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> Design & Assessment of Development in Bushfire Prone Areas
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Review of Bushfire Issues

In relation to

Mundamia Residential Subdivision

Prepared for:

Independent Planning Commission of NSW

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Project: 19176

Email: office@accuplan.com.au

Mail: PO Box 34 Forster NSW 2428
Office: Level 1, Building Q – Head Street Carpark
Head Street Forster 2428
Phone (02) 6555 5522

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

www.bushfireconsultants.com.au

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1. INTRODUCTION

ABAC Australian Bushfire Assessment Consultants have been engaged by the Independent Planning Commission of NSW to review certain documents in relation to the proposed Mundamia Residential Subdivision (State Significant Development SSD 7169) and provide advice on specific aspects of that review.

The scope of the review was:

1. Review of relevant project documentation and Planning for Bushfire Protection 2006;
2. Provide advice on whether the Department's Assessment Report conclusions regarding bushfire risk mitigation are reasonable in light of both the Applicant's and the Department's bushfire consultants reports;
3. Provide advice on whether the Applicant's alternative bushfire solution has been prepared in accordance with Planning for Bushfire Protection 2006;
4. Provide advice on whether the Neighbourhood Safer Place (NSP) recommended by the Department is a robust risk mitigation measure that accords with an alternative solutions approach (i.e. reduces risk to levels envisaged by secondary access) in Planning for Bushfire Protection 2006; and
5. Having regard to points 1-3, provide advice on the Applicant's concerns regarding conditions A1(9)(a)(i), A1(9)(a)(ii), A1(9)(b)(v), A1(9)(d) and A1(9)(e).

The project documentation provided by the Commission was:

1.1 Applicant's Bushfire Assessment documents:

a. Environmental Assessment Report (April 2013) by Cowman Stoddart Pty Ltd (*Major Project – Part 3A, Environmental Planning and Assessment Act, 1979; Proposed Subdivision: Lot 3 DP 568613 and Lot 384 DP 755952 George Evans Road and Jonsson Road, Mundamia*)

b. Bushfire Protection Assessment (25 May 2012) by Ecological (*Proposed Subdivision: Lot DP 568613 & Lot DP 755952 at Mundamia Growth Area*)

c. Preferred Project Report (22 January 2015) by Cowman Stoddart Pty Ltd (*Major Project – Part 3A, Environmental Planning and Assessment Act, 1979; Proposed Subdivision: Lot 3 DP 568613 and Lot 384 DP 755952 George Evans Road and Jonsson Road, Mundamia*)

d. Bushfire Protection Assessment (22 May 2015) by Ecological (*Proposed Subdivision: Lot 30 George Evans and Jonsson Roads, Mundamia*)

e. Applicant's Additional Bushfire Information to Department (2 April 2019) by Ecological Australia

f. Applicant's Bushfire Submission (pages 1-7; 19-40 of letter dated 26 August 2019)

1.2 Department's assessment and independent review documents:

a. Department of Planning, Industry and Environment Assessment Report (July 2019): *Mundamia Residential Subdivision: State Significant Development (SSD 7169)*

b. Department's Peer Review undertaken by Australian Bushfire Protection Planners (1 February 2019) *Mundamia MP 08_0141; Assessment of Bushfire Impacts for the NSW Department of Planning & Environment*

c. Proposed Instrument of Consent

d. Evacuation Review, prepared by Stantec, dated 5 November 2018

e. Submissions made by NSW RFS (letters from RFS dated 10 September 2015, 4 November 2016 and 12 November 2018)

f. Meeting Transcripts of separate meetings with the Department and Applicant on 6 August 2019.

2. REVIEW OF RELEVANT PROJECT DOCUMENTATION

Environmental Assessment Report, April 2013 ("EA")

The EA references the 2012 Ecological Bushfire Protection Assessment, noting that the BPA was prepared in accordance with PBP 2006. Relevantly, the EA noted the following findings of the BPA:

- the predominant vegetation type is forest in all directions.
- Slopes were assessed as being predominantly downslope and generally >0-5° and >5-10°, with slopes in the south-eastern corner of the site falling downslope >15-18° (shown in Figure 3 of the 2012 BPA report).
- The recommended APZ ranges from a minimum of 20 metres up to a maximum of 60 metres.
- the property has connection to the public road system in the south-western corner of the site, formed by Yalwal Road.
- Alternative access and egress routes are available from the western and north-western sides via Jonsson Road.
- Egress/ingress routes are identified from the south-west, west and north-west.
- a proposed fire trail surrounding six allotments would comply with the design standards of PBP.
- the proposed road network and fire trail comply with the requirements of PBP.

Comment:

The slope analysis in the 2012 BPA differs from the 2015 BPA and the extent of the APZs recommended also differ (60 metre APZ to south-eastern part of proposed subdivision in 2012 BPA v 33 metre APZ to south-eastern part of proposed subdivision in 2015 BPA). It is not clear why the slope analysis differed between the 2012 and 2015 BPAs). The 2012 BPA identified the availability of alternative access/egress routes, but these are internal routes to get to the single access/egress road from the south-western corner of the subdivision. There is clearly no alternative access/egress from the subdivision to Yalwal Road, only the single route via George Evans Road.

Bushfire Protection Assessment, 25 May 2012 ("2012 BPA")

The main aspects of the 2012 BPA were paraphrased in the summary of the review of the bushfire related content of the EA above and the comments are relevant.

The documentation provided for review does not disclose whether the 2012 BPA was subject to assessment via either the Department's Assessment Report or the three (3) submissions from the RFS which are part of this review.

Preferred Project Report, 22 January 2015 ("PPR")

The PPR references the 2015 Bushfire Protection Assessment and, at Section 3.3.1, notes that the RFS raised concerns with the proposal, relating to the staging of the project to ensure that relevant requirements of PBP are met at each stage.

