

Building Construction in Bush Fire Prone Areas

Bushfire Hazard Assessment Report

REF No. 22.11.443

Address Lot 1 DP 808703
5 Chiltern Road
Ingleside NSW 2101

For Galstaun College

The site was inspected on 16th November 2022

Report Preparation

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Grad Dip Design for Bushfire Prone Areas
FPAA Certified BPAD – Level 3 Practitioner



1.0 Introduction

We have been engaged by Galstaun College, the owners of the subject land to prepare a bush fire hazard assessment report to be a supplement for inclusion in a development application to Northern Beaches Council for the proposed construction of a Lift within an existing college building.

The existing college is considered to be a Special Fire Protection Purpose development and therefore section 100b of *Rural Fires Act 1997* is applicable.

The site has been identified as being bushfire prone land and therefore the legislative requirements for the proposed development are applicable.

1.1 Purpose of Report

- To determine the vegetation type, the expected fire behaviour and the threat to the proposal; and
- To assess the proposal with reference to *Planning for Bush Fire Protection 2019*; and
- To assess the proposed construction with reference to the National Construction Code of Australia; and
- To determine the level of construction with reference to AS 3959-2018 *Construction of buildings in bushfire prone areas*; and
- To identify any other such measures as to improve the chances of building survival during a bushfire event; and
- To assist the consent authority Northern Beaches Council in the determination of the development application subject to this proposal.

1.2 Scope of Report

The scope of this report is limited to the Bushfire Hazard Assessment for the proposed development and only contains recommendations for the subject property. Where reference is made to adjacent or adjoining lands, this report does not purport to assess those lands; rather it may discuss bushfire progression on and through those lands with the possible bushfire impact to the subject property and the proposed development.

1.3 Regulatory Controls

The findings were related and assessed with reference to *Planning for Bush Fire Protection 2019* and AS 3959-2018 *Construction of buildings in bushfire prone areas* for the formulation of the Bushfire Hazard Assessment.

This report has been prepared in accordance with the requirements of Clause 45 of the *Rural Fire Service Regulation 2008* for the purpose of satisfying the requirements of section 100b of the *Rural Fires Act 1997*.

1.4 Methodology

A site inspection for the purpose of assessing bushfire related matters affecting this site was conducted on the 16th November 2022 and a review of the proposed construction plans as supplied and prepared by E S Design has taken place.

An assessment of slope was conducted out to a distance of 100 metres and assessment of vegetation to a distance of 140 metres from the proposed development.

The findings were related and assessed with reference to *Planning for Bush Fire Protection* 2019 and AS 3959-2018 *Construction of buildings in bushfire prone areas* for the formulation of the Bushfire Hazard Assessment.

1.5 The Proposal

The proposal as indicated by consultation with the proponents and perusal of plans supplied, shows for the construction and installation of a new two storey lift within an existing college building.

Further details of construction are shown upon plans included within appendix 1 of this report.

However, it must be noted that the plans supplied may not fully satisfy the recommendations included within this report and subject to actual consent conditions issued by the consent authority some modifications or changes may need to occur to achieve the required compliance.

2.0 Site and Adjacent Developments

The following seeks to describe the site, the adjoining lands and land uses effective upon the development proposal.

2.1 Site Description

The site is identified as Lot 1 DP 808703
 5 Chiltern Road
 Ingleside NSW 2101
 LGA Northern Beaches Council

