

**SUPPLEMENTARY BUSHFIRE COMPLIANCE INFORMATION FOR SITE  
COMPATIBILITY CERTIFICATE APPLICATION & DEVELOPMENT APPLICATION  
LOT 17 DP1210621 (FORMERLY LOT 100 DP 751279, LOT 1 & 2 DP 1165344,  
OLD SADDLEBACK ROAD, KIAMA) SENIORS LIVING DEVELOPMENT**



20<sup>th</sup> November 2019

The following report refers to land identified as Lot 17 DP1210621 (previously Lot 100 DP751279, Lot 1 DP1165344, Lot 2 DP1165344 Old Saddleback Road) No.2 Caliope Street Kiama NSW 2533 (herein '*the subject property*') and the Site Compatibility Certificate application for a 19 Dwelling Seniors Living development (herein '*the proposed development*').

This report is provided at the request of Mr Graham Werry (Weriton Properties Pty Ltd, PO Box R1694, Royal Exchange NSW 1225), being the applicant for the proposed development.

This report should be considered supplementary to any previous reporting submitted for the proposed development and information for the NSW Rural Fire Service (RFS), and is for the purpose of addressing the following outstanding points of compliance;

1. Asset Protection Zone (APZ) compliance to facilitate a Special Fire Protection Purpose (SFPP) Development or a maximum limit of 10kW/m<sup>2</sup> theoretical radiant heat flux (RHF) at proposed new building lines,
2. Identification and management of any identified hazardous vegetation persisting on adjoining rural land (Lot 33 DP709582) to the south & southwest of the subject property, &
3. Identification of a compliant internal roadway system which also facilitates a perimeter roadway arrangement to the identified / potential bushfire vegetation.

Detailed mapped analysis of the subject property, proposed development and identified requirements / outcomes for bushfire safety compliance are as attached Appendices 1-7 to this report.

For the purpose of this advice, it should be specifically noted that the proposed development has now been modified by a reduction in the number of proposed dwellings from 21 to 19. The purpose of this reduction to facilitate greater separation between the southernmost dwelling sites and potential grassland hazard within neighbouring Lot 33 DP709582. Apart from the deletion of dwellings 6 & 7 (from the previous plan), re-numbering of the retained 19 dwellings and a re-subdivision of the residual eastern / APZ area to formally identify Community & Future Development Lots, the proposed development remains more or less the same as previously submitted.



## APZ Compliance (Subject Property)

The estimated distance or width of the required SFPP APZ between the proposed development (new building lines) has been previously established using the principles of Short Fire Run (SFR) modelling. Detailed calculations have been provided courtesy of Australian Bushfire Safety & Planning (Mr John Delany), report dated 16/02/19 – again attached Appendix 4. Parameters used for modelling are as outlined within the SFR report (copy attached Appendix 5 to this report).

It is understood the RFS will support the use of SFR modelling to demonstrate compliance with 10kW/m<sup>2</sup> (at the nearest building lines) with the parameters used within the SFR report. Associated correspondence in this regard as shown Appendix 7.

Based on the SFR report, the minimum APZ distance required for proposed residential dwellings nearest to the identified / certified hazard includes;

- 48m to residential dwellings 15-17, &
- 45m to residential dwelling 19.

In recognition of the above, the following is recommended (if not already proposed) for the proposed development.

**Recommendation (1): The entire area of each new residential allotment shall be maintained as an APZ for the life of the proposed development.**

**Recommendation (2): The APZ area for the proposed development shall be further maintained for at least;**

- 48m from Dwellings No.15, 16 & 17, or to the boundary if a lesser distance, &
- 45m from Dwelling No.19 or to the boundary if a lesser distance.

**The APZ area shall be maintained entirely to an Inner Protection Area standard as described by NSW Planning for Bushfire Protection (PBP) 2006.**



## APZ Compliance (Lot 33 DP709582)

An APZ easement over neighbouring Lot 33 DP709582 will not be established for this stage of the proposed development. In this regard, and to address the potential hazard threat and identify prescribed or performance based requirements for bushfire safety, the following is now considered.

In recognition of a potential grassland hazard >100mm in height persisting within direct vicinity of the proposed development site on Lot 33 DP709582, the proposed development has been amended – see Appendices 1 to 4. The amended / adjusted plan will now ensure that all proposed new community title allotments provide ample room to facilitate 25m building separation to the potential grassland hazard within Lot 33 DP709582 to the south and southwest of the proposed development site.

Effectively, previously proposed Lots 6 & 7 have been deleted (or consolidated with adjoining proposed allotments to create new larger Lots 5 & 6), and the proposed residential building structures within new Lots 5 & 6 are sited to be not closer than 25m to the common / adjacent boundary of Lot 33 DP709582.

The identified 24m setback distance is now derived from detailed grassland modelling courtesy of Australian Bushfire Safety & Planning (Mr John Delany), report dated 30/09/19 – attached Appendix 6.

Input parameters for the grassland radiant heat modeling included;

- Pasture Grassland (G26-Figure 2.4(A) AS3959-2018) as the predominant vegetation type,
- 4.5 tonnes per hectare (Table B3 AS3959-2018) grassland fuel load,
- 400mm as average fuel height,
- 130 Grass Fire Danger Index (GFDI),
- 1,200 Kelvin flame temperature,
- 45 kph wind speed,
- Effective slope of 10°,
- Site slope of 6°, &
- 3.7m Peak Elevation of Receiver.

Modelled setback distances as adjusted with radiant heat shielding indicates that a 2m high shield located on or directly adjacent to the hazard edge would facilitate 10kW/m<sup>2</sup> with a building setback (or APZ) of 25m.

Similarly, a 3m high shield located on or directly adjacent to the hazard edge would facilitate 10kW/m<sup>2</sup> with a building setback (or APZ) of 22m.

In recognition of the above, the following is recommended (if not already proposed) for the proposed development.

**Recommendation (3): A non-combustible and solid barrier (e.g. colour bound fencing) of at least 2m in height shall be installed along, or directly adjacent to, the common boundary of Lot 33 DP709582 to the subject property.**

**The barrier shall also be partly extended (≈30m) along the western boundary of the subject property to ensure that dwelling No. 5 is fully shielded from any potential grassland vegetation persisting to the southwest (within adjoining unformed road reserve area & Lot 33 DP709582).**

**Recommendation (4): No additional or detached building development shall be located closer than 25m to the common boundary of Lot 33 DP709582 to the subject property.**

### Vehicle Access Compliance

SFPP vehicle access requirements (considered applicable to the subject development) are derived from PBP Section 4.2.7 Standards for Bush Fire Protection Measures for Special Fire Protection Purpose Developments, Access – Internal Roads, which states;

*The public road system in a bush fire prone area should provide alternative access or egress for firefighters and residents during a bush fire emergency if part of the road system is cut by fire. This is of critical importance for areas with the higher densities associated with SFPP developments.*

*Where those developments are being established, the requirements for public roads and car parking apply in the same way as new residential subdivisions. (See Section 4.1.3, Access - Public Roads).*

PBP (Section 4.1.3 Access – Public Roads) provides the minimum widths for public roads that are not perimeter roads for the safe access of fire fighting vehicles (*Category 1 Tanker - Medium Rigid Vehicle*, Table shown below) in urban areas. The maximum prescribed width required for a single lane width is 4.5m where the curve radius (inside edge) is <40m.

**Caliope Street (Public Roadway)**

The proposed development will be directly accessed from Caliope Street which runs partly along the north boundary of the subject property and is linked to Old Saddleback Road which runs along the western boundary.

Caliope Street is a recently constructed public roadway extension, contained within a 13-30m wide reserve area, to service the proposed development site and adjacent residential subdivision (Hanrahan Place). The fully formed and sealed carriageway (including roll-over concreted drainage) is at least 6m wide, with another 1-2m wide cleared verge and pedestrian pathway access facilitating at least 8m trafficable width for vehicle passing or parking / positioning.

The total length of Caliope Street is approximately 220m, which also provides a turning area / facility at its eastern end - near proposed Dwelling No.19. The existing roadway section does NOT exceed 10° at its maximum gradient (8.5° estimated) and on average ≈6° over the full length.

Given the proposed length of Caliope Street, technically this public roadway section would not fully facilitate PBP acceptable solutions for public or internal roadway requirements (i.e. <100m for internal roadway or <200m for public roadway access compliance). However, the proposed roadway area would nevertheless be reasonably clear and free of any adjacent bushfire vegetation, and the egress direction (i.e. to the west) is away from the identified hazard. As the proposed roadway area (i.e. carriageway and additional verges) would also provide a relatively wide access area (i.e. 8m total trafficable area), this would otherwise reasonably achieve the PBP Performance Criteria by enabling *safe access for emergency services and allow crews to work with equipment about the vehicle*.

Notwithstanding the above, emergency through access would be afforded to Caliope Street by virtue of an additional perimeter fire trail link to be incorporated as part of the proposed development.

**Proposed Perimeter (Fire Trail)**

The proposed perimeter fire trail will effectively mark the edge (or thereabouts) of the required APZ area and provide a vehicle access link between the end Caliope Street and the southern end of the internal public roadway area. The length of the proposed perimeter trail is 235m and will be maintained as 4m wide carriageway along the entire length.

The proposed trail section will not exceed 15° gradient, and apart from 40m section (located adjacent to the southern boundary of the subject property) is effectively <10° slope along the majority of the trail.

### Internal Public Roadway Access

The internal roadway arrangement to service the proposed development will be a looped one-way access route (≈300m) from Caliope Street, with separate entry / exit points. The roadway will be contained within a 9.5m road reserve area which directly service dwellings No. 2-9 & 11-15. Dwellings No.1, 10 & 19 will have frontage and access via Caliope Street. The proposed carriageway will be 6m wide, with another 1.5m wide designated verge area either side to facilitate one-way traffic flow and access and services to the adjoining new allotments and structures.

The internal roadway arrangement will NOT exceed 10° at its maximum gradient (9.5° estimated) and on average ≈ 0-5°.

Table 1.0 as follows lists the respective vehicle access requirements for the proposed development.

**Table 1.0 – PBP Public Roadway Access (Section 4.2.7)**

<b>PBP Acceptable Solution</b>	<b>Compliance</b>	<b>Comment</b>
<i>internal roads are two-wheel drive, sealed, all-weather roads;</i>	Can comply	The proposed internal roadway section will be a fully formed, drained and sealed surface to facilitate all weather access and otherwise as per normal Kiama Council specifications.
<i>internal perimeter roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions.</i>	As recommended for performance based compliance	The subject development does not specifically propose a perimeter roadway access.  Perimeter and linked fire trail section ( 4m wide) for alternate or additional looped emergency access & APZ area maintenance are proposed. The proposed location and extent of the perimeter fire trail section as shown Appendices 1-4 of this report.
<i>Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle).</i>	Can comply	The proposed internal roadway will be >4.5m wide (effectively >6m wide) within a 9.5m wide road reserve, directly servicing proposed Dwellings 1-20. As a one-way & single lane access route, this provides the maximum required roadway width for single lane access as outlined Table 4.1 of PBP.  Similarly, the identified road reserve and verges areas for Caliope St are 13-30m wide over a relatively straight section, easily wide enough to contain the prescribed roadway width (6.5m minimum).