The PPR:

- comments that the subdivision will provide a primary and alternate access route, perimeter access and Asset Protection Zones (APZ), with access roads or a perimeter fire trail complying with the requirements for *Planning for Bushfire Protection*.
- notes that the 2015 BPA recommends that:
    - APZs be provided in accordance with PBP for allotments sited on the perimeter of the development; or
    - for allotments inside the ultimate perimeter, a temporary minimum APZ of 100 metres (or to the final development perimeter) be provided.
- refers to a plan which shows the interim protection measures required for Stage 1 of the subdivision, including provision of a temporary 100 metre APZ surrounding Stage 1 of the subdivision.
- Notes that while the provision of APZs will extend into a number of allotments, the effect of such encroachment will be negligible and those allotments will retain a large extent of developable land to enable construction of suitable residential accommodation.

In the Statement of Commitments at Section 4.0 of the PPR, Commitment 16 is:

> *Staging is to include provision for alternative access, fire trails and temporary APZs of a width of 100 m or to the perimeter of the site.*

Comment:

As was the case with the EA, while the PPR comments that access/egress complies with PBP (alternative routes), there is clearly no alternative access/egress from the subdivision to Yalwal Road, only the single route via George Evans Road.

The PPR notes:

- that APZs be provided in accordance with PBP for allotments sited on the perimeter of the development; and
- the proposal to provide a temporary minimum APZ of 100 metres and states a Commitment (16) in that regard.

Bushfire Protection Assessment, 22 May 2015 ("2015 BPA")

The 2015 BPA:

- notes that the proposal is for a total of 319 residential lots, 1 commercial lot and 4 public reserves.
- states that the BPA was prepared and reviewed by BPAD Level 3 Practitioners.
- identifies the predominant vegetation type as forest in all directions.
- provides a slope analysis as follows:
    - western and northern boundary of the proposed subdivision – 'upslope/flat' and downslope >0-5°; and
    - south-eastern boundary – slope ranges from 1.1° to 8.8° downslope.
- notes that the steepest slope identified (8.8°, rounded up to 9°) was used to model the width of the required APZ (to the south-eastern part of the development).
- illustrates recommended APZs at Figure 2 (on page 3).
- notes that public reserves proposed within the internal boundary of the subdivision are to be maintained with fuel loads which do not exceed those of an APZ.

- states (at Section 8.1) that "egress/ingress routes for the proposed subdivision are available from the south-west corner (via the realigned George Evans Road) and western side (via existing Jonsson Road) and north-western corner (Jonsson Road)."

The issue of APZs is dealt with in Section 3 of the 2015 BPA, which outlines an alternative solution which uses a quantitative/modelling approach to determine APZs. The BPA notes that this achieves the relevant PBP (2006) performance criteria with respect to APZs: '*radiant heat levels at any point on a proposed building will not exceed 29 kW/m^2*'.

Section 3 of the 2015 BPA notes that:

- *Both PBP and the NBC Bushfire Attack Assessor were used to determine the width of Asset Protection Zones (APZ) for each proposed allotment adjoining a hazard using vegetation and slope data (identified in Figure 2).*
- *All minimum APZs for the proposed development are 20 m wide where the hazard is upslope from the development, and either 25 m or 33 m wide, where it is downslope of the development.*
- *The APZ for the south-eastern boundary was determined using the NBC Bushfire Attack Assessor, and the approach was discussed with Amanda Moylan of the RFS. The steepest slope of 8.8° (rounded up to 9°) was used to model the width of APZ at 32 m and subsequently rounded up to 33 m. A 33 m APZ was then applied to the full length of the south-eastern bushland interface.*

The provision of a temporary APZ of 100 metres is discussed briefly in the last paragraph of Section 5 of the 2015 BPA and in more detail in Section 10 (Staging). One of the Recommendations (Section 11, Recommendation 7) of the BPA is that staging (of the subdivision) is to include provision for perimeter access and temporary APZs "as detailed in Section 11" (but it is noted that this reference should be to Section 10).

Comment:

The use of the quantitative/modelling approach to determine APZs as discussed in Section 3 of the 2015 BPA is appropriate as a general concept and, as with any modelling approach the quality of the results is subject to the inputs, including slope analysis.

The details/results of the modelling undertaken by the applicant's bushfire consultant were not included in the documentation provided for review. It is noted that the 2015 BPA states that

the approach (modelling) was undertaken collaboratively with the RFS. There is no information available in this regard.

As both the 2012 and 2015 BPAs were within the scope of this review, the main potential issue that has arisen is the differences between slope analysis in each BPA. As identified previously in relation to the south-eastern part of the proposed subdivision, APZ widths were identified based on slopes of:

- >15-18° downslope in the 2012 BPA (shown in Figure 3 of the 2012 BPA report); and
- 9° downslope (adopted) in the 2015 BPA.

There is no information as to why there were differences in the slope analysis between the 2012 and 2015 BPAs.

As with the 2012 BPA, the 2015 BPA identified the availability of alternative access/egress routes, but these are references to internal routes to get to the single access/egress road from the south-western corner of the subdivision. There is clearly no alternative access/egress, only the single route via George Evans Road.

The provision of temporary APZs of 100 metres is included as a Recommendation of the 2015 BPA, consistent with the Statement of Commitments in the PPR.

Applicant's Additional Bushfire Information to Department, 2 April 2019

This is a letter from Ecological (applicant's bushfire consultant) to the Department dated 2 April 2019. The letter:

- introduces the proposal of the Neighbourhood Safer Place (NSP) as an alternate solution to the (acceptable solution for) alternate access roads (for egress from the subdivision to Yalwal Road); and
- notes that "*a key residual risk associated with two alternate egress routes under the Acceptable Solutions within PBP can be quantified by the likelihood and consequence of a bushfire attack when 'early evacuation' cannot occur. In situations where early evacuation is not feasible the Acceptable Solutions are silent and in so doing inherently accept the risk of 'sheltering in place' in a minimum BAL 29 dwelling with a BAL 29 sized APZ*".

