BUSHFIRE RISK *Specialists in Bushfire Risk Management*

BPAD-Level 3 Accredited Business (Cert. No: BPAD-L3-21977)
PO Box 685, Lismore NSW 2480
Mobile: 0447 211 375
mj@bushfirerisk.com
www.bushfirerisk.com

ABN: 23 908 692 569
Ref: 150406 AddInfo V3

Bushfire Threat Assessment
Additional Information Response
Re: Kings Forest Service Station

Modification of Concept Plan (MP06_0318 MOD 5)
and Stage 1 Project Approval (MP08_0194 MOD 3)

Location: Lot 7 DP 875447
Tweed Coast Road, Kings Forest, NSW

Applicant: Planit Consulting Pty Ltd

12 May 2015-Version 3

This report has been prepared by: **Melanie Jackson**
Grad Dip (Bushfire Protection); B.App.Sc (EnvResMgt)
BPAD-Level 3 Accredited Practitioner & Member of the FPA Australia

‘Prepare—Act—Survive’

In the Event of an Emergency Call:

‘000’

DISCLAIMER

Despite best efforts, there is no guarantee that desirable outcomes are achievable during extreme bushfire weather episodes, which may occasion unpredictable bushfire behaviour and detrimental consequences to life, property and the environment.

Any representation, statement, opinion, or advice expressed or implied in this report is made in good faith on the basis that Bushfire Risk or its employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for damage or loss whatsoever that may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to below.

EXECUTIVE SUMMARY

Client/s:	Planit Consulting Pty Ltd		
Location of the subject site:	Tweed Coast Road, Kings Forest NSW (Ref. Fig. 1)		
LGA:	Tweed	Lot/Sec/Plan:	Lot 7 DP 875447
Site inspection date:	5 May 2015		
Proposed development:	For a service station including shops with food outlets, carwash and dog wash facilities.		
Prosposed site plans (Ref: App. A)	Amended proposed site plans by Push; Date: September 2015 (Dwg 0000, Issue D and Dwg 1000, Issue G).		
Type of development:	'Other Development' (Planning for Bushfire Protection (PBP (2006)); Class 6 (Other Buildings)		
Special fire protection purpose:	No		
What is the Bushfire Attack Level (BAL) as per AS3959–2009?	BAL-29 & BAL-19 (Ref. Fig. 2)		
Are there any non-conformity issues envisaged in relation to the deemed-to-satisfy arrangements?	YES-Alternate solutions were used to demonstrate compliance.		
Can this proposal comply with AS3959–2009 & Addendum: Appendix 3 of PBP (2006)?	YES: Method—simplified procedure and Method 2—complex procedures were used to determine the BAL (AS3959–2009).		
Does this development comply with the Aims and Objectives of PBP (2006)?	YES: Alternate solutions apply.		
Does this development require referral to the NSW Rural Fire Service as per s.79BA of the *Rural Fires Act* 1997?	No: provided the consent authority is satisfied, the development conforms to the relevant specifications and requirements.		
This assessment has been prepared and Certified by Melanie Jackson: BPAD-Level 3 Certified Practitioner FPAA-Cert. #: 21977			

The proposed development, as assessed under s.79BA of the *Environmental Planning and Assessment Act 1979,* AS3959–2009 *Building in Bushfire Prone Areas* and *Planning for Bushfire Protection 2006*, indicate non-compliance with the acceptable solutions of PBP (2006), therefore alternate solutions, more specifically the use of Method 2 Complex Procedure for calculating radiant heat flux and bushfire protection measures in combination were used to mitigate the bushfire risk.

Notes: *This Bushfire Risk Assessment and BAL rating shall remain valid for 12 months from date of issue. Council is the Final Consent Authority and construction of the building must comply with the recommendations included in Council's conditions of consent.*

COMMONLY USED ABBREVIATIONS

APZ	Asset Protection Zone
BCA	National Construction Code Series-Building Code of Australia
BSEB	Bushfire Safety Engineering Brief
DPE	Department of Planning and Environment
IPA	Inner Protection Area
LEP	Local Environment Plan
NBC	Newcastle Bushfire Calculator
NSW RFS	New South Wales Rural Fire Service
PBP (2006)	NSW RFS, *Planning for Bush Fire Protection* (2006)
TSC	Tweed Shire Council

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1 INTRODUCTION

Bushfire Risk has been commissioned by Planit Consulting Pty Ltd to provide a Bushfire Threat Assessment that provides further information in relation to bushfire matters as requested by the Department of Planning and Environment (DPE) in relation to the following development as proposed:

- *Kings Forest - Modification to Concept Plan (MP06_MOD 5) and Stage 1 Project Approval (MP08_MOD 3).* (Ref. Appendix A – Amended Site Plans).

DPE have requested the following additional information:

- *Demonstrate that the future development of the employment lands is consistent with the Planning for Bushfire Protection (PBP) aims and objectives. In particular, flame length for bush fire (including grasslands);*
- *The proposed building construction standards are aligned to the modelled radiant heat values;*
- *Demonstrate that bulk storage of fuels and oils are located outside of safe flame and radiant heat outputs, to ensure the safety of occupants and fire fighters in the event of a bushfire;*
- *Demonstrate how the development can meet the requirements of Australian Standard 3745-2010-'Planning for Emergencies in Facilities'.*

A Bushfire Risk Assessment was conducted by Planit Consulting Pty Ltd, Date: December 2014 and lodged with the application for modification as proposed. The Bushfire Risk Assessment by Planit Consulting Pty Ltd shall be read in conjunction with this report; however, this assessment ultimately overrides the Bushfire Risk Assessment conducted by Planit Consulting Pty Ltd.

This Bushfire Threat Assessment incorporates re-assessment of the subject site and surrounds to ensure consideration of all elements and bushfire protection measures (BPMs) in combination addressed in relation to protection of people, property and the environment. This assessment aims to ensure the additional information requested by the DPE is accurately addressed.

1.1 LEGISLATION

The subject site has been identified and mapped as 'bushfire prone land' under Section 146 of the *EPA Act*; therefore, the legislative requirements for building on bushfire prone land are applicable.

