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NSW Independent Bushfire Inquiry
By email to: inquiries@bushfireinquiry.nsw.gov.au

16 April 2020

Submission to the NSW Independent Bushfire Inquiry
Dr Grahame Douglas (Western Sydney University)

Dear Professor O'Kane and Mr Owens,

1. Introduction.

My name is Grahame Douglas. I am the Academic Course Advisor for the Post-graduate Construction Programs within the School of Built Environment at the University of Western Sydney. These programs include Bushfire Protection, Building Surveying and Fire Safety Engineering. I do this submission as an individual academic and practitioner and not on behalf of or with any endorsement of Western Sydney University.

My specific expertise includes the implications of climate change on land use planning, construction practice, and risk management planning for coordinated fire arrangements. I was previously employed by the NSW Rural Fire Service (and its predecessor Dept of Bush Fire Services) for 16 years. I was the Manager, Planning and Environment and was responsible for the delivery of the package of reforms following the 2001/02 NSW Bushfires. Before retiring from the RFS, I was working as the Coordinator of Climate Change and Sustainability within the RFS and assisted in the development of the AFAC policy on climate change. My qualifications are set out in Appendix 1 of this submission.

This submission seeks to only focus on the following terms of reference:

1. The causes of, and factors contributing to, the frequency, intensity timing and location of, bushfires in NSW in 2019-20 bushfire season, including consideration of any role of the weather, drought, climate change, fuel loads and human activity.

2. The preparation and planning by agencies, government, other entities and the community for bushfires in NSW, current laws, practices and strategies, and building standards and their application and effect.

AND to make recommendations arising from the Inquiry as considered appropriate, including on:

5. Preparation and planning for future bushfire threats and risks,
6. Land use planning and management and building standards, including appropriate clearing and other hazard reduction, zoning, and any appropriate use of indigenous practices.
7. Appropriate action to adapt to future bushfire risks to communities and ecosystems.
8. Emergency responses to bushfires, including overall human and capital resourcing.

In addressing these terms of reference, I have structured the submission in the following way:

a) The role of climate change in relation to bushfire protection including implications for hazard reduction, land-use planning and construction;
b) A case study (Conjola Park) from the 2019/20 fire season to illustrate some of the challenges arising from the fire including implications for land use planning and coordinated risk planning;
c) The role of land-use planning and construction practice and areas in need of reform;
d) The Bushfire Planning and Design Scheme and its role in improving community outcomes arising from the planning process; and
e) Improvements needed in relation to bush fire risk management within NSW.

In considering these issues, it should be noted that bushfire protection is largely driven by planning principles, however, building and construction practice is a significant component of bushfire protection, as is landscaping, vegetation management (APZs), subdivision design, water supplies, emergency management arrangements and firefighting capacity. All of these are based upon a critical aspect of understanding the likely design bushfire conditions applying to a development/building.

In undertaking this submission, I have in some cases drilled down to specific and sometimes complex levels of detail, which may not assist in a strategic review. However, in some cases the details are important to rectify key challenges, rather than simply allowing bureaucratic

structures to fail to understand some of the important findings and recommendations from you Inquiry.

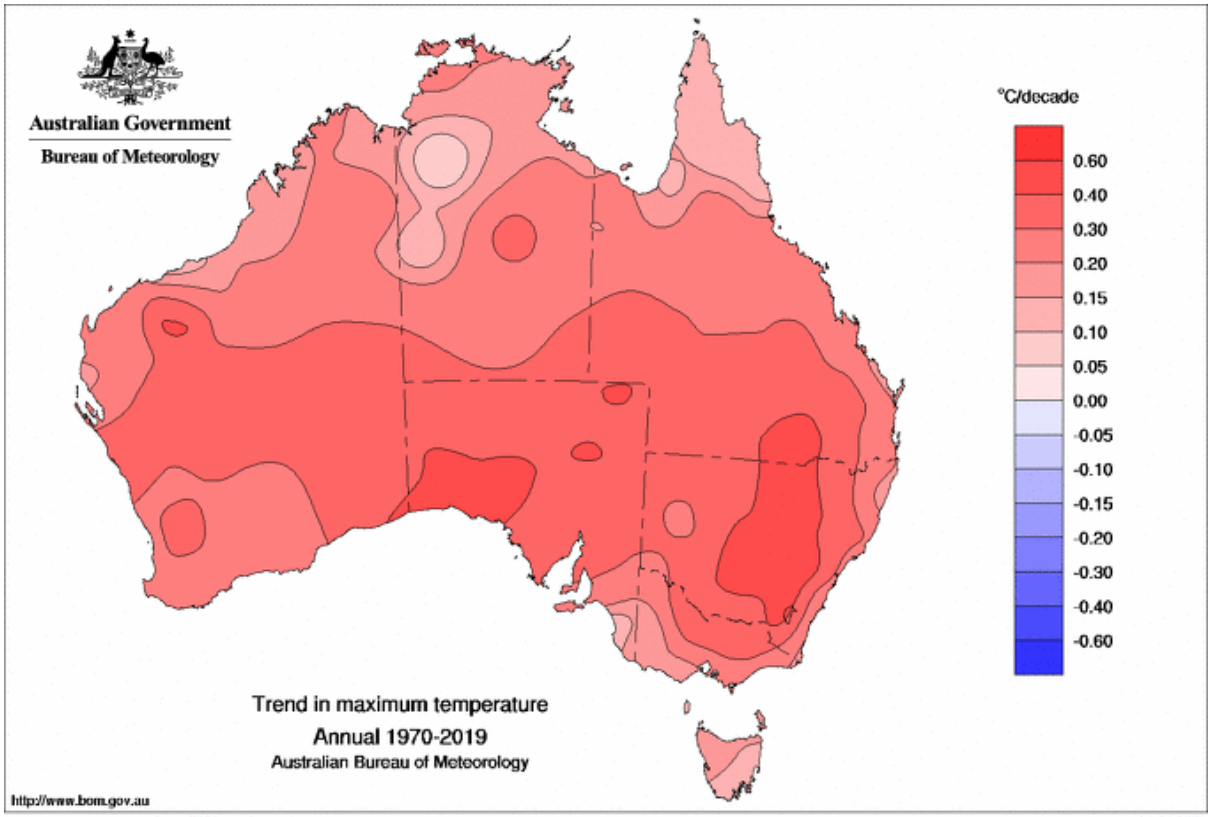
I hope you can at least investigate some of these details, and I would be pleased to respond to any issues or follow up, asked by your Inquiry.

2. Climate Change and its implications for Land-use Planning, Construction Practice and Conservation Land Management in NSW.

Climate change has been a focus of much of the debate during the 2019/20 bushfires both within NSW, and more generally within Australia. It is essential for climate change to be at the forefront of considerations in the areas of coordinated bushfire risk management planning, NPWS fire reserve plans, and also planning and building practice.

Climate change can be expressed through a few metrics. These metrics have been discussed elsewhere but in essence, the climatology of bushfire events centres around changes in drought (as pre-conditioning factor), temperature rises over time, changes in relative humidity associated with temperature changes, and rainfall.

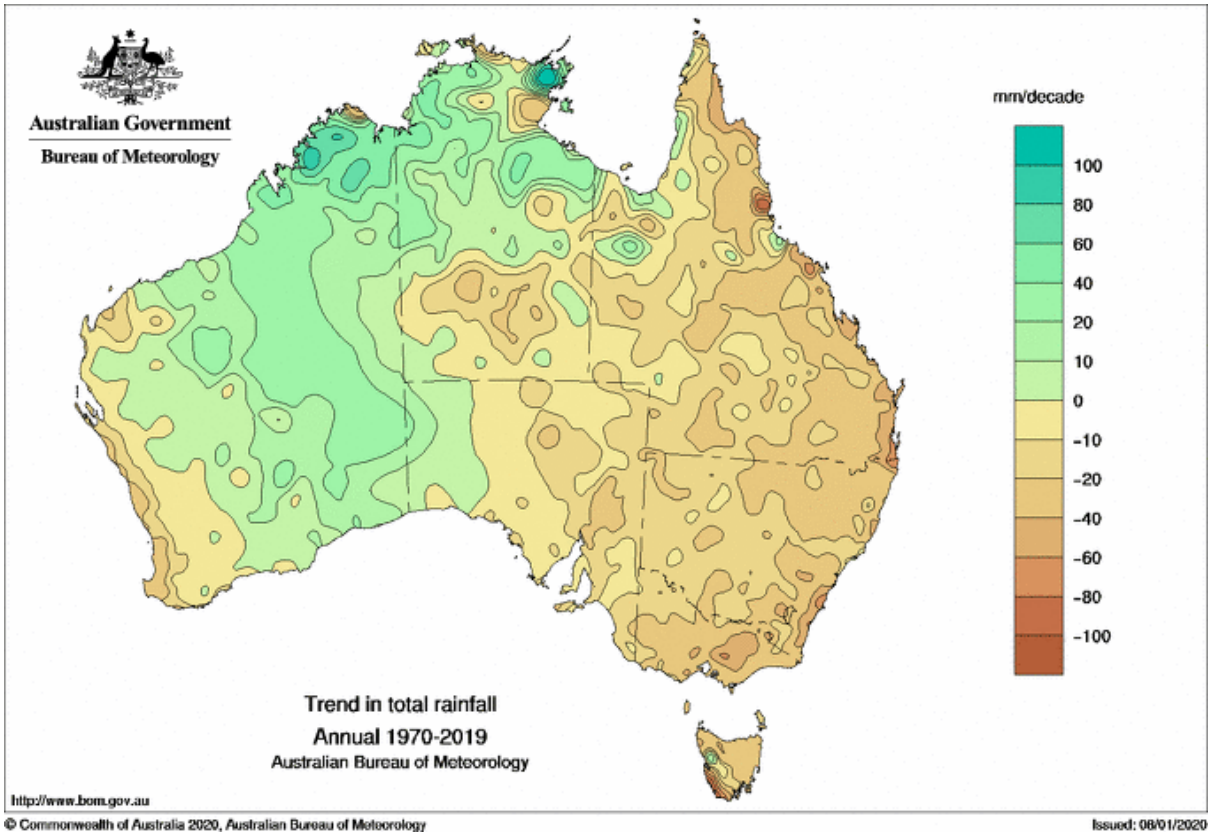
The three figures below from the BoM website (viewed April, 2020) illustrates changes (trend) in Rainfall, maximum temperatures and pan evaporation for Australia.

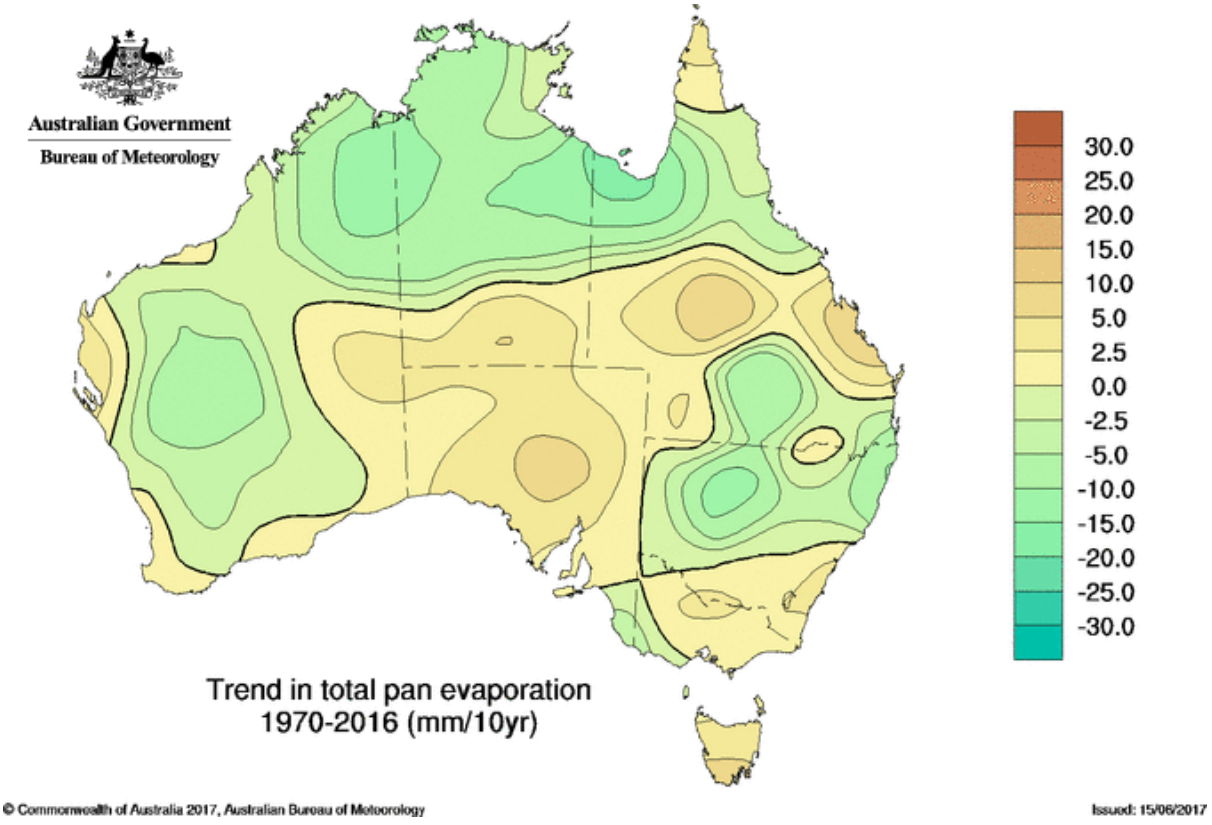


The trends in maximum temperature figure above illustrates that for Australia and NSW in particular there is a change over the period including all coastal regions. This is in the range of approximately 0.5 degrees Celsius per decade. The figure below for rainfall shows a rainfall deficit for NSW and coastal NSW in particular. This is at an average rate of 20 – 60 mm/decade. The third figure for pan evaporation shows that for the coastal regions and inland in the south of NSW, the is an increase in evaporation when compared to the north which shows some lessening of evaporation.