<i>the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas.</i>	As recommended for performance based compliance	The proposed perimeter fire trail for alternate or additional looped emergency access & APZ area maintenance would be linked to both the proposed internal roadway and Caliope Street at an interval of <500m (≈260m).
<i>roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard.</i>	Performance Based Solution Required	By virtue of a recommended perimeter and linked fire trail section, both the existing and proposed public roadway sections would facilitate through access.  An additional Right of Access is also recommended along the southern boundary of proposed Lot 5 to facilitate an additional access / egress point to Old Saddleback Road if required.
<i>traffic management devices are constructed to facilitate access by emergency services vehicles.</i>	Can comply	It is anticipated that DA conditions will identify this requirement and there is no known or reasonable site / planning constraint in this regard.
<i>a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.</i>	Can comply	As above.
<i>curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.</i>	Can comply	As above.
<i>the minimum distance between inner and outer curves is six metres.</i>	Can comply	As above.
<i>maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees.</i>	Complies	No proposed or existing public roadway sections to service the proposed development exceed 10°.
<i>cross-fall of the pavement is not more than 10 degrees.</i>	Can comply	As above.
<i>roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge).</i>	Complies	The proposed development site is well elevated and there would be no reasonable areas of wetland or period inundation affecting the site.
<i>roads are clearly sign-posted and bridges clearly indicate load ratings.</i>	Can comply	It is anticipated that DA conditions will identify this requirement and there is no known or reasonable site / planning constraint in this regard.
<i>the internal road surfaces and bridges have a capacity to carry fully-loaded fire fighting vehicles (15 tonnes).</i>	Can comply	As above.

**Recommendation (5):** The proposed perimeter fire trail shall be constructed and maintained in accordance with the requirement of PBP Section 4.1.3 Access (3) – Fire Trails, primarily including (but not necessarily limited to);

- minimum carriageway width of 4m with an additional 1m wide strip on each side of the trail (clear of bushes and long grass) being provided,
- the trail not exceeding a maximum grade of 15° if sealed and not more than 10° if unsealed,
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches being provided,
- the crossfall of the trail not exceeding 10°,
- the trail having the capacity for passing by reversing bays using the intersections from Caliope Street and internal roadway section to reverse fire tankers, which are six metres wide and eight metres deep to any gates, with an inner minimum turning radius of 6m and outer minimum radius of 12m,
- the fire trail being accessible at all times for firefighters and maintained in a serviceable condition by the owner of the land,
- appropriate drainage and erosion controls being provided,
- any gate access is provided and locked with a key/lock system authorized by the local Fire Authority,
- the design acts as an effective barrier to the spread of weeds and nutrients.

**Recommendation (6):** Where any section of the proposed perimeter fire trail exceeds 10°, the surface of the carriageway shall be sealed.

**Recommendation (7):** A formally identified Right Of Access (ROA) shall be place along the southern boundary of proposed Lot 5.

The ROA shall be at least 4m wide to facilitate an emergency access only link between the proposed internal public roadway section and Old Saddleback Road if ever required.

## Concluding statement

Based on the above recommendations and identified circumstances affecting the subject property, it is my considered opinion that the acceptable solutions or performance-based requirements of PBP are reasonably achieved for the proposed development.

Predicated upon the APZ area as recommended by this report, radiant heat levels emanating from remnant rainforest and scrub vegetation to the east of the proposed development have been calculated by SFR modelling as not exceeding 10kW/m<sup>2</sup>.

Predicated upon building / hazard separation of at least 25m and a 2m high radiant heat shield located at the hazard edge along the southern boundary (Lot 33 DP709582), radiant heat levels emanating from a potential grassland hazard to the south of the proposed development have been calculated by detailed grassland modelling as not exceeding 10kW/m<sup>2</sup>.

The vehicle access design & arrangement to service the proposed development site would reasonably achieve the acceptable or performance based solutions for internal vehicle access. By virtue of the recommended perimeter and link trail sections, the proposed development would be afforded multiple options for alternative emergency access if required. All other design and construction parameters for a single access public roadway arrangement can be easily achieved within the proposed road reserve area and route.

*The above advice / certification has been prepared by:*

### Matt Jones

BAppSc Environmental Health  
Grad. Dip Design for Bushfire Prone Areas  
**BPAD-L3-14598 Accredited Practitioner**

*(I hereby certify that I have undertaken the assessment of the above site and any determined Bushfire Attack Level or threat stated in accordance with the requirements of AS3959 and/or NSW Planning for Bushfire Protection Guidelines 2006 where applicable)*



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**DISCLAIMER:** Bushfire mitigation or protection measures as identified, recommended or purported by this report may not guarantee that the proposed building development will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions, and the behaviour of building occupants or fire fighters defending the building when exposed to severe or greater bushfire attack conditions.







LOT 17 DP 1210621 (Formerly Part Lot 100 DP 751279), 43  
Old Saddleback Road, KIAMA NSW

for WERITON PROPERTIES

SCC SITE LAYOUT -  
OVERALL

11-11-19 SCC-01





**coble stephens**  
**architects**

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**PROPOSED SENIORS LIVING ESTATE**  
 LOT 17 DP 1210621 (Formerly Part Lot 100 DP 751279), 43  
 Old Saddleback Road, KIAMA NSW  
 for WERITON PROPERTIES