The proposed development is defined in *Planning for Bushfire Protection* (PBP (2006)) as non-integrated development. The buildings being for commercial use are identified as '*Class 6*' buildings as per the *National Construction Codes Series – Building Codes of Australia* ((BCA) ABCB 2015) and referred to as '*other*' classes of buildings as per s.1.3 [b] PBP (2006) and these '*other*' classes of building developments are to be determined on a case by case basis.

In relation to '*Controlling Development Types',* PBP (2006) states the following in relation service stations: *'Development which should not be permitted on bushfire grounds, including those that may start bushfires or are a potential hazard to adjacent areas or to fire fighters if they are impacted upon by a bushfire'.*

This Bushfire Threat Assessment therefore aims to address the submission requirements in s.A4.1 PBP (2006) for consideration under s.79BA of the *Environmental Planning and Assessment Act* 1979 (EPA Act), in order to demonstrate the proposed development meets the aim and objectives of PBP (2006) and to satisfy Council requirements without the need to refer the application to the NSW RFS.

This bushfire assessment includes analysis of the hazard, threat and subsequent risk to the development as proposed and provides recommendations that demonstrate compliance as required under s.79BA of the *Environmental Planning and Assessment Act, 1979 (EPA Act)* in order to assist Council and DPE in determining approval for the proposed development.

1.2 AIMS AND OBJECTIVES OF PBP (2006)

i. Afford occupants of any building adequate protection from exposure to a bushfire;

ii. Provide for a defendable space to be located around buildings;

iii. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;

iv. Ensure that safe operational access and egress for emergency service personnel and residents is available;

v. Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ;

vi. Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).

2 PROPOSED DEVELOPMENT

The proposal is for the development of a service station to be situated on Lot 7 DP 875447, Tweed Coast Road, Kings Forest, NSW. The proposal consist of a two (2)

storey building, with six (6) food shops, a dining area, parking facilities and two (2) truck filling points and fuel filling points as per the proposal (Ref. *Kings Forest - Modification to Concept Plan (MP06_MOD 5) and Stage 1 Project Approval (MP08_MOD 3)).*

The storage of fuels has been addressed in the report entitled '*Multi-Level Risk Assessment for LEDA Developments Pty Ltd',* prepared by Myros Design Pty Ltd dated 5 November 2014 accompanying the application. The '*Multi-level Risk Assessment'* should be read in conjunction with this Bushfire Threat Assessment.

3 DESCRIPTION OF THE SUBJECT SITE

The subject site was inspected on 5 May 2015 by Melanie Jackson of Bushfire Risk, a BPAD-Level 3 Bushfire Planning and Design Accredited Practitioner. The subject site is sited within category 1 and buffer on Council's Bushfire Prone Land Map-2012 (TSC 2012) (Figure 3). The property is zoned as a Deferred Matter on Tweed Shire Council's (TSC) Local Environment Plan (LEP) 2014 (NSW Legislation, 2015). The allotment is situated approx. 2km from Casuarina and 4km from Kingscliff, where services are provided e.g. doctors, shops, schools etc.

The subject site consists of two separated portions of land, the northern portion being approx. 4ha and the southern portion approx. 3.7ha in size. The assessment relating to the proposed development is only concerned with the northern (4ha) portion of the subject site. The following section describes in detail the vegetation, slope, access, water, utilities and environmental considerations for the site.

FIGURE 1: THE SUBJECT SITE (SOURCE: PUSH).

4 BUSHFIRE THREAT ASSESSMENT

4.1 CLASSIFICATION OF THE VEGETATION ON AND SURROUNDING THE SUBJECT SITE

The assessment includes the identification of the predominant vegetation communities surrounding the subject site for a minimum distance of 140m.

4.1.1 North

The area to the north consists of a recently harvested and re-planted forest plantation. The area presents currently as a low hazard, being managed (slashed) land; however, it shall be identified as a 'Plantation' allowing for the mature state of the hazard.

It is evident from the size and managed condition of the land, which includes plantation timbers in various growth stages, that fuel loadings for managed plantations being 20t/ha is appropriate (PBP (2006)).

There is a 4m fire break along the boundary on the neighbouring allotment. Although it is unable to be assessed as part of the on-site APZ, this fire break provides a level of redundancy allowing additional separation distance between the plantation and subject site.

4.1.2 East to South

The eastern boundary of the subject site traverses alongside Cudgen Creek in a north-east to south-west direction. Rainforest and riparian communities dominate the first 50m of land (approx.) immediately adjacent to the cleared (proposed development) site. This area is to be planted and regenerated with rainforest species. Beyond this zone, the vegetation type transitions into Melaleuca and Swamp She-oak Forest along the creek. Erring on the side of caution, the vegetation in this area shall be classified as 'Forest', which is considered a bushfire threat to the subject site.

4.1.3 West

The area west of the subject site consists of 'Managed Land'. The managed lands consist of a variable width road reserve (min. 25m wide), a service road and row of dwellings on the western side of the service road. A separation distance of 100m has been identified between the subject site and the Melaleuca Swamp She-oak Forest that is west of the managed land; this area presents as a low bushfire threat to the subject site.

4.2 Assessment of Effective Slope

The entire subject site is level and the effective slope is the ground under the bushfire hazard (vegetation as classified above), assessed to a distance of 100m (radius) from the subject site (Table 1) as follows:

All directions: 0° level;

4.3 Environmental Considerations

An environmental assessment including environmental features, threatened species, populations, endangered ecological communities and critical habitat and Aboriginal heritage known to the applicant has not been included as part of this report, however Planit Consulting Pty Ltd have included an ecological assessment as part of the development application.

The proposed development shall be sited in a previously cleared area within the subject site. The provisions for any buffer/rainforest plantings have been taken into consideration as part of this assessment and allowed for in the overall design.

Ongoing site maintenance and vegetation management has been addressed herein and in more detail by Planit Consulting Pty Ltd and has been provided with the application and/or as requested by Council/DPE.