It must be remembered that the fire weather considerations for FFDI is a function of drought (rainfall), temperature and humidity as well as wind speed. It should also be noted

that these figures only reflect average changes in these three parameters and do not account for shifts at the statistical extreme.





Fire weather conditions are best measured using key metrics that reflect shifts in seasonal factors, annual factors, severity of events, and recurrence.

Three fire weather parameters are suitable for considering changes arising from climate change. These are generally FFDI (used within the MacArthur forest fire behaviour calculations), fuel moisture (used in the DEFFM-CSIRO calculations) and drought (using KBDI).

Using these three parameters, the appropriate metrics for measuring climate change shifts relate to:

- Annual and seasonal four-year moving averages;
- No of days over 4 years of above (or below) threshold values;
- 20 year moving GEV extreme value calculations.

Previous studies by Hennessey et al (2005) and Lucas et al (2007) provided projected assessment of ∑FFDI values (annual and seasonal) and changes in no of threshold FFDI values. Douglas (2017) extended this work to these and the other parameters of fire weather.

Weather stations of Coffs Harbour, Sydney and Dubbo are a focus of this submission to illustrate the principles.

The following table illustrates the shifts in climate parameters and matrices to measure climate change (from Douglas, 2017).

References:

Douglas G. 2017. *Property Protection from Extreme Bushfire Events Under the Influence f Climate Change*. Thesis for the award of PhD.

Hennessey, K. Lucas C., Nicholls N., Bathols J., Suppiah R. and Ricketts J. 2005. *Climate change impacts on fire-weather in south-east Australia,* CSIRO. ISBN 1 921061 10 3.

Lucas C., Hennessey K., Mills G., and Bathols J. 2007. *Bushfire weather in south-east Australia: recent trends and projected climate change impacts*. CSIRO and Bushfire CRC.

Table 1: Shifts in climate parameters for fire weather and matrices for Coffs Harbour, Sydney and Dubbo.

Metric (parameter)	Coffs Harbour	Sydney	Dubbo
∑FFDI values	9% increase in annual 2% increase in spring, 2% increase in autumn 2% increase in winter 3% increase in summer	27.5% increase in annual 6% increase in autumn 5% increase in winter 12% increase in spring 4.5% increase in summer	73% increase in annual 20% increase in spring, 16.6% increase in autumn 6% increase in winter 30% increase in summer
Days above threshold (FFDI>25)	Change from 1.4 days/yr to 2 days per year > FFDI 25	Change from 10 days/yr to 15 days/yr > FFDI 25	Change from 39 days/yr to 50 days/yr >FFDI 25
Days below threshold (7%FMC)	30% increase in annual 2% increase in autumn 13% increase in spring 4% increase in winter 10% increase in summer	98% increase in annual 7% increase in autumn 58% increase in spring 54% increase in winter 21% **decrease** in summer	270% increase in annual 93% increase in autumn 114% increase in spring 19% increase in winter 46 increase in summer
Days above threshold (KBDI>150)	5% increase annually	19 decrease annually	15% decrease annually
GEV FFDI (1:50 yr) 43 years data	71 (1972-92) 108 (1995-2015) 91 (overall 1972-2015)	104 (1972-92) 121 (1995-2015) 116 (overall 1972-2015)	97 (1972-1992) 110 (1995-2015) 114 (overall 1972-2015)
FFDI for PBP and AS3959	80	100	80
GEV FMC (1:50 yr) 43 years data	3.02% (1972-1992) 2.17% (1995-2015) 2.56% (overall 1972-2015)	2.11% (1972-1992) 2% (1995-2015) 2.16% (overall 1972-2015)	1.95% (1972-1992) 2.49% (1995-2015) 1.95% (overall 1972-2015)

The purpose of the above table is to illustrate that the message for NSW in relation to climate change is that shifts in fire weather parameters are not uniform and are not all trending in the same direction or by the same amount. However, the most crucial value from a land use planning and construction practice perspective is GEV (1:50 year)

recurrence level, which is used as the basis for planning and construction (in PBP and AS3959).

Both the NSW north coast and central west of the State are significantly underestimated in terms of potential impacts on communities, infrastructure and housing and that the current planning levels in PBP 2019 and construction practice in AS3959-2018 should be urgently upgraded at least to FFDI=100 in line with the remaining parts of the State.

It should be noted that the AS3959 Committee (FP-20) upgraded these areas of NSW but it was the RFS that recommended reductions, even though the evidence of the above had been presented, known and accepted for the purposes of public exhibition.

The rationale of the RFS for not changing was based upon the implementation of a National Fire Danger Rating System, based on fire behaviour, rather than weather alone. Such a rationale is fraught with problems, as the RFS does not control the final delivery of the NFDRS and would by now have implemented more appropriate levels of protection.

3. Implications for Hazard Reduction and Land Management for Conservation.

In addition to land-use planning and construction practice, the above table has significant implications for land managers, especially those seeking manage for nature conservation.

The table above illustrates that both the seasonal ∑FFDI and the changes to no of days exceeding the threshold of FFDI>25 will have significant impacts on the ability of land managers to implement hazard reduction through prescribe burning. In general, prescribe burning is undertaken at FFDI≤12 (RFS, 2002).

In effect, the data supports the often observed by fire agencies and land managers, that the windows of opportunity for prescribe burning is narrowing and in the west it is getting too hot. In Sydney, the only season in which days below the 7% threshold for FMC is reducing is in summer, however drought persistence and FFDI recurrence (@1:50 years) is increasing across all seasons.

The overall message is that it will continue to be difficult to implement landscape scale hazard reduction, due to the risks associated with lighting fires in unacceptable weather conditions, and that the most appropriate strategy is to focus on asset protection zones for new development, and within the development area footprint, with land managers focussing on providing prescribed burning within sound containment lines within 500 metres of the interface.

There are further implications for section 52 bush fire risk management plans and NPWS reserve fire management plans. It is now possible to look at some quantification of risk based on data for local weather station. The current land management and community planning regime is not addressing likelihood in relation to weather. Bush fire risk management plans are being drafted in accordance with a template framework and do not adequately consider fuel or climate/weather. These areas of bush fire risk management plans are generic at best and give little insight into bush fire risk. The bush fire management committees are often working in good faith, but the plans are deficient in identifying risk.

BFRMPs are supposed to meet ISO 31000 standards, but they do not. A much better arrangement is provided through the National Emergency Risk Assessment Guideline (NERAG) series (funded by EMA and prepared by the Tasmania Emergency Services) which provides an appropriate framework for bushfire risk planning. These guidelines include suitable assessment measures for human life, buildings, infrastructure and employment as well as environmental values.

This will necessitate an extensive training program for which the RFS is currently not capable of managing. Ann addition, challenge has been that BFMCs are highly dependent on motivated individuals from agencies as the development of bushfire risk management plans are not specifically budgeted for. Executive officers are RFS employees (District/Zone/Team Managers). This requires greater commitment by the NSW Government to fund the RFS through more local specialised people. This could use the existing Planning and Environment Centres in North Coast (Coffs Harbour), Glendenning (Blacktown) and South Coast (Moruya).

This challenge also goes to the FRNSW district committees which have been preparing poor bush fire risk management plans. An example is the recently released draft Hunters Hill/Ryde/Lane Cove/Parramatta Bush Fire Risk Management Plan. Weather/climate, vegetation and risk descriptors are poor with treatments based on intuition rather than actual credible risk assessment.

For NPWS reserve fire management plans, there needs to be a shift from reserve management objectives to that of risk. For example, a review of the Narrawallee Nature Reserve Fire Management Plan does not include any risk assessment and although the treatments are credible, the implications for species management are poorly considered. By using the NERAG framework, it would be possible to enhance the good work of NPWS staff in terms of land management for conservation outcomes. To illustrate, species like the Corroboree Frog (Kosciusko NP) or Wollemi Pine should be subject to a risk management framework which considers the likelihood (recurrence) of fire weather and ignitions likely to impact on these species. NPWS staff are to be commended for their actions in the protection of the Wollemi pine community, as evidenced in media reports over the recent summer fires. However, this is not the same as a careful risk assessment which could deliver enhanced strategies for protection.

Climate change should be a central aspect when considering future land management strategies and fire management arrangements (including prevention, preparedness, response and recovery) within national parks estate.

4. Conjola Park Case study.

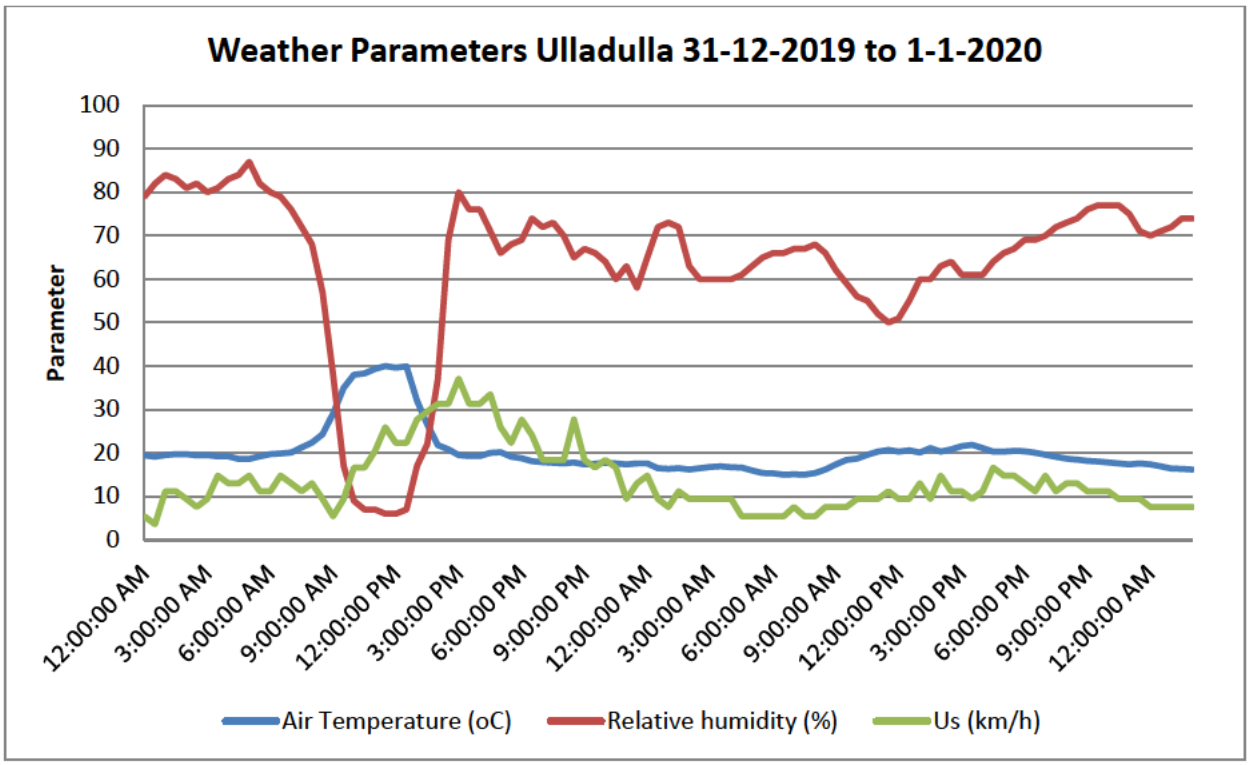
Conjola Park lies on the NSW South Coast within Shoalhaven Council area. It lies south of Nowra and just north of Ulladulla. It is an area with a combination of retired persons and those who enjoy owning a holiday home on the south coast. Nearby, the Conjola township provides camping and caravan facilities (owned by Council) as well as a mobile home estate and a residential area. Again, homes are a mix of local retired residents, holiday homes and commuting residents.

On 26 November 2019 the Currowan fire started, presumed by lightning. By New Years Eve the fire was uncontained and was in excess of 215,000 Ha in size, largely burning within Morton National Park and heading in a southerly and easterly direction towards the coast. The fire broke out of Morton National Park and impacted on the Narrawallee Creek Nature Reserve and the communities of Conjola and Conjola Park.

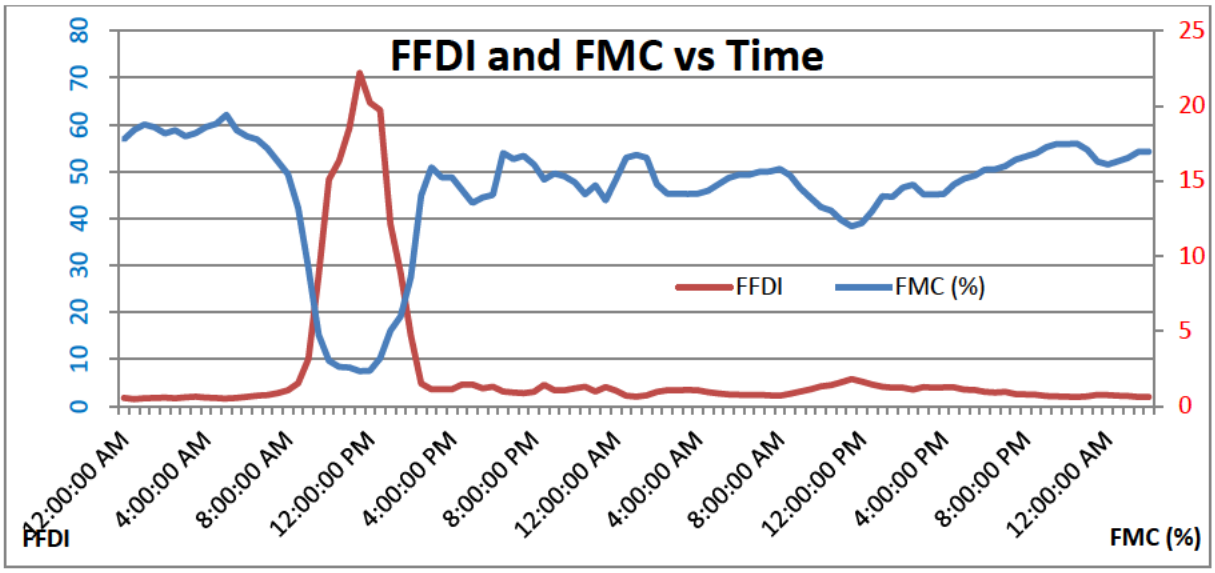
In Conjola Park 106 homes were recorded as lost with one facility also being lost. 51 outbuildings were destroyed. In addition, 31 homes were damaged and 129 buildings were described as being untouched (Shoalhaven Council, Per communication). In Conjola township, 16 houses were lost and another 5 homes were damaged, largely within the mobile home estate.