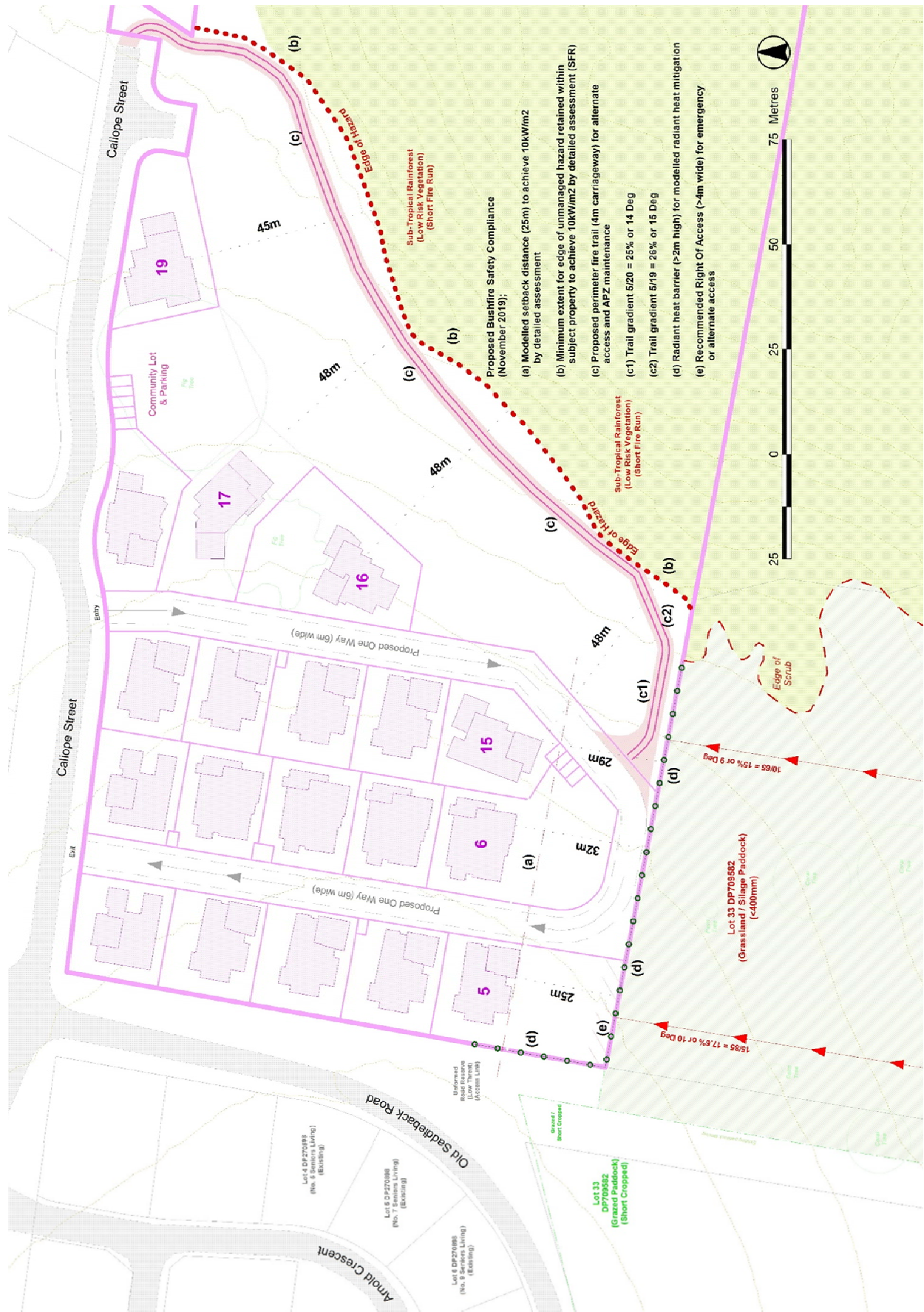
**SITE LAYOUT - DETAIL**

11-11-19 SCC-02



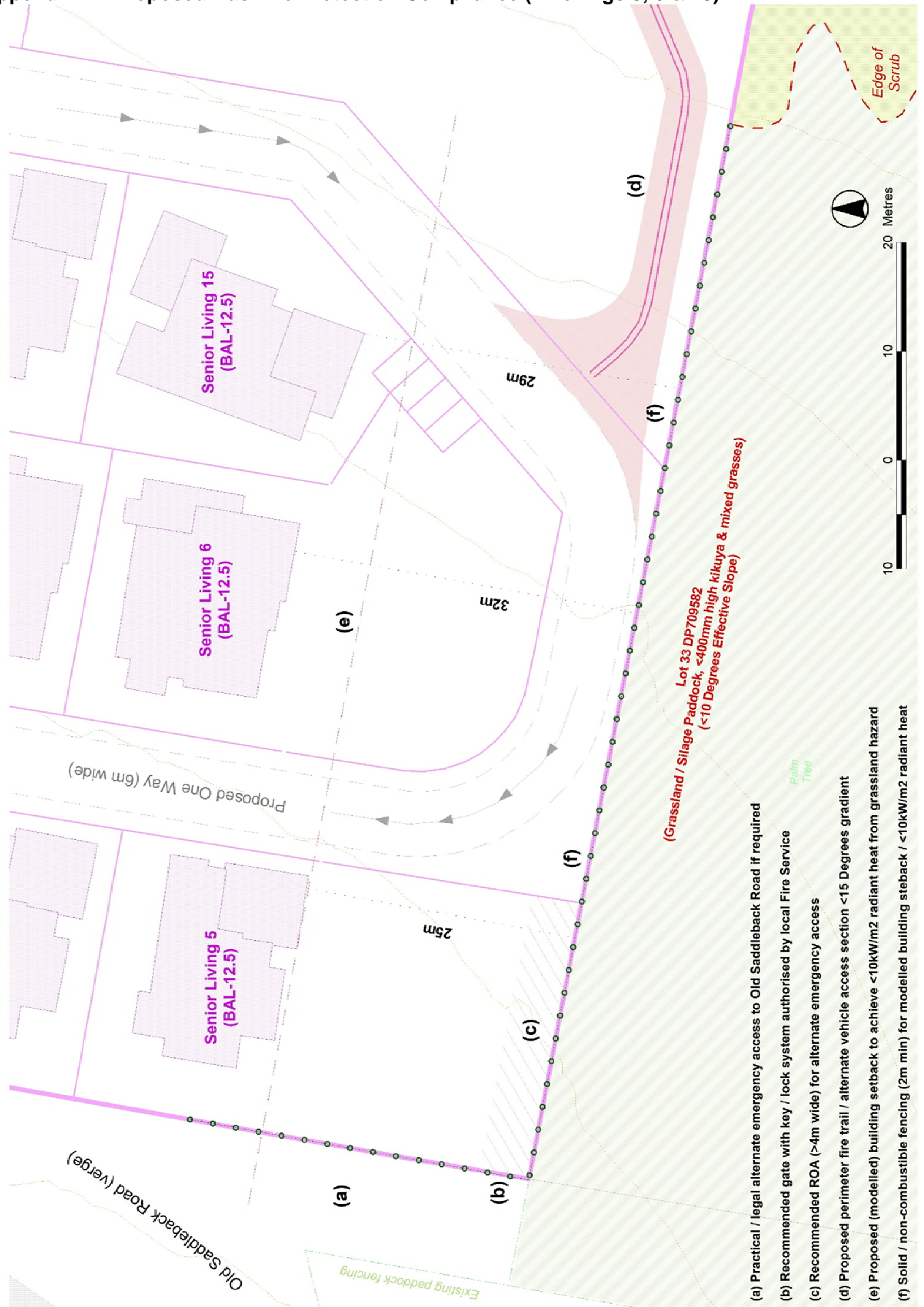


## Appendix 3 – Proposed Bushfire Protection Compliance





## Appendix 4 – Proposed Bushfire Protection Compliance (Dwellings 5, 6 & 15)



# Australian Bushfire Safety & Planning



Bushfire Protection Consultants

The Director  
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Australian Bushfire Safety & Planning  
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Office: 02 67471567  
Mobile: 0467 011 168

ABSP ref: BF-00296

Attn: Mr Matthew Jones

16 February 2019

**RE:** Bushfire Attack Level (BAL) calculations for proposed SFPP development at 100 Old Saddleback Road Kiama.

Dear Matthew,

As requested, I have looked at the proposal you sent via email concerning a proposed development site at 100 Old Saddleback Road Kiama. I concur with your findings and in support have calculated the outcomes in two accepted models which match the outcomes identically.

The inputs used in the calculation process were supplied by yourself and checked by this office byway of desk top assessment. Images of the calculation pages are attached in this report. I also reference the ecological report that supports vegetation classification as mapped by OEH.

Calculation parameters (inputs) used to calculate the BAL are:

Vegetation classification: Littoral Rainforest (Mapped by OEH 2017)

Fuel Load: 10.0 tph surface & near surface fuel load

13.2 tph overall fuel load

(Fuel loads provided by University of Wollongong research  
Paper Report 5)

Elevated fuel height: 1.4 metres

FDI: 100

Elevation of receiver: 5.1 metres

Flame Temperature: 1200 K

3 Fire runs have been assessed.

Fire Run	Effective slope	Site slope	Fire Run Length	Required APZ	Radiant Heat
Fire Run a	22 degrees	15 degrees	110 metres	48 metres	9.92 kW/m <sup>2</sup>
Fire Run b	22 degrees	17 degrees	110 metres	48 metres	9.67 kW/m <sup>2</sup>
Fire Run c	19.5 degrees	14 degrees	113 metres	45 metres	9.90 kW/m <sup>2</sup>

Page 1 of 6



The above parameters have been supplied by your office.

This office also understands that there is a proposal to remove vegetation as marked on your site drawing.

Calculations were determined using:

RFS Short Fire Run Model for low threat vegetation.

Maximum separation required to achieve 10 kW/m<sup>2</sup> from vegetation located to the southeast of the proposed development site is identified in the above table.

I trust that the above and attached information supports your development application. If you need anything further, please do not hesitate to contact me.

Best Regards



**John Delany JP**  
Managing Director



Graduate Diploma - Design in Bushfire Prone Areas (UWS 2006)  
Assoc. Prof. Cert. Expert Evidence for the Land & Environment Court  
Member (21455) Fire Protection Association of Australia

### **Australian Bushfire Safety & Planning**




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 <b>Australian Bushfire Safety &amp; Planning</b> <small>Bushfire Protection Consultants</small>	
<b>FOREST &amp; WOODLAND - Bushfire Attack Level (BAL) Calculator</b> performance based assessment for a developing fire run in Forest & Woodland vegetation formations.	
<div style="text-align: right; font-size: small;">Version: 1.09 - 20/08/2018</div> <div><b>Developing (SFR) fire run in low risk vege</b></div>	
Site Particulars:	Date: <input type="text" value="16/02/2019 19:02"/>
Site Address: <input type="text" value="Lot 17 DP 1210621 Old Saddleback Road Kiama"/>	Lot/DP: <input type="text" value="17/- /DP1210621"/>
LGA: <input type="text" value="Kiama (100)"/>	ABSP Job No. <input type="text" value="BF-00296"/>
Assessment prepared by: <input type="text" value="John Delany"/>	
	
Field and reporting notes:	



## Forest/Woodland - FDF &amp; SFR Calculation page:

Fire run specifics: Lot 17 DP 1210621 Old Saddleback Road Kiama - Fire run a

## Common and bushfire behaviour contributor inputs:

Predominant vegetation: Littoral Rainforests - 10 &amp; 13.2 - Medium - 0.9m - 1.4m

Surface & Elevated Fuel Load	10	tph	Overall fuel load	13.2	tph
Average Canopy Height	12	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1200	Kelvin
Distance to vegetation	48	Metres	Target elevation of receiver	5.1	Metres
Effective slope	22	Degrees	Ambient temperature	308	Kelvin
Site slope	15	Degrees	SFR fire run length	110	Metres
DF nominal head width	100	Metres			

## Outputs - Fully Developed Fire (FDF)

Wind Speed	45	kph
Default elevation of receiver	18.588	Metres
FDF Flame Angle	75	Degrees
FDF Flame Length	37.18	Metres
FDF Intensity	37344	kW/m
FDF FROS	5.4757	kph
FDF Flame transmissivity	0.7885	kW/m
FDF View Factor	0.3079	

## Outputs - Developing Fire Run (DFR)

Wind speed	30	kph
Default elevation of receiver	11.927	Metres
SFR Flame Angle	81	Degrees
SFR Flame Height	23.855	Metres
SFR Intensity	28291	kW/m
SFR FROS	5.4757	kph
SFR Flame transmissivity	0.7839	kW/m
SFR View Factor	0.1133	
Calculated SFR Head Width	40.264	Metres
SFR fire run length	110	Metres
Approx. SFR travel time	20:05	min/sec

FDF Radiant Heat: 27.11 kW/m<sup>2</sup>SFR Radiant Heat: 9.92 kW/m<sup>2</sup> Input cells Locked output cells

## Glossary of abbreviations/terms:

tph = tonnes per hectare  
 kW/m = Kilowatts per metre  
 kW/m<sup>2</sup> = Kilowatts per metre squared

m/h = metres per hour  
 FROS = Forward rate of Spread  
 kph = kilometres an hour

K = Kelvin  
 min = minutes  
 sec = seconds

## Forest/Woodland - FDF &amp; SFR Calculation page:

Fire run specifics 

## Common and bushfire behaviour contributor inputs:

Predominant vegetation 

Surface & Elevated Fuel Load	<input type="text" value="10"/>	tph	Overall fuel load	<input type="text" value="13.2"/>	tph
Average Canopy Height	<input type="text" value="12"/>	Metres	Fire weather district	<input type="text" value="100"/>	FDI
Average elevated fuel height	<input type="text" value="1.4"/>	Metres	Flame temperature	<input type="text" value="1200"/>	Kelvin
Distance to vegetation	<input type="text" value="48"/>	Metres	Target elevation of receiver	<input type="text" value="5.1"/>	Metres
Effective slope	<input type="text" value="22"/>	Degrees	Ambient temperature	<input type="text" value="308"/>	Kelvin
Site slope	<input type="text" value="17"/>	Degrees	SFR fire run length	<input type="text" value="110"/>	Metres
DF nominal head width	<input type="text" value="100"/>	Metres			

## Outputs - Fully Developed Fire (FDF)

Wind Speed	<input type="text" value="45"/>	kph
Default elevation of receiver	<input type="text" value="18.588"/>	Metres
FDF Flame Angle	<input type="text" value="73"/>	Degrees
FDF Flame Length	<input type="text" value="37.18"/>	Metres
FDF Intensity	<input type="text" value="37344"/>	kW/m
FDF FROS	<input type="text" value="5.4757"/>	kph
FDF Flame transmissivity	<input type="text" value="0.7870"/>	kW/m
FDF View Factor	<input type="text" value="0.3047"/>	

## Outputs - Developing Fire Run (DFR)

Wind speed	<input type="text" value="30"/>	kph
Default elevation of receiver	<input type="text" value="11.927"/>	Metres
SFR Flame Angle	<input type="text" value="84"/>	Degrees
SFR Flame Height	<input type="text" value="23.855"/>	Metres
SFR Intensity	<input type="text" value="28291"/>	kW/m
SFR FROS	<input type="text" value="5.4757"/>	kph
SFR Flame transmissivity	<input type="text" value="0.7829"/>	kW/m
SFR View Factor	<input type="text" value="0.1106"/>	
Calculated SFR Head Width	<input type="text" value="40.264"/>	Metres
SFR fire run length	<input type="text" value="110"/>	Metres
Approx. SFR travel time	<input type="text" value="20:05"/>	min/sec