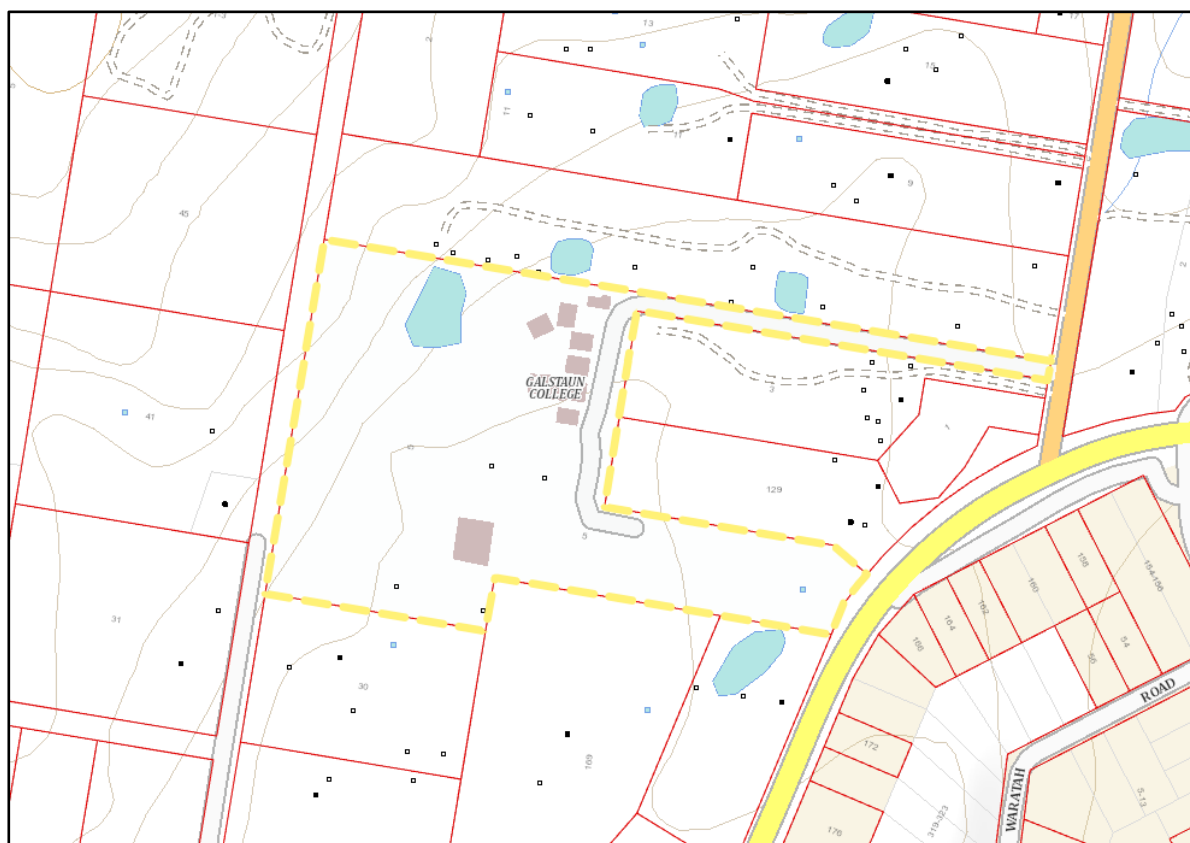


Figure 1: Address validation ex NSW Planning Portal

The subject allotment was created prior to the current subdivisional requirements contained within *Planning for Bush Fire Protection 2019*.

The site is a residential allotment of approximately 9.5 hectares located to the west of Chiltern Road and Mona Vale Road. The area in which the proposal is located is generally light industrial development and rural lifestyle allotments that have been established for many years.

The subject allotment is located within an area that should be considered as having a direct interface to bushfire hazardous vegetation.

The subject allotment is positioned upon the westerly aspect slopes of a south to north ridgeline. The allotment is to the west of a naturally occurring topographical drainage feature identified as Wirreanada Creek that descends in a northerly direction away from the subject allotment.

The parcel of land is quite irregular in shape with eastern boundary road frontages to Chiltern Road and Mona Vale Road although vehicle access is only currently possible from Chiltern Road.

At present the site has structural improvements to approximately eleven college buildings.

In terms of vegetation the subject allotment contains a large area of managed land across the eastern section of the subject allotment with an equally large area of forest vegetation on the western section of the site.

The site is shown upon the Northern Beaches Bushfire Prone Land Map (Figure 2) to be within a combination of category 1 vegetation (shown red), category 1 vegetation buffer zone (shown yellow) and areas not bushfire prone. The site inspection and interpretation of aerial photography for the site confirms that the subject allotment is reasonably depicted upon this image although the area of category 1 vegetation is slightly understated.



Figure 2; Section Ingleside LGA Bushfire Prone Land Map ex NSW Planning Portal

Provision of mains reticulated water supply, electricity and phone is available to the proposal by existing infrastructure.

2.2 Description of Adjoining Lands

To the north of the subject allotment is a retail landscaping supplies outlet and beyond this are rural lifestyle allotment that are combination of managed lands and tall heath vegetation.

To the east of the subject allotment is initially light industry usage and then beyond Mona Vale Road are large residential allotments some of which contain forest vegetation although these are beyond the study area of this report.

To the south of the subject allotment is rural lifestyle allotment that consist of horse grazing paddocks and fragmented sections of forest vegetation.

To the west of the subject allotment is a large and expansive area of forest vegetation that is contiguous with the bushfire hazardous vegetation on the subject allotment.



Figure 3: Aerial photo depicting localised terrain and adjoining allotments ex Nearmap

3.0 Environmental Considerations

The scope of this report has not been to provide an environmental survey although this report will be a supplement to a Statement of Environmental Effects as part of the development application process.

The proposed scope of works does necessitate the removal of a limited area of vegetation as required to satisfy the recommendations for asset protection zones. It is also our opinion that the bushfire protection measures as recommended within this report will have little or no adverse environmental effects.

The proposal is located on a site that has been developed for many years and this proposal does not change the current land use or increase the level of occupancy.

4.0 Bushfire Hazard Assessment

The bushfire hazard assessment was conducted for the proposed development, using the procedures as outlined in *Planning for Bush Fire Protection* 2019 to determine the bushfire attack level (BAL) likely upon the development. The assessment was conducted on the assumption of the building footprint being positioned as described in section 1.5 The Proposal of this report and the site plan.

4.1 Classification of Vegetation and Separation Distance from Proposed Development

The vegetation was assessed for a distance of 140 metres from the proposed development building footprint in each of the following directions. To the north, east, south and west being the general direction adjacent and away from the proposed building elevations within such building footprint.