The predicted fire weather (FFDI) for Conjola was predicted to exceed 85 by 11:00 pm and over 90 by midday under the influence of a north-westerly (WNW) wind of approximately 50 kph. Winds were expected to turn to the south-west from about 2:00pm with lower wind speeds. In fact, the events of the day were marginally less however the peak at Ulladulla weather station was FFDI of 79.

A profile of the days fire weather conditions is illustrated in the two graphs below. The first graph shows the temperature (^{0}C), relative humidity (%) and wind speed (km/h) over the 48 hours of the fire event.

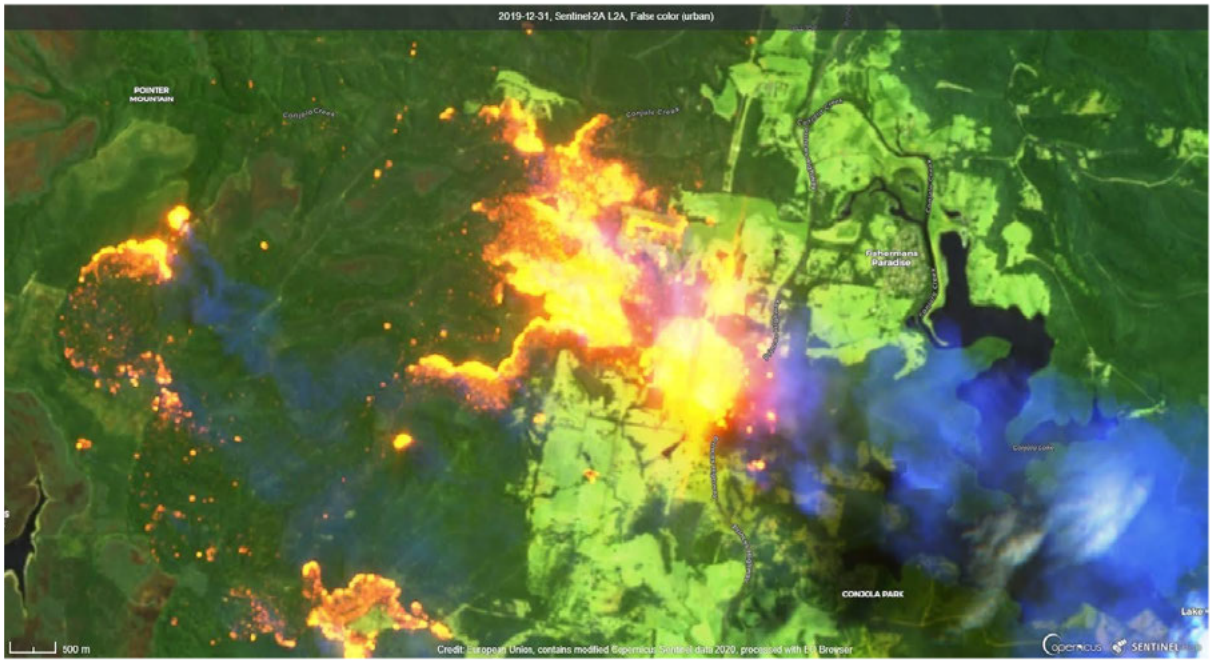


The second graph provides the FFDI and fuel moisture content (FMC%) of forest fuels over the same period as the graph above. The weather station for both graphs is Ulladulla. It should be noted that fuel moisture is at the limits of minimal conditions.



In post-fire interviews, residents reported that the fire impacted on the Conjola Park area at about 11:00 am under a northerly (NW) wind. They report the winds as very strong which aligns with the predictions by the BoM. This also corresponded to the point of greatest mixing height, or greatest atmospheric instability. A line scan of the fire just prior to impact is shown below.

Unfortunately, and significantly, the predicted wind change did eventuate however the on-ground winds did not abate as predicted and hence a second fire front impacted Conjola park from the south. This destroyed more buildings.

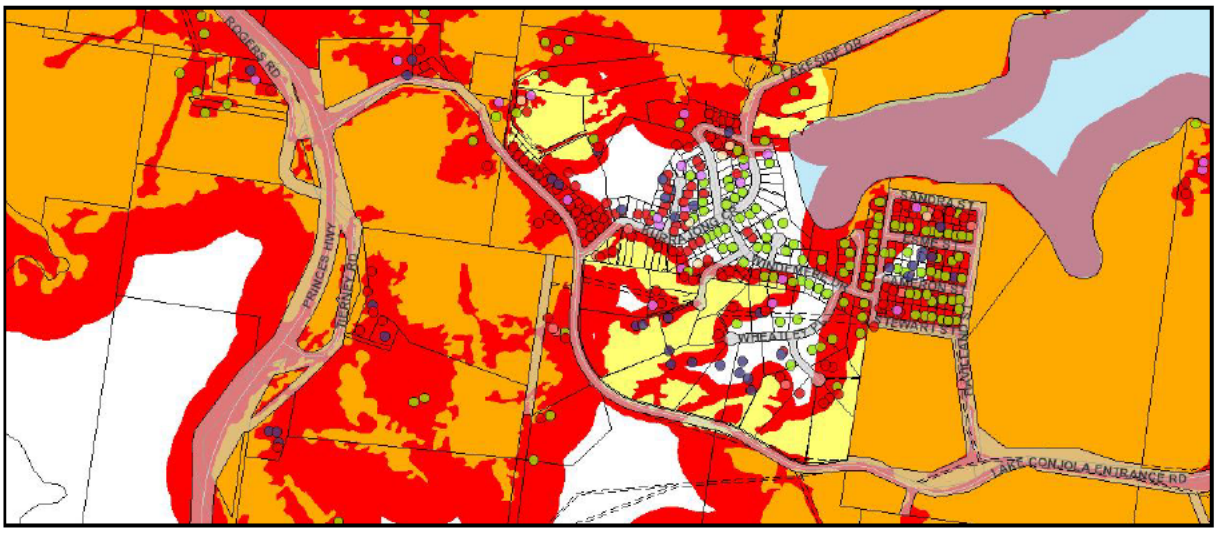


To illustrate the challenge of climate change, the Nowra (Albatross) weather station has been used to look at impacts on the south coast. The 1:50 year fire weather (FFDI) conditions calculated for Nowra has shifted from an FFDI of 116 in the 1972-92 period, to a value of 123 in the period 1995-2015 (Douglas, 2017). PBP 2019 is designed around an FFDI

of 100 and therefore falls short of the 1:50 year design conditions needed to better protect housing in the Shoalhaven.

Residents also reported that as the fire impacted on the area, the town water supply was lost. At least two fire appliances attended near Conjola Park. FRNSW sent a pumper to Conjola Park residential area only to find no reticulated water and an inadequate static water supply. FRNSW rely heavily on reticulated water. The NSW RFS had a tanker, but this was stationed at the Pacific Hwy so as to prevent vehicles travelling south to Ulladulla into the fire. Ultimately approximately 20 vehicles were guided later by convoy north, which has been reported widely in the news reports of the day.

Many of the houses lost were not in designated bushfire prone areas, although only a small number of houses appear to be new builds and comply with modern planning and construction practice. One house near Lake Conjola was built to BAL Flame Zone and suffered minor superficial damage. A number of mobile homes at Conjola were lost (3 in all) and several houses were damaged to varying degrees, one significantly was saved by the home owner. Two houses burning in Conjola were extinguished by a helicopter which dropped water on them and also saved a neighbouring mobile home. A copy of the bushfire prone land map and houses impacted in the main area of Conjola Park is illustrated below. It should be noted that areas to the north on Lakeside Dr were also impacted.



It should be noted that an area of grassland near the areas impacted were not mapped as being bushfire prone, and as can be seen a number of houses were lost.

The mobile home estate was subject to planning controls, but mobile homes are not subject to the NCC building code. The RFS imposed a requirement for compliance with AS3959-2009 through s100B of the RF Act, however, the homes were treated as residential, when in practice the estate is a senior's living estate and should have been subject to larger setbacks.

A preliminary survey by Shoalhaven Council and Western Sydney University researchers found a number of significant common themes. These were:

- The reticulated water supply was lost and residents did not have access to static water supplies;
- There were demonstrable numbers of house to house fires where one house would lead to a cascading of multiple houses being lost;
- Landscaping was a significant cause of house ignition and although were at times arising from ember attack, there are clear cases of surface fires from grasslands (not mapped as bush fire prone) into gardens leading to house loss;
- Gutter fires were prevalent and this led to roof fires;
- Gas cylinders used in the community were seen to discharge frequently, and one resident observed that at least one cylinder exploded and was jettisoned about 20 metres just missing his house;
- The bush fire prone land map was incorrect in that it failed to map all hazards (notably grasslands);
- Conjola (including Conjola Park) had no posted Community Protection Plan as observed in other Shoalhaven villages, including Sussex Inlet and Malua Bay.
- A house built to BAL FZ survived well although the resident reported that the shutters installed on the building had two shutters which only closed to half height of the windows;
- The enclosure of carports lead to a significant fire damage event and may have been partly responsible for other mobile homes being lost. There were identified deficiencies with the sub-floor enclosure of the mobile homes.

Although overwhelmingly, most houses were constructed prior to the introduction of the 2001 planning reforms, houses built subsequently largely performed well, however there are challenges.

These challenges include:

- Areas mapped as being bush fire prone are not being adequately updated, grasslands are often excluded because they are not updated or recognised as a hazard, and the buffer of 100 metres is inadequate in terms of planning for basic bushfire protection measures. A distance of 150 was considered by the VBRC but no action has occurred other than in Victoria;
- There is no requirement for dedicated water supplies within PBP 2019 (or AS3959-2018) for reticulated areas and no assessment at planning of possible loss of water is undertaken by Councils or the RFS in these circumstances. This contrasts with Victoria, where minimal static water is dedicated and available for fire fighters, even in reticulated areas;
- Gutter and valley guards are not required by either AS3959 or PBP 2019, and the RFS removed this requirement within PBP 2006 and has consistently not accepted the need for this protection measure, even though the RFS website promotes gutter protection;
- Landscaping is not adequately assessed by the RFS at the time of lodging development consent and is specifically excluded from consideration under the

complying development provisions under the SEPP Exempt and Complying Development Codes. This is also related to lack of skills by the RFS staff who are not trained in these matters and are not routinely considered. BPAD consultants, at least at Conjola, recognised the need t address landscaping in those cases where they were used for undertaking bushfire assessments;

- Improved construction standards can reduce house to house losses, even where these may only apply to additions or extensions of buildings;
- Gas cylinder installation needs improved advice;
- Ongoing maintenance of property is not being adequately addressed after development has been approved and occupied. A system of improving maintenance is desperately needed as the RFS is unable to use its powers under section 66, due to workload and resources.

Note: data collected for this case study in collaboration with Shoalhaven City Council and the resident of Conjola Park.

Conclusions.

This case study illustrates that there are many ongoing challenges for protection of life, property and environmental values within NSW. Instead of 100 metres, bush fire prone land should be 150 metres for eucalypt and pine plantation forest environments and 50 metres for grasslands and rainforests.

Conjola Park illustrates the need for communities to improve their resilience and adaptability in the face of climate change, rather than finding fault with the land management arrangements of national parks estate. During the events of New Year's Day, there was never going to be an opportunity to prevent the fire travelling from Moreton National Park into private lands, which also had high fuel loads. Treatment of fuels, where needed, would have been more effective at the interface and on the private lands south of the Princes Highway, rather than deep within Morton National Park. Hazard reduction in 2013 near Mt Kingiman and designed to protect Ulladulla, ultimately did not stop the fires into Ulladulla. Likewise the 2018 hazard reduction at Mt Wirritin in the depths of the Budawang National Park, provided no benefit to the community of Conjola Park on New Year's Eve. The challenge of identifying where the fire will travel and under what conditions, is not likely to provide any fruitful assessment of risk within the landscape. Protection at the interface with some protection at depth is therefore essential rather than an attempt at meeting hectare targets.

Community protection planning is not being systematically used, and there are questions about its effectiveness. The current bush fire risk management planning framework is not currently serving communities well and needs reform.

5. Bushfire Planning and Design Scheme in NSW.

Bushfire Planning and Design (BPAD) can provide an enhanced level of service to support the community in the area of bushfire protection and nature conservation. This can occur,

not only in the current area of land-use planning and design, but also in the areas of environmental assessment for existing buildings (eg bush fire hazard reduction certificates), ensuring maintenance and compliance of protection measures at time of property transfer, and supporting the accreditation of practitioners through building professions standards as well as quality control of tertiary course providers.

The RFS is ill equipped to manage these issues, as is having problems in developing appropriate policy responses, even in the light of recommendation of the VBRC. The RFS does not see itself as having environmental responsibilities, notwithstanding the Objects of the RF Act which include having regard to ecological sustainability principles in exercising its functions.

Whereas the system of land-use planning is at an advanced stage of development in terms of bushfire protection decision making, the administration of the system is poor, and in relation to maintenance of protection measures is effectively absent. This arises in part from the operation of the EP&A Act, which only requires that Councils "may" enforce conditions of consent, and the RFS resources in ensuring maintenance is not systematically considered.