4.4 Water and Utility Services

The subject site shall be serviced by a reticulated water supply and utility services compliant with s.4.1.3 PBP (2006). Sufficient water supply, capacity and pressure for firefighting purposes shall be made available at all times.

4.5 Access and Egress

The proposed development shall be sited adjacent to the Tweed Coast Road, a pre-existing Council managed, sealed two-way, two-wheel drive accessible main road with appropriate turning access provided. Access shall comply with s.4.1.3 & s.4.2.7 PBP (2006), which provides suitable, safe, operational access for emergency service vehicles and persons traversing in opposite directions.

4.6 Emergency Evacuation Planning

An Emergency Evacuation Plan-Bushfire has been prepared by Melanie Jackson of Bushfire Risk, dated 12 May 2015. Provisions for emergency and evacuation planning recommends compliance with s.4.2.7 of PBP (2006) and specifically *3745-2010-'Planning for Emergencies in Facilities'* in relation to bushfire only. The Emergency Evacuation Plan-Bushfire shall be provided as a separate document to be read in conjunction with this report.

4.7 CONSTRUCTION STANDARDS

The proposed development including the service station and associated buildings (e.g. shops), fuel and gas storage tanks are considered *'other'* classes of buildings (PBP (2006)). These types of construction do not attract specific construction standards in relation to bushfire, however they shall be assessed in relation to radiant heat exposure and flame contact in order to provide adequate safety parameters and compliance in accordance with the aims and objectives of PBP (2006).

4.7.1 Service Station Building (Class 6)

The service station building being a 'Class 6' building, shall be constructed in accordance with the deemed-to-satisfy provisions of the BCA (ABCB 2015) and as per the recommendations contained herein in relation to bushfire. Provisions shall be made to ensure the buildings are not exposed to direct flame contact or radiant levels in excess of 29kW/m^2.

4.7.2 Underground Fuel Storage Tank

The storage and handling of flammable and combustible liquids, design, installation and operation of underground petroleum storage tanks shall be conducted in accordance with the relevant standards as addressed in the Multi-Level Risk Assessment (Myros 2014) accompanying this report.

In summary, the report identifies the storage and handling of the products shall be designed and installed to best practice guidelines for safe operation and environmental protection. '*All equipment will be designed and installed to the latest technology and techniques available to date from approved suppliers*' (Myros 2014).

The storage tanks are to be installed one (1) metre underground with a 200mm concrete pavement above. Protected under earth (underground), the storage tanks are unable to be impacted by direct flame contact and radiant heat flux. The infrastructure e.g. pumps and hoses contains multi-layer shut-off, underground fuel vapour recovery systems etc. Specifically, the installation of the underground tanks and associated infrastructure is to be installed in accordance with AS4897-2008 (Myros 2014).

4.7.3 Underground LPG Storage Tanks

The proposed installation of LPG storage tanks and infrastructure shall be installed in accordance with AS/NZS 1596:2014 'The Storage and Handling of LP Gas', which is to be stamped as complying by an Accredited Dangerous Goods Consultant.

The LPG tanks shall be installed one (1) metre underground. LPG systems are equipped with remote shut down systems and multi-layer safety measures developed with state of the art technology in storage and retailing of automotive LPG, being WorkCover NSW Authority approved (Myros 2014).

4.7.4 Consultation

Discussions were held between Rolando Ferreira-Accredited Dangerous Goods Consultant and Melanie Jackson-Bushfire Consultant in relation to the risks associated with service station fuel and gas storage and delivery systems. Clarification was obtained that the main threat to the structures is diminished by the storage tanks being installed 1.2m underground, which includes a 200mm concrete pavement at the surface that cannot be impacted upon by direct flame contact or radiant heat.

Previous discussions with NSW RFS (Alan Bowden) and Russell Jackson (explosives expert) in relation to the handling and storage of volatile substances, clarified that earth mounds insulate from radiant heat and are unable at this depth to be affected by direct flame contact or radiant heat exposure. The existing construction methods comply with state of the art safety measures in accordance with current Australian and New Zealand Standards for the storage of fuel and gas products (Myros 2014).

This Bushfire Threat Assessment makes the determination through alternate solutions that although the proposed fuel and LPG storage tanks are protected from direct flame contact, shortfalls in the system are to be addressed in the Bushfire Safety Engineering Brief (BSEB) contained herein. The assessment of radiant heat flux and direct flame contact to the building is presented in Table 1, Appendix B and are discussed in the BSEB herein.

4.8 SETBACKS-APZ S-ALTERNATE SOLUTION

In order to determine radiant heat levels to the receiver, e.g. service station building, storage tanks etc., Method 1-Simplified Procedure (acceptable solution) and Method 2–Complex Procedure of AS3959-2009 being an alternate solution were used to demonstrate compliance.

4.9 METHODOLOGY

Method 1-Simplified Procedure and Method 2—Detailed Procedures for Determining the BAL in accordance with AS3959–2009 was used to calculate the radiant heat exposure in relation to the setback distances (APZ) to the forest (south-east) and plantation (north) respectively. The Newcastle Bushfire Calculator (NBC) Calculator (2013) (Ref: Appendix B) was used with a flame temperature of 1000 (Kelvin) and Fire Danger Index-FDI-80 (Forest) and FDI-110 (Grassland) where applicable.

4.10 RESULTS

Table 1 is a summary of the results showing the radiant heat exposure to the receiver in relation to the proposed and existing setback distances to each storage facility within the subject site. The proposed building shall be constructed to BAL-29 and BAL-19 (Ref. Figure 2).

