought to very high to extreme during periods when abundant fuel is available and cured to greater than 70%.

The Overall Fuel Hazard for unmanaged grassy woodland vegetation within the Nature Reserve is **Very High**.

4.10 Likely Fire Scenarios.

An assessment of the fire scenarios likely to impact the site has been undertaken, based on the potential fire paths identified on Figures 12 & 13.

This assessment assumes that the vegetation within the Remembrance Nature Park will not be adequately managed to reduce/remove the fuel hazard.

Scenario 1:

A fire starting in the vegetation within the Mount Ainslie Nature Reserve and Remembrance Nature Park to the north/northwest of the War Memorial site and spreading under northerly winds towards the site.

This potential fire impact may occur if the vegetation is not managed and a fire occurs during fire seasons when conditions are such that the grassland vegetation has cured to > 70%, the Fire Danger Index is Extreme (FDI > 50) and the prevailing wind is from the north.

This fire scenario will produce burning embers which will extend inside the adjacent built form edge.

Scenario 2:

A fire starting in the vegetation within the Mount Ainslie Nature Reserve, to the northeast of the War Memorial site, and spreading under north-easterly winds upslope to the apex of the ridgeline then burning downslope towards Remembrance Nature Park and the War Memorial.

This potential fire impact may occur if the grassy woodland vegetation is not adequately managed and a fire occurs during fire seasons when conditions are such that the grassland vegetation has cured to > 70%, the Fire Danger Index is Extreme (FDI > 50) and the prevailing wind is from the northeast.

This fire scenario will produce burning embers which will extend inside the adjacent built form edge.

4.11 Risk Statement.

Table 4 provides a statement of risk for the potential fire scenarios that may impact the site [prior to the implementation of the recommended mitigation measures being adopted / implemented] and assigns risk levels reflecting identified levels of likelihood and consequences for a fire occurrence which may occur if the vegetation is not managed to reduce the combustible fuels available to burn during high, extreme and catastrophic fire weather conditions.

Table 1 provides a list of qualitative measures of consequence [or impact] whilst Table 2 provides a list of qualitative measures of likelihood and Table 3 provides a qualitative risk analysis matrix – used to determine the level of risk in Table 4.

Table 1 – Qualitative Measures of Consequence [or Impact]

Level	Descriptor	Detail Description
1	Insignificant	No public safety injuries or impact to buildings
2	Minor	No public safety injuries – minor impact to buildings
3	Moderate	Burns and Respiratory problems – moderate damage to buildings
4	Major	Death of people exposed to radiant heat & major property damage
5	Catastrophic	Death of people exposed to radiant heat and total destruction of buildings

Table 2 – Qualitative Measures of Likelihood

Level	Descriptor	Detail Description
A	Almost Certain	Is expected to occur during severe fire danger periods
B	Likely	Will probably occur during severe fire danger periods
C	Possible	May occur during severe fire danger periods
D	Unlikely	Unlikely to occur during severe fire danger periods
E	Rare	Will rarely occur during severe fire danger periods

Table 3 – Qualitative risk analysis matrix – used to determine the level of risk in Table 4

Likelihood	Risk Rating				
	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A – almost certain	High	High	Extreme	Extreme	Extreme
B – likely	Moderate	High	High	Extreme	Extreme
C – possible	Low	Moderate	High	Extreme	Extreme
D – unlikely	Low	Low	Moderate	High	Extreme
E – rare	Low	Low	Moderate	High	High

Table 4 – Bushfire Risk Register – Severe Bushfire Event – if high levels of combustible fuels/unmanaged vegetation exist in the landscape.