A new way of thinking is necessary. These issues are explored below.

(a) BPAD and land-use planning/construction practice.

In NSW, section 4.14 (previously 79BA) of the EP&A Act and SEPP Complying and Exempt Development Codes provides for persons to be recognised (or qualified persons) by the RFS.

S4.14 states:

> *4.14 Consultation and development consent—certain bush fire prone land (cf previous s 79BA)*
>
> *(1) Development consent cannot be granted for the carrying out of development for any purpose (other than a subdivision of land that could lawfully be used for residential or rural residential purposes or development for a special fire protection purpose) on bush fire prone land (being land for the time being recorded as bush fire prone land on a relevant map certified under section 10.3(2)) unless the consent authority—*
>
> *(a) is satisfied that the development conforms to the specifications and requirements of the version (as prescribed by the regulations) of the document entitled Planning for Bush Fire Protection prepared by the NSW Rural Fire Service in co-operation with the Department (or, if another document is prescribed by the regulations for the purposes of this paragraph, that document) that are relevant to the development (the relevant specifications and requirements), or*
>
> *(b) has been provided with a certificate by a person who is **recognised** by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements.*
>
> *(1A) If the consent authority is satisfied that the development does not conform to the relevant specifications and requirements, the consent authority may, despite subsection (1), grant consent to the carrying out of the development but only if it has consulted with the Commissioner of the NSW Rural Fire Service concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire.*
>
> *(1B) This section does not apply to State significant development.*

(1C) The regulations may exclude development from the application of this section subject to compliance with any requirements of the regulations. The regulations may (without limiting the requirements that may be made)—

*(a) require the issue of a certificate by the Commissioner of the NSW Rural Fire Service or other **qualified** person in relation to the bush fire risk of the land concerned, and*

(b) authorise the payment of a fee for the issue of any such certificate.

(2) In this section— special fire protection purpose has the same meaning as it has in section 100B of the Rural Fires Act 1997.

It is unclear what the difference is between a 'recognised' person or a 'qualified' person.

Non conformity with PBP (sub-section 1(A)) triggers the allowance of Councils to refer the development application to the RFS for advice. In practice, this has largely meant BAL-40 or BAL FZ assessed development. Council's can rely on a certificate from a recognised person which in practice accompanies a bushfire assessment report. Sub-section 1(c) should facilitate the development within an urban release area, however, in practice, the RFS reports that is rarely used. In effect, this provision overrides the requirements of s100B of the RF Act. In addition, Councils by their own admission, routinely refer DAs to the RFS rather than checking compliance with PBP themselves. This is at least partly due to there being no LEP provisions for the Council to consider.

The major challenge however is that many members of the public rely on the RFS self-assessment kit which is downloadable from the RFS website. It is incongruous that a member of the public would be able to prepare their own self-assessment of bushfire risk, whereas BPAD practitioners are expected to have university qualification to undertake such an assessment. Many Councils do not rely on such assessments and end up either doing their own assessment (i.e. design on behalf of an applicant) or refer the matter to the RFS for verification and validation (see sub-section 1(A) above).

A council would not normally be expected to accept a lay assessment of vegetation or threatened species impacts, geotechnical and engineering requirements, flood liability or heritage values to accompany a development application. BPAD practitioners are best placed to do this, when accompanied by appropriate skills and experience.

Complying development also provides for 'recognised persons' to undertake a BAL certificate. This can be found in both the Housing Coe provisions, as well as the Rural Housing Code provisions of the SEPP. Clause 1.19A provides general requirements for bush fire prone land in the SEPP being:

1.19A Land on which complying development may not be carried out—bush fire prone land

(1) To be complying development specified for any complying development code (except the Housing Alterations Code)—

(a) the development must not be carried out on land in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ), and

(b) in the case of development specified for the Rural Housing Code—any associated access way to the development must be on land that is—

(i) not in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ), or

(ii) grasslands.

Note.

More information about the categories of bush fire attack, including the flame zone, can be found in Table A1.7 of Planning for Bush Fire Protection.

(2) This clause does not apply to the following development—

(a) non-habitable detached development that is more than 6m from any dwelling house,

(b) landscaped areas,

(c) non-combustible fences,

(d) swimming pools.

(3) For the purposes of this clause, land is not in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ) if—

*(a) the council or a person who is **recognised** by the NSW Rural Fire Service as a suitably qualified consultant in bush fire risk assessment determines, in accordance with the methodology specified in Planning for Bush Fire Protection, that the land is not in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ), or*

(b) in the case of development carried out on grasslands—the development conforms to the specifications and requirements of Table 7.9a of Planning for Bush Fire Protection that are relevant to the development.

(4) Nothing in this clause prevents complying development being carried out on part of a lot that is not land referred to in this clause even if other parts of the lot are such land.

(5) In this clause, grasslands has the same meaning as in Planning for Bush Fire Protection.

It should be noted that for bushfire prone areas, fencing must not be combustible for complying development. There is significant duplication between Clause 1.19A and other clauses in Division 3 of the SEPP. For example, Clause 3.4 provides:

***3.4 Complying development on bush fire prone land* (see also Cll 3A.37, 3B.4 and 3C.5, etc.)**

(1) This clause does not apply to the following complying development under this code—

(a) a non-habitable detached development that is more than 6m from any residential accommodation,

(b) a landscaped area,

(c) a non-combustible fence,

(d) a swimming pool.

Note.

See clause 1.19A for additional provisions relating to bush fire prone land.

(2) If complying development under this code is carried out on bush fire prone land, all of the following development standards also apply—

(a) (Repealed)

(b) the lot on which the development is to be carried out must have direct access to a public road or a road vested in or maintained by the council,

(c) the dual occupancy or manor house must be able to be connected to mains electricity,

(d) if reticulated or bottled gas is installed and maintained on the lot—

(i) it must be installed and maintained in accordance with AS/NZS 1596:2014, The storage and handling of LP Gas, and

(ii) the storage and handling of any LP gas on the lot must comply with the requirements of the relevant authorities (including the use of metal piping),

(e) any gas cylinder stored on the lot within 10m of any dwelling must—

(i) have its release valves directed away from the dwelling, and

(ii) be enclosed on the hazard side of the installation, and

(iii) have metal connections to and from the cylinder,

(f) there must not be any polymer sheathed flexible gas supply lines to gas meters adjacent to the dual occupancy,

(g) if the development is carried out on a lot in Zone RU5, there must be—

(i) a reticulated water supply connection to the lot and a fire hydrant within 70m of any part of the development, or

(ii) a 10,000 L capacity water tank on the lot,

(h) if the development is carried out on a lot in any zone other than Zone RU5, there must be—

(i) a reticulated water supply connection to the lot, and

(ii) a fire hydrant within 70m of any part of the development,

(i) the development must conform to the specifications and requirements of Planning for Bush Fire Protection that are relevant to the development.

Note 1.
Attached development, council and detached development are defined in clause 1.5.
Note 2.
Bush fire prone land, landscaped area, road and swimming pool have the same meanings as they have in the Standard Instrument.

(3) (Repealed)

In the case of complying development, a recognised person can only issue a certificate to identify if it is not BAL 40 or BAL Flame Zone (under PBP 2019). Building surveyors can and should ensure compliance with AS3959 construction practice, however building surveyors are not skilled in vegetation and slope assessments, or bushfire behaviour. Building surveyors will typically rely on engineer's specifications, geotechnical requirements, etc but ensure buildings are built in accordance with building practice for DAs. Building surveyors cannot engage in design, being a clear conflict of interest with its regulatory function. As such, BPAD practitioners can and should be engaged in design, to ensure compliance. A

BPAD practitioner should be able to certify that the requirements of clause 3.4 (as an example) are complied with.

Complying development must comply with the deemed-to-satisfy requirements of the National Construction Code (NCC). The complying development bushfire provisions above effectively duplicates, with some inconsistency, between PBP and the provisions within clause 3.4, etc. Note that in effect, landscaping is not a consideration of housing under the Complying development provisions for either urban or rural housing.

As seen, in the Conjola Park Case study, landscaping was found to be a major factor in house loss. The failure to address the fundamental planning principles of containing risk to within the development boundaries places pressure on natural areas to address bush fire risk, rather than residents choosing to develop and live in bushfire prone areas.

(b) BPAD accreditation (*recognised persons*) and FPAA.

The RFS has released its Community Resilience Practice Note 01/13 which provides guidance on a person to be qualified as a 'recognised person'. The current document is somewhat vague, and provides lower standards than the previous documents, Fast Fact 5/10 and Practice Note 1/10. Persons are only recognised through a scheme. This is not the case for other professions under the Building Professions Act.

In NSW, the adopted scheme is administered by the Fire Protection Association of Australia (FPAA) and is referred to as the Bushfire Planning and Design Scheme (BPAD). Under the scheme, practitioners can be either Level 2 or Level 3, with Level 3 being the more advanced and considered appropriate for performance-based solutions. Level 2 is primarily concerned with acceptable solutions. FPAA uses Level 1 in WA but it is not recognised in NSW, being only needed to attend a 5 day short course.

In NSW there are 66 registered BPAD practitioners within the FPAA scheme. 29 are identified as being Level 3 practitioners. The remaining 37 are level 2 practitioners.

Under the scheme practitioners must adhere to:

- A code of ethics;
- PI insurance;
- Compliance with any conditions of accreditation;
- Ongoing professional development; and
- Ensuring that advertising is accurate and not misleading.

While the technical requirements are vague, in practice, NSW practitioners have obtained post-graduate qualification from the Western Sydney University, bushfire protection program. Practitioners in NSW who are members of the scheme consider that there should be no relaxation of the standards of qualifications. The FPAA recently announce a proposal to develop a short course at VET level, rather than post-graduate as at present.

There is significant tension between the BPAD practitioners and RFS Development Assessment Planning Officers (DAPOs). This arises from a number of issues.

RFS staff believe that as a regulator, they can establish the ground rules. In many cases, RFS staff operate independently of the PBP document, and can arrive at decisions, largely without justification. Inconsistencies by RFS staff, mean BPAD consultants seek to exploit these inconsistencies. DAPOs operate through the Planning and Environment Services Centres at Glendenning, Coffs Harbour and Moruya.

(c) RFS Staff Skills in dealing with DAs and Building.

There is no requirement for RFS staff to be qualified, or to match the requirements of BPAD practitioners. As a profession, there should be no difference between those engaged in design and those assessing that design, especially if the design is of a performance nature. Some RFS decisions appear arbitrary, and staff will often be unable to engage with qualified practitioners, resorting to the authority vested in the officer by virtue of the RF Act. In addition, RFS will no longer engage in the Land and Environment Court. After the introduction of PBP in 2001 and again in 2006, RFS staff did engage in court matters with some success and in many cases this resulted in improved bushfire outcomes whilst recognising environmental attributes, especially for threatened species and to protect adjoining conservation areas. This lack of engagement goes to the heart of both confidence and competence of RFS DAPO staff, especially those who have not completed the WSU courses.

The following table illustrates the current education of RFS personnel in terms of formal qualifications from WSU, with DAPO staff having core planning responsibilities.

Table 2. RFS qualification in BPAD assessment by PES location.

PES Centre	DAPO staff	DAPO staff qualified	Other staff	Other Staff qualified	Centre Manager
Glendenning (Central)	9 (1 person is currently enrolled)	4	13	0	Yes
Coffs Harbour (Northern)	6	3	7	0	Yes
Moruya (Southern)	7	1	4	0	No
Total	22	8	24	0	2

Note the Director of the three PES Centres also does not have qualifications in development assessment and bushfire protection. Two of the three Centre Managers are suitably qualified.

Secondly, there has been some BPAD practitioners who have likewise advised clients of outcomes, outside of the PBP requirements. RFS staff are concerned with the ethical decisions being made by BPAD practitioners, however, the practitioners point to

inconsistencies of RFS decision making. In addition, even though the RFS may be concerned with individual practitioners, they do not believe that they can engage in disciplinary procedures, even though the RFS recognises the FPAA scheme, and ultimately the practitioners under statute. This reinforces they view that BPAD practitioners are not subject to review, auditing and disciplinary actions. The FPAA having undertaken an initial disciplinary process (and won the case in the Supreme Court) has been reluctant to further discipline practitioners, but rather hold up or condition the accreditation of person seeking accreditation. The FPAA is not adequately resourced to undertake sufficient auditing of its members and has been a source of concern both in NSW and WA. As a result, FPAA increasingly seeks to conduct is own courses as a revenue raising exercise. This however, is a clear conflict of interest.

However, BPAD practitioners can easily point to the decisions of the RFS, due to political pressure, after the 2018 Tathra fires, and the incorrect BAL assessments undertaken by the RFS, for post fire recovery. This also required clearance of adjoining bushland and Aboriginal owned lands, rather than containing the BAL to the development boundaries.

Parallels can be made for BPAD practitioners with other building practitioners, such as fire safety engineers and building surveyors. These professions are registered through the Buildings Professions Act (now administered through the Department of Fair Trading). Under these Building Professions listings, practitioners must meet minimum educational standards, as well as professional indemnity (and public liability) insurance, operate ethically, engage if professional development and not misrepresent etc in advertising. Professional organisations support professional development, but do not have conflicts of interest in relation to formal qualifications. The Buildings Professions Board have seen numerous practitioners being disciplined, and even loose accreditation.

In NSW, under the Building Professions Act, fire safety engineers must have a Masters of Fire Safety Engineering. For building surveyors, there are 4 levels, and for the highest level (Level A1) they must have at least a Graduate Diploma in Building Surveying plus work experience (see schedule within the BP Act).