The alternate solution proposed in the letter is essentially:

- 'early evacuation' to a suitable evacuation destination when a single access road is far less prone to failure;
- a 'shelter in place' design within a 'Neighbourhood Safer Place' as the second alternative evacuation destination.

The letter notes that:

- "Community Bushfire Shelters and NSP are described by fire agencies as 'places of last resort', that is, if early evacuation is not feasible/safe then these facilities are suitable for 'sheltering in place'."
- as a community-wide safety strategy using a NSP where evacuees are all in one place where communication, safety and management are more effective and reliable (than enlarging APZs for dwellings).
- Early evacuation is the best bushfire survival plan for the protection of life.
- it is not possible to always evacuate early, even when two or more alternate egress roads exist.
- Sheltering in place in a dwelling is feasible but has a higher residual risk than a NSP.

Comment:

The lack of an alternate access/egress route from the proposed subdivision is a matter of fact and comments in the applicant's additional bushfire information to the Department are noted (in relation to the potential for both primary and alternate routes to be cut be rapid on-set fire). As a concept, the provision of a NSP is supported, mainly because it would the only option of last resort for persons seeking to evacuate (if the sole access/egress route was cut).

The alternate solution outlined in the applicant's additional bushfire information to the Department is discussed in more detail in a later section of this document.

Applicant's Bushfire Submission (pages 1-7; 19-40 of letter) 26 August 2019

Pages 1-7

Pages 1-7 of the letter from Allen Price & Scarratts Pty Ltd to the Commission concern draft conditions A1(8) and A1(9) of the proposed instrument of consent and notes that the applicant rejects draft conditions A1(9)(a)(i), A1(9)(a)(ii), A1(9)(b)(v), A1(9)(d) and A1(9)(e).

Draft conditions A1(9)(a)(i) and A1(9)(a)(ii) concern APZs. The basis for the applicant's rejection of draft condition A1(9)(a)(i) is the alternate solution (with respect to APZs) proposed by the applicant's bushfire consultant in the 2015 BFA, supplemented by an email from the consultant to the RFS dated 27 June 2016. The basis for the applicant's rejection of draft condition A1(9)(a)(ii) is that:

- the plan of proposed subdivision provides APZs along the western boundary of the site that are compliant with the Acceptable Solutions in PBP (as per Table A2.4); and
- an additional temporary APZ on top of an already compliant APZ (to the western boundary) is unnecessary.

Draft condition A1(9)(b)(v) concerns parking restrictions and the basis for the applicant's rejection of this condition is that the road widths already comply with PBP 2006.
Draft condition A1(9)(d) concerns the provision of alternate access/egress to perimeter lots and the basis for the applicant's rejection of this condition is that the envisaged alternate access/egress is unnecessary to comply with PBP 2006.

Draft condition A1(9)(e) concerns the relocation of medium density lots a minimum of 100 metres from the adjoining bushfire hazard and the basis for the applicant's rejection of this condition is that any requirement to relocate these lots is unnecessary because medium density development cannot be undertaken unless the site (and any medium density development) meets BAL-29.

Comment:

The relevant conditions are addressed in a later section of this document.

Pages 19-40

The main aspect of this section of the documents for review is the email (at page 19 of the PDF file) from the applicant's bushfire consultant to Martha Dotter of the RFS dated 27 June 2016 and associated photographs. This is considered in more detail in a later section of this document in relation to the alternate solution proposed by the applicant's bushfire consultant for APZs.

Department's Peer Review by Australian Bushfire Protection Planners (1 February 2019)

The ABPP assessment provided by the Commission for review does not consider or review either of the alternate solutions with respect to APZs or the NSP.

The main issue addressed by the ABPP assessment was the reliance of the subdivision on the use of George Evans Road and Yalwal Road as the sole access/egress road connection to West Nowra. The ABPP assessment discussed the "likely fire paths which will impact both of these roads and found that both roads will be impacted by fire over-run which will pose an extreme level of risk to the public and emergency service personnel".

The ABPP assessment was critical of the fact that the subdivision layout also does not address the provision of a safe alternate access/egress to/from the subdivision precinct.

In relation to the Stantec assessment, the ABPP assessment identified that while the Stantec assessment reviews the road capacity and evacuation times in the event of a bushfire emergency at Mundamia, it did not assess operational difficulties experienced by Police and Emergency Services during extreme emergencies such as bushfires.

Proposed Instrument of Consent

The proposed instrument of consent was reviewed with respect to the specific conditions relevant to this review as identified later in this document.

Evacuation Review, prepared by Stantec, dated 5 November 2018

This document is discussed in relation to the review of the Department's Assessment Report in a later section of this document.

3. WHETHER THE DEPARTMENT'S ASSESSMENT REPORT CONCLUSIONS REGARDING BUSHFIRE RISK MITIGATION ARE REASONABLE

The review of the Department's Assessment Report (DAR) has been undertaken in terms of the two (2) alternate solutions – Asset Protection Zones and Neighbourhood Safer Place – that are within the scope of this review.

Asset Protection Zones (APZs)

The DAR notes that the applicant's bushfire consultant proposes a performance-based approach (alternate solution) to determine APZs (via the 2015 BPA).