FDF Radiant Heat  kW/m<sup>2</sup>SFR Radiant Heat  kW/m<sup>2</sup> Input cells Locked output cells

## Glossary of abbreviations/terms:

tph = tonnes per hectare  
 kW/m = Kilowatts per metre  
 kW/m<sup>2</sup> = Kilowatts per metre squared

m/h = metres per hour  
 FROS = Forward rate of Spread  
 kph = kilometres an hour

K = Kelvin  
 min = minutes  
 sec = seconds

**Forest/Woodland - FDF & SFR Calculation page:**Fire run specifics **Common and bushfire behaviour contributor inputs:**Predominant vegetation 

Surface & Elevated Fuel Load	<input type="text" value="10"/>	tph	Overall fuel load	<input type="text" value="13.2"/>	tph
Average Canopy Height	<input type="text" value="12"/>	Metres	Fire weather district	<input type="text" value="100"/>	FDI
Average elevated fuel height	<input type="text" value="1.4"/>	Metres	Flame temperature	<input type="text" value="1200"/>	Kelvin
Distance to vegetation	<input type="text" value="45"/>	Metres	Target elevation of receiver	<input type="text" value="5.1"/>	Metres
Effective slope	<input type="text" value="19.5"/>	Degrees	Ambient temperature	<input type="text" value="308"/>	Kelvin
Site slope	<input type="text" value="14"/>	Degrees	SFR fire run length	<input type="text" value="110"/>	Metres
DF nominal head width	<input type="text" value="100"/>	Metres			

**Outputs - Fully Developed Fire (FDF)**

Wind Speed	<input type="text" value="45"/>	kph
Default elevation of receiver	<input type="text" value="15.765"/>	Metres
FDF Flame Angle	<input type="text" value="78"/>	Degrees
FDF Flame Length	<input type="text" value="31.54"/>	Metres
FDF Intensity	<input type="text" value="31.427"/>	kW/m
FDF FROS	<input type="text" value="4.6081"/>	kph
FDF Flame transmissivity	<input type="text" value="0.7910"/>	kW/m
FDF View Factor	<input type="text" value="0.2858"/>	

**Outputs - Developing Fire Run (DFR)**

Wind speed	<input type="text" value="30"/>	kph
Default elevation of receiver	<input type="text" value="10.529"/>	Metres
SFR Flame Angle	<input type="text" value="82"/>	Degrees
SFR Flame Height	<input type="text" value="21.058"/>	Metres
SFR Intensity	<input type="text" value="23809"/>	kW/m
SFR FROS	<input type="text" value="4.6081"/>	kph
SFR Flame transmissivity	<input type="text" value="0.7879"/>	kW/m
SFR View Factor	<input type="text" value="0.1124"/>	
Calculated SFR Head Width	<input type="text" value="40.264"/>	Metres
SFR fire run length	<input type="text" value="110"/>	Metres
Approx. SFR travel time	<input type="text" value="23:52"/>	min/sec

FDF Radiant Heat  kW/m<sup>2</sup>SFR Radiant Heat  kW/m<sup>2</sup> Input cells Locked output cells**Glossary of abbreviations/terms:**

tph = tonnes per hectare  
 kW/m = Kilowatts per metre  
 kW/m<sup>2</sup> = Kilowatts per metre squared

m/h = metres per hour  
 FROS = Forward rate of Spread  
 kph = kilometres an hour

K = Kelvin  
 min = minutes  
 sec = seconds



# Australian Bushfire Safety & Planning



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## Bushfire Protection Consultants

---

The Director  
Bushfire Protection Planning  
and Assessment Services  
PO Box 334  
Narooma NSW 2546

Australian Bushfire Safety & Planning  
68 Learmonth Street  
Willow Tree NSW 2339

02 67471567  
0467011168

30 September 2019

ABSP Ref: BF-00296

Attention: Mr Matthew Jones

Re: Lot 17//DP1210621 Old Saddleback Road Kiama.

With regards to the above proposed development site, and following your request, I have undertaken calculations to determine a possible way forward to achieve an appropriate Asset Protection Zone (APZ) facing the grassland hazard on the southern boundary of the site. You will recall that I have previously determined the appropriate APZ to address the Rainforest hazard to the east and southeast. I believe the Rural Fire Service (RFS) have already accepted those calculations.

From the onset I have endeavoured to provide you with the most up to date outcomes which included perusing the newly released Australian Standard AS-3959 (AS3959) and from that document develop a grassland model to determine the fire behaviour characteristics by applying Method 2, as defined, in the new release.

Applicable inputs as determined and additional information provided by your office.

Site: Lot 17//DP1210621 Saddleback Road Kiama

Development Proposal: Aged Care

Predominant vegetation: Pasture grasslands (G26 – Figure 2.4(A) AS3959-2018)

Grassland fuel load: 4.5 tonnes (Table B3 AS3959-2018);

Average fuel height: 0.4 metres (not relevant for grassland BAL calculations);

Fire Danger Index (GFDI): 130;

Flame temperature: 1200 Kelvin

Wind speed: 45 kph

Peak elevation of receiver: 3.74 metres (this allows for a maximum radiant heat impact to all sections of the dwelling as required by BPP.

---

↩ Australian Bushfire Safety & Planning is the trading name of Jaydel Consulting Pty Ltd - ABN 95 619 252 925. ↪



From my investigations I have determined the following.

The application of the Deemed-To-Satisfy (DTS) requirements of Planning for Bushfire Protection 2006 previously verbally approved by RFS cannot be supported under the current guidelines and, in my view, even though it was RFS advice, would not be cost effective to pursue now.

With regards to the above an appropriate APZ under today's requirements cannot be contained within the development site boundaries so I have calculated the minimum APZ required and using the application of a:

2-metre-high radiant heat fence; and

3-metre-high radiant heat fence:

The following table will provide insight into the calculations. I have also attached the worksheets to support my calculations.

Radiant heat fence height	location	Calculate distance to achieve 10kW/m <sup>2</sup> .	Calculated Radiant Heat flux.
2 metre.	On boundary	25 metres	10.02 kW/m <sup>2</sup>
3 metre.	On boundary	22 metres	9.32 kW/m <sup>2</sup>

My worksheet also gives you insight to any flank fire exposure for each of the APZ setbacks.

The application of a 2-metre-high radiant heat fence at 25 metres is just outside the acceptable limits by RFS but could possibly be argued.

I hope this information will be useful to you in presenting a way forward for the development at Saddleback Road Kiama. If you need any further information or clarification of the above, please do not hesitate to call.

Best Regards

John Delany

## Australian Bushfire Safety & Planning

Bushfire Protection Consultants

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**Bushfire Attack Level (BAL) Calculator**  
for the performance based assessment of grassland vegetation formations.

Site Particulars:

Site Address:  Date:

LGA:  Lot/DP:

ABSP Job No.:  Assessment prepared by:

---

Field notes:

Australian Bushfire Safety and Planning - Grassland BAL Model

**FDF & SFR Calculation Page:**

Fire Run Specifics:

**Common and bushfire behaviour contributor inputs:**

Predominate Vegetation:

Surface & Elevated Fuel Load:  tph

Average Canopy Height:  Metres

Average elevated fuel height:  Metres

Distance to vegetation:  Metres

Effective slope:  Degrees

Site Slope:  Degrees

Overall Fuel Load:  tph

Fire Danger Index:

Flame Temperature:  Kelvin

Target Elevation of Receiver:  Metres

Ambient Temperature:  Kelvin

Measured SFR Length:  Metres

---

**Outputs - Fully Developed Fire (FDF)**

Wind Speed:  kph

Default Elevation of Receiver:  Metres

FDF Flame Angle:  Degrees

FDF Flame Length:  Metres

FDF Intensity:  kW/m

FDF FROS:  m/h

FDF Flame Transmissivity:

FDF View Factor:

**FDF Radiant Heat:  kW/m²**

---

**Plank Fire (PF) for above design fire**

FF Horizontal Flame Depth:  Metres

Modified FF View Factor:

FF View Factor:

FF Residence Time:  sec

FROS:  Metres

**Plank Fire Radiant Heat:  kW/m²**

---

**Summary of abbreviations:**

tph = tonnes per hour  
kW/m = kilowatts per metre  
kW/m² = kilowatts per metre squared  
HFD = Horizontal Flame Depth

m/h = metres per hour  
FROS = Forward rate of Spread  
kph = kilometres per hour

FF = Plank Fire  
K = Kelvin  
sec = Seconds

1 Australian Bushfire Safety and Planning - Grassland BAL Model

2

**Radiant Heat Shielding Calculator**

Requires manual input ☐

**Fully developed fire (FDF)**

FDF Modelled Flame length:  Metres

FDF Modelled Flame Angle:  Degrees

FDF Calculated Radiant Heat:  kW/m²

FDF Head Width:  Metres

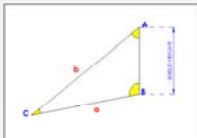
**Proposed Radiant heat shield height:  Metres**

Effective Slope:  Degrees

Site Slope:  Degrees

---

**Fully Developed Fire**



Angle A = Sum of B + C plus balance to 180°  
Angle B = Sum of effective slope and 90° of radiant heat shield.  
**Note:** Negative figure required for upslope  
Angle C = Calculated FDF flame angle.

Adjust surface fuel loads in cells  to match radiant heat shield height with the **proposed** radiant heat shield height.

FDF Surface Fuels:

FDF Modified Flame Height:

FDF Unshielded flame length:  Metres

FDF shielded effective slope (a):  Metres

FDF shielded flame length (b):  Metres

FDF Modified flame length:  Metres

FDF Unshielded radiant heat:  kW/m²

FDF Shielded radiant heat value benefit:  kW/m²

FDF Modified radiant heat output:  kW/m²

---

**Short fire run (SFR)**

SFR Modelled flame length:  Metres

SFR Modelled Flame Angle:  Degrees

Calculated Radiant heat SFR:  kW/m²

SFR Head width:  Metres

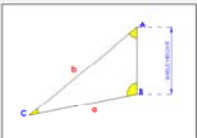
Distance from vegetation:  Metres

FDF Intensity:  kW/m

SFR Intensity:  kW/m

---

**Short Fire Run**



Angle A = Effective Slope  
Angle B = Calculated shielded flame length  
Angle C = height of Radiant Heat Shield

SFR Surface Fuels:

SFR Modified Flame Height:

SFR Unshielded flame length:  Metres

SFR shielded flame length (a):  Metres

SFR shielded flame length (b):  Metres

SFR Modified flame length:  Metres

SFR Unshielded radiant heat:  kW/m²

SFR Shielded radiant heat benefit:  kW/m²

SFR Modified radiant heat output:  kW/m²

Australian Bushfire Safety and Planning - Forest Woodland BAL Model



## Australian Bushfire Safety & Planning

Bushfire Protection Consultants

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**Bushfire Attack Level (BAL) Calculator**  
for the performance based assessment of grassland vegetation formations.