The RFS is not an accrediting body and should not be engaged in this role. The provisions in s4.14 were only introduced in 2002 as an interim arrangement, while the industry got established, which it now is. BPAD practitioners should be subject to the same operational requirements as fir safety engineers, if the NSW Government is to ensure the safety of the public in land-use planning and construction practice. While the FPAA could be a professional body similar to the Australian Institute of Building Surveyors (AIBS) or Assoc of Consultant Certifiers (ACC), or the Society of Fire Safety (SFS through Engineers Aust), it is trying to focus on revenue at the expense of standards. The FPAA should, like AIBS and SFS, be engaged in the accreditation of courses by the tertiary education sector, and promote related skills, knowledge or competencies, but allow the public building professionals model to ensure the public interest, independent of the sector. Likewise, the RFS should be removing itself from 4.14 matters, allowing Councils to undertake their own assessments.

Conclusions.

The educational standards of RFS staff dealing with development applications should be improved, at least to the same standards expected of BPAD consultants. There is a need for the Planning and Environment Centres of the RFS to regularly check bush fire prone land mapping, rather than relegating this to local government. Buffers on bush fire prone lands should be extended to ensure that grasslands (and Category 2 vegetation) at least meet the 50 metre distance required for construction practice, and a 150 metre buffer for category 1 vegetation.

In the absence of the building code to address improvements in bushfire protection, housing should be required to have gutter-guards and valley guards in areas with forests, woodlands and rainforests. Dedicated water supplies of new builds should be mandated as part of the compliance with BASIX in NSW. At the moment water tanks can be minimal or not used in meeting BASIX, however, in rural villages along the coast, inclusion of Storz fittings and access for firefighting could assist in areas where water supplies are subject to bush fire events.

(d) Western Sydney University Bushfire Protection Program.

In the wake of the 2009 Victorian bushfires, the VBRC (p.268) recognised that:

> *"The University of Western Sydney offers the only graduate diploma course in bushfire planning and design in Australia. ..... A practitioner who has completed the course would be well placed to take a holistic approach to planning and building in a bushfire prone area. ...."*
>
> *AFAC advises the Commission that it had begun discussions with the Fire Protection Association Australia and the University of Western Sydney with a view of developing a national graduate diploma in bushfire planning and design."*

Table 3: Structure of the Bushfire protection Programs for BPAD consultants.

Semester Offerings	Graduate Certificate Subjects	Graduate Diploma Subjects	Masters Subjects
		Graduate Certificate Subjects plus:	Graduate Diploma Subjects plus:
Summer	Bushfire Fighting	Professional Practice and Building Law	
Autumn	Bushfire Behaviour Interpreting Building Regulations	Fire Technology and Engineering Principles Spatial Tools and Mapping	Research Project A
Q3 (Winter)	Planning and Development Control	Disaster and Emergency Management	

Spring	Planning for Bushfire Prone Areas Building in Bushfire Prone Areas	Emergency Management in Bushfire Prone Areas Performance Solution for Bushfire Protection	Research Project B

The Western Sydney University (WSU) bushfire protection course (at Graduate Diploma level) was designed around the needs of the industry and has evolved specifically to meet both AFAC and FPAA standards nationally.

The table below shows the numbers of students that have graduated from the relevant courses.

Table 4. Students that have completed WSU courses.

Course	Graduate Diploma in Design in Bushfire (6 Units)	Graduate Certificate in Bushfire Protection (4 units)	Graduate Diploma in Bushfire Protection (6 Units)	Graduate Certificate in Bushfire Protection (6 units)	Graduate Diploma in Bushfire Protection (12 units)	Masters in Bushfire Protection (16 Units)
Students Graduating	61	19	84	5	12	4

There are currently approximately 30 students in the current program and will graduate over the next 2-3 years.

Since its inception, the WSU course has seen nearly 200 students complete one of its courses. More than half of the students are estimated as coming from NSW. Both the RFS and FPAA are represented on the WSU Construction Post-graduate Courses External Advisory Committee.

The current course is an expanded one when compared to the course in 2004, when it started. It is the only course specifically related to bushfire protection in Australia, although Melbourne University does have a Bushfire Management PG Certificate Course with two units related to land-use and building.

The roles of the BPAD practitioner could be seen not only as ensuring compliance with meeting land use planning and construction requirements, but also ensuring environmental assessment (issuing a bush fire hazard reduction certificate) under the Bushfire Environmental Assessment Code provisions (under s. 100C-100I) and maintenance compliance. This would necessitate legislative changes but would relieve the pressure on the RFS and councils and allow them to focus on ensuring section 66 notices (under the RF Act) are undertaken. This can also allow for the revocation of the 10/50 provisions which is poor public policy and is subject to abuse.

This may require some additional training of some BPAD practitioners but is certainly within the skill set of many of the current BPAD practitioners.

6. Challenges with maintenance and enforcement.

One of the greatest challenges of the current system, is that of ongoing maintenance. PBP requires amongst other things asset protection zones (within the development boundary), appropriate construction standards, landscaping, access and water supplies. Maintenance is a major and fundamental flaw in the existing bushfire protection system.

Of particular concern is the issue of maintenance of APZs and construction as well as associated landscaping. During subdivision design, APZs are readily achieved through the use of perimeter roads to separate the urban form of residential development, and natural or rural areas. This demarcation using perimeter roads enhances and facilitates land management activities including prescribed burning and nature conservation. Where subdivisions have rear property boundaries and possibly fire trails for demarcation, they become increasingly problematic, with urban residents using fire trails and conservation areas such as bushland reserves for grass clippings and other rubbish disposal, encroachments into public lands (e.g. for parking or storage) and in more rural-residential areas bushland regrowth into the asset protection zone. These threaten the adoption of bushfire protection measures being effective into the long term, with public odium being transferred to public land managers such as the NPWS.

Previous studies by Penrith Council around Londonderry have demonstrated these challenges and fire trails in the Blue Mountains LGA have been gated and fenced off as extra parking areas. The current provisions relating to s.66 notices may deal with vegetation regrowth, but they cannot address alien uses on public lands, and in many cases councils and the RFS are unaware of these challenges. Sutherland Council has likewise expressed concern with its ability to manage this problem.

Recent studies by Shoalhaven Council (as yet unpublished) have likewise identified these problems. The existing bush fire risk management planning arrangements are not addressing these issues and it is often a complaint that is raised before any action is taken. This is piecemeal and not systematic.

For class 2, 3, 4 and 9 buildings (aged care, health care and assembly buildings such as schools) there is a general requirement under the EP&A Act and regulations to ensure compliance through annual fire safety statements. Fire protection (as opposed to BPAD) industry technicians are engaged to regular ensure compliance with Fire Safety Systems and annual certification. However, bushfire compliance does not regularly form part of the annual fire safety statement system. Fire protection and fire safety practitioners are not qualified to review and monitor as well as report on bushfire protection measures.

It can be reasonably assumed that bushfire does not form part of the fire safety systems (although this is of some debate) in that the location of the bushfire provisions (being G5 in Volume 1 of the NCC) is more associated with ancillary matters than the fire safety measures in sections C, D and E of the NCC (Vol 1) and clearly related to fire safety systems.

For residential dwellings (Classes 1a and 1 b) there are no requirements for annual inspections, but rather compliance is checked at time of purchase for some issues. As such,

a preferred model is to use a system similar to that used for swimming pool compliance and smoke detector compliance in residential homes. This is undertaken at the time of transfer of ownership or annually for rented accommodation.

BPAD practitioners are well positioned to assist in this regard. It would be particularly important for Level 2 practitioners, whereas Level 3 practitioners will be more engaged in performance-based solution. BPAD practitioners understand the requirements for APZs, for basic building maintenance (they cannot see all aspects of construction) and planning provisions. Any consents, especially those based on performance solutions, should ensure BPAD practitioners engaged on behalf of purchasers to be able to access such documents as part of the process of due diligence when purchasing a residential property or home. As with swimming pools, purchasers may proceed with purchase on condition of rectification with a period of time (say 3 months) or the vendor is to complete and ensure compliance prior to settlement. This should include landscaping which may have been undertaken and risks the dwelling.

Where properties interface with bushland reserves and national parks estate, the failure of private land holders to suitably manage their own land, means that it presents additional logistical challenges for the public land manager, both in terms of containment strategies, as well as property protection during hazard reduction, especially prescribed burning.

7. Local Environment Plan (LEP) provisions and bushfire measures.

IN NSW, local councils are guided by the production of LEPs by the LEP template. This is not to say that some councils do not have bushfire provisions within the LEP.

Currently the only compulsory planning provision within the LEP is:

5.11 Bush fire hazard reduction [compulsory]

Bush fire hazard reduction work authorised by the *Rural Fires Act 1997* may be carried out on any land without development consent.

As can be seen, the LEP relies on the RF Act (s.100B) however, the RFA also makes provision for the issuance of a bush fire hazard reduction certificate as well as the 10/50 Code. Some LEPs do have other provisions which call up PBP, but are few and does not form part of the LEP template.

In general, however, LEPs are inadequate in relation to bushfire protection measures, relying on section 4.14 of the EP&A Act and s.100B of the RF Act. The importance of PBP being called up in the EP&A Act cannot be understated. A development standard within an LEP can be varied subject to clause 4.6 of the Standard Instrument which provides:

"4.6 Exceptions to development standards [compulsory]

(1) The objectives of this clause are as follows:

(a) to provide an appropriate degree of flexibility in applying certain development standards to particular development,

(b) to achieve better outcomes for and from development by allowing flexibility in particular circumstances.

(2) Development consent may, subject to this clause, be granted for development even though the development would contravene a development standard imposed by this or

any other environmental planning instrument. However, this clause does not apply to a development standard that is expressly excluded from the operation of this clause.

(3) Development consent must not be granted for development that contravenes a development standard unless the consent authority has considered a written request from the applicant that seeks to justify the contravention of the development standard by demonstrating:

(a) that compliance with the development standard is unreasonable or unnecessary in the circumstances of the case, and

(b) that there are sufficient environmental planning grounds to justify contravening the development standard.

(4) Development consent must not be granted for development that contravenes a development standard unless:

(a) the consent authority is satisfied that:

(i) the applicant's written request has adequately addressed the matters required to be demonstrated by subclause (3), and

(ii) the proposed development will be in the public interest because it is consistent with the objectives of the particular standard and the objectives for development within the zone in which the development is proposed to be carried out, and

(b) the concurrence of the Secretary has been obtained.

(5) In deciding whether to grant concurrence, the Secretary must consider:

(a) whether contravention of the development standard raises any matter of significance for State or regional environmental planning, and

(b) the public benefit of maintaining the development standard, and

(c) any other matters required to be taken into consideration by the Secretary before granting concurrence.

(6) Development consent must not be granted under this clause for a subdivision of land in Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU3 Forestry, Zone RU4 Primary Production Small Lots, Zone RU6 Transition, Zone R5 Large Lot Residential, Zone E2 Environmental Conservation, Zone E3 Environmental Management or Zone E4 Environmental Living if:

(a) the subdivision will result in 2 or more lots of less than the minimum area specified for such lots by a development standard, or

(b) the subdivision will result in at least one lot that is less than 90% of the minimum area specified for such a lot by a development standard.

(7) After determining a development application made pursuant to this clause, the consent authority must keep a record of its assessment of the factors required to be addressed in the applicant's written request referred to in subclause

(8) This clause does not allow development consent to be granted for development that would contravene any of the following:

(a) a development standard for complying development,

(b) a development standard that arises, under the regulations under the Act, in connection with a commitment set out in a BASIX certificate for a building to which State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 applies or for the land on which such a building is situated,

(c) clause 5.4.

***Direction.** Additional exclusions may be added."*

Clearly, sub-clause 8 above could allow for bushfire protection through PBP to be added for those Councils with bush fire prone areas. Clause 28 of the Shoalhaven LEP provides a guide in relation to appropriate additional bush fire provisions.

The following amended clause (28) extracted from Shoalhaven LEP 1985 should provide for:

"?? Bush fire protection measures

(1) The Council must not grant consent to the carrying out of development on bush fire prone land if it is of the opinion that—

(a) the development may have a significant adverse effect on the implementation of—

(i) any strategies for bush fire hazard reduction or risk management adopted by the Council, or

(ii) any strategies for the conservation of nature on public or private land: or

(iii) any relevant provisions of the Act or the Rural Fires Act 1997, and

(b) the development, including the arrangements for access to and from the development, may constitute a significant threat to the lives of residents, visitors or emergency services personnel, and

(c) the development may give rise to an increased demand for emergency services during bush fire events that will result in a significant decrease in the ability of the emergency services to effectively control major bush fires.

Note. Section 146 of the Act provides that bush fire prone land is land recorded by the Council as such on a map certified by the Commissioner of the NSW Rural Fire Service as a bush fire prone land map for the area of the Council.

(2) The Council must not grant consent to the carrying out of development on bush fire prone land unless it is satisfied that adequate measures are proposed to avoid or mitigate the threat from bush fire, having regard to—

(a) the siting of the development, and

(b) the design of, and the materials used in, any structures involved in the development, and

(c) the clearing of vegetation, and

(d) the requirements set out in Planning for Bush Fire Protection, ISBN 978 0 646 99126 9, prepared by the NSW Rural Fire Service in co-operation with the Department of Planning, Industry and Environment, dated November, 2019.

(3) Before deciding to grant consent to any development on bush fire prone land, the Council—

(a) the Council has received a bush fire assessment report from a qualified bush fire practitioner, in relation to the land, that addresses each of the matters referred to in subclause (2), and the Council is of the opinion that the development is feasible despite the land being bush fire prone, and

(b) must be satisfied that these requirements will be met as far as is practicable in the circumstances.

"(c) must be satisfied that the provision of asset protection zones and maintenance thereof can be contained within the development without imposing any burden upon adjoining land.

(4) The Council must not consent to the erection of any building on the following land within the set-backs identified by building lines on the map describing that land—"

The term qualified bush fire practitioner may need to be defined but should relate to a new category of BPAD practitioner within the Building Professionals Act (or its replacement).