The DAR identified that the RFS raised concerns in relation to the alternate solution and the slope analysis and the applicant then provided further information for consideration by the RFS. The DAR notes that the RFS (following provision of the additional information from the applicant) recommended that:

- the land adjacent to the north-eastern boundary should be characterised as 0-5° downslope, rather than 0-5° upslope;
- the Applicant should recalculate the APZs adjacent to proposed lots 1101-1104 and lots 1113-1116 based on the correct slopes (0-5° downslope) and demonstrate the affected lots will not be exposed to radiant heat levels greater than 29kW/m^2 as required in PBP 2006.

The above dot points are reflected in the RFS letter to the Department dated 4 November 2016. There is no information included in the documentation provided by the Commission for review as to whether the applicant's bushfire consultant addressed the issues in the dot points.

The DAR also notes that the Department sought advice from its bushfire consultant about the suitability of the proposed APZs for the site, with their recommendations including:

- the provision of a 100 metre wide, temporary APZ along the western boundary of the site as a part of Stage 1 of the proposal;
- APZs should be provided around the entire perimeter of the subdivision in accordance with Table A2.4 of PBP 2006 (including consideration of a dynamic bushfire event);
- all future dwellings should achieve a Bushfire Attack Level (BAL) of 29 or lower; and
- the Applicant prepare an APZ management plan and a bushfire fuel management plan.

The DAR states (at page 41) that: "*the Department agrees that a 100m wide temporary APZ should be provided along the western boundary of the site as a part of Stage 1 of the proposal. This would ensure the subdivision, including most of the medium density lots located along the western boundary, are protected from the main westerly fire path, until the adjoining, Council owned land to the west is developed. The Department also agrees that the APZs should be provided in accordance with Table A2.4 of PBP 2006, rather than using* (sic) *performance-based approach. This would increase the width of the APZs and improve the level of protection afforded to future dwellings. It would also resolve the issues raised by RFS about the errors in the Applicant's slope analysis*".

The first and second dot points raised by the Department's bushfire consultant (referred to in the DAR) have been included as draft deferred commencement conditions A1(9)(a)(ii) and A1(9)(a)(i) respectively (although the wording of deferred commencement condition A1(9)(a)(ii) is not entirely clear). The statement in the above paragraph from the DAR in relation to the medium density lots along the western boundary appears to be the basis for draft deferred commencement condition A1(9)(e).

If the intent of the first dot point raised by the Department's bushfire consultant is to require a maintained area of land of 100 metres to be left between the western boundary of the site and any initial stages of the subdivision (until the land to the west of the site is developed), then this is not considered reasonable. On a similar basis, draft deferred commencement condition A1(9)(e) is also unreasonable. The obligation of the developer with respect to the potential bushfire risks arising from any retained vegetation on the land to the west of the site is to provide APZs between the western boundary of the site and the westernmost part of any development in accordance with the *Planning for Bush Fire Protection* guideline document in force at the time. There is also the ability for perimeter roads etc to form part of the APZ. The DAR also notes that perimeter roads will also form part of the APZs and provide a clear control line to conduct hazard reduction or defensive activities.

While the DAR notes that the Department considered the advice received from the RFS and the independent bushfire expert (in reaching its conclusions), it is noted that the report by the Department's bushfire consultant does not include any discussion in relation to APZs. It is assumed that there is separate correspondence relating to this issue on the Department's file.

Access Issues and Neighbourhood Safer Place (NSP)

The DAR notes that the Department raised concerns about the proposal as it relies on a single access road which could be cut in the event of a bushfire.

These concerns were reflected in the Department's Bushfire Consultant's report, which concluded that the subdivision and access roads would be subject to an extreme level of bushfire risk and the road providing access into and out of the site would be impacted by fire over-run during major fire events which would pose an extreme level of risk to the public and emergency service personnel.

The Department's Bushfire Consultant's report also referred to the Stantec Review which was commissioned by the Department on advice from the RFS to undertake a strategic traffic assessment to determine whether additional road upgrades could be implemented to improve egress in a bushfire emergency.

The DAR (at page 38) discusses the advice provided to the Department by the independent traffic expert (Stantec) to review the capacity of the road network and evacuation timeframes in the event of a bushfire emergency. The Stantec Review considers evacuation times only along George Evans Road to the junction of that road with Yalwal Road (and not along Yalwal Road).

The Stantec Review concluded that the proposal, when considered in isolation:

- could be evacuated within 30 minutes during a daytime bushfire emergency and 15 minutes during a night-time emergency
- would not require any additional road upgrades to accommodate a 30-minute evacuation time.

The DAR also noted that the Stantec Review concluded that:

— at full development, the Mundamia URA could be evacuated in 45 to 60 minutes during a daytime bushfire emergency and 30 minutes during a night-time emergency.

— to reduce the evacuation time for the full URA to 30 minutes during the day and evening periods:

— additional south bound lanes could be provided by prohibiting car parking on Road 1, south of Road 9;

- the shoulder on the eastern side of George Evans Road could be widened; and
- the northern side shoulder of Yalwal Road could be widened to provide two eastbound traffic lanes.

The Stantec review also anticipated that, if Yalwal Road is operating at full capacity, an evacuation time of 60 minutes would be likely once vehicles enter Yalwal Road. To reduce this evacuation time, the Stantec review also stated that a second westbound lane could be provided between George Evans Road and Filter Street, including the widening of the bridge over Flat Rock Dam.

It is noted that any evacuation to West Nowra would rely on travel via George Evans Road in a southerly direction to Yalwal Road, and then in a (more or less) easterly direction along Yalwal Road. Notwithstanding the Stantec review, if George Evans Road was cut for whatever reason, then there would be no evacuation route available from the proposed subdivision.