**Site Particulars:**

Site Address:   
 LGA:   
 Date:   
 Lot/DP:   
 ABSP Job No.:   
 Assessment prepared by:

---

**Field notes:**

Australian Bushfire Safety and Planning - Grassland BAL Model

1

### FDF & SFR Calculation Page:

Fire Run Specifics:

**Common and bushfire behaviour contributor inputs:**

Predominate Vegetation: <input type="text" value="Sown Pasture (G24)"/>	Overall Fuel Load: <input type="text" value="4.5"/> t/ha
Surface & Elevated Fuel Load: <input type="text" value="4.5"/> t/ha	Fire Danger Index: <input type="text" value="130"/>
Average Canopy Height: <input type="text" value="0.4"/> Metres	Flame Temperature: <input type="text" value="1200"/> Kelvin
Average elevated fuel height: <input type="text" value="0.4"/> Metres	Target Elevation of Receiver: <input type="text" value="3.7"/> Metres
Distance to vegetation: <input type="text" value="22"/> Metres	Ambient Temperature: <input type="text" value="300"/> Kelvin
Effective slope: <input type="text" value="10"/> Degrees	Measured SFR Length: <input type="text" value="100"/> Metres
Site Slope: <input type="text" value="6"/> Degrees	

**Outputs - Fully Developed Fire (FDF)**

Wind Speed: <input type="text" value="45"/> t/ha	Default Elevation of Receiver: <input type="text" value="3.74"/> Metres
FDF Flame Angle: <input type="text" value="86"/> Degrees	FDF Flame Length: <input type="text" value="7.47"/> Metres
FDF Intensity: <input type="text" value="39293"/> kW/m	FDF FROS: <input type="text" value="16.90"/> m/h
FDF Flame Transmissivity: <input type="text" value="0.8343"/>	FDF View Factor: <input type="text" value="0.1603"/>
<b>FDF Radiant Heat: <input type="text" value="14.94"/> kW/m²</b>	

**Flank Fire (FF) for above design fire**

FF Horizontal Flame Depth: <input type="text" value="187.78"/> Metres	Modified FF View Factor: <input type="text" value="0.0753"/>
FF View Factor: <input type="text" value="0.1603"/>	FF Residence Time: <input type="text" value="40"/> sec
FF FROS: <input type="text" value="7.7094"/> Metres	<b>Flank Fire Radiant Heat: <input type="text" value="5.30"/> kW/m²</b>

**Glossary of abbreviations**

t/ha = tonnes per hectare  
 kW/m = kilowatts per metre  
 kW/m² = kilowatts per metre squared  
 m/h = metres per hour  
 FROS = Forward rate of Spread  
 t/ha = tonnes per hectare  
 FF = Flank Fire  
 K = Kelvin  
 sec = Seconds

2

Australian Bushfire Safety and Planning - Grassland BAL Model

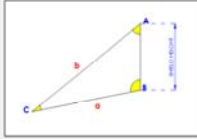
### Radiant Heat Shielding Calculator

Requires manual input

**Fully developed fire (FDF)**

FDF Modelled Flame length: <input type="text" value="7.47"/> Metres	FDF Modelled Flame Angle: <input type="text" value="86"/> Degrees
FDF Calculated Radiant Heat: <input type="text" value="14.94"/> kW/m²	FDF Head Width: <input type="text" value="31.49"/> Metres
<b>Proposed Radiant heat shield height: <input type="text" value="3"/> Metres</b>	Effective Slope: <input type="text" value="10"/> Degrees
	Site Slope: <input type="text" value="6"/> Degrees

**Fully Developed Fire**



Angle A = Sum of B + C plus balance to 180°.  
 Angle B = Sum of effective slope and 90° of radiant heat shield.  
**Note:** Negative figure required for upslope  
 Angle C = Calculated FDF flame angle.

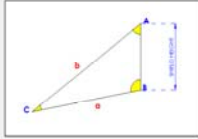
Adjust surface fuel loads in cells  to match radiant heat shield height with the **proposed** radiant heat shield height.

FDF Surface Fuels: <input type="text" value="1.4"/>	FDF Modified Flame Height: <input type="text" value="3.00"/>
FDF Unshielded flame length: <input type="text" value="7.47"/> Metres	FDF shielded effective slope (a): <input type="text" value="2.43"/> Metres
FDF shielded flame length (b): <input type="text" value="4.18"/> Metres	FDF Modified flame length: <input type="text" value="5.04"/> Metres
FDF Unshielded radiant heat: <input type="text" value="14.94"/> kW/m²	FDF Shielded radiant heat value benefit: <input type="text" value="5.42"/> kW/m²
FDF Modified radiant heat output: <input type="text" value="9.32"/> kW/m²	

**Short fire run (SFR)**

SFR Modelled Flame Height: <input type="text" value="1"/> Metres	SFR Modelled Flame Angle: <input type="text" value="1"/> Degrees
Calculated Radiant Heat SFR: <input type="text" value="1"/> kW/m²	SFR Head Width: <input type="text" value="1"/> Metres
Distance from vegetation: <input type="text" value="1"/> Metres	FDF Intensity: <input type="text" value="1"/> kW/m
FDF Intensity: <input type="text" value="1"/> kW/m	SFR Intensity: <input type="text" value="1"/> kW/m

**Short Fire Run**



Angle A = Effective slope  
 Angle B = Calculated shielded flame length  
 Angle C = Height of Radiant Heat Shield

Australian Bushfire Safety and Planning - Grassland BAL Model



## Appendix 7 – Email Correspondence (March – April 2019)

**mattj@bushfireconsultants.com.au**

---

**From:** Bradley Bourke <Bradley.Bourke@rfs.nsw.gov.au>  
**Sent:** Monday, 1 April 2019 10:01 AM  
**To:** mattj@bushfireconsultants.com.au  
**Subject:** RE: Development Application 10.2017.352.1 - Lot 100 Old Saddleback Road Kiama - RFS Feedback

Hi Matt,

As long as the current internal road layout is retained and amended to comply with PBP 2006 / Pre-released PBP dated August 2018, the NSW RFS raises no objection to a proposed *designated and formally maintained fire / maintenance trail* being used in lieu of providing a perimeter road for this proposal.

Regards,



**Bradley Bourke**  
Development Assessment & Planning Officer, Planning & Environment Services (South)  
NSW RURAL FIRE SERVICE  
PO Box 35, Batemans Bay NSW 2536  
P 02 4472 0600 E [pes@rfs.nsw.gov.au](mailto:pes@rfs.nsw.gov.au)  
[www.rfs.nsw.gov.au](http://www.rfs.nsw.gov.au) | [www.facebook.com/nswrfs](https://www.facebook.com/nswrfs) | [www.twitter.com/nswrfs](https://www.twitter.com/nswrfs)  
**PREPARE. ACT. SURVIVE.**

**From:** mattj@bushfireconsultants.com.au <mattj@bushfireconsultants.com.au>  
**Sent:** Saturday, 30 March 2019 2:19 PM  
**To:** Bradley Bourke <Bradley.Bourke@rfs.nsw.gov.au>  
**Cc:** 'Graham Werry' <Graham@weriton.com.au>; 'Anthony Randall' <Anthonyr@kiama.nsw.gov.au>  
**Subject:** RE: Development Application 10.2017.352.1 - Lot 100 Old Saddleback Road Kiama - RFS Feedback

Thanks Brad – much appreciated.

I'll work up the revised / supplementary reporting requirements ASAP.

At this point, I understand the Proponent is negotiating with the southern neighbour (Lot 33 DP709582) to negotiate a formal APZ easement / agreement to manage the potential grassland hazard in favour of the proposed development. It is anticipated that the conditions of consent for this matter will specify the required APZ area – which I'll clearly identify as part of my supplementary reporting.

With regard to the acceptable solutions for provision of access, please note that a perimeter roadway section is NOT proposed in this instance. A designated and formally maintained fire / maintenance trail section will however be located at or near the edge of the identified / persisting



bushfire hazard to facilitate perimeter vehicle access and an additional link from the end of Caliope Street to the southern end of the development site. Please let me know if this is considered an issue.

**MATT JONES** *BAppSc Environmental Health, Grad. Dip Design for Bushfire Prone Areas*  
**BPAD-L3-14598 Accredited Practitioner** - Fire Protection Association of Australia



**BUSHFIRE PROTECTION PLANNING & ASSESSMENT SERVICES PTY LTD** ABN. 29 155 412 981 ACN. 155 412 981

Mob: 0428 296 526 - Ph: (02) 6100 3143 - Skype: Bushfire Protection Planning & Assessment Services

Email: [mattj@bushfireconsultants.com.au](mailto:mattj@bushfireconsultants.com.au) - Web: [www.bushfireconsultants.com.au](http://www.bushfireconsultants.com.au)

Mail (1): PO Box 1727 Queanbeyan NSW 2620 / Mail (2): PO Box 334 Narooma NSW 2546

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**From:** Bradley Bourke <[Bradley.Bourke@rfs.nsw.gov.au](mailto:Bradley.Bourke@rfs.nsw.gov.au)>  
**Sent:** Thursday, 28 March 2019 10:02 AM  
**To:** Matthew Jones <[mattj@bushfireconsultants.com.au](mailto:mattj@bushfireconsultants.com.au)>  
**Cc:** Anthony Randall <[Anthonyr@kiama.nsw.gov.au](mailto:Anthonyr@kiama.nsw.gov.au)>; Martha Dotter <[Martha.Dotter@rfs.nsw.gov.au](mailto:Martha.Dotter@rfs.nsw.gov.au)>  
**Subject:** RE: Development Application 10.2017.352.1 - Lot 100 Old Saddleback Road Kiama - RFS Feedback

Hi Matt,

Just to follow up on our discussion on 14 March 2019, the NSW RFS will support the use of SFR to demonstrate compliance with 10kW/m<sup>2</sup> (at building) with the parameters used in the modelling undertaken by Australian Bushfire Safety & Planning dated 16 February 2019. As discussed, the revised bush fire report will still need to address the hazards within Lot 33 DP709582 to the south and southwest of the subject site.

Any deviation away from the acceptable solutions with regards to the provision of access will need to be adequately addressed.