Figure 4: Vegetation study area



140 metre radius approx. Image ex Nearmap



Proposed development location



Forest

To the west of the proposed development (Area A) is an area of effective bushfire hazardous vegetation and this area should be classified as being a vegetation formation of **Forest** with a minimum separation distance of 93 metres after consideration of the asset protection zone recommended by this report.

4.2 Slope Assessment

The slope was assessed for a distance of 100 meters within the bushfire hazardous vegetation and reference to slope classifications has been undertaken considering the procedure specified within *Planning for Bush Fire Protection* 2019.



Figure 5; Slope assessment study area contour data ex Geoscience Australia

The **effective slope** of the land, out to a distance of 100 metres from the proposed scope of works (that is, the slope of the land most likely to influence bushfire behaviour for the purposes of calculating the Category of Bushfire Attack and Asset Protection Zones, has been assessed (using a clinometer) and desktop analysis as being;

- Area A – Forest - > 5 to 10 degrees downslope (assumed) (elevation 19.45 met / dist. 114.69 met = 9.63 degrees)

4.3 Category of Bushfire Attack

The bushfire attack level (BAL) for the proposed development was determined by using the information gathered with respect to the classification of the vegetation, the effective slope and provision of asset protection zones specified in this report with reference given to *Planning for Bush Fire Protection* 2019.

It is the determination of the site inspection, the assessment procedure with incorporation of the recommendations in this report that the proposed development could experience a BAL 12.5 category of bushfire attack. The proposed development is most likely to be subject to the greatest bushfire attack from any area to the west from the proposed development location.

Bushfire Attack Summary

West	
Vegetation Formation	Forest (Area A)
Vegetation Slope	Downslope > 5 to 10 degrees
Building Separation Distance metres	93
Separation Slope	Upslope degrees
Fire Danger Index	100
AS 3959 Construction Standard	BAL 29

5.0 Assessment of the extent to which the development conforms or deviates from *Planning for Bush Fire Protection 2019*

The proposed development being the construction of a lift will conform to the requirements of *Planning for Bush Fire Protection (PBP) 2019* when considered in conjunction with both the proposal supplied for this assessment and the recommendations arising from this bushfire hazard assessment report.

5.1 Asset Protection Zones

The provision of asset protection zones for the proposed building footprint can be fully provided for onsite to satisfy the requirements of *Planning for Bush Fire Protection 2019*.

Based upon the provisions of PBP2019 to achieve a maximum exposure of 10kW/m² radiant heat, the asset protection zone required to be provided between the vegetation hazard and the proposed new works to the existing building is 80 metres.

The maintenance of the majority of area upon the subject allotment in direct proximity to the existing buildings currently would satisfy the requirements of an inner protection area of an asset protection zone as contained in *Planning for Bush Fire Protection 2019*.

This report will recommend that the site where not built upon is maintained to the requirements of an inner protection area of an asset protection zone and managed to these provisions for the lifetime of the development as follows;

- From the proposed lift installation site to the adjacent sections of northern eastern and southern boundaries; and
- From the proposed lift installation site for a distance of 93 metres to the west.

As such, the effective separation distance between the proposed building and the forest vegetation will comply with *Planning for Bush Fire Protection 2019*.

The following is a summary of the requirements for an asset protection zone inner protection area as described within the documents *Planning for Bush Fire Protection 2019* and NSW RFS *Standards for Asset Protection Zones*.

Inner Protection Area (IPA)

The IPA is the area closest to the building and creates a fuel management area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defensible space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 10cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building consisting of a mown lawn and well-maintained gardens.

When establishing and maintaining in IPA the following requirements apply;

Trees

- tree canopy cover should be listed 15% at maturity;
- trees at maturity should not touch your overhang the building;
- lower limbs should be removed to a height of two metres above the ground;
- preference should be given to smooth bark and Evergreen trees

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards the buildings;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves vegetation debris should be removed

The creation and continued maintenance of the full asset protection zone is one of the primary factors in bushfire protection measures for developments in bushfire prone areas.

5.2 Position and Design of Proposed Development

The design and siting of the proposed development must take into consideration the actual bushfire risk and this report contains recommendations to assist in mitigating the mechanisms of bushfire attack.

5.3 Construction Level

The National Construction Code contains both the performance requirements and the 'deemed to satisfy' provisions relating to construction of class 1, 2 & 3 buildings that are proposed for *construction in bushfire prone areas*. To satisfy the performance provision P2.3.4 of the National Construction Code of Australia Vol. 2, a Class 1a building that is constructed in a designated bushfire prone area must be designed and constructed to reduce the risk of ignition from a bushfire while the fire front passes.

Australian Standard 3959-2018 *Construction of buildings in bushfire prone areas* is referenced by the NCC as the deemed to satisfy construction standard for residential dwellings in designated bushfire prone areas with the exception that in NSW the requirements shall be varied to comply with section 7.5.2 Additional construction requirements of *Planning for Bushfire Protection 2019*.