TABLE 1: SERVICE STATION BUILDING-CALCULATIONS AND RESULTS SUMMARY

Hazard Direction	*North (Method 2)*	*East to South (Method 1)*	*West*
Slope of Hazard	0° Level	0° Level	0° Level
Hazard Structure	Plantation	Forest	Managed Land
Min. Distance to Hazard	13.5m (BAL-29)	21m (BAL-19)	N/A
Max. Radiant Heat Flux	29 kW/m^2	19 kW/m^2	N/A
Actual Distance to Hazard	**17m**	N/A	N/A
Radiant Heat Exposure	**22.03 kW/m^2**	N/A	N/A
Flame Length	11.76m	N/A	N/A
Is Flame Contact to the Receiver Likely?	NO	NO	NO
BAL	BAL-29	BAL-29 & 19	BAL-29 & 19

Notes:

- Modified fuel levels for a mature plantation shall not exceed 20t/ha.
- Ref. Figure 2 for appropriate BAL ratings in relation to aspect.
- A reduction in construction requirements due to shielding may be applied in this instance, tabulated above are APZ distances and BAL construction requirements as modified.
  The principles of shielding allows for a reduction in BAL level to the next lower BAL level than that determined for the site may be applied to an elevation of the building where that elevation is not exposed to the source of bushfire attack and shall not be less than BAL-12.5, except where the exposed elevations have been determined as BAL-LOW (AS3959-2009).
  (There can only be a reduction of one BAL level and this can only apply to the elevation directly opposite the exposed side).

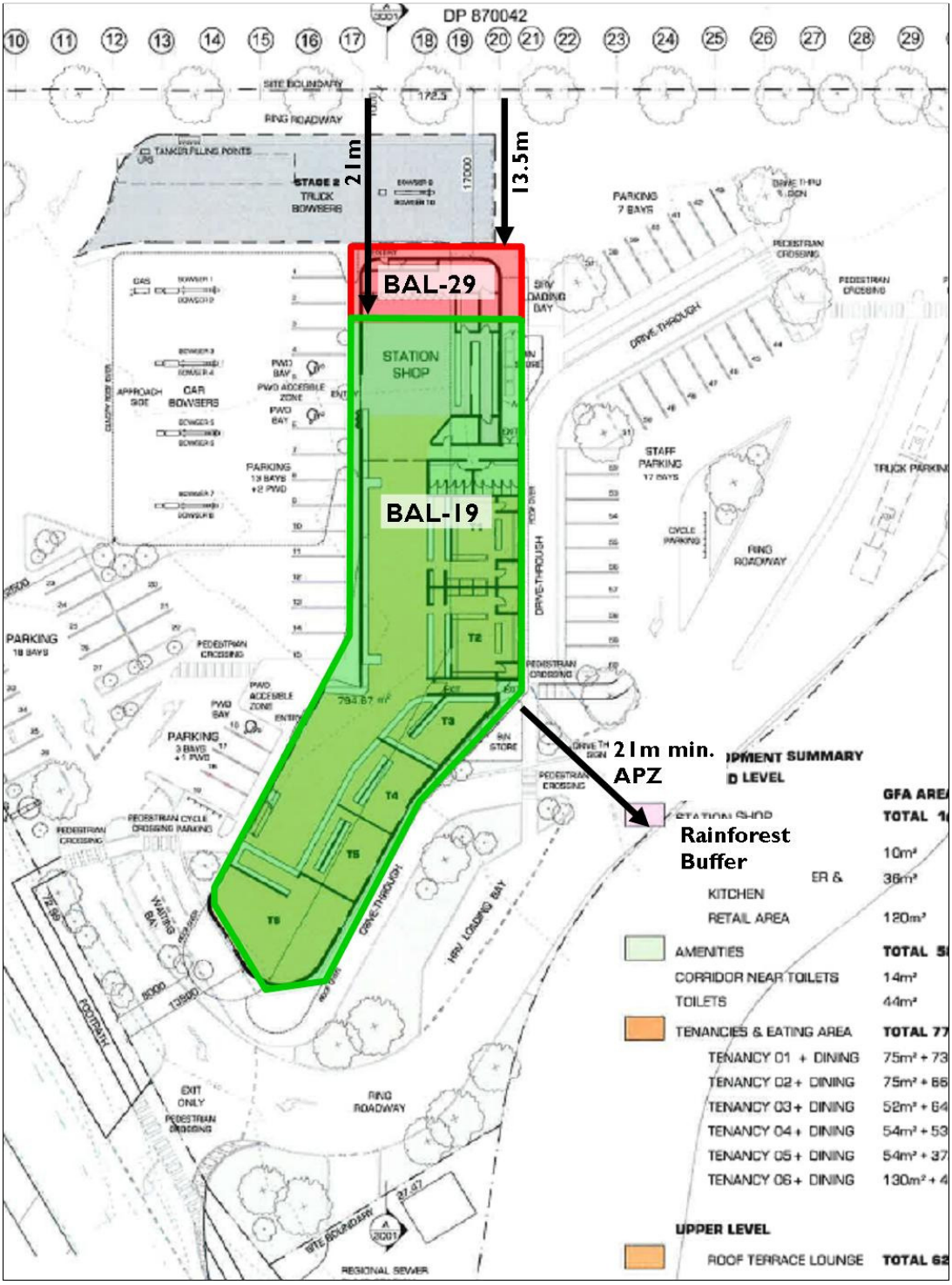


FIGURE 2: BAL RATINGS DIAGRAM

5 BUSHFIRE ENGINEERING BRIEF—ALTERNATE SOLUTION USING METHOD 2 CALCULATIONS

The following BSEB summarises the process of analysis undertaken to formulate an alternative solution using Method 2 calculations and measures in combination. There is a need to establish adequate setbacks between the hazard and buildings, fuel and LPG storage tanks.

5.1 METHOD OF ANALYSIS: TRIAL DESIGN FOR EVALUATION

A series of calculations 'Trial Designs' were conducted to incorporate measures to compensate for potential failures of the bushfire safety system. Quantification of these measures shall be carried out using Method 2—Detailed Procedures of AS 3959–2009, (NBC (2013)).

Method 2 calculations of AS3959-2009 form the basis of analysis to determine the likely radiant heat exposure and potential for direct flame contact to the receiver (buildings). The results of the trial design shall be evaluated against the aim and objectives of PBP (2006) in order to demonstrate compliance.

5.2 NON-REGULATORY OBJECTIVES

The objectives for the development within the bounds of the subject site are to:

- Provide a service station and associated facilities e.g. shop, food outlet etc. for the Kings Forest and surrounding communities.
- Sell fuel and gas for the surrounding communities, which are stored safely and securely in specifically designed underground storage tanks.