The Risk What can happen?	The consequences of an event happening Consequences Likelihood		Consequence Rating	Likelihood Rating	Level of Risk	Risk Priority
Fire Scenario 1: A fire burning through the grassy woodland vegetation under northerly winds	Moderate	Possible	3 [Moderate]	C [Possible]	High risk rating	1
Fire Scenario 2: A fire burning through the grassy woodland vegetation under north-easterly winds	Moderate	Possible	3 [Moderate]	C [Possible]	High risk rating	1

4.12 Summary of Bushfire Risk.

Fire ignitions that occur in the grassy woodland vegetation within the Remembrance Nature Park/Mount Ainslie Nature Reserve have the potential to spread rapidly, under northerly and north-easterly wind influences, impacting on the north-eastern edge of the War Memorial site.

If these identified fire paths occur when the grassy woodland vegetation contains excessive amounts of cured fuels the bushfire risk to the proposed development is high.

Section 5 of this report examines the bushfire protection measures, derived from the ACT Strategic Fire Management Plan [Version 3] and A.S. 3959 – 2009 – *Construction of Buildings in Bushfire Prone Areas*.

4.13 Asset Interface Classification [AIC].

The ACT ESA & Rural Fire Service have developed a methodology for determining the classification of potential exposure of the urban edge to severe bushfires and introduces Asset Interface Classification [AIC], which is defined as the boundary between an asset and the bushfire paths that approach it. It is determined by an assessment of:

- The maximum fire size an asset may be subject to;
- The part of the fire [head, flank, back] an asset maybe subject to recognizing the major fire threat from the north and west;
- The fire run length criteria and the length of fire run.

The following table provides an Asset Interface Classification [AIC], at a broader scale for the outer edge of Canberra;

Table 5: Asset Interface Classification

	Length of Fire Run to Asset Interface (through unmanaged vegetation)		
Aspect of Fire Run	<100	100 – 350	>350
N	Secondary	Primary	Primary
NW	Secondary	Primary	Primary
W	Secondary	Primary	Primary
SW	Lee	Secondary	Primary
S	Lee	Secondary	Secondary
SE	Lee	Lee	Lee
E	Lee	Lee	Secondary
NE	Lee	Lee	Secondary

An examination of the Asset Interface Classification at a precinct level for the War Memorial site identifies the following results:

Table 6: Asset Interface Classification – War Memorial Site.

	Length of Fire Run to Asset Interface (through unmanaged vegetation)		
Aspect of Fire Run	<100m	100 – 350m	>350m
North: Unmanaged grassy woodland vegetation			Primary
Northeast: Unmanaged grassy woodland vegetation			Secondary

SECTION 5

PROTECTION MEASURES TO BE IMPLEMENTED TO REDUCE THE BUSHFIRE RISK TO THE PROPOSED DEVELOPMENT

5.1 Provision of Asset Protection Zones [APZs].

Table 7 identifies the widths of the Asset Protection Zones required to comply with the *Strategic Bushfire Management Plan for the ACT – Version 3 – 2014* and are based on the assumption that buildings [assets] are constructed to a standard which meets the specifications of A.S. 3959 – 2018 – *Construction of Buildings in Bushfire Prone Areas*.

Table 7 – Inner & Outer Asset Protection Zones to Assets - Strategic Bushfire Management Plan for the ACT – Version 3 – 2014.

Aspect of Fire Run	Length of Fire Run to Asset Interface (through unmanaged vegetation)			Required Asset Protection Zones	
	<100m	100 – 350m	>350m	IAPZ	OAPZ
North: Unmanaged grassy woodland vegetation			Primary AIC	30m	Minimum 100m
Northeast: Unmanaged grassy woodland vegetation			Secondary AIC	20m	Nil

5.2 Review of Asset Protection Zones [APZs].

Strategic Bushfire Management Plan for the ACT – Version 3 – 2014 requires the provision a minimum 30 metre wide Inner Asset Protection Zone [IAPZ] and a minimum 100 metre wide Outer Asset Protection Zone [OAPZ] to the north and a minimum 20 metre wide Inner Asset Protection Zone [IAPZ] to the northeast of the War Memorial complex.