Given that the proposed development could experience a Bushfire Attack Level (BAL) 12.5 from vegetative fuels to the west, this proposed lift installation should therefore be designed and constructed to the requirements of AS 3959-2018 and must be constructed to comply with section 3 Construction General and section 5 BAL 12.5 of such standard apart from as varied to comply with section 7.5.2 Additional Construction Requirements of *Planning for Bushfire Protection* 2019.

5.4 Access / Egress

5.4.1 To the Proposed Development

The access to the subject site is from Chiltern Road which is a sealed two lane road in a well maintained condition and under most conditions should provide adequate access and egress for both residents and emergency service vehicles.

Chiltern Road links to other through roads at each end which would afford the residents the ability to evacuate the area to a location not being directly implicated by the mechanisms of bushfire attack, although under most bushfire conditions this would generally not be required.

5.4.2 Within the Site

The site plan for the proposal does show that vehicle access may not be possible to all elevations of each building within the site, although a fire tanker will be able to park in close proximity to the eastern building elevations upon an existing driveway and foot access will be available to each of the other building elevations.

It should be considered by the residents that during a major bushfire event the following may occur;

- The suppression or defensive operations by fire authorities may not be possible in the general area of the development due to safety considerations for fire fighters; and
- That there may not be adequate fire authority resources to protect this development or others in the general area.

Whilst all fire authorities will endeavour to assist all occupants and protect all buildings during major bushfire events this is not always possible and cannot be guaranteed.

5.5 Public Road Links to Fire Trail Network and Two Way Access

The objective for provision of a dedicated fire trail system is to assist fire fighters in either offensive or defensive firefighting. In addition, a fire trail may be incorporated into a development to define the asset protection zone and to provide access for maintenance.

In this instance given that the area bushfire hazard is clearly defined by the asset protection zone and any hazard is easily accessible this report does suggest a fire trail system is not needed or required.

5.6 Adequacy of Access and Egress from the Development Site for Emergency Response

The proposed development is within the fire response area of the NSW Rural Fire Service and more particularly the Ingleside Rural Fire Brigade whose station is located approximately 1.0 kilometres (by road) to the southeast of the subject site.

The system of public roads to the site should be adequate under most conditions to allow for access and egress for the site for emergency service vehicles.

5.7 Adequacy of Bushfire Maintenance Plans and Fire Emergency Procedures for the Development Site

It is assumed that at present there are no bushfire management plans and/or bushfire emergency procedures for the school site.

Bushfire evacuation procedures should be included within any existing emergency management plan for the school or, if no such plan exists, a bushfire evacuation plan should be prepared in accordance with the current NSW RFS guidelines.

5.8 Utility Supplies

5.8.1 Water

In this instance for Galstaun College, this report recommends that a Static Water Supply (SWS) tank of not less than 20,000 litres is provided within the site that satisfies the below noted conditions.

The acceptable solutions as noted within PBP 2019 include the following;

- Above ground tanks are constructed from metal or concrete;
- Underground tanks are clearly marked and have an access hole of 200mm to allow for the draughting of water; or
- If above ground the tank is fitted with a 65mm Storz outlet with a gate or ball valve; and
- All external fittings and pipes are metal rather than plastic; and
- A hardened ground surface (minimum width of 4 metres and minimum vertical clearance of 4 metres) is provided to within 4 metres of the tank.

This tank should be fitted with the suitable plumbing and its location indicated by approved Static water Supply (SWS) signage together with other provisions as noted above and in the recommendations of this report.

5.8.2 Electricity

The site inspection noted that within the college grounds the supply of electricity is by underground cabling. The connection of electricity to the subject building is also by underground connection.

This methodology satisfies the requirements for the acceptable solutions as contained within *Planning for Bush Fire Protection* 2019.

5.8.3 Gas

At the time of report preparation it was not known if it is proposed to connect gas supply to the subject building. However any future connection to either mains or portable gas supply should be undertaken and maintained to the provisions of AS 1596-2002 *Storage and handling of LP Gas*. All piping associated with the installation must be metal.

5.9 Landscaping

A formal landscaping plan was not supplied for perusal at the time of formulating this report however recommendations are made with respect to the maintenance of the area on the site.

It is highly probable that in the future landscaping and garden establishment may occur on the site. However no future planting of trees or shrubs, or combustible landscaping features should be undertaken or constructed in a manner which creates a path for bushfire progression towards the dwelling or allows for a potential compromise to the integrity of the asset protection zone.

6.0 Assessment of the extent to which the development conforms or deviates from Chapter 6 of *Planning for Bush Fire Protection 2019*

The proposed development can conform to the requirements of *Planning for Bush Fire Protection 2019* based on the scope of works submitted for this bushfire assessment with the integration of the recommendations as included within this report.

Asset Protection Zones for the proposed development easily satisfies the separation and asset protection zone provisions under the current and existing conditions for the allotment.

Access and Egress shall be provided directly from Camden Valley Way with an all weather trafficable surface road leading from Camden Valley Way to the child care centre.

Levels of Construction shall be undertaken to satisfy the recommendations included within this report.