5.2.1 Compliance with the Aims and Objectives of PBP (2006)

The aim of PBP (2006) is to use the NSW development assessment system to provide for the protection of human life (including firefighters) and to minimise impacts on property from the threat of bushfire, whilst having due regard to development potential, on-site amenity and protection of the environment.

The objectives and concluding comments are as follows:

i. Afford occupants of any building adequate protection from exposure to a bushfire;

COMPLIES: the application is for a non-habitable 'Class 6' structure. Throughout the assessment process, consideration to ensure persons are safe from direct flame contact and radiant heat levels of up to and including 29kW/m^2 were achievable. The measures in combination as per the recommendations herein, result in appropriate level of protection to persons at the subject site.

ii. Provide for a defendable space to be located around buildings;

COMPLIES: there is good access to all structures from within the subject site.

iii. Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;

COMPLIES: Direct flame contact to the fuel and LPG storage tanks is negated due to being stored 1m underground and covered with 200mm of concrete paving. The potential for ignition of the stored materials is negligible.

The buildings are to be constructed to BAL-29 and BAL-19 with appropriate separation distances to prevent direct flame contact to the building. A 1.8m radiant heat shield shall be constructed adjacent to the northern boundary providing an additional level of redundancy to the bowsers.

iv. Ensure that safe operational access and egress for emergency service personnel and residents is available;

COMPLIES: refer to recommendations herein.

v. Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the APZ;

COMPLIES: refer to recommendations herein.

vi. Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bushfire fighting).

COMPLIES: adequate water supply and utility services shall be provided in accordance with s.4.1.3 PBP (2006). Refer to recommendations herein.

5.3 DISCUSSION

The subject site, being non-integrated development, provides for an effectively managed on-site APZ. By calculating radiant heat exposure to the building using detailed Method 2 calculations, the APZ distances have been assessed with the aim to keep potential radiant heat exposure to 29kW/m^2 or less, whilst ensuring no part of any building or storage tanks are exposed to direct flame contact.

The calculation results were extremely conservative, using worst case scenarios to evaluate the radiant heat exposure to the proposed development. The underground storage tanks have negligible potential for radiant heat exposure or direct flame contact due to being installed 1.2m underground.

Flame heights are less than the APZ distances, which negates direct flame contact to the receiver (buildings). An additional level of redundancy is provided by the installation of a

non-combustible concrete (non-combustible) 1.8m high radiant heat shield along the northern boundary adjacent to the bowsers.

5.4 CONCLUSION

The proposed fuel and LPG storage cannot be impacted by direct flame contact or radiant heat flux, determined through quantitative and qualitative analysis, including expert opinion and reports.

Measures have been taken to protect the building and persons from direct flame contact and radiant heat exposure above 29kW/m^2 by providing adequate APZs and separation distances between the receiver (building) and the bushfire hazard where the recommendations contained herein are applied.

Risks associated with the type of development for sale and storage of fuel and LPG have been adequately addressed in the Multi-Level Risk Assessment provided by Myrnos Pty Ltd (2014), which should be read in conjunction with this report.

The suite of BPMs in combination as provided in the recommendations contained herein are suitable for the development as proposed and the information as requested by DPE have been satisfied. Therefore, in my professional opinion the proposed development appears to be acceptable.

6 ASSESSMENT OF THE EXTENT TO WHICH THE PROPOSED CONFORMS OR DEVIATES FROM CH. 4, PBP (2006).

The following table provides an assessment of how the development conforms with or deviates from the acceptable solutions of the performance criteria of Ch.4 PBP (2006).

TABLE 2: BUSHFIRE PROTECTION MEASURES—CONFORMATION OR DEVIATION FROM THE PERFORMANCE CRITERIA OF PBP (2006).

PERFORMANCE CRITERIA (PBP (2006))	**MEETS PERFORMANCE CRITERIA**	**SOLUTIONS**
THE INTENT MAY BE ACHIEVED WHERE:		
APZ: A defendable space is provided on-site; An APZ is provided and maintained for the life of the development.	YES-Alternate Solution	APZ have been calculated in accordance with AS 3959–2009-Method 2, detailed procedure (PBP (2006)). Defendable space is provided around the structures and APZ shall be maintained for the life of the development and is mainly taken up by paved parking areas surrounding the site.
Siting & Design: Buildings are sited and designed to minimise the risk of bushfire attack.	YES-Acceptable Solution	The proposed building locations have been determined based on requirements in relation to existing infrastructure and materials separation distance requirements.
Construction Standards: It is demonstrated that the proposed building can withstand bushfire attack in the form of wind, smoke, embers, radiant heat and flame contact.	YES-Alternate Solution	Classed as 'Other Classes of Buildings' and 'Other Development', the service station 'Class 6' buildings shall be constructed to BAL-29 & BAL-19, assessed against AS3959-2009 using Method 2, detailed procedure. Fuel and LPG storage tanks being underground do not require additional construction requirements in relation to bushfire.
Access Requirements: Safe, operational access is provided (and maintained) for the emergency services personnel in suppressing a bushfire whilst residents are seeking to relocate, in advance of a bushfire, (satisfying the intent, and performance criteria for access roads in s.4.1.3 and s.4.2.7).	YES-Acceptable Solution	Property access roads shall satisfy the intent of measures and performance criteria of s.4.1.3 PBP (2006); No specific access requirements in relation to bushfire.