In response to the Department's concerns, the NSP was proposed as an alternate solution by the applicant's bushfire consultant. In relation to the NSP, the DAR notes (at p5) that the Department is satisfied that the NSP will provide an acceptable performance-based solution, given:

- it would not be feasible to provide an alternative access/egress route given the constraints of the site;
- the NSP would be constructed in accordance with the RFS requirements;
- future residents would have two alternative evacuation options (i.e. early evacuation to West Nowra via existing roads, or evacuation to the NSP); and
- the RFS supports the establishment of a NSP as an additional bushfire protection measure.

The DAR states (at page 40) that:

> *The Department referred the amended proposal to the independent bushfire expert and RFS for comment. The independent bushfire expert advised that the proposed NSP would help mitigate the risk of not providing a safe alternative access to the site, however some risk would remain. The RFS advised that it supports the establishment of an NSP as an additional bushfire protection measure, subject to conditions requiring the NSP to comply with its relevant guidelines.*

The review of the documentation provided by the Commission has not revealed any record of support for the NSP by the RFS. The most recent correspondence from the RFS provided for the purpose of this review is dated 12 November 2018. While this does not mean that the RFS has not registered its support for the NSP, such documentation was not available for this review.

The February 2019 report by the Department's bushfire consultant does not consider the NSP.

The main issue with the NSP is that it be located and constructed in accordance with the RFS guideline. This is a major component of draft deferred commencement condition A1(1) in the proposed instrument of consent.

4. WHETHER THE APPLICANT'S ALTERNATIVE BUSHFIRE SOLUTION HAS BEEN PREPARED IN ACCORDANCE WITH PLANNING FOR BUSHFIRE PROTECTION 2006

There are two (2) separate alternate solutions proposed with respect to the residential subdivision.

Section 1.2.2(c) of PBP 2006 is relevant to instances where alternative solutions are proposed and provides that:

> *Submissions proposing variations to acceptable solutions must provide substantiated evidence that the specific objectives and performance criteria can be met.*

PBP 2006 provides no other provisions as to how alternate solutions should be prepared.

RFS Practice Note 1/07 (Alternate Solutions) provides that the: *RFS will consider alternative solutions where the applicant demonstrates that their solution meets the performance of PBP. The onus is on the applicant to demonstrate this*. The Practice Note borrows most of its content from the National Construction Code defining "alternative solution" and "performance based solution" by reference to a "building solution".

Neither of the alternate solutions involved in the subject proposal would be strictly considered as a building solution but they do, nonetheless, involve departure from the acceptable solutions provisions of PBP 2006.

Alternate Solution 1 – Asset Protection Zones

There are two (2) critical aspects of the alternate solution with respect to APZs. They are:

a) the slope analysis that was undertaken by the applicant's bushfire consultant; and

b) the durability of the alternate solution to ensure that all future residential buildings in all stages of the proposed subdivision will be subject to a Bushfire Attack Level (BAL) of BAL-29 or lower.

Each of these aspects is discussed in more detail below but, from the outset, it is noted that this review is limited only to the documentation provided by the Commission (as listed in Sections 1.1 and 1.2).

This review has identified significant differences between the slope analysis in the 2012 BPA and the later slope analysis work in the 2015 BPA. Aside from the 2012 BPA document, there

is no documentation available for review to ascertain whether the 2012 BPA was subject to assessment via either the Department's Assessment Report or submissions by the RFS which are part of this review.

The alternate solution with respect to APZs was initially proposed via the 2015 BPA and, as discussed previously involved a quantitative/modelling approach to determine APZs. Section 3 of the 2015 BPA noted that:

- *Both PBP and the NBC Bushfire Attack Assessor were used to determine the width of Asset Protection Zones (APZ) for each proposed allotment adjoining a hazard using vegetation and slope data (identified in Figure 2).*
- *All minimum APZs for the proposed development are 20 m wide where the hazard is upslope from the development, and either 25 m or 33 m wide, where it is downslope of the development.*
- *The APZ for the south-eastern boundary was determined using the NBC Bushfire Attack Assessor, and the approach was discussed with Amanda Moylan of the RFS. The steepest slope of 8.8° (rounded up to 9°) was used to model the width of APZ at 32 m and subsequently rounded up to 33 m. A 33 m APZ was then applied to the full length of the south-eastern bushland interface.*

The project documentation reviewed did not disclose any details of the modelling, including inputs relied upon by the applicant's bushfire consultant. The RFS letter of 10 September 2015:

- raised concerns that slopes to the east and north-east of the site appeared to exceed those provided in the 2015 BPA;
- requested additional information to verify the slope analysis;
- recommended that additional APZs be provided to lots adjoining the northern and eastern development edge so that future dwellings are able to construct to a maximum BAL-29 under AS3959-2009;
- Advised that any modelled APZs should be accompanied with supporting information on the inputs used for the modelling.

The project documentation indicates that the only documentation referable to the RFS concerns/requests in the September 2015 letter is the email from the applicant's bushfire

consultant (Mr Rose) to Martha Dotter of the RFS dated 27 June 2016, where Mr Rose stated that:

- the additional slope analysis requested by the RFS (i.e. analysis of slopes out to 150 metres from the building line) had been completed;
- As predicted, the highest radiant heat flux resulting from the steeper slopes produces a radiant heat flux (RHF) of 17kW/m^2 well under the 29kW/m^2 achieved with the more gentle slopes nearer the development (see attached modelling report, using the slopes from the nine 50 metre transect extensions shown in green in the Figure attached to the email);
- Using expert judgement, (he considers that) the short lengths of steeper slopes beyond 100 metres would not result in fire intensities that will carry through any distance of consequence within the APZ because:
    - the steeper slopes are often 20 metres or so in length and covered in a heavy rock cover on average about 25% of ground surface and >30% of surface within 50 metres nearest the building line;
    - the rock cover and the short length of slope up from the bottom of the watercourse significantly mitigates fire spread and intensity; and
    - The site conditions and the exponential decrease in radiant heat with distance means the steeper slopes beyond 100 metres are not the effective slope.