Water Supplies shall be undertaken to satisfy the recommendations included within this report.

Emergency Management shall be undertaken to satisfy the requirements of the NSW RFS for Bushfire Evacuation/Relocation.

7.0 Bushfire Hazard Assessment Recommendations

1. That the site where not built upon shall have the vegetation reduced where necessary to satisfy the requirements of *Planning for Bush Fire Protection* 2019 and the NSW Rural Fire Service document “Standards for Asset Protection Zones” for an inner protection area of an asset protection zone and this area shall be maintained at this vegetation level for the lifetime of the development as described below;
 - From the proposed lift installation site to the adjacent sections of northern eastern and southern boundaries; and
 - From the proposed lift installation site for a distance of 93 metres to the west.

These areas are to form a continuous and linked buffer around the entire college buildings.

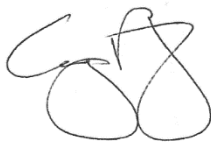
2. That no future landscaping features, planting of shrubs, trees or other vegetation shall occur in such a manner as to compromise the integrity of the asset protection zone.
3. That the proposed development shall be constructed to section 3 Construction General and section 5 BAL 12.5 of AS3959-2018 *Construction of buildings in bushfire prone areas* with the exception that the construction requirements shall be varied to comply with section 7.5.2 Additional Construction Requirements of *Planning for Bush Fire Protection* 2019.
4. A Static Water Supply (SWS) tank is to be located within site. This tank should have a minimum capacity of 20,000 litres, be of non-combustible construction and be fitted with a ball valve and 65mm Storz outlet located within 4.0 metres of the hard driveway surface.
5. That all plumbing associated with the reserve water supply above the ground or for a depth of not less than 300mm below the ground shall be metal.
6. That approved NSW Rural Fire Service; Static Water Supply signage is installed at approved locations for the proposed development.
7. Bushfire evacuation procedures for the college should be included within any existing emergency management plan or, if no such plan exists, a bushfire evacuation plan should be prepared in accordance with the NSW RFS *Guide to Develop a: Bushfire Evacuation Plan*.

These recommendations are the opinions of the author of this report and are compiled to assist the consent authority and the NSW Rural Fire Service in the assessment of this proposed development and that the final conditions as imposed by the consent authority must be adhered to at all stages and where required for the lifetime of the development.

8.0 Conclusion

The objectives and performance requirements for the proposed development as required by the National Construction Code Volume and the document *Planning for Bush Fire Protection* 2019 will be achieved by the incorporation of the 7 recommendations contained within this report.

The recommendations contained within this report will assist in providing a reasonable level of bushfire protection and improve but not guarantee the chances of building survival, or provision for the occupants with a safe refuge during the passage of a bushfire front and or the provision of a defensible space for fire fighters.



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Caveat

Quote from *Planning for Bush Fire Protection* 2006, '*notwithstanding the precautions adopted, it should always be remembered that bushfire burn under a wide range of conditions and an element of risk, no matter how small always remains.*'

Quote from Standards Australia, '*Although the standard is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any one building will withstand bushfire attack on every occasion.*'

References

Planning for Bush Fire Protection 2019 Planning NSW in conjunction with NSW Rural Fire Service

Building Code of Australia Volume 2 2013 Australian Building Codes Board

AS 3959 –2018 Construction of buildings in bushfire prone areas Standards Australia & Australian Building Codes Board

Landscape and building Design for Bushfire Areas Ramsay C. & Rudolph L. CSIRO 2003

Quantifying bushfire penetration into urban areas in Australia Keping Chan & McAneny J. Geophysical Research Letters, Volume 31, L12212, doi:10.1029/2004GL020244,2004