PERFORMANCE CRITERIA (PBP (2006))	MEETS PERFORMANCE CRITERIA	SOLUTIONS
THE INTENT MAY BE ACHIEVED WHERE:		
Water and Utility Services: Adequate water and eletricity services are provided for firefighting operations. Gas and electricity services are located so as not to contribute to the risk of fire to a building.	YES-Acceptable Solution	The property is serviced by a reticulated water supply. Compliance with s.4.1.3 PBP (2006) and AS2419.1–2005 is recommended. Gas and electricity services are to comply with s.4.1.3 of PBP (2006).
Landscaping: It is designed and managed to minimise flame contact and radiant heat to buildings and the potential for wind driven embers to cause ignitions.	YES-Acceptable Solution	Landscaping shall be managed in order to minimise flame contact and radiant heat to the building and shall comply with Appendix 5, PBP (2006).
Emergency Evacuation Planning:	YES-Alternate Solution	An Emergency Evacuation Plan has been prepared by Bushfire Risk, dated 12 May 2015 and shall be consistent with the RFS guidelines for the Preparation of Emergency/Evacuation Plan and the requirements of Australian Standard 3745-2010-'Planning for Emergencies in Facilities'. It is recommended to provide a copy to the Far North Coast Bushfire Management Committee.

7 RECOMMENDATIONS

The following recommendations relate to the proposed development on the subject site, namely Kings Forest Service Station Lot 7 DP 875447; Tweed Coast Road, Kings Forest, NSW as per the relevant provisions of the NSW Rural Fire Service guideline PBP (2006).

TABLE 3: RECOMMENDATIONS IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF PBP (2006).

ELEMENT/S	SOLUTIONS
Construction	Construction shall comply with **BAL-29 & BAL-19** of AS3959–2009. (Ref. Figure 2-BAL ratings diagram). Construction shall be conducted in accordance with s.3: Construction General and s.7-BAL-29 and s.6-BAL-19 of AS3959–2009 and varied in accordance with s.A.3.7 Addendum: Appendix 3 of PBP (2006) for additional construction requirements (Sarking, Subfloor Supports, Elevated Floors, Verandas, Decks, Steps, Ramps and Landings).
Radiant Heat Shield	A 1.8m high radiant heat shield constructed from a non-combustible material e.g. brick, besser block, concrete or like, is to be erected along the north boundary adjacent to the bowsers and is to extend a min. of two (2) metres either side of the bowsers.
APZ	The entire allotment being an APZ shall be managed and maintained in perpetuity as an IPA, in accordance with PBP (2006) and the RFS brochure 'Standards for Asset Protection Zones' (NSW RFS, 2005). The following points are a guide to APZ requirements and should comprise of the following: • The APZ shall be maintained with fuel managed and cleared around all structures within the subject site; • Minimal fine fuel on the ground e.g. any grassed areas shall be mowed on a regular basis to maintain a grass height not exceeding 5cm (max.); • Vegetation does not provide a continuous path to the building for the transfer of fire; • Shrubs and trees are pruned so that they do not touch or overhang buildings or structures; • Flammable materials must be stored well away from access points and the building itself.
Landscaping Treatments	Landscaping treatments and property maintenance shall be consistent with the RFS brochure 'Standards for APZ' and comply with Appendix 5 of PBP (2006).
Emergency Risk Management	The Emergency Evacuation Plan as provided by Bushfire Risk, Date 12 May 2015, should be practised and reviewed annually (min) and updated every 5 years or sooner if significant changes to the subject site or surrounds are imminent.

ELEMENT/S	SOLUTIONS
	A copy shall be provided to the Far North Coast Bushfire Management Committee and local area Rural Fire Service and/or NSW Fire Brigade.

8 CONCLUSION

Provided the recommendations contained within this report are complied with, it is my professional opinion that the proposed development satisfies the aim, objectives and performance criteria of PBP (2006). Furthermore, the additional information as requested by DPE has been adequately addressed as follows.

- *Demonstrate that the future development of the employment lands is consistent with the Planning for Bushfire Protection (PBP) aims and objectives. In particular, flame length for bush fire (including grasslands);* COMPLIES-demonstrated herein.
- *The proposed building construction standards are aligned to the modelled radiant heat values;* COMPLIES-demonstrated herein.
- *Demonstrate that bulk storage of fuels and oils are located outside of safe flame and radiant heat outputs, to ensure the safety of occupants and fire fighters in the event of a bushfire;* COMPLIES-demonstrated herein.
- *Demonstrate how the development can meet the requirements of Australian Standard 3745-2010-'Planning for Emergencies in Facilities';* COMPLIES-provided as a separate document. [*]

[*] *Note: Despite best efforts and due to the unpredictable behaviour, variable nature of bushfires and that the standard has been designed to improve performance of buildings in bushfire prone areas, there can be no guarantee that any one building will withstand a bushfire attack on every occasion and desirable outcomes are not always achievable during extreme bushfire weather episodes.*

This Bushfire Assessment provides the required information to assist Local Council and the Rural Fire Service in determining compliance in accordance with Planning for Bushfire Protection and AS3959-2009. The Local Council is the Final Consent Authority and the construction of the building must comply with the recommendations included in the Council's conditions of consent.

9 APPENDIX A—AMENDED SITE PLANS

Amended proposed site plans by Push; Date: September 2015 (Dwg 0000, Issue D and Dwg 1000, Issue G). A full set of final plans shall be provided by the applicant to accompany the DA. Any changes to the plans must comply with minimum BAL ratings and setback distances in relation to the development as proposed and as per the recommendations contained herein.

KINGS FOREST SERVICE STATION

TWEED COAST ROAD, KINGS FOREST, NSW

REAL PROPERTY DESCRIPTION

LOT 7 IN DP 875447
TWEED SHIRE

DEVELOPMENT SUMMARY

PROPOSED SERVICE STATION INCLUDING SHOP WITH FOOD OUTLETS, CARWASH AND DOG WASH FACILITIES

AREAS

TOTAL SITE AREA	10870 m²
GFA	1063 m²
TOTAL STRUCTURAL BUILDING FOOTPRINT	APPROX 2026 m²
CARWASH & DOG WASH	APPROX. 150 m²
LANDSCAPING	APPROX. 1500 m²

PARKING

GENERAL CARPARKING BAYS	53
STAFF CARPARKING BAYS	17
PWD CARPARKING BAYS	3
TOTAL CARPARKING BAYS	73

BICYCLE PARKING CAPACITY FOR 20 BIKES

SURVEY INFORMATION

SITE INFORMATION ON DRAWING HAS BEEN PROVIDED BY LANDSURV. PTY LTD REGISTERED SURVEYORS & DEVELOPMENT CONSULTANTS.IT HAS BEEN SHOWN FOR INFORMATION ONLY.RESPONSIBILITY FOR THE ACCURACY OF THE SURVEY RESTS WITH THE SURVEYOR.