Figure 14 on Page 33 identifies that the minim 30 metre wide IAPZ to the north is provided by the width of Treloar Crescent and the managed Outer Asset Protection Zone within the Park is approximately 80 metres wide (not the 100 metres required by the SBFMP).

Figure 14 also details the location of the unmanaged vegetation to the north-east and confirms that availability of the minimum 20 metre wide IAPZ within Treloar Crescent.

Figure 15 on Page 34 provides a copy of the ESA Regional Management Zones Plan which identifies the location of the Inner Asset Protection Zone within the Treloar Crescent corridor and the managed Outer Asset Protection Zone within the Remembrance Park. Figure 15 also identifies the location of a Strategic Fire Advantage Zone (SFAZ) beyond the OAPZ.

Figure 14 – Plan of available Asset Protection Zones to unmanaged vegetation within the Remembrance Nature Park.

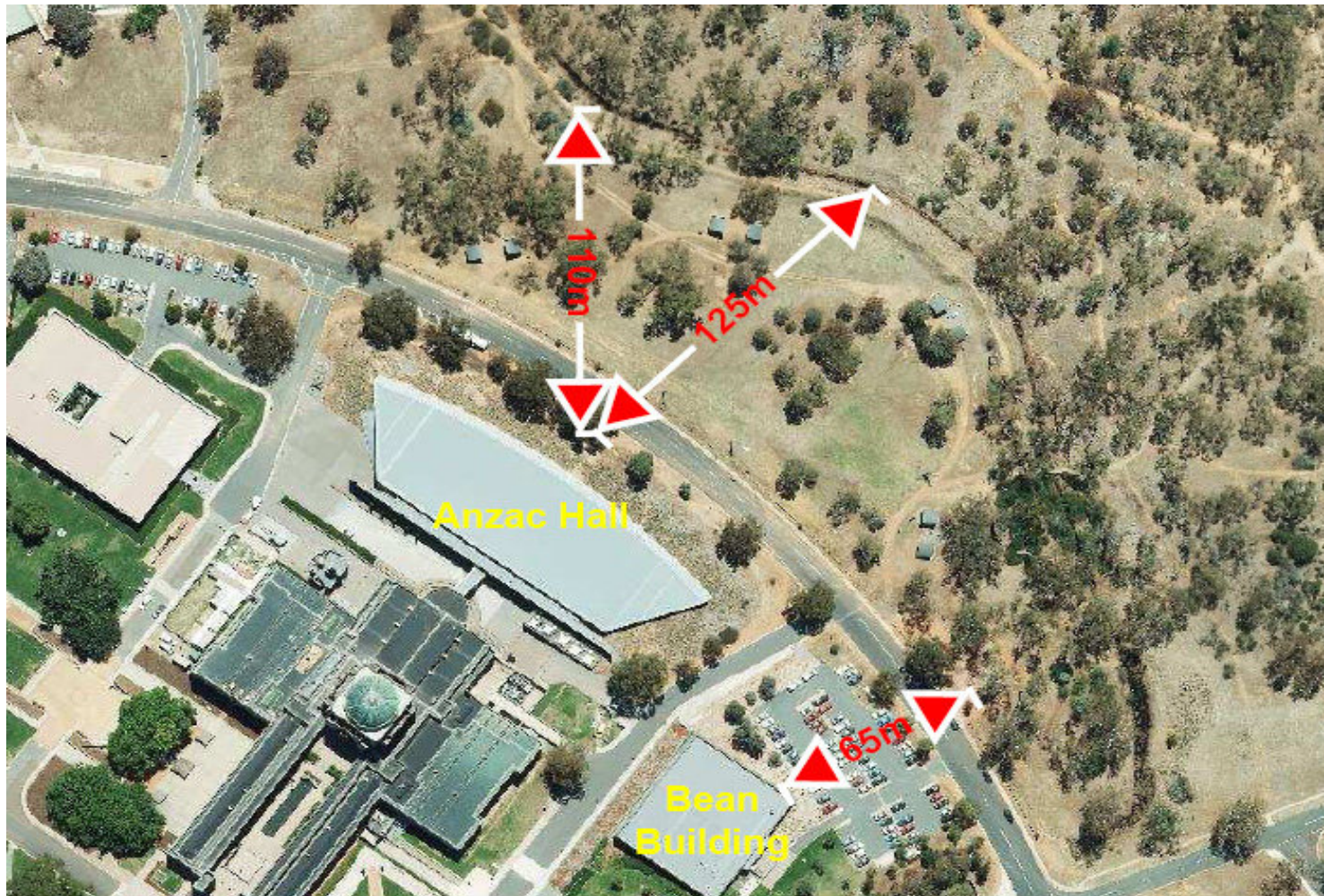


Figure 15 – ESA Regional Management Zones Plan.



Figure 15 confirms that the intent is that the Nature Park is to be managed to the location and width shown.

This width increases the Outer Asset Protection Zone to more than 100 metres to the north, satisfying the requirements of Table 7 and therefore complying with the Strategic Fire Management Plan.

The available width of Asset Protection Zone to the northeast of the Anzac Hall and the extension to the Bean Building exceed the 20 metre setback determined in Table 7, therefore complying with the Strategic Fire Management Plan.

5.3 Construction Standards to the new works:

The new building works within the Anzac Hall precinct are located more than 100 metre from unmanaged bushfire prone vegetation therefore placing them outside the bushfire construction standards required by A.S. 3959 – 2018 – *‘Construction of Buildings in Bushfire Prone Areas’*.

However, due to the likelihood of significant ember attack on the works it is recommended that all new building work shall be constructed to comply with Section 3 and Section 5 (BAL 12.5) of A.S. 3959 – 2018 – *‘Construction of Buildings in Bushfire Prone Areas’*.

The proposed extensions to the Bean Building are located more than 55 metres from unmanaged woodland vegetation within the Remembrance Nature Park. The landform is upslope therefore all new work shall be constructed to comply with Section 3 and Section 5 (BAL 12.5) of A.S. 3959 – 2018 – *‘Construction of Buildings in Bushfire Prone Areas’*.