Bushfires in Australia Luke R.H. & McArthur CSIRO 1978

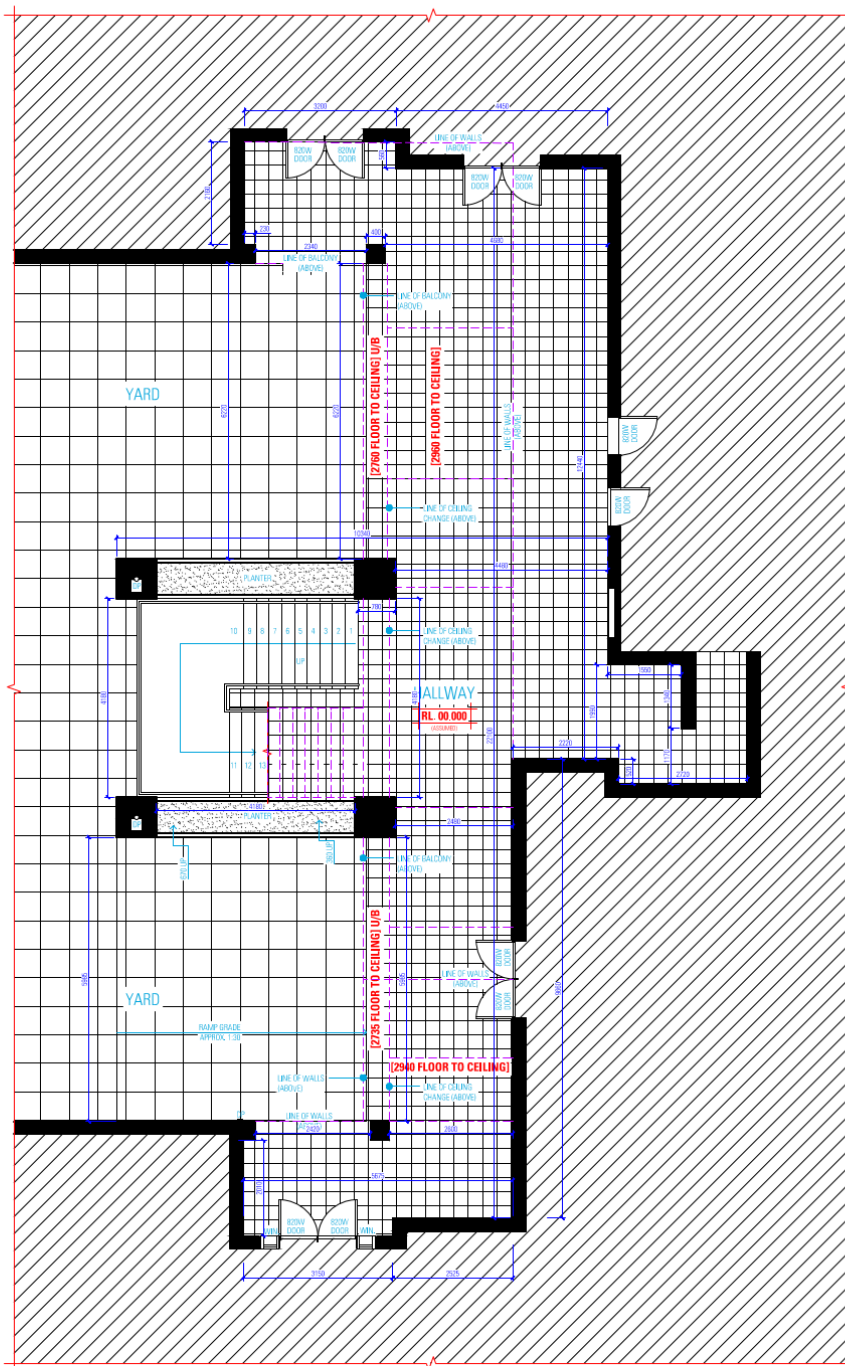
Performance of Building Elements in Bushfire Prone Areas Poon S.L. & England J.P. Warrington Fire Research Australia

Address Validation Search Department of Lands www.maps.nsw.gov.au

Standards for Asset Protection Zones NSW Rural Fire Service 2005

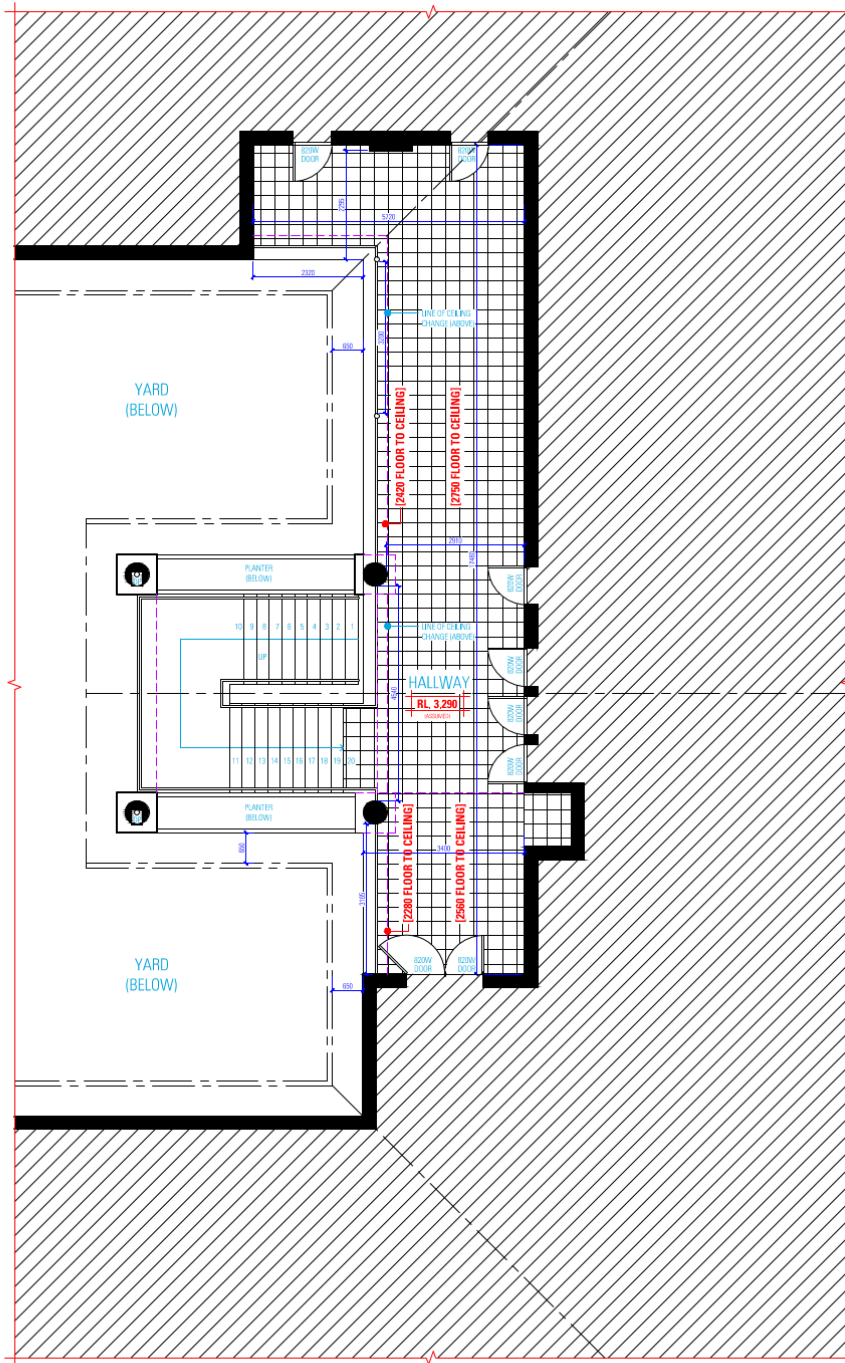
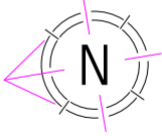
Ocean Shores to Dessert Dunes Keith D. Department of Environment and Conservation Sydney 2004