TRAFFIC ENGINEERING INFORMATION

TRAFFIC ENGINEERING INFORMATION ON DRAWING HAS BEEN PROVIDED BY BITZIOS CONSULTING TRAFFIC ENGINEERING & TRANSPORT PLANNING CONSULTANTS. IT HAS BEEN SHOWN FOR INFORMATION ONLY. RESPONSIBILITY FOR THE ACCURACY OF THE INFORMATION RESTS WITH THE CONSULTING SPECIALIST.

DRAWING LIST

DRAWING NO.	DRAWING NAME
0000	COVER SHEET
1000	PROPOSED SITE PLAN
1001	PROPOSED GROUND FLOOR PLAN
1002	PROPOSED UPPER FLOOR PLAN
1003	PROPOSED ROOF PLAN
2001	PROPOSED NORTH & WEST ELEVATIONS
2002	PROPOSED NORTH & WEST ELEVATIONS
3001	PROPOSED SECTIONS
4001	PERSPECTIVE VIEWS
4002	PERSPECTIVE VIEWS
4003	PERSPECTIVE VIEWS
4004	PERSPECTIVE VIEWS

MATERIALS LEGEND

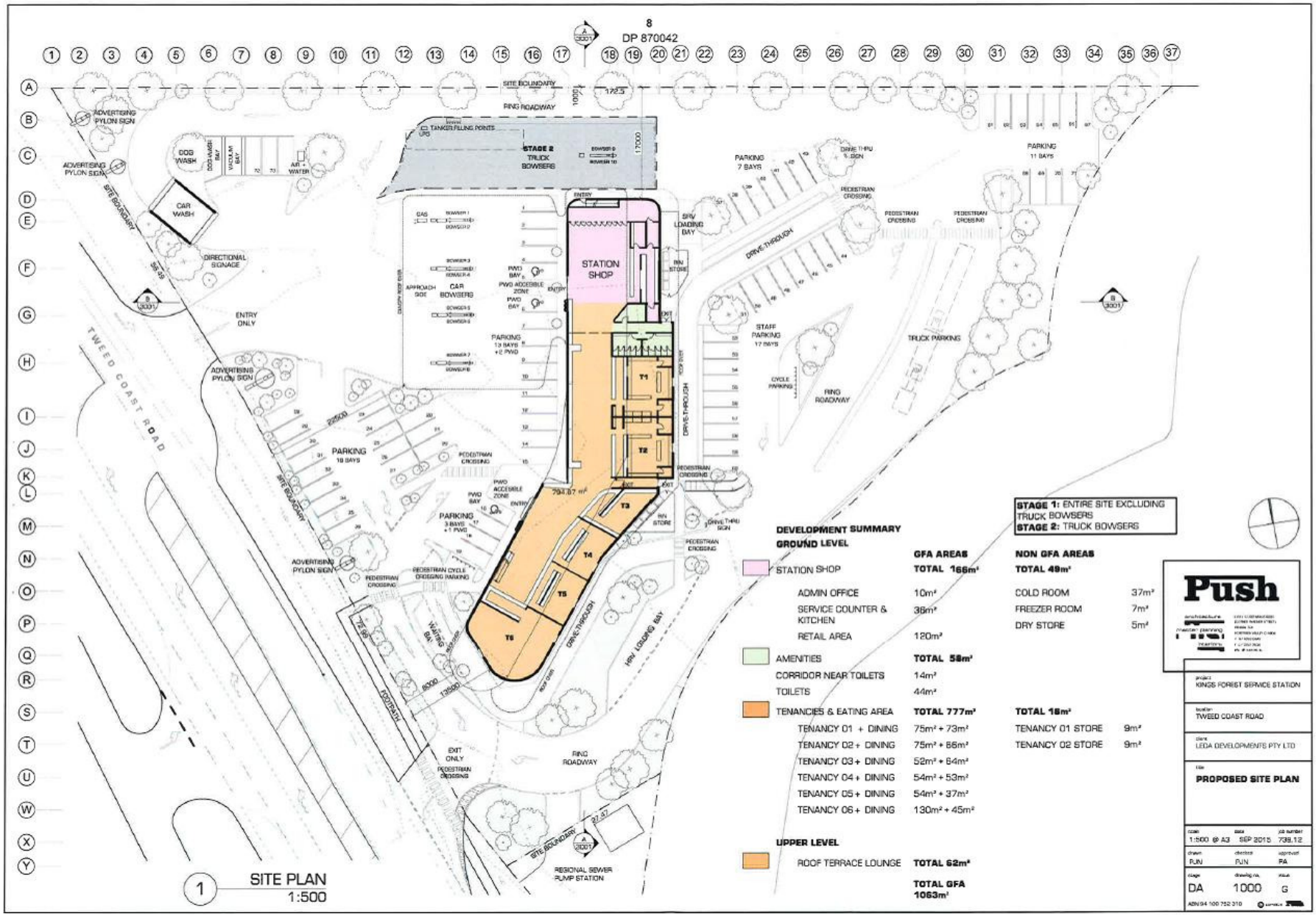
C	PRECAST CONCRETE
MS1	METAL SHEET CLADDING TYPE 1
MS2	METAL SHEET CLADDING TYPE 2
MS3	METAL SHEET ROOFING
BK	BRICK
PB	PLASTERBOARD

LOCALITY MAP SCALE 1:2500

KINGS FOREST SERVICE STATION
TWEED COAST ROAD

Push

Scale	Date	Job Number
1:2500@A3	SEP 2015	738.12
Drawn	Stage	Drawing No.	Issue
PN	DA	0000	D