The following additional construction standards shall apply to the new work:

- The downpipe/stormwater system to internal box gutters [if installed] shall be sized to provide the self flushing of combustible materials from the roof/gutter. This shall include increased fall in the box gutters to the sumps;
- Any external vents, grilles and ventilation louvres shall have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers into the building or be fitted with a louvre system which can be closed in order to maintain a maximum aperture or gap of no more than 2mm;
- Roof ventilators shall be fitted with stainless steel flymesh [2mm aperture] to prevent the entry of embers into the building or be fitted with a louvre system which can be closed in order to maintain a maximum aperture or gap of no more than 2mm.

- Roof lights/roof vents shall not use polycarbonate material unless fitted with a Grade A Safety Glass Diffuser, complying with A.S. 1288, is installed under the glazing;
- The roof to the Access Link between the existing War Memorial building and the new Anzac Hall shall have a non-charged wet-down irrigation sprinkler system installed.

The sprinkler system shall be capable of wetting down the entire dome roof area during ember attack on the roof. Operation of the sprinkler system shall be available from inside the building.

The development proposal includes the establishment of an Electrical Substation to the northeast of the extension to the Bean Building. The location of this facility is approximately 35 metres from the unmanaged woodland vegetation to the northeast of Treloar Crescent. This separation removes the risk of direct impact from bushfire however ember protection should be provided to any vents/grilles installed in the equipment or building (if constructed).

5.4 Access for Fire-fighting Operations.

Table 10 of the *ACT Strategic Bushfire Management Plan – Version 3 – 2014* provides ‘Access Standards for Public Roads for New Estate Development’.

The document does not provide specifications for road access to commercial development.

The Australian War Memorial complex has primary access from Limestone Avenue, Fairbairn Avenue and Treloar Crescent with internal service roads.