There is not enough information available to verify the comments in second dot point above email and it is unclear where the differentiation between the RHFs referred to in the second dot point occurs (or why). The modelling report was not included in the project documentation provided by the Commission for review, and it is assumed that the lower RHF might be the assessed value based on distance between the building line of the perimeter lots and the point to the east where the steeper slopes occur.

With respect to the use of expert judgement (third dot point above), this obviously relates back to the modelling report and Mr Rose's personal knowledge of the site. Expert judgement is one of the assessment methods listed (at Section 4) in the RFS Practice Note 1/07 that may be used to determine that an alternate/performance based solution complies with the Performance Criteria.

The RFS letter of 4 November 2016 stated that:

> *Following receipt of additional information providing a greater level of detail regarding slope analysis and bush fire behaviour modelling of the steeper slopes to the east, the NSW RFS is satisfied that the slope issues raised in our previous corrospondance* (sic) *dated 10 September 2015, and 30 March 2016 have been resolved and/or may be addressed by way of conditions.*

With reference to Development Control Note 1/07, and the provision that '*the RFS will consider alternative solutions where the applicant demonstrates that their solution meets the performance* (criteria) *of PBP*', the content of the RFS letter of 4 November 2016 indicates that the RFS considers that the relevant performance criteria is met based on information before it at the time.

Given the above, and based solely on the above statement in the RFS letter of 4 November 2016, it is possible to draw a qualified conclusion that the alternate solution is consistent with the relevant performance criteria of PBP 2006 with respect to APZs.

The qualifications to this conclusion are:

- the significant differences between the slope analysis in the 2012 BPA and the later slope analysis work in the 2015 BPA as identified earlier in this document. It is unclear why the differences in the respective slope analyses arose, or why the 2015 slope analysis was eventually preferred to the 2012 slope analysis. It is appropriate that clarification be sought on this issue; and
- there is now more recent information in relation to the likely APZs required for future dwellings on perimeter lots within the proposed subdivision to achieve a BAL of BAL-29 or lower. For example, it is noted that Table A1.12.2 of the pre-release version of *Planning for Bush Fire Protection 2018* identifies 37 metres as a minimum APZ distance (for residential subdivision based on >5-10° downslope). In relation to perimeter lots in the south-eastern part of the subdivision, the applicant's (2015) alternate solution proposes APZs of 33 metres (compared to the acceptable solution of 35 metres for APZs in Table A2.4 of the current PBP 2006 guideline).

Given the second point above, the applicant's alternate solution relates to PBP 2006 and, if APZs are provided (to perimeter lots) on the basis of the alternate solution, there is a risk that future dwellings on perimeter lots may be subject to BAL-40 under any future guideline document that is eventually adopted as the successor to PBP 2006.

It was noted previously that a critical aspect of the alternate solution was the durability of the alternate solution to ensure that all future residential buildings in all stages of the proposed subdivision will be subject to a Bushfire Attack Level (BAL) of BAL-29 or lower. Indeed, the ability for occupants of future residential buildings to *'shelter in place' in a minimum BAL 29 dwelling with a BAL 29 sized APZ* is also one of the key justifications forwarded by the applicant's bushfire consultant to support the separate alternate solution with respect to the NSP. If the ability for occupants of residences on perimeter lots to be able to shelter in place *in a minimum BAL 29 dwelling with a BAL 29 sized APZ* is called into question then, potentially, so are each of the alternate solutions.

It is, therefore, essential that the APZs for each of the residential allotments around the perimeter of the subdivision be of a size that can ensure that future residential buildings in all stages of the subdivision be subject to not greater than BAL-29. It is appropriate that this investigation take place now, given that there is information available as to the imminence of the successor guideline to PBP 2006 and the provisions of that successor guideline with respect to APZs. It is appropriate that an alternate solution utilise all relevant and current information pertaining to the issue, not just PBP 2006.

Alternate Solution 2 – Neighbourhood Safer Place (NSP)

The alternate solution with respect to the NSP was proposed via the applicant's additional bushfire information to the Department (letter from the applicant's bushfire consultant, Ecological) to the Department dated 2 April 2019.

The premise of the alternate solution is that the provision of the NSP will facilitate an alternative evacuation destination (that is, occupants of the subdivision will have the option of evacuating to West Nowra or to the NSP).

The key aspects of the alternate solution, as discussed in the letter dated 2 April 2019, are:

- The Alternate Solution proposed is the construction of a community building (on an area of public reserve within the proposed subdivision) as a NSP in Stage 1 of the development.

- The NSP is to be located beyond the 10 kW/m^2 exposure as determined from models assuming a flame temperature of 1200°C[1].
- The community facility/NSP will have a floor area compliant with the guideline for ABCB Community Bushfire Refuges for 1m^2 per person. The alternate solution proposes that the NSP have a capacity capable of 'sheltering in place' all occupants of all lots within 100 metres of the bushfire hazard (i.e. approximately 600 assuming an average of 2.5 persons per dwelling) either within the community building or immediately outside (subject to the '*refuge in the open*' standard for NSP, which is <2kW/m^2 exposure).
- A NSP protocol can be prepared to ensure the more vulnerable evacuees are located inside.
- The NSP should be constructed to the standard within the ABCB Handbook on Design and Construction of Community Bushfire Refuges (2014) and compliant with the current RFS NSP requirements.

The primary justification for the alternate solution is stated by the applicant's bushfire consultant as avoiding "the risk associated with relying on off-site evacuation only and in so doing has a lower residual risk than the Acceptable Solution (if it was provided) for two alternate egress routes which are at risk of being cut simultaneously by a rapid on-set bushfire".

The issue of whether or not alternate egress routes might be at risk of being cut simultaneously is a moot point, because there are no alternate routes.