Please note, the NSW RFS is not in a position to support a reduced FDI or modified fuel loads.

Regards,



**Bradley Bourke**  
Development Assessment & Planning Officer, Planning & Environment Services (South)  
**NSW RURAL FIRE SERVICE**  
PO Box 35, Batemans Bay NSW 2536  
P 02 4472 0600 E [pes@rfs.nsw.gov.au](mailto:pes@rfs.nsw.gov.au)  
[www.rfs.nsw.gov.au](http://www.rfs.nsw.gov.au) | [www.facebook.com/nswrfs](https://www.facebook.com/nswrfs) | [www.twitter.com/nswrfs](https://www.twitter.com/nswrfs)  
**PREPARE. ACT. SURVIVE.**



Supplementary Advice 15 June 2019

**SUPPLEMENTARY BUSHFIRE COMPLIANCE INFORMATION FOR SITE  
COMPATIBILITY CERTIFICATE APPLICATION & DEVELOPMENT APPLICATION  
LOT 17 DP1210621 (FORMERLY LOT 100 DP 751279, LOT 1 & 2 DP 1165344,  
OLD SADDLEBACK ROAD, KIAMA) SENIORS LIVING DEVELOPMENT DWELLINGS  
REVISED APZ & ACCESS**



15<sup>th</sup> June 2019

The following report refers to land identified as Lot 1 DP 1210621 previously Lot 100 DP 751279 Lot 1 DP 1165344 Lot 2 DP 1165344 Old Saddleback Road off Caliope Street Kiama NSW 25 herein *the subject property* and the development application Reference No 10/201/521 or a 21 Delling Seniors living development herein *the proposed development*

This report is provided at the request of Mr Graham Perry Meriton Properties Pty Ltd of R169 Royal Exchange Street 1225 being the applicant for the proposed development

This report should be considered supplementary to any previous reporting submitted for the proposed development and in accordance with the NSW Rural Fire Service RFS and is primarily for the purpose of addressing the following outstanding points of compliance

- 1 Asset protection zone A compliance to facilitate a Special fire protection purpose S Development or a maximum limit of 10 m<sup>2</sup> theoretical radiant heat flux R at proposed new building lines
- 2 Identification and management of any identified hazardous vegetation persisting on adjoining rural land Lot DP 09582 to the south south east of the subject property  
Identification of a compliant internal roadway system which also facilitates a perimeter roadway arrangement to identified potential bush fire vegetation

Previous compliance solutions based on *alternate solutions for exits on the non-hazard side of the building, exceptional circumstances due to low threat of the vegetation* and calculated reduction of the local fire Danger Index as per previous RFS advice 29/05/11 are no longer identified for the purpose of assessing the proposed development for bush fire safety compliance. The revised assessment pathway is now based on more recent advice from the RFS dated 1/11/18 stating that *the NSW RFS does not consider any previous advice issued in good faith outside the official pre-lodgment process as a pathway to compliance*

Detailed mapped analysis of the subject property proposed development and recommended requirements for bush fire safety compliance are as attached Appendices 1 to this report



## APZ Compliance (Subject Property)

The estimated distance or width of the required SAA between the proposed development and building lines has not been established using the principles of Short Fire Run SRR modelling. Detailed calculations have been provided courtesy of Australian Bushfire Safety Planning. Mr John Delany report dated 16/02/19. Parameters used for modelling are as outlined within the SRR report copy attached Appendix to this report.

It is understood the R/S could support the use of SRR modelling to demonstrate compliance with 10 m<sup>2</sup> at building with the above parameters used in the above SRR report.

Based on the SRR report, the minimum A distance required for proposed residential dwellings nearest to the identified/identified hard includes:

- 8m to residential dwellings 1-19
- 5m to residential dwelling 21

dedicated upon an A area maintained to approximately the 80-85m contour lines east of the proposed development site, radiant heat levels of greater than 10 m<sup>2</sup> could technically be experienced by emergency services or persons aiding residents associated with the site.

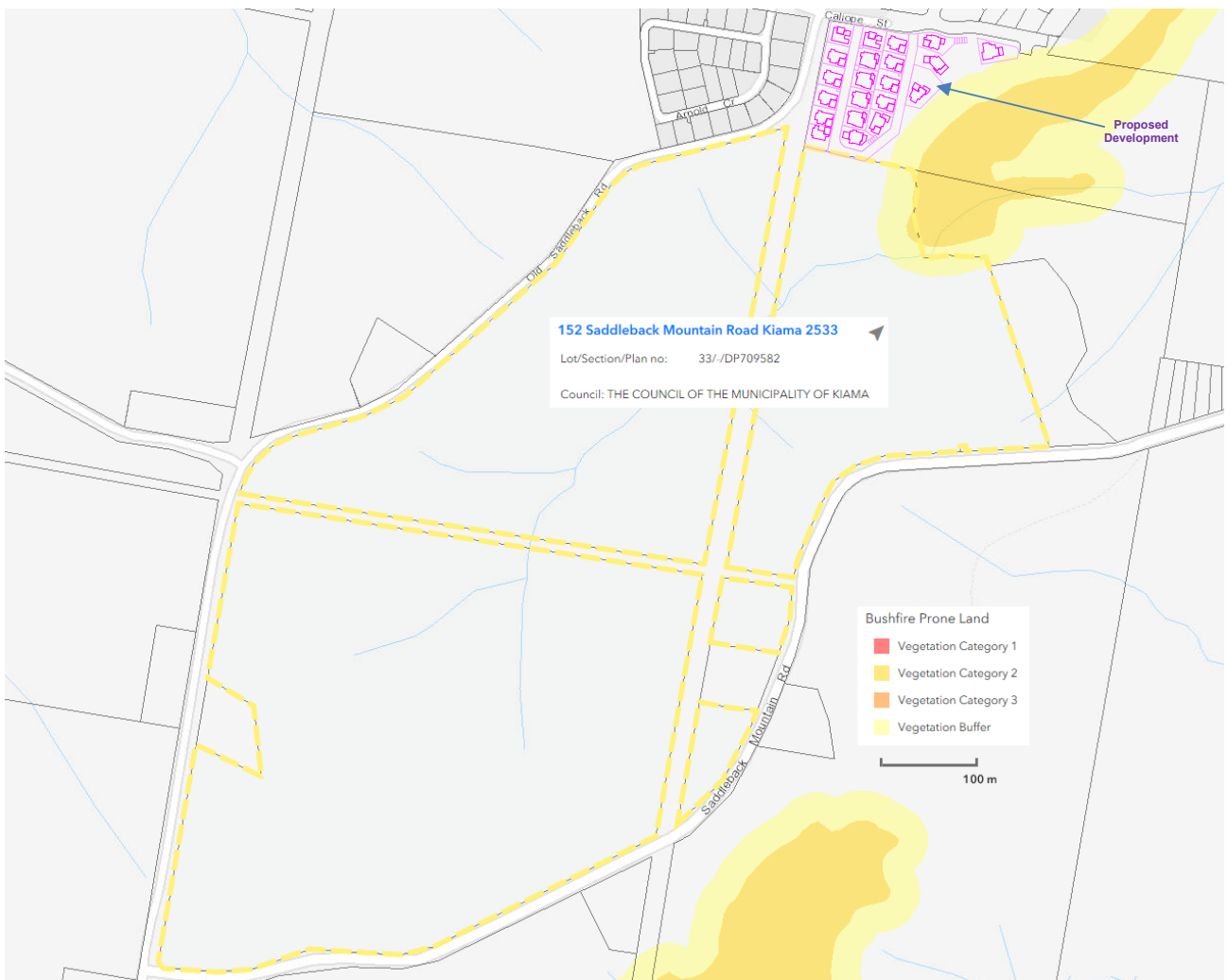
**Recommendation (1): The APZ area for the proposed development shall be maintained entirely to the north, west & south boundaries, and to approximately the 80m contour line within the subject property or else to where the land gradient remains <32.5% (<18°) slope to the east of the proposed development site.**

**The APZ area shall be maintained entirely to an Inner Protection Area standard as described by NSW Planning for Bushfire Protection (PBP) 2006.**



## APZ Compliance (Lot 33 DP709582)

Lot DP 09582 is approximately 6ha of R 2 Rural landscape zoned land which is more or less entirely cleared and maintained for agricultural and livestock grazing purposes. The land is comprised of 5 separate parcels with the two larger northern parcels effectively interacing the proposed development area. Apart from  $\approx 1\,000$ s m or less of Category 2 vegetation identified along the north eastern most boundary section the land is otherwise currently identified as containing bush fire prone vegetation by the current bush fire prone land map of the Kiama LGA. An unformed road reserve area 20m wide which partly runs along the east boundary of the subject property and further bisects the two larger northern parcels also effectively forms part of the lot by virtue of being within the fenced paddock areas.



Courtesy: <https://www.planningportal.nsw.gov.au/spatialviewer/#/find-a-property/lot>

Notwithstanding the above it is acknowledged that the interacing area of Lot DP 09582 and unformed road reserve area to the subject property appear to be an intermittently grazed or slashed paddock and possibly may present an occasional grassland hard of  $\approx 100$ mm in height or greater.

o address the potential hazard threat and identify prescribed requirements for bush fire safety the following is considered

Australian Standard 959 identifies low threat vegetation as

*...grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks, further noting that...minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100mm).*

It is difficult to confidently state whether or not there should be a classified grassland area over lot D 09582 to the south and south east of the proposed development area whilst the associated area appears currently and historically utilised for livestock grazing and also occasionally slashed the continued and perpetual management of the same is unclear Enquiries by the applicant to the owner of lot D 09582 has confirmed that the relevant area is slashed periodically for silage and maintenance of the paddock for grazing purposes

Relevant to the proposed development and S requirements planning for bush fire protection guidelines 2006 requires that

- *an APZ is provided in accordance with the relevant tables and figures in Appendix 2 of this document.*
- *exits are located away from the hazard side of the building.*
- *the APZ is wholly within the boundaries of the development site. Exceptional circumstances may apply.*