8
DP 870042
SITE BOUNDARY
RING ROADWAY
ADVERTISING PYLON SIGN
TANKER FILLING POINTS U/G
STAGE 2 TRUCK BOWSERS
DOG WASH
CAR WASH
DIRECTIONAL SIGNAGE
ENTRY ONLY
TWEED COAST ROAD
STATION SHOP
CAR BOWSERS
PARKING 13 BAYS +2 PWD
PARKING 18 BAYS
PARKING 3 BAYS +1 PWD
PARKING 7 BAYS
PARKING 11 BAYS
STAFF PARKING 17 BAYS
TRUCK PARKING
DRIVE THROUGH
HRV LOADING BAY
SRV LOADING BAY
CYCLE PARKING
WAITING BAY
EXIT ONLY
PEDESTRIAN CROSSING
REGIONAL SEWER PUMP STATION
T1
T2
T3
T4
T5
T6
294.87 m²
1 SITE PLAN 1:500
DEVELOPMENT SUMMARY
GROUND LEVEL
GFA AREAS
NON GFA AREAS
STATION SHOP TOTAL 166m²
ADMIN OFFICE 10m²
SERVICE COUNTER & KITCHEN 36m²
RETAIL AREA 120m²
AMENITIES TOTAL 58m²
CORRIDOR NEAR TOILETS 14m²
TOILETS 44m²
TENANCIES & EATING AREA TOTAL 777m²
TENANCY 01 + DINING 75m² + 73m²
TENANCY 02 + DINING 75m² + 66m²
TENANCY 03 + DINING 52m² + 64m²
TENANCY 04 + DINING 54m² + 53m²
TENANCY 05 + DINING 54m² + 37m²
TENANCY 06 + DINING 130m² + 45m²
UPPER LEVEL
ROOF TERRACE LOUNGE TOTAL 62m²
TOTAL GFA 1063m²
NON GFA AREAS TOTAL 49m²
COLD ROOM 37m²
FREEZER ROOM 7m²
DRY STORE 5m²
TOTAL 18m²
TENANCY 01 STORE 9m²
TENANCY 02 STORE 9m²
STAGE 1: ENTIRE SITE EXCLUDING TRUCK BOWSERS
STAGE 2: TRUCK BOWSERS
Push
KINGS FORREST SERVICE STATION
TWEED COAST ROAD
LEDA DEVELOPMENTS PTY LTD
PROPOSED SITE PLAN
1:500 @ A3
SEP 2015
739.12
RJN
RJN
PA
DA
1000
G

10 APPENDIX B—NBC CALCULATIONS RESULTS

NBC Bushfire Attack Assessment Report V2.1

AS3959 (2009) Appendix B - Detailed Method 2

Printed: 13/05/2015 **Assessment Date:** 6/05/2015

FPA AUSTRALIA Certified Business Bushfire Planning & Design

Site Street Address: Kings Forest Setbacks, Kingscliff

Assessor: Melanie Jackson; Bushfire Risk

Local Government Area: Tweed **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: North Plantation - Actual

Vegetation Information

Vegetation Type:	Forest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Level
Surface Fuel Load(t/ha):	15	**Overall Fuel Load(t/ha):**	20

Site Information

Site Slope	0 Degrees	**Site Slope Type:**	Level
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	17

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K)**	1090

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	5.49
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	14880
Radiant Heat(kW/m2):	22.03	**Flame Angle (degrees):**	69
Flame Length(m):	11.76	**Maximum View Factor:**	0.342
Rate Of Spread (km/h):	1.44	**Inner Protection Area(m):**	17
Transmissivity:	0.847	**Outer Protection Area(m):**	0

Run Description:	North Plantation Minimum for BAL-29		
Vegetation Information			
Vegetation Type:	Forest	**Vegetation Group:**	Forest and Woodland
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Level
Surface Fuel Load(t/ha):	15	**Overall Fuel Load(t/ha):**	20
Site Information			
Site Slope	0 Degrees	**Site Slope Type:**	Level
Elevation of Receiver(m)	Default	**APZ/Separation(m):**	13.5
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K)**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80
Program Outputs			
Category of Attack:	HIGH	**Peak Elevation of Receiver(m):**	5.28
Level of Construction:	BAL 29	**Fire Intensity(kW/m):**	14880
Radiant Heat(kW/m2):	28.37	**Flame Angle (degrees):**	64
Flame Length(m):	11.76	**Maximum View Factor:**	0.434
Rate Of Spread (km/h):	1.44	**Inner Protection Area(m):**	14
Transmissivity:	0.861	**Outer Protection Area(m):**	0

11 REFERENCES

Australian Building Codes Board, 2015, *NCC –National Construction Code Series, Building Code of Australia Class 1 and Class 10 Buildings,* Vol 2. Canberra, Act.

Couch, P., 2013, Newcastle Bushfire Consultants, NBC Bushfire Attack Assessor, Warners Bay NSW 2282.

Google Maps, 2015, Map data ©2015, GBRMPA, *Google Maps Australia*, <https://maps.google.com.au/maps >, accessed 12 May 2015.

NSW Government, 2015, Land and Property Information, NSW Spatial Information Exchange. <https://six.maps.nsw.gov.au>, accessed 12 May 2015.

NSW Legislation 2015, Tweed Local Environental Plan 2014, 5 May 2015, <http://www.legislation.nsw.gov.au>, accessed 12 May 2015.

NSW Rural Fire Service, 2005, *Standards for Asset Protection Zones*, NSW Rural Fire Service, Sydney NSW.

NSW Rural Fire Service, 2006, *Planning for Bush Fire Protection*, A Guide for Councils, Planners, Fire Authorities and Developers, NSW Rural Fire Service, Sydney NSW.

NSW Rural Fire Service, 2011, *Bushfire Survival Plan*, 3 December 2012, accessed 20 February 2015 <http://www.rfs.nsw.gov.au>.

Standards Australia, 2009, *AS 3959-2009 Construction of Buildings in Bushfire Prone Areas*, Sydney, Standards Australia International Ltd.

Tweed Shire Council, 2012, *Bush Fire Prone Land,* <http://www.ballina.nsw.gov.au>, accessed 12 May 2015.