Note that sub-clause 3(a) is taken from the flood liable provisions in Shoalhaven LEP 1985 but reworded for bush fire protection. The provisions of a clause 28 model within the Shoalhaven LEP 1985 should form a mandatory requirement under the LEP template for all Councils with bush fire prone land. This would then provide a sensible transition away from section 4.14 of the EP&A Act, but still allow the RFS to issue a BFSA in relation to subdivisions and special fire protection developments.

8. Problems and challenges with Planning for Bush Fire Protection 2019.

Planning for Bush Fire Protection 2019 is the fourth iteration of a document originally drafted in response to the events of 1994 bushfires. In 2001, it was formally adopted as part of the suite of reforms arising after the Xmas 2001/2002 bushfires in NSW.

The 2001 document was more of a guidance document. The scope of the document was limited, although it did include issues in relation to LEP development and strategic planning. This was picked up by the S117 directions under the EP&A Act. Importantly, the 2001 document established an improved site assessment for building based on the AS3959-1999 construction levels. This was the precursor to the subsequent changes to AS3959 in 2009.

In 2006, the decision was made that the document would be more based on acceptable solutions but with an allowance for performance-based planning solutions and merit. The 2006 represented a substantial way forward and provided a framework for other jurisdictions to follow. In addition, PBP 2006 was drafted around the regulations and changes to SFPPs adopted in conjunction with the release of PBP 2006. Again, the site assessment integrated the planning requirements with a Level of construction under AS3959-2009. However, with the adoption of AS3959-2009, the 2006 version of PBP was no longer aligned between planning and construction and the planning level was set at a BAL 40 (sometimes BAL FZ) instead of BAL 29 which had been the intended policy response.

The importance of PBP and s.100B is that unlike other jurisdictions, NSW spearheaded the adoption of both construction standards and planning setbacks for vulnerable uses (called SFPPs). And although other jurisdictions, notably Victoria and Tasmania, has followed suit, the National Construction Code (NCC) still does not include classes other than residential classes (Classes 1,2 and 3) such as aged care, schools and health care (being Classes 9a, 9b and 9c) as well as Manager's residences (Class 4). The Australian Building Codes Board (ABCB) has strongly resisted the inclusion of other classes within the ambit of bushfire protection on cost grounds and because of concerns that AS3959 may not be suitable as a construction practice for these buildings. In NSW, Victoria and Tasmania, this has not proved to be true. The basis of such resistance appears to be on the basis that the ABCB believes that planning will provide the acceptable levels of risk, whereas as State planning bodies believe that existing construction practice must be acceptable for these more vulnerable developments.

PBP 2006, supported subdivisions, SFPPs and infill dwelling but relied on Councils to undertake other classes of building using the Aims and Objectives of PBP rather than the accepted solutions adopted for residential style buildings.

In addition, PBP 2006 began the process of including building matters within the planning space, due to deficiencies of the building codes and inadequacies of AS3959-2009 specifically. These included matters such as the use of non-combustible fencing and gutter guards. The 2009 Addendum to Appendix 3 which sought to implement the recommendations of the VBRC also implemented changes resisted by the ABCB.

The effect of PBP 2006 and the integration with AS3959 in 2006 was to ensure that APZs and construction meant that new development would retain any planning impact to within the boundaries of the development. However, in the post 2009 era, the RFS has shifted to a politically risk adverse culture, in which neighbours would contribute to risk mitigation through vegetation management, rather than focussing on other bushfire protection measures. This is to appease concerns of home owners with the cost of development. In recent times, this has manifest itself through the Biodiversity Conservation Act, whereby residents are more prepared to increase the construction level including to Flame Zone, rather than pay for offsets imposed by the Department of Planning, Infrastructure and the Environment (formerly OEH). This has thereby limited operational consideration for firefighting and where a consent is vague, the subsequent use of the 10/50 provisions to clear vegetation.

The adoption of PBP 2019, has both some significant improvements and also some clear regressive provisions. For example, PBP 2019 reintroduces the requirements for consideration of strategic planning issues and has carried over the building measures adopted after the 2009 VBRC, however it removes fundamental protections such as gutter guards, it does not mandate non-combustible fencing close to walls and no longer requires 'dedicated' water supplies. The issue is well illustrated in the events of New Year's Eve in relation to Conjola Park, where the reticulated water supply was cut off, and residents (and the fire services) had no water for property protection. Many of the losses can be directly attributed to lack of water supply, with FRNSW pumper that was on site having no accessible water.

PBP 2019 also lowered the fuel loads from AS3959-2018 but were higher than that within PBP 2006. AS3959-2018 is largely based on fuel loads within PBP 2001 and NPWS reported data. A more conservative approach should have been to use AS3959-2018 fuel load values, due to the level of uncertainty of the data used from the University of Wollongong, compared with previous data from the NPWS (Good, 1996). The 1996 NPWS data illustrates the variability (range) of fuel loads and does not account for canopy fuels. These average fuel loads can exceed 25 tonnes/Ha (dead fine fuels) with maximum values well over 40 tonnes/Ha.

This again reflects the poor skills and competence of those in the policy space of the RFS, or possibly worse, the resistance of the Corporate hierarchy to address improved bushfire

protection due to concerns of political backlash. PBP 2019 has significant improvements over the previous 2006 document. However, it also has significant problems.

The revised PBP 2019 has removed much of the previous narrative, which can give context to the bushfire protection measures adopted. A clear example is the rationale for ensuring that APZs are contained within the development area and not intrude on adjoining lands, especially nature conservation areas (both public and private). This is essential as the transfer of protection on neighbouring lands, means that adjoining land holders, who already have a duty to prevent the spread of fires on or from there land (see section 63 of the RF Act), also now have to meet the needs of private interests for development within these bush fire prone areas.

A further recent example has been the proposal for the creation of APZs within Lane Cover National Park, for the former UTS Kur-ring-gai campus to accommodate a private school in 2019. This was accepted by the RFS based on a bushfire assessment which recognised that without such a situation, the risk levels and protection measures could not be achieved. This is totally inconsistent with planning decisions by the Land and Environment Court, which are discussed below.

9. Fire weather and RFS website.

PBP 2019, relies on the fire weather within the RFS website. There are concerns with the current process in that it leaves a legislative function to a government agency (RFS). The major concern relates to the under-estimation of fire weather conditions in the Central West and North Coast of NSW. In the Far west, vegetation is not dependent on FFDI being dominated by semi-arid and arid vegetation types, however the far west being classed as an FDDI 80 area makes no sense in 20120.

The criteria for PBP 2019 (and PBP 2006) was for a recurrence (annual exceedance probability) of 1:50. Evidence from the Bureau of Meteorology and Western Sydney University, clearly demonstrates that the general State-wide FFDI should be at least 100, with only the Cooma-Monaro and New England fire weather districts being set at FFDI of 80. At the moment, it is only the Greater Hunter, Greater Sydney, Illawarra-Shoalhaven and the South Coast that are set at an FFDI of 100.

The 1:50 year fire weather conditions (FFDI) can be seen in the table below. This table is based on three different statistical methods to determine the 1:50 year design bush fire conditions and includes results from the Bureau of Meteorology and Western Sydney University (Douglas, 2017).

Table: 1:50 year FFDI for NSW Fire Weather Districts. (from Douglas, 2017) (data 1972-2009)

	1:50 year Recurrence FFDI			Other design FFDI			Louis (2014) (BoM)	
Weather Station	Gumbel*	GEV	GPD	95%	RFS	Max	Gumbel	GPD
Casino	143	120	116	na	80	101	na	na
Grafton	120	101	94	37	80	93	84	(88)
Coffs Harbour	94	95	82	34	80	95	86	90
Williamtown	121	105	101	45	100	99	102	103
Cessnock	n/a	n/a	n/a	n/a	100	n/a	135	126
Sydney	110	96	96	45	100	95	93	94
Richmond	128	112	108	n/a	100	96	95	108
Nowra	122	112	104	47	100	120	105	101
Batemans Bay	112	97	90	42	100	74	na	na
Cooma	96	83	84	39	80	68	80	(84)
Thredbo	n/a	n/a	n/a	n/a	50	n/a	47	53
Canberra	115	102	96	42	100	99	104	92
Goulburn	121	105	104	50	100	91	na	na
Bathurst	100	83	82	37	80	91	na	na
Armidale	52	46	46	24	80	46	na	na
Tamworth	101	100	100	40	80	105	na	na
Moree	104	102	103	36	80	125	102	101
Coonamble	163	123	121	42	80	121	na	na
Dubbo	121	107	101	40	80	99	105	102
Young	97	79	89	41	80	71	na	na
Wagga Wagga	144	128	121	47	80	138	127	119
Deniliquin	146	131	125	51	80	121	na	na
Hay	125	126	106	36	80	125	113	106
Mildura	150	133	130	49	80	132	128	136
Cobar	128	114	113	44	80	117	104	109

*Gumbel = annual max values, GPD = General Pareto Distribution, GEV = Generalised Extreme Value. Max= maximum recorded value, 95% is 95 percentile of data. RFS = values used in RFS website (PBP).

The fire weather conditions require rectification as a matter of priority in the light of both climate change as well to reflect the current situation in the Central West and North Coast (as well as the Far West). For the period 1995-2015, the Coffs Harbour value has now reached FFDI=108, which is greater than the earlier studies and reflects shifts arising from climate change (Douglas, 2017).

In relation to the issue of climate change, it should be noted that when PBP 2019 adopted a University of Wollongong fuel study which lowered fuel loads and therefore lower APZs than AS3959, it did not address FFDI. The new National Fire Danger Rating System is years away, but the political flack is now. Also, with the NSW North Coast hit hard and the fact we have

had Catastrophic days in NSW means that the NSW North Coast is also going to need to be reconsidered. This will mean there is a chance to rectify the FDI tables (currently not in PBP 2019) while the RFS can. A question will be: why is it that NSW North Coast residents have a higher risk that those in Sydney and South Coast? Same goes for Northern Tablelands and Slopes (e.g. Tamworth and Moree etc.) as well as Central NSW (e,g, Dubbo).

10. Planning Principles - Land and Environment Court cases.

Planning for Bush Fire Protection 2006 was largely based upon the planning principles established by the NSW Land and Environment Court. These cases include the following:

Scott Revay and Unn vs Ku-ring-gai Council. (1994)

This is an important case in that and centred mainly on bushfire matters and importantly, the proposal to use an adjacent bushland Crown reserve for the creation of an APZ and impacts on vegetation (through clearance). It extended the planning principle in relation to APZs on adjoining lands, not within the development site.

Council initially agreed to the development on bushfire grounds but resisted on environmental grounds. The then Department of Conservation and Lands (CALM) advised by letter that under the (then) Bush Fire Act, that up to 20 metres of land could be cleared. The Court found this could not be used for gaining development potential and clearly established that, as with previous cases, a developer could not rely on these types of provisions and APZs had to be contained within the development site.

Sternhell vs Warringah Council (2014)

In this case the RFS sought a 20 metre APZ within a Council bushland reserve managed by (then) Warringah Council, and further that the Council would need to manage the APZ in perpetuity. The matter ended up in court because the Council, quite rightly refused to entertain such a requirement and ongoing cost to ratepayers. The appeal and development proposal was rightly refused.

The principle established by the court and stated in PBP 2006 is: *Bush fire protection measures are to be contained within the 'overall' development and not on adjoining lands, other than in exceptional circumstances."*

In this case, the court found there were no exceptional circumstances.

This case illustrates a problem with the culture and lack of experience by the RFS DAPO staff in relation to planning matters which could be addressed if RFS staff were trained at the same level of BPAD practitioners. The cultural challenge is that the RFS is not prepared to engage in what it sees as political conflict in resisting development potential and a lack of understanding of competing environmental values.

Unfortunately, much of the important narrative included in PBP 2006 and used in this case has now been removed from PBP 2019, which would have assisted in understanding the principle, established by the Court in this matter.

In Eden Holdings vs Blue Mountains Council (LEC 1258-2014).

One of the most interesting cases it that of Eden Holding vs Blue Mountains Council. In this case the court found that the RFS BFSA was issued incorrectly and that the RFS had not identified that slopes exceed 20 degrees, and that they had not applied the appropriate setback for a special fire protection purpose. The court noted:

> *"The bushfire protection measures in the BFSA, such as the improved access, water and utility services and upgrades to the existing house are improvements to what currently exists on the site. However, on balance, they do not provide a better bush fire risk outcome given that the new development will be closer to the hazard and will result in an increased number of people who are unfamiliar with the risk. The evidence of* [redacted] *and* [redacted] *has raised doubts about the adequacy of the proposed bushfire protection measures in the BFSA and on the assumptions upon which the risk was assessed. Consequently, I am not satisfied that the proposal incorporates effective measures to protect the development from bushfire as required by cl 10.5(ca)."*

In this matter, the RFS did not attend the Court and the matters were resolved for the Court by the bushfire consultants. This matter illustrates the challenge of RFS staff confidence and competence in addressing matters before the Court.

In summary, these planning principles still hold importance in PBP 2019 and should be understood by relevant practitioners including RFS staff, architects and planners. In NSW, building surveyors doing the WSU Post-graduate Diploma and Masters level courses includes building protection as an underlying set of skills, knowledge and training. These principles should also apply to RFS staff, as well as planning and architecture courses.

Conclusions.

The long established principles of the Land & Environment Court form the basis of decision making, especially in relation to s4.14 matters.

That planning, architecture and building surveying courses should all include training, knowledge and skills on bush fire protection principles, initially at a post-graduate level, but increasingly undergraduate courses to include some understanding of natural hazards as part of modern environmental planning principles.

The RFS is not the expert in land use planning and building matters. In many cases, RFS lack the skills and knowledge to undertake appropriate bushfire assessments and BPAD practitioners are most likely to be more experience and competent than the RFS DAPO staff.

This is also true in other areas, such as vegetation management, landscaping and overall planning matters.

There are a number of significant changes that are needed to improve community safety and mitigate against the risks posed by the bushfires of 2019/20. In summary these include:

- All RFS staff involved in assessment development matters should be required to undertake the same level of education (and possibly accreditation) as the private BPAD practitioners.