All access roads provide satisfactory access for ACT Fire & Rescue Appliances.

5.5 Water Supplies for Fire Fighting Operations.

A fire-fighting water supply is installed to comply with F6 and the standards agreed by ACTEW and ACT Fire & Rescue.

5.6 Fuel Management Protocols:

The War Memorial site shall continue to be managed as an Inner Asset Protection Zone [IAPZ] complying with the management protocols as provided in Part 2 – Table 4 – Fuel Management Standards for Asset Protection Zones of the ‘*Strategic Bushfire Management Plan for the ACT – Version 3 – 2014*’.

Access to hydrants, other water supplies and services must not be impeded by trees, street furniture or landscaping. Minimum height clearance for ACTF&R appliance is 4.5 metres.

Street trees and landscape planting shall be selected for low bark flammability characteristics.

Mature tree crown separation shall be 3 – 5 metres with > 3 metre fuel [vertical] gap to the crown.

The management of the Outer Asset Protection Zones [OAPZ], within the Remembrance Nature Park is the responsibility of the ACT Government and shall be undertaken in accordance with the '*Strategic Bushfire Management Plan for the ACT – Version 3 – 2014*'.

5.7 Emergency Management:

A Bushfire Emergency & Evacuation Plan [BEEP] shall be prepared for the complex and approved by the ACT Emergency Services Agency prior to the occupation of the new works

The BEEP shall establish protocols for the activation of the roof wet-down sprinklers closure of the complex to the public during declared emergencies which present a direct risk to the public.

SECTION 6

RESIDUAL RISK.

6.1 Introduction.

Table 8 evaluates the residual bushfire risk to the site, following the implementation of the recommended bushfire protection measures, and determines the vulnerability of the proposed development, the possible consequences and residual bushfire risk.

Table 8 – Bushfire Risk Register & Action Treatment Plan – Severe/Catastrophic Bushfire Event, Post implementation of Protection Measures.

The Risk What can happen?	Consequences / Likelihood of an event happening before mitigation	Risk before mitigation	Strategy to reduce risk	Consequences & Likelihood after mitigation measures applied	Residual Level of Risk
Fire Scenario 1: A fire burning through the grassy woodland vegetation under northerly winds	Moderate / Possible	High risk rating	APZs + construction standards	Minor /Possible	Moderate
Fire Scenario 2: A fire burning through the grassy woodland vegetation under north-easterly winds	Moderate / Possible	High risk rating	APZs + construction standards	Minor /Possible	Moderate

6.2 Summary of Residual Bushfire Risk.

Table 8 provides an assessment of the residual level of risk to the proposed development and has been determined on the basis that the recommended bushfire protection measures have been implemented.

SECTION 7

CONCLUSION

This risk assessment examines the potential bushfire risk to the proposed extensions to the Australian War Memorial complex.

This report has examined the topography, vegetation and the fire-paths which are likely to present a threat to the proposed development and determined the level of risk prior to and the residual risk after the implementation of the recommended bushfire protection measures.

The level of residual risk to the development has been determined having regard to the assumption that the recommended bushfire protection measures are fully implemented, including the provision of the recommended Asset Protection Zones, bushfire construction standards to the building, access and water supply requirements for fire-fighting operations and the preparation of an Bushfire Emergency Evacuation Plan which establishes protocols for the closure of the complex to the public during direct bushfire threat to the complex.

It is therefore concluded that the provision and maintenance of these measures reduces the existing high level of bushfire risk to a moderate level of risk.



Graham Swain
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REFERENCES:

- Strategic Bushfire Management Plan for the ACT – Version 3 – 2014;
- The Canberra Spatial Plan – ACT Planning & Land Authority – March 2004;
- *Australian Standard for Risk Management* A.S./N.Z.S. ISO 31000:2009 and A.S. 3959 - 2018;
- Emergency Risk Management – Applications Guide. (EMA) 2000);
- Overall Fuel Hazard Guide Fourth Edition – DSE. July 2010.