Appendix 1- Proposed development plans ex E S Design



NOT FOR CONSTRUCTION

DWG No. 19159-01



EXISTING FIRST FLOOR PLAN

NOT FOR CONSTRUCTION

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES
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ALTERATIONS AND ADDITIONS

5 CHILTERN ROAD,
INGLESIDE NSW 2101

DESIGN ELIE SLEMAN
DRAFTED ELIE SLEMAN

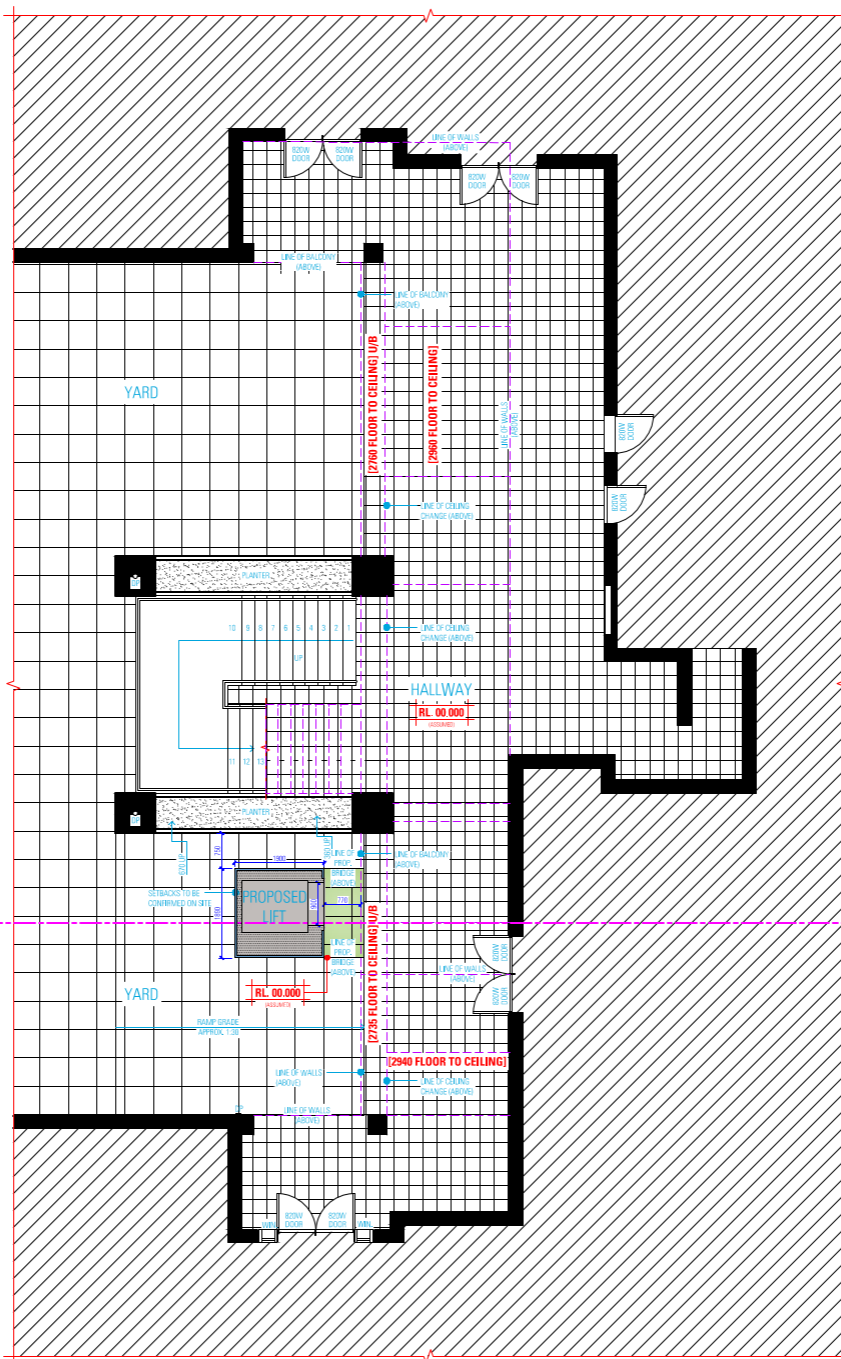
MIR SAM BASMAJIAN

DRAWING