Appendix 2 table A2.6 A or S does identify grassland as vegetation formation

Table A2.6 Minimum Specifications for Asset Protection Zones (m) for Special Fire Protection Purposes in bush fire prone areas ( $\leq 10\text{kW/m}^2$ )					
Vegetation Formation	Effective Slopes				
	Upslope/Flat	>0°-5°	>5°-10°	>10°-15°	>15°-18°
Rainforests	30	40	50	60	65
Forests	60	70	85	100	100
Woodland (Grassy)	40	50	60	70	75
Plantations (Pine)	50	60	70	85	95
Tall Heath (Scrub)	45	50	55	60	65
Short Heath (Open Scrub)	35	35	40	45	45
Freshwater Wetlands	35	35	40	45	45
Forested Wetlands	50	60	75	90	95
Semi-Arid (Woodland)	30	35	40	45	50
Arid Shrubland	30	35	40	45	45
Alpine Resorts	(see page 31 and Table A3.5 on page 66)				



does however state that

*Construction requirements are not specified in relation to grassland areas and these areas may not be mapped as being bush fire prone. Grass fires can threaten the sub floor spaces of a building and may generate significant embers. The RFS supports protection of the sub floor or the integration of 1.8 metre high protective (non combustible) fencing in conjunction with screened windows and a basic APZ of 10 metres for these situations.*

In recognition of a potential grassland hazard 100mm in height persisting within direct vicinity of the proposed development site on lot DP 09582 the proposed development has been amended see Appendix 1 the amended adopted plan will now ensure that all proposed new community title allotments provide ample room to facilitate 10m building separation to the potential grassland hazard to the south and south east of the proposed development site

Effectively proposed community lots 5 & 6 have been modified and the proposed residential building structure within lot 6 has been re sited adopted to be not closer than 10m to the common boundary of lot DP 09582

The following is further recommended to achieve the acceptable solutions of considered relevant and to address the hazard within lot DP 09582 and unformed road reserve area to the south and south east of the proposed development site

**Recommendation (2): A non-combustible and solid barrier (e.g. colour bound fencing) of at least 1.8m in height shall be installed along the common boundary of Lot 33 DP709582 to the subject property.**

The barrier shall also be partly extended (≈50m) along the western boundary of the subject property to ensure that at least dwellings No. 4-6 are fully shielded from any potential grassland vegetation persisting to the southwest (within adjoining unformed road reserve area & Lot 33 DP709582).

**Recommendation (3): Dwellings numbered 6 & 7 shall be designed and constructed in accordance with AS3959 Sections 3 & 7 (BAL-29) as a conservative margin of safety.**

**Recommendation (4):** An emergency access / fire trail extension shall be created partly along the west boundary (within the adjoining road reserve area) of the subject property, linking the southwest corner of the proposed development (proposed Lot 6) to Old Saddleback Road. An indicative location and extent of the recommended trail / link is as shown Appendices 2 & 3 to this report.

The trail shall extend for a distance not less than the total west boundary lengths of proposed Lots 5 & 6, and shall be designed, constructed and maintained in accordance with the requirement of PBP Section 4.1.3 Access (3) – Fire Trails (as further described / listed Recommendation No. 5 of this report).

The purpose of the trail section to ensure formal reduction / management of the potential grassland hazard within the Old Saddleback Road Reserve and interfacing the western boundary of the subject property (or else proposed Lots 5 & 6).

## Vehicle Access Compliance

Section 2 Standards or Bush Fire Protection Measures or Special Fire Protection Purpose Developments Access Internal Roads which states

*The public road system in a bush fire prone area should provide alternative access or egress for firefighters and residents during a bush fire emergency if part of the road system is cut by fire. This is of critical importance for areas with the higher densities associated with SFPP developments.*

*Where those developments are being established, the requirements for public roads and car parking apply in the same way as new residential subdivisions. (See Section 4.1.3, Access - Public Roads).*

Section 1 Access Public Roads provides the minimum widths for public roads that are not perimeter roads or the same access for firefighting vehicles *Category 1 Tanker - Medium Rigid Vehicle*, (able shown below) in urban areas the maximum prescribed width required for a single lane width is 5m where the curve radius inside edge is 0m

### **Caliope Street (Public Roadway)**

The proposed development will be directly accessed from Caliope Street which runs partly along the north boundary of the subject property and is lined to Old Saddleback Road which runs along the eastern boundary.

Caliope Street is a recently constructed public road way extension contained within a 10m wide reserve area to service the proposed development site and adjacent residential subdivision. The planned fully formed and sealed carriage way including roll over concreted drainage is at least 6m wide with another 1.2m wide cleared verge and pedestrian path way access facilitating at least 8m traicable width for vehicle passing or parking positioning.

The total length of Caliope Street is approximately 220m which also provides a turning area facility at its eastern end near proposed Dwelling 21. The existing road way section does not exceed 10° at its maximum gradient 8.5° estimated and on average ≈6° over the full length.

Given the proposed length of Caliope Street technically this public road way section could not fully facilitate acceptable solutions for public or internal road way requirements i.e. 100m or internal road way or 200m or public road way access compliance. However the proposed road way area could nevertheless be reasonably clear and free of any adjacent bush fire vegetation and the egress direction i.e. to the west is away from the identified hazard. As the proposed road way area i.e. carriage way and additional verges could also provide a relatively wide access area i.e. 8m total traicable area this could otherwise reasonably achieve the Performance Criteria by enabling *safe access for emergency services and allow crews to work with equipment about the vehicle.*

Notwithstanding the above emergency through access could be afforded to Caliope Street by virtue of an additional perimeter fire trail line as further recommended by this report.

### **Internal Access Extension**

The internal road way arrangement to service the proposed development will be a looped one way access route ≈ 100m from Caliope Street with separate entry/exit points. The road way will be contained within a 9.5m road reserve area which directly services proposed new Dwellings 1 & 20. Dwelling 21 will have frontage and access via Caliope Street. The proposed carriage way will be 6m wide with another 1.5m wide designated verge area either side to facilitate one way traffic flow and access and services to the adjoining new allotments and structures.

the internal road way arrangement will exceed 10° at its maximum gradient 9.5° estimated and on average ≈ 0.5°

Table 1.0 as follows lists the respective vehicle access requirements for the proposed development

**Table 1.0 – PBP Public Roadway Access (Section 4.2.7)**

<b>PBP Acceptable Solution</b>	<b>Compliance</b>	<b>Comment</b>
<i>internal roads are two-wheel drive, sealed, all-weather roads;</i>	Can comply	the proposed internal road way section will be a fully formed drained and sealed surface to facilitate all weather access and other use as per normal Kiama Council specifications
<i>internal perimeter roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions.</i>	As recommended or performance based compliance	the subject development does not specifically propose a perimeter road way access  perimeter and lined fire trail sections provide or alternate or additional looped emergency access  Area maintenance are recommended Indicative locations and extent of the recommended fire trail sections are as shown Appendix 2 to this report
<i>Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle).</i>	Can comply	the proposed internal road way will be 5m wide effectively 6m wide within a 9.5m wide road reserve directly servicing proposed Dwellings 1-20. As a one way single lane access route this provides the maximum required road way width for single lane access as outlined in Table 1.0  Similarly the identified road reserve and verges areas for Caliope St are 10m wide over a relatively straight section easily wide enough to contain the prescribed road way width 6.5m minimum
<i>the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas.</i>	As recommended or performance based compliance	the recommended perimeter fire trail or alternate or additional looped emergency access Area maintenance could be linked to both the proposed internal road way and Caliope Street at an interval of 500m ≈ 260m

<i>roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard.</i>	Performance based Solution Required	by virtue of a recommended perimeter and lined fire trail sections both the existing and proposed public roadway sections could facilitate through access
<i>traffic management devices are constructed to facilitate access by emergency services vehicles.</i>	Can comply	It is anticipated that DA conditions will identify this requirement and there is no known or reasonable site planning constraint in this regard
<i>a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.</i>	Can comply	As above
<i>curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.</i>	Can comply	As above
<i>the minimum distance between inner and outer curves is six metres.</i>	Can comply	As above
<i>maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees.</i>	Complies	no proposed or existing public roadway sections to service the proposed development exceed 10°
<i>cross-fall of the pavement is not more than 10 degrees.</i>	Can comply	As above
<i>roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge).</i>	Complies	the proposed development site is well elevated and there would be no reasonable areas of wetland or period inundation affecting the site
<i>roads are clearly sign-posted and bridges clearly indicate load ratings.</i>	Can comply	It is anticipated that DA conditions will identify this requirement and there is no known or reasonable site planning constraint in this regard
<i>the internal road surfaces and bridges have a capacity to carry fully-loaded fire fighting vehicles (15 tonnes).</i>	Can comply	As above

**Recommendation (5):** In lieu of providing a full perimeter road between the proposed development site and identified bushfire hazard, formally identified & maintained fire / maintenance trail sections shall be incorporated. Indicative locations and extent of the recommended perimeter fire trail sections are as shown Appendix 2 to this report.

The fire trail shall be constructed and maintained in accordance with the requirement of PBP Section 4.1.3 Access (3) – Fire Trails, primarily including (but not necessarily limited to);

- minimum carriageway width of 4m with an additional 1m wide strip on each side of the trail (clear of bushes and long grass) being provided,
- the trail not exceeding a maximum grade of 15° if sealed and not more than 10° if unsealed,
- a minimum vertical clearance of 4m to any overhanging obstructions, including tree branches being provided,
- the crossfall of the trail not exceeding 10°,
- the trail having the capacity for passing by reversing bays using the intersections from Caliope Street and internal roadway section to reverse fire tankers, which are six metres wide and eight metres deep to any gates, with an inner minimum turning radius of 6m and outer minimum radius of 12m,
- the fire trail being accessible at all times for firefighters and maintained in a serviceable condition by the owner of the land,
- appropriate drainage and erosion controls being provided,
- any gate access is provided and locked with a key/lock system authorized by the local Fire Authority,
- the design acts as an effective barrier to the spread of weeds and nutrients.

**Recommendation (6):** Where any section of a formally identified & maintained fire / maintenance trail exceeds 10°, the surface of the carriageway shall be sealed.

**Recommendation (7):** A formally identified Right Of Access (ROA) shall be place along the southern boundary of proposed Lot 6.

The ROA shall be at least 4m wide to facilitate an emergency access only link between the proposed internal public roadway section and Old Saddleback Road (via the emergency trail link – Recommendation No.4).

## Concluding statement

Based on the above recommendations and identified circumstances affecting the subject property it is my considered opinion that the acceptable solutions or performance based requirements are reasonably achieved for the proposed development.

Allocated upon the Area as recommended by this report radiant heat levels emanating from remnant rain forest and scrub vegetation to the east of the proposed development have been calculated by S R modelling as not exceeding 10 m<sup>2</sup>.

Accepting the potential grassland hazard within Lot D 09582 to the south and south east of the subject property the proposed development has not been modified to ensure the closest building site proposed of 6 is not ordered a basic Area of 10m. Additionally the building structures within vicinity of the potential grassland hazard could be designed and constructed to at least A 12.5 and further protected by the integration of a 1.8 metre or higher protective non combustible fencing.