- The RFS withdraw its self assessment kit for the public to undertake there own individual bushfire assessments as experience shows that applicants get it wrong, and that Council and the RFS are being required to engage in design, rather than providing an independent regulatory review;
- That the bushfire prone land be extended from 100 metres to 150 metres, and that the buffer for grasslands and rainforests be extended at least to 50 metres in accordance with the PBP 2019 and AS3959 site assessment distances (see also VBRC findings);
- The provisions of section 4.14 of the EP&A Act be amended to remove the ***recognised*** persons provisions, and that all BPAD practitioners be required to be accredited through the Building Professions Act (or its replacement) in the same way that fire safety engineers are accredited. Further, that a requirement of accreditation is that BPAD practitioners have as a minimum of a Graduate Diploma in Bushfire Protection from Western Sydney University to undertake detailed performance assessments. A lesser qualification of Graduate Certificate in Bushfire Protection could be recognised for the purposes of undertaking complying development in bushfire prone areas under the SEP (Exempt and Complying Development Codes).This would necessitate a change to that SEPP;
- The RFS be removed as an advisory body from section 4.14 of the EP&A Act, and that LEPs (and the LEP template) include a similar provision as found within clause 28 of the Shoalhaven LEP (with an addition relating to maintaining APZs within development area – see suggested wording above);
- Clause 4.6 of the LEP Template be amended to ensure that a development standard in PBP, as applied in a clause 28 model within Shoalhaven LEP cannot be varied;
- The LEP template be amended as described above so that Councils take responsibility for decision-making for bushfire protection, and that Councils with bushfire prone areas, employ specialised staff to address the requirements for bushfire protection and on-going maintenance;
- That, based on examples at Conjola and Cobargo in 2019/20, the NSW Government through its powers to vary the National Construction Code ensure that AS3959-2019 (and its successors) be amended (initially by regulation) as a matter of urgency to include requirements for:
    - gutter and valley guards in areas with forests, woodlands or rainforests;
    - dedicated water tanks (non-combustible) with appropriate fittings; and

  be implemented for new dwellings in rural villages and other rural-urban fringe areas with likely loss of power supplies, though the requirements of s 4.14 and complying development.
- Amending the RFS website for fire weather (FFDI) in fire weather districts so that all districts are presumptive of being an FFDI of 100 (with the possible exception of Cooma-Monaro and New England weather districts which can be maintained at an FDDI of 80. Alpine areas should be FFDI=50);
- That buildings in bushfire prone areas of classes 2, 3, 4 and 9's be subject to an annual bushfire safety inspection and audit by a BPAD practitioner, and that for class

1 buildings, that an inspection to ensure compliance with previous development consent (and building standards) be instituted at the time of sale and transfer to a new owner prior to settlement or for a rental agreement renewal;

- An urgent review of all coastal council bush fire prone land maps be undertaken to ensure their accuracy, and that the RFS PES offices prepare all bush fire prone land maps, rather than councils on a 5 year period, or sooner in urban release areas based on release area master plans or structure plans;
- State significant development, where it is a special fire protection purpose be required to obtain a bushfire safety authority from the RFS prior to submitting a development application t the Minister for Planning for development consent.

11. **State Environmental Planning Policy (Educational Establishments and Child Care Facilities)**.

In 2017, the NSW Department of Planning (now Planning, Infrastructure and Environment) issued a draft and finalised the SEPP (Educational Establishments and Child Care Facilities).

The policy seeks to implement the following policy initiatives:

- streamline the planning system for education and child care facilities including changes to exempt and complying development;
- NSW will be the first State to bring Commonwealth Laws regulating early childhood education and care into a state planning system;
- brings the Department of Education into the planning process early, and gives child care providers and developers information, from the beginning regarding all national and state requirements for new child care services;
- streamline the delivery of new schools and upgrading existing facilities, with a focus on good design; and
- assist TAFEs and universities to expand and adapt their specialist facilities in response to the growing need, and to maintain our reputation for providing world class tertiary education, while allowing for more flexibility in the use of their facilities.

In doing so, it seeks to provide for exempt and complying development provisions for establishments (education) and facilities (child care) identified. Public authorities will not be subject to a requirement for development consent and will consult with other relevant authorities.

The proposed provisions seek to allow developments within bush fire prone lands to be complying development using standardised development standards and processes.

Of particular note is that at clause 16(e), consultation with the NSW Rural Fire Service is required if the development (for education establishment or school-based child care) is located within bush fire prone areas, with a response being made within 21 days. These provisions would generally apply to matters under Part 5 of the EP&A Act where development consent is not required.

The policy intention is to continue the process whereby public authorities are dealt with under Part 5, whereas non-public organisations will be dealt with under Part 4, including exempt and complying development.

Where public safety is operating, however, it should be Government policy that developments of the type suggested are not to be located within bushfire prone areas, as defined under section 146 of the EP&A Act. It should be recognised that during the Black Saturday Bushfires in 2009, two schools and two child care centres were completely lost (burnt down) due to their proximity to bushland and within bush fire prone land (since mapped). The Victorian Bushfire Royal Commission highlighted the need for care with vulnerable developments. It was indeed fortunate that the fires were not on a school day as there would have been major fatalities. As it was, 173 people died in that one day, of which 123 died in or adjacent to their home. Evacuation in such circumstances may not exist.

It is noted, and endorsed, that clause 34(2)(b) of the policy does not provide for complying development in bush fire prone areas for school-based child care. This provision should generally apply to all the classes of development identified within the SEPP at this time.

Part 7 provides for general development control for educational establishments, including provisions relating to clause 52 and Coastal Wetlands. A principle should be that such facilities should not occur in bush fire prone areas. However, where they do, the ability to clear coastal wetlands for these facilities should not be countenanced. TAFE and University campuses are sufficiently large enough to have greater evacuation arrangements, and in either case, the application of water drenching systems should be a cost-effective alternative than simply constantly clearing coastal wetlands. Clause 52 should be deleted. I doubt clause 66, 72 and 73 could be used in either case.

In relation to Schedule 1, although an underlying aspect for exempt development is compliance with the Building Code of Australia, a general **note** should be made that *AS3959-2009 Construction in Bushfire Prone Areas* applies to bush fire prone lands identified under section 146 of the EP&A Act. In relation to fencing, timber fences should not be located within 10 metres of a building as identified in *Planning for Bush Fire Protection* (2019).

In relation to Schedule 2, the allowance of complying development under the EP&A Act, for schools, child care or other educational establishments would be *ultra vires* in that the NSW Rural Fires Act at Section 100B makes clear that matters identified as a Special Fire Protection Purpose under s100B(6) may not be complying development (see section 100B(5)(b)). Further the reference to *specifications and requirements* does not apply, as section 100B(2) requires meeting with *Commissioner's Standards*.

It is my submission that complying development should not, even as a matter of policy, apply to developments within this SEPP that have been identified as being located within bush fire prone land as mapped under section 10.4 of the EP&A Act. Such developments should not be located at BAL levels of 19 or 29 as the main criteria is a radiant heat flux exposure of 10kW/m^2 (@ 1200K) which will fall within BAL 12.5 or maybe outside of bush fire prone areas (at higher slopes).

In summary, there should be no unnecessary exposure of our most vulnerable or to those who do not appreciate the nature of risk associated with the facilities and establishment identified within the proposed SEPP. These developments should be subject to the provisions of section 100B of the Rural Fires Act, 1997.

The issue is highlighted through the sale of the former UTS Ku-ring-gai site which has been approved by the RFS (using a BFSA) and seeks to impose asset protection within Lane Cove National park. This highlights that the RFS is not capable of adequately dealing with development matters, either due to political influences or lack of skills and knowledge. If this occurs for private schools requiring development consent, then public schools will continue to go under the radar.

Recommendation: that schools, child care and other educational facilities, should as a matte of principle, not be located within bushfire prone areas, but where this s necessary, then these facilities must be subject to s.100B of the RF Act and that BPAD consultants and the RFS contain suitable protection measures within the boundaries f the development site.

12. NSW Bushfire risk management planning and environmental considerations.

Section 63 of the RF Act, makes provision for the owner or occupier of land to prevent fires spreading on or from their property. This duty of care provision includes public authorities and private landholders. In doing so, the owner or occupier can rely on a bushfire risk management plan for guidance on the implementation of this duty of care.

Section 66, allows the RFS to appoint officers (hazard management officers) for the purposes of enforcing the duty of care under section 63. Section 66 is only limited to the extent that the land should be cleared unless it is needed for agricultural purposes or because of certain environmental values (e.g. threatened species). Section 66 cannot require a building to be maintained or gutters to be cleared.

Bush fire risk management plans, are adopted by the Bush Fire Coordinating Committee under section 48, although their content is generally set out in section 54 and 55. They should set out schemes for the measures needed to reduce bushfire hazards. This is now extended to fire trails.

The introduction of the 10/50 rule in 2013 is not related in any way to the schemes set out under these provisions. The 10/50 provisions were introduced in haste for political expediency, without understanding the context for its use in Victoria. This suggests a failure of the bush fire risk management planning process to actually address these risks. Note that

risk reduction can include fuel management. In fact, the 10/50 rule undermines the Commissioner's and RFS functions which are to consider environmental matters, by virtue of section 3(d) of the Act which provides:

> *"for the protection of the environment by requiring certain activities referred to in paragraphs (a)–(c1) to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the Protection of the Environment Administration Act 1991."*

The introduction of the provisions for risk management plans in the 1997 RF Act, were designed to be a brake on the previous excesses of those wanting to simply clear the landscape of vegetation. The 10/50 policy framework, has setback risk management planning to prior to 1997 where the focus is again solely on fuel. However, it is worse. Previously significant focus had been directed to broader landscape burning which had the potential for harm if used repetitively within a too frequent period. The introduction of bushfire risk management plans saw the introduction of the 4 fuel management zones of asset protection, strategic fire advantage, land management and fire exclusion. This allowed for fuel reduction at depth through the strategic fire advantage zones, which adjoined asset protection zones in most cases in the initial iteration of bushfire risk management plans.

It is clear the RFS is not adequately resourced for the purpose of issuing bushfire hazard reduction certificates and is seeking to transfer responsibility for the requirements to enforce section 63 duty of care away from itself. Experience already shows that those seeking to use the new 10/50 measures are seeking to enhance views or gain pre-development clearance in anticipation of new developments (such as subdivisions). The measures do not enhance community understanding or community engagement, nor do they support enhanced safety through the planning system in the maintenance of asset protection zones. Further it removes the focus from improved hazard reduction at depth of up to 500 metres within the broader landscape. A role often undertaken by the NPWS in managing its estate.

The new focus as a result of the 10/50 provisions places the attention on the asset protection model only without protection 'at depth' through strategic fire advantage fuel management (or SFAZ). The SFAZ should be an area where prescribed burning at depths of approximately 500 metres could be carried out in large national parks. In smaller national parks (etc.) prescribed burning at depth may be problematic due to the proportion of clearance that may be required (say along a river).

The bushfire events have highlighted the concerns of the community that fauna are not being adequately considered in fire planning. This would be a misreading of existing fire reserve plans, however, the current model of bush fire risk management plans are overly focussed on biodiversity thresholds for vegetation, at the expense of fauna. The call for

indigenous burning practices, likewise need to be carefully considered, with the extrapolation of fire-stick burning from northern Australia, having a different emphasis in NSW. This is not to argue against burning practices based on spot ignitions rather than line ignitions as currently practiced, common with indigenous practices. However, any lighting of fires in the landscape have to be balanced with the shifts in burning periods as a result of climate change, and that of losing fires could have tragic consequences for communities and land managers alike.

It should be noted that from previous house loss records, including Black Saturday in 2009, in Canberra in 2003 and the 2001/02 NSW bushfire events, houses have not been lost beyond 700 metres, and that it is rare indeed for a house to be lost at a distance greater than 500 metres from the bushland interface.

Conclusions.

Section 66 should be amended to allow for a direction to a land owner to clear fuel from gutters or around buildings as part of the maintenance of properties and not just in relation to vegetation.

That greater emphasis be placed in bush fire risk management plans and fire reserve plans to the provision of APZs within development sites, and that SFAZ focus on treatment of the first 500 metres within public lands interfacing with urban areas. Within this area, a greater emphasis should be placed on fauna requirements rather than vegetation communities alone.

Dr Grahame Douglas
School of Built Environment
Western Sydney University

Note: Throughout this report the term PBP refers to the document *Planning for Bush Fire Protection.* This document was produced by the NSW RFS in conjunction with the Department of Planning, Infrastructure and the Environment (or its predecessors).

The term AS3959 refers to Australian Standard AS3959: Construction in Bushfire Prone Areas.

Both documents are referred by their year of publication.

Appendix 1 - Curriculum Vitae of Grahame Bruce Douglas.

Name: Grahame Bruce DOUGLAS

Address: Western Sydney University
School of Built Environment
Locked Bag 1797, Penrith, NSW, 2751.

Telephone: [redacted]

Date of Birth: 2 December 1953

Age: 66 yo

Previous position: Coordinator, Climate Change and Sustainability
NSW Rural Fire Service

Current Role: Academic Course Advisor (Post-Graduate Construction).
School of Built Environment
Western Sydney University
Kingswood Campus
Building ED, Room G.134

Qualifications: Bachelor Applied Science (Environmental Biology) (UTS)
Masters in Environmental Studies (Macquarie)
Post Graduate Diploma Public Sector Management (UTS)
Post Graduate Diploma in Executive Leadership, (AIPM)
Post Graduate Diploma Design in Bushfire Prone Areas (UWS)
PhD.

Awards: NSW RFS – Service Medal 2009.
NSW RFS – Commissioner's Commendation – Manager, Planning Services, 2004.
Frazer Environment Award Liverpool Council, Australia Day, 1994
Fire Protection Association of Aust. Fire Industry Award, 2017.

Details on my career in relation to the 16 years in NSW Rural Fire Service.