The issue with this proposed subdivision, on land the subject of an earlier strategic planning decision to rezone the land as residential despite the fact that there is presently only a single potential evacuation route is clear. If George Evans Road was cut in the event of a bushfire, or not trafficable for whatever other reason, then the NSP is the only other option available for evacuation. On this basis, it is concluded that the alternate solution for the provision of the NSP is consistent with the relevant performance criteria of PBP 2006 and there is agreement with the justification provided by the applicant's bushfire consultant with respect to the NSP.

[1] It is noted that the reference to 1200°C in the third dot point above should be to 1200°K. This is probably just an error in the consultant's letter to the Department dated 2 April 2019 as the applicant's bushfire consultant used 1200°K in preliminary calculations accompanying that letter.

5. WHETHER THE NEIGHBOURHOOD SAFER PLACE (NSP) IS A ROBUST RISK MITIGATION MEASURE THAT ACCORDS WITH AN ALTERNATIVE SOLUTIONS APPROACH

The situation with respect to egress from the proposed subdivision is that there is only one possible evacuation route available via George Evans Road. The risk associated with all occupants of the proposed subdivision relying on that single route for evacuation in a bushfire emergency is significant.

That risk is that if George Evans Road is cut, or impassable for whatever reason in the event of a bushfire, then all occupants of the subdivision will be unable to evacuate to any location except towards the internal parts of the overall site. If there was an alternative egress route available from the proposed subdivision, and George Evans Road was cut, then the alternative egress route may potentially be available as a second means of egress from the site and subdivision.

The argument advanced by the applicant's bushfire consultant is that:

- even if there were alternative egress routes available from the site and proposed subdivision, there is an inherent risk of both alternate egress routes being cut simultaneously by a rapid on-set bushfire; and
- provision of the NSP will allow for occupants of the site and subdivision to 'stay in place' (with the NSP to be located and constructed to the appropriate RFS guideline).

The appropriate RFS guideline is the 2017 document entitled "*Neighbourhood Safer Places: Guidelines for the identification and inspection of Neighbourhood Safer Places in NSW*".

The assessment criteria are set out in Section 7.1 of the RFS guideline and, with respect to assessment of radiant heat (on the NSP), the calculation of radiant heat is to be as per Appendix 1: Assessment Criteria (Acceptable Solutions).

While the applicant's bushfire consultant has correctly identified that the acceptable solution for radiant heat threshold is 10kW/m^2 (building) and 2kW/m^2 (open space), their calculations have used inputs that differ from those in Appendix 1 of the RFS guideline. In relation to open space, it is noted that assessment should include the furthest potential car parking space(s) for evacuees and pathways from that car parking to the NSP.

Further information would be required, and the calculations should be revised, to adopt:

- Fire Danger Index of 120;
- No radiation attenuation through the atmosphere (transmissivity = 1); and
- Flame Emissivity of 100%.

It is noted that draft deferred commencement condition A1(1) is:

The Applicant must:

(i) submit to the satisfaction of the consent authority, plans and further details about the design, location, operation and capacity of the NSP, including with respect to the total estimated number of evacuees from the completed Mundamia URA;

(ii) demonstrate to the satisfaction of the consent authority that the NSP complies with the requirements of the NSW RFS NSP Guideline 2017;

(iii) demonstrate it has adequately consulted with the Bushfire Management Committee, NSW RFS District staff and the Local Emergency Management Centre about their requirements for the NSP;

(iv) demonstrate it has provided adequate evacuee and emergency service parking at the NSP; and

(v) demonstrate that the NSW RFS have approved the design, location, capacity and operation of the NSP.

It is noted that part (i) of the draft condition requires "*details about the design, location, operation and capacity of the NSP, including with respect to the total estimated number of evacuees".*

In relation to part (i) of the draft condition, and while the applicant's alternate solution with respect to the NSP identifies that the capacity of the NSP should allow for approximately 600 people, it could be reasonably assumed that the number of persons seeking to evacuate their homes during a bushfire emergency might be all occupants of the subdivision (and not just those within 100 metres of the bushfire hazard).

In terms of consideration to the design capacity of the NSP and its environs, Table 5 (page 35) of the Department's Assessment Report assumes the population of the subdivision on the basis of 346 dwellings with an occupancy rate of 2.5 persons per dwelling (865 persons).

With a conservative estimate of the number of potential occupants/evacuees seeking to access the NSP and environs during a bushfire emergency, it is considered that the draft condition will ensure appropriate oversight of the final location, design and construction of the NSP and will ensure that the NSP is a robust risk mitigation measure within the overall subdivision.

6. DRAFT CONDITIONS A1(9)(a)(i), A1(9)(a)(ii), A1(9)(b)(v), A1(9)(d) & A1(9)(e)

Draft Condition A1(9)(a)(i)

the APZs for the site shall be determined to the widths required by Table A2.4 of Planning for Bushfire Protection 2006 and shall take into account the impact of a dynamic bushfire event

Comment

Clarification was sought from the Commission as to this condition.

The Commission then received advice – via email dated 30 October 2019 – stating that the Department considered both the applicant's 2012 and 2015 BPAs and did not accept the applicant's slope analysis to determine the APZ widths.

The Department also advised that this draft condition was based on advice from the Department's bushfire consultant.

With respect, the wording of the draft condition does not highlight the Department's concerns with the slope analysis.

A third person reading the condition could interpret it as requiring the applicant to adjust the APZs based on the 2015/16 slope analysis by the applicant's bushfire consultant. This interpretation would not address the Department's concerns.

The scope of this review did not include a quantified slope analysis. The scope was limited to a review of documentation provided by the Commission. That said, there are inconsistencies between various documents with respect to slope analysis as discussed previously in this document.