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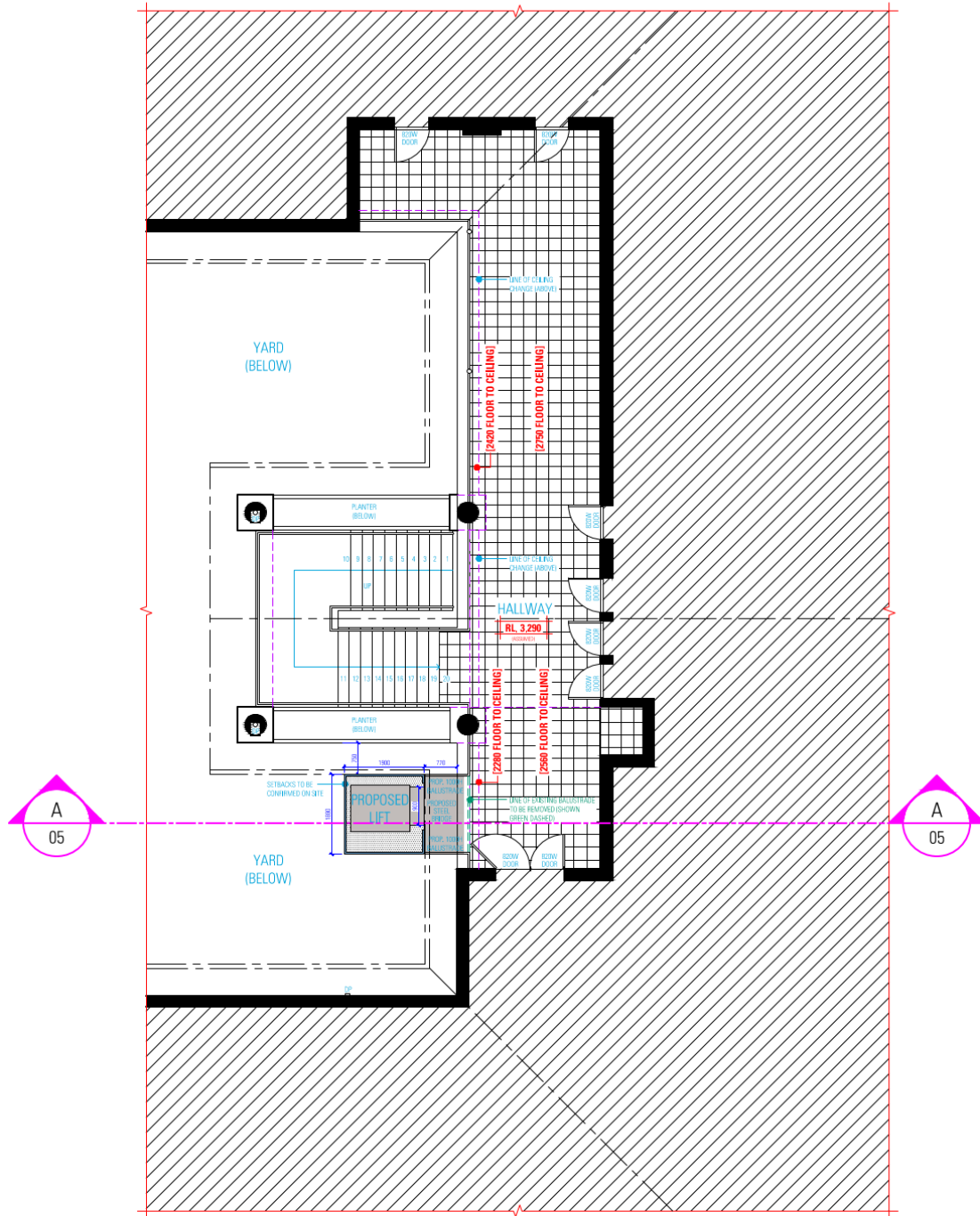
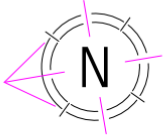
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PROPOSED FIRST FLOOR PLAN

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ALTERATIONS AND ADDITIONS

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PROPOSED FIRST FLOOR PLAN

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ISSUE A

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