I have been involved in bushfire safety and associated policy development since the early 1990s. I participated initially on the Bush Fire Council of NSW and subsequently joined the Department of Bushfire Services (which became the NSW Rural Fire Service) in 1996. My earlier research work on air quality and land-use in the Sydney Basin gave me important insights and background into bushfire behaviour, especially vegetation, topography and weather (climate). I also have training in fire ecology.

I joined the NSW Rural Fire Service in 1996, and had a range of positions including Senior Environmental Officer, Manager of Planning and Research, Manager of Planning and Environment, Manager of Development Control and Manager, Natural Environment Services. These positions have lead to significant support for various research investigations over a period of sixteen years, and the last 5 years in particular.

With the introduction of the *Rural Fires Act 1996* and the extension of the coordinated system across the State, I was the leader in the development of the original framework and documentation of the bush fire risk management planning approaches used in NSW. These guidelines were revised by myself and endorsed by the Bush Fire Co-ordinating Committee in 2007 and based on Australian Standard for Risk Management.

I have written 2 books for the NSW RFS on land use planning and bushfire being *Planning for Bushfire Protection* (2001) and its successor *Planning for Bush Fire Protection* (2006). I was a participant on behalf of the Australasian Fire and Emergency Services Agencies Council (AFAC) in the development of the revised Australian Standard AS3959-2009 *Construction in Bushfire Prone Areas* produced by Standards Australia.

After the 2001/2 NSW Bushfires, I was involved in preparing the RFS response to the Parliamentary Inquiry into these fires. I also was the main driver for the preparation of the Cabinet documents, and drafting of legislation (with Parliamentary Counsel) of the 2002 amendments which included changes to the NSW planning and rural fires legislation. These changes related to land-use decision making, environmental assessment (code and certificates), accountability of agencies for fuel management, permit system and bush fire danger periods.

I was also the team leader in the development of the first Bush Fire Environmental Assessment Code in 2005.

I concluded my career in the RFS as Coordinator, Sustainability and Climate Change, and assisted in the AFAC Position Statement on Climate Change.

Details on my career in relation to the Western Sydney University.

In 2007, I was appointed to a Conjoint position of Senior Lecturer, Bushfire, funded by the RFS and located half-time within the University of Western Sydney (then School of Engineering). This position involved the teaching, research and administration of bushfire related programs within the School of Engineering on behalf of the RFS and UWS. This role concluded in 2012, at which time I was initially contracted to teach, on a casual basis, in the Bushfire Protection program.

I am currently Academic Course Advisor for the Post-Graduate Construction Programs and have worked full-time at WSU since 2014.

I teach in the areas of:

- Bushfire fighting;
- Bushfire behaviour;
- Planning and development control;
- Planning for bushfire prone areas.

- Building in bushfire prone areas;
- Disaster and emergency management;
- Emergency management in bushfire prone areas;
- Performance solutions for bushfire prone areas;

The post-graduate program includes Graduate Certificate, Graduate Diploma and Masters in Bushfire Protection courses.

As an individual researcher, I completed my PhD in 2017 examining the implications of climate change on fire weather and corresponding fire behaviour across NSW fire weather areas. This research builds upon work of the CSIRO which has derived new bushfire behaviour calculations (Project Vesta). This has significant implications for the implementation of planning and construction design for developments in bushfire prone areas.

Current and past activities associated with bushfire protection.

I am the current chair of TAC/20 (Bushfire) Committee of the Fire Protection Association of Australia (FPAA) and until this committee replaced it, was a member of the Bushfire Special Interest Group within FPAA. I have also been a member of the NSW State Bushfire Working Group.

I am currently a member of the Australian Standards Committee, FP-020, Construction in Bushfire Prone Areas and chair Working Group A within this Committee. I represent the FPAA on this committee.

For the period 2002-2009, I was also an active participant and represented AFAC in the working groups to Standards Australia Committee FP-20, Construction in Bushfire Prone Areas.

I have been invited by a number of State and national professional associations to make presentations on advanced bushfire safety design and site assessment methodology. These institutions include:

- Australian Institute of Building Surveyors – NSW Division (2006-2019)
- Society of Fire Safety (Eng. Aust) (2006 – 2010)
- Institute of Surveyors (2002-2010)
- Association of Consulting Surveyors (Aust) (2003-2019)
- Planning Institute of Australia (2002-2007)
- Building Design Association (Australia)(2002)

I have been disseminating my research results to non-academic professional communities by writing to journals, magazines (e.g., Fire Australia) and presenting at conferences and seminars (e.g., FPAA/AFAC conferences). I also give national media interviews on issues related to bushfire safety.

Over the last 3 years (2017-2019) I have also been a member of the organising committee for the annual Australian Bushfire Building Conference in the Blue Mountains (BMEE).

My PhD title is "*Property Protection from Extreme Bushfire Events under the Influence of Climate Change*", March 2017. https://researchdirect.westernsydney.edu.au/islandora/object/uws:36944/

Recent significant publications (since 2006)

Refereed Journal Articles

1. Douglas G.B., Tan Z., Midgely S. and Short L. 2008. "Bushfire Building Damage - A NSW Perspective". *Proceedings of the Queensland Royal Society*. Special Edition: Selected papers from Bushfire 2006 Conference, Brisbane Qld, held on 6-9 June 2006.
2. Kwok, K.C.S., He, Y. and Douglas, G.B., 2012, Bushfire-enhanced Wind Load on Structures. Proceedings of the Institution of Civil Engineers. *Engineering and Computational Mechanics*. Accepted 19/7/2012.
3. He Y., Kwok K., Douglas G. and Razali I., 2011. Numerical investigation of bushfire-wind interaction and its impact on building structure. *Fire Safety Science* 10. pp.1449-1462.
4. Douglas G.B. and He Y., 2019. "Design bushfire selection for bushfire protection in adaptation to global warming." *Frontiers in Mechanical Engineering*.

Refereed Conference Articles

1. Douglas G.B. He. Y. Xiang Y., Morris C.E. 2014. "Use of Extreme Value Analysis in Determining Annual Probabilities of Exceedance for Bushfire Protection." *Proceedings of the 11th International Association of Fire Safety Science.* Christchurch, New Zealand, 10-14 February 2014.
2. Douglas G.B. 2012. "Using Extreme Value Analysis to enhance Defendable Space for fire fighters and residents". *Proceeding of the 12th International Association of Wildland Fire Safety Summit*. Held in Sydney, 2012.
3. Douglas G.B., Holland M., Andreou A. 2012. "A new Site Assessment Framework for the Victorian Planning and Building Arrangements after the Black Saturday Bushfires". Australasian Fire and Emergency Services Conference. Perth.
4. He, Y., Kwok, K. C. S., Douglas, G. B., Razali, I. M., 2011,"Numerical Investigation of Bushfire-Wind Interaction and Its Impact on Building Structure", to appear in *Proceedings of the 10th International Symposium on Fire Safety Science*, University of Maryland, USA, 19-24 June.
5. Kwok, K.C.S., He, Y. and Douglas, G.B., 2010, "Wind impacts on fire spread and structural failure during bushfire in complex terrain", Proceedings of 9th United Kingdom Conference on Wind Engineering, Bristol, UK, 20-22 September, pp. 3-14
6. Douglas, G.B., He, Y., Kwok, K.C.S., 2010, "Wind Impacts on Fire Spread and Structural Failure in a Complex Terrain", *Proceedings of 14th Australasian Wind Engineering Society Workshop*. Canberra: Australasian Wind Engineering Society, pp. 91-94.
7. Douglas G.B., Short L. and Tan Z. 2007. "Developing new paradigms and recognising the limitations for the integration of Alternate Solutions and a Performance Environment in NSW bush fire prone areas". Fire Safety Engineering Conference 2007.
8. Douglas G.B., L. Short and Z. Tan. 2006. "NSW Advances in Approaching Performance based Assessments of Residential Developments in Bushfire Prone Areas". Bushfire 2006 Conference, Brisbane, 6-9 June 2006.
9. Bilous S., Heemstra S, Douglas G, Davies B, Johnston S. 2006. "Evaluating Bush Fire Risk Management Planning in New South Wales". Bushfire 2006 Conference, Brisbane, 6-9 June 2006.
10. Douglas G.B., Z. Tan and S. Midgely. 2006. "A Verification Method for Evaluating Alternative Building Solutions in Bushfire-Prone Areas". *The Future of Fire Safety.* International Fire Safety Engineering Conference 2006, Gold Coast, 23 May 2006.

11. Ramsay G. C., Wynn-Jones M., Wood C., Douglas G. and Robeson P. 2006. "The Australian Bushfire Safety Engineering Guidelines" *The Future of Fire Safety*. International Safety Engineering Conference, Gold Coast, 23 May 2006.
12. Douglas G.B.and Tan X., 2006. "Integrating Site Assessment and Performance Planning Outcomes for Bushfire Prone Areas". *Planning for Natural Hazards - How we can Mitigate the Impacts?* Symposium Proceedings, University of Wollongong.
13. Tan Z., Midgley S. and Douglas G. 2006 "A Computerised Model for Bushfire Attack Assessment". *Planning for Natural Hazards – How can we mitigate the impacts?* Symposium Proceedings, University of Wollongong.

Non- refereed Conference Papers.

1. Douglas G.B. 2009. "Working through New Standards for Construction in Bushfire Prone Areas. *Australian Institute of Building Surveyors Annual Conference –NSW Division*. Cockle Bay, Sydney.
2. Douglas G.B. 2009 "Developing Alternate Solutions and Performance for Developments in NSW bush fire prone areas". *Australasian Fire Authorities Council Conference*. Adelaide, South Australia.
3. Douglas G.B. 2008 "Urban/Rural Interface: Setting the Direction". *Fire Australia. Fire Protection Association Australia Conference.* Sydney. 13-15 October 2008.
4. Douglas G.B. 2008. "Future directions and advances for building in bush fire prone areas". *Australian Institute of Building Surveyors Annual Conference –NSW Division*. Cockle Bay, Sydney.

Previous publications by author alone (pre-2006)

The Place of Bush Fire Risk Management in the Rural Fire Service. at RFS Community Education Conference, Port Macquarie, 1998.

Bush fire risk management planning: A new name for an old toy or will it help biodiversity? at the Bushfire 99 Conference, Albury NSW, 7-9 July 1999.

Ecological Fire Management. at NCC Conference: Red Trucks - Green Futures., September 2000, NSW.

Integrating Land use Planning and Construction Standards for Protection for Bushfires in NSW – a model. at Bushfire 2001, May, 2001, Christchurch, New Zealand. (co-authored with P. Ellis).

Progressing Bush Fire Risk Management Plans and their integration with the environmental planning system for NSW. Australasian Fire Authorities Council Conference, Darwin, 10-12 August, 2001.

How Santa Brought New Initiatives after the NSW Fires – Christmas 2001. Australasian Fire Authorities Council Conference, Brisbane, July 2002.

CONSULTANCIES

World Health Organisation - to investigate and report on occupational health, training and administration for environmental health officers in the Fiji Islands, 1988.

Bussellton City Council (WA) *Report to Busselton Council in relation to bushfire protection and the adoption of AS3959-2009 by the Building Code of Australia in 2010*. Jan 2010.

Country Fire Authority (Vic) *Report to the Country Fire Authority in relation to the Implementation of Defensible Space and BAL levels for planning and building in WMO Areas*. Jan 2011. Centre for Local Government, University of Technology, Sydney.

Building Commission (Vic) *Expert Panel on Community Bushfire Refuges*. 2011-12.

Centre for Local Government – University of Technology, Sydney. (Associate) *NSW Planning for Bushfire Prone Areas Course*. 2002-present.

Centre for Local Government – University of Technology, Sydney. (Associate) *Victorian Building and Development for Bushfire Prone Areas Course*. 2011- 2014.

Centre for Local Government – University of Technology, Sydney. (Associate) *Tasmanian Planning for Bushfire Prone Areas Course*. 2011-2014.

AIBS (2019) – *Changes to AS3959-2018 and the Bushfire Verification Method under the National Construction Code*.

WA Department of Planning, Lands and Heritage. Peer Review and Revision of the Tourism Position Statement for the WA Government.

Various consultancies and expert witness to the Land and Environment Court in relation to bushfire protection (planning and building).

MEMBERSHIPS.

International Association of Wildland Fire.

National Parks Association of NSW.

North Coast, Regional Advisory Committee (NPWS)

Australian Conservation Foundation.

SUMMARY - EMPLOYMENT HISTORY

1974-79	Technical Officer Health Commission of NSW, Division of Analytical Laboratories
1979-80	Inspector (Pesticides) NSW Agriculture, Pesticide Registration Section
1980-87	NSW Department of Environment and Planning Specialist, Botany Bay and Macarthur Regional Offices Assessments Branch/Environmental Policy Branch
1987-89	University of Western Sydney, Hawkesbury Lecturer, Occupational Health
1989-97	WorkCover Authority of NSW Co-ordinator, OHS Education and Training
1995 (3 months)	Sydney Water Corporation Environmental Liaison Officer, Warragamba Dam Project
1996 (9 months)	Hon. Ian Cohen, MLC & Hon. Alan Corbett, MLC, Parliament of NSW Policy/Research Officer
April - July 1999	Office of Minister for the Environment, Emergency Services and Corrective Services and Minister assisting for the Arts. Liaison Officer/Policy Officer (N.P.&W.S.)
Dec. 2003 – July 2004	Nature Conservation Trust of NSW Executive Officer
Dec. 1996 - 2012	NSW Rural Fire Service Environmental Officer Manager, Planning and Environment Services Manager, Community Hazards Management Manager, Natural Environment Services Coordinator, Sustainability & Climate Change.
Current:	Academic Course Advisor (PG Bushfire), Western Sydney University School of Built Environment, Parramatta South.
Also	Associate, University of Technology, Sydney Planning for Bushfire Protection, Short Course (NSW/Vic/Tas)