This prevents a clear conclusion as to the veracity of the applicant's alternate solution with respect to APZs.

To resolve the inconsistencies, it is recommended that:

A The RFS be requested to provide a clear statement confirming that the slope analysis in the 2015 BPA was adopted and accepted (by the RFS) notwithstanding the slope analysis contained in the 2012 BPA; **or**

B The slope out to a distance of at least 100 metres from the easternmost extent of land able to be maintained as an APZ (the eastern side of the perimeter road system) be determined (and certified) by a registered surveyor based on a minimum of 2 metre contours. The slope is to be assessed at not less than 100 metre intervals along the eastern boundary of the site and long sections are to be provided; **and**

C A suitably qualified bushfire consultant is to determine the "effective slope" based on the survey information and identify the APZ widths required to ensure that no dwelling within the proposed subdivision will be subject to construction requirements any higher than BAL-29 as per AS3959.

It is evident that future residential buildings on the land are most likely to be subject to requirements for APZs and construction levels based on the successor guideline to PBP 2006.

It is important to ensure (as much as possible) that the potential risk of any future dwellings on perimeter lots being subject to BAL-40 (under any successor guideline document to PBP 2006) is minimised.

Put simply, the integrity of the applicant's separate alternate solutions relies on the ability for no dwelling within the proposed subdivision to be subject to construction any higher than BAL-29. The inconsistency between the slope analysis in the 2012 and 2015 BPAs, plus more recent information (for example, APZ provisions in the pre-release version of PBP 2018; named at present as the successor to PBP 2006) indicates that there is a risk that this might not be achievable.

Provision of the information identified in (A)-(C) above will provide clarity in relation to the issue of the slope analysis to ensure that the APZs eventually adopted will result in no future dwellings being subject to construction requirements any higher than BAL-29.

Recommendation: Draft Condition A1(9)(a)(i)

A. Revise draft condition A1(9)(a)(i) in light of (A)-(C) in the above comments and amend the condition as required; and

B. Reference in the draft condition to "*a dynamic bushfire event"* may be deleted as it is not clear how this can be quantified.

Draft Condition A1(9)(a)(ii)

provide for a temporary 100 m wide APZ to the east of the southern portion of Road 1 and Road 6 in accordance with the requirements of Planning for Bushfire Protection 2006, as a part of the first stage of the development

Comment

It appears that this condition has been proposed by the Department as a result of the comments at page 41 of the DAR:

"*that a 100m wide temporary APZ should be provided along the western boundary of the site as a part of Stage 1 of the proposal. This would ensure the subdivision, including most of the medium density lots located along the western boundary, are protected from the main westerly fire path, until the adjoining, Council owned land to the west is developed".*

It was noted earlier in this document that the obligation of the developer with respect to potential bushfire risks arising from any retained vegetation on the land to the west of the site is to provide APZs between the western boundary of the site and the westernmost part of any development in accordance with the *Planning for Bush Fire Protection* guideline document as in force at the relevant time.

On this basis, there does not appear to be any justification for retention of this condition.

Recommendation: Draft Condition A1(9)(a)(ii)

Delete draft condition A1(9)(a)(ii)

Draft Condition A1(9)(b)(v)

ensure no vehicle parking is permitted on:

a. both sides of the perimeter access roads

b. Road 1 south of Road 9

Comment

Part (b) of the proposed condition is consistent with the recommendations of the Stantec review and should be retained.

The applicant's comments with respect to the parking restrictions on perimeter roads are noted and it is considered that there is no reason why parking on the residential development side of the perimeter road should be prohibited altogether.

While it is considered appropriate that there be some parking restriction on the bushfire hazard of the perimeter roads, it is not considered appropriate that all parking be prohibited for the entire length of perimeter road (on the bushfire hazard side of the road).

Instead, it is considered that restriction of parking on the bushfire hazard side to intervals of 200 metres is an appropriate means of ensuring that emergency services access to the bushfire hazard side of the road is available.

Recommendation: Draft Condition A1(9)(b)(v)

A. Amend condition to read:

   Ensure no vehicle parking is permitted on Road 1 south of Road 9.

B. Consider inclusion of the following condition (or a similarly worded condition) in the set of operational conditions for bushfire protection in Section F of the proposed instrument of consent:

   Parking along the bushfire hazard side of perimeter access roads is to be limited to intervals not greater than 200 metres each, with a clear no standing/no parking restriction of at least 200 metres length between each parking interval (to facilitate emergency services access to the bushfire hazard side of the road)

Draft Condition A1(9)(d) *amend the subdivision layout to provide alternate, safe internal access roads/laneways from all perimeter lots to the NSP*
Comment The intent of this condition appears to be that an access way be provided from the rear of each perimeter lot to avoid people having to egress via the perimeter road. While the intent is understood, consideration of the condition has been undertaken based on what, if any, similar restriction (or requirement for design amendment) might be imposed on perimeter lots if this was a subdivision where alternative evacuation routes were available to West Nowra. This has concluded that there would be unlikely to be any such restriction/amendments required in the case of a subdivision where alternative evacuation routes were available.
Recommendation: Draft Condition A1(9)(d) Delete draft condition A1(9)(d)
Draft Condition A1(9)(e) *relocate medium density lots a minimum of 100 m from the adjoining bushfire hazard*
Comment This condition is related to draft condition A1(9)(a)(ii), discussed above. Any development on medium density lots is to be subject to a BAL not greater than BAL-29, subject to the availability, and provision, of minimum required APZs to achieve that standard.
Recommendation: Draft Condition A1(9)(e) Delete draft condition A1(9)(e)

SIMON CARROLL **November 2019**
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Graduate Diploma in Building Fire Safety & Risk Engineering
Bushfire Planning and Design Accredited Practitioner Level 3 – NSW
Accreditation Number BPAD9326