The vehicle access design arrangement to service the proposed development site could reasonably achieve the acceptable solutions for internal vehicle access by virtue of the recommended perimeter and line trail sections the proposed development could be allocated multiple options for alternative emergency access required further the recommended line trail section to Old Saddleback Road from the south east corner of proposed lot 6 could also reasonably ensure 10m separation between the associated residential building structures and any potential grassland vegetation to the south east of the site the perimeter and lined fire trail arrangement as recommended by this report are considered a more than reasonable outcome for bush fire safety compliance in this instance.

*The above advice / certification has been prepared by:*

### Matt Jones

BAppSc Environmental Health  
Grad. Dip Design for Bushfire Prone Areas  
**BPAD-L3-14598 Accredited Practitioner**

*(I hereby certify that I have undertaken the assessment of the above site and any determined Bushfire Attack Level or threat stated in accordance with the requirements of AS3959 and/or NSW Planning for Bushfire Protection Guidelines 2006 where applicable)*

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**TERM OF VALIDITY:** Opinions and statements made within the following report will expire 2 years from the date of the report. Should the following report require re-examination with a view to the possible extension of its term of validity, please apply to Bushfire Protection Planning & Assessment Services before the date of expiry. Bushfire Protection Planning & Assessment Services reserves the right at any time to withdraw any opinions or statements in the light of new knowledge.

**DISCLAIMER:** Bushfire mitigation or protection measures as identified, recommended or purported by this report may not guarantee that the proposed building development will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions, and the behaviour of building occupants or fire fighters defending the building when exposed to severe or greater bushfire attack conditions.





## Appendix 1 – Revised Site Plan



**coble stephens**  
architects

1 EAST STREET ■ MOSS VALE ■ NSW 2577  
PO BOX 2072 ■ BOWRAL ■ NSW 2576  
Ph 02 4869 5395 ■ Fax 02 4869 5495 ■ cs.arch@bigpond.net.au  
Andrew Coble Architects Registration 6922 Alison Stephens Architects Registration 6678

### SITE LAYOUT - DETAIL

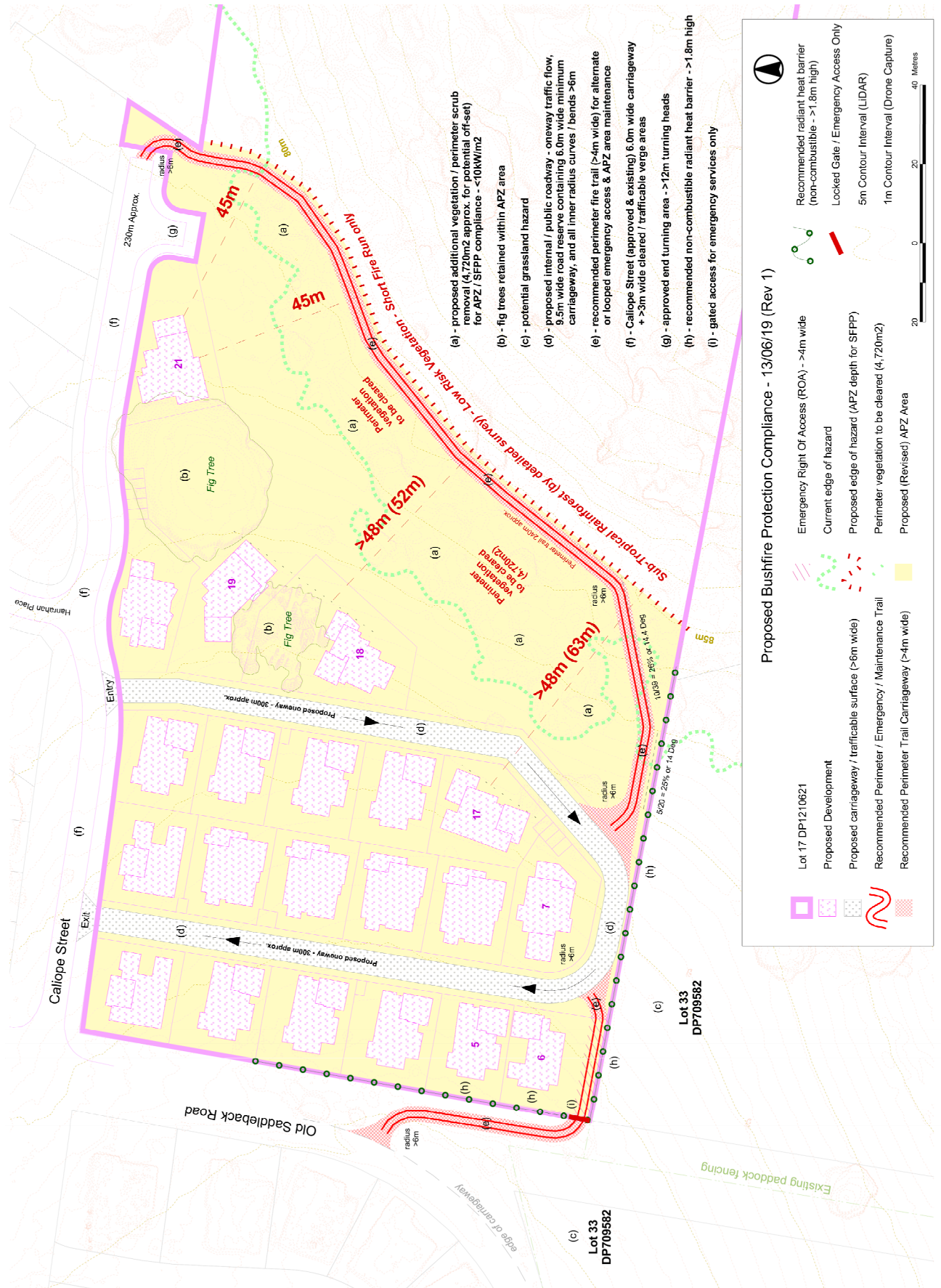
**PROPOSED SENIORS LIVING ESTATE**  
at LOT 17 DP 1210621 (Formerly Part Lot 100 DP 751279),  
43 Old Saddleback Road, KIAMA NSW  
for WERITON PROPERTIES

23-11-18 SCC02

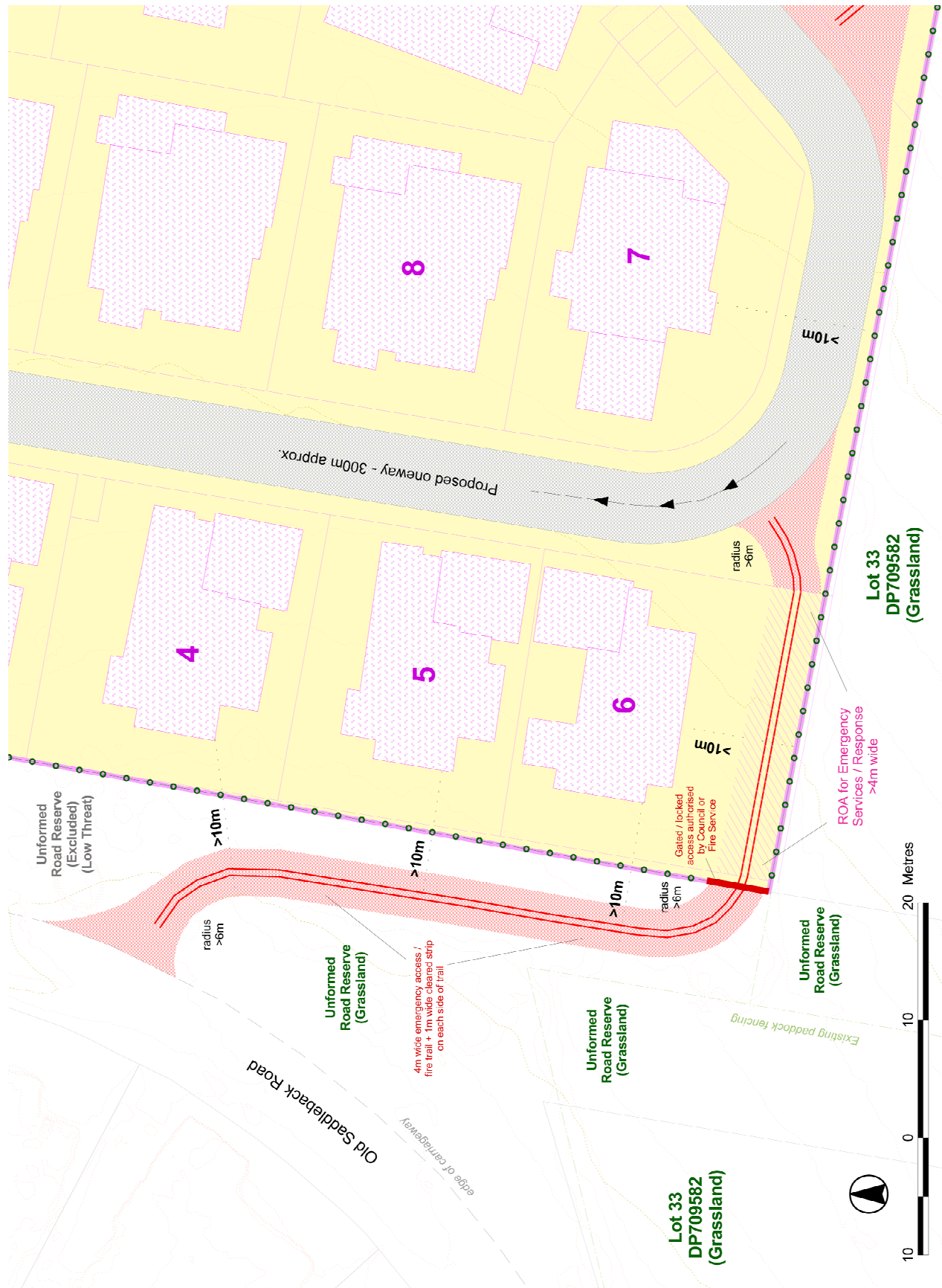
Amended ad usted allotments



## Appendix 2 – Proposed and Recommended Bushfire Protection Compliance







## Appendix 4 – Short Fire Run Modelling

# Australian Bushfire Safety & Planning



Bushfire Protection Consultants

The Director  
Bushfire Protection Planning & Assessment Pty Ltd  
PO Box 334  
Narooma NSW 2546

Australian Bushfire Safety & Planning  
68 Learmonth Street  
Willow Tree NSW 2339

Office: 02 67471567  
Mobile: 0467 011 168

ABSP ref: BF-00296

Attn: Mr Matthew Jones

16 February 2019

RE: Bushfire Attack Level (BAL) calculations for proposed SFPP development at 100 Old Saddleback Road Kiama.

Dear Matthew,

As requested, I have looked at the proposal you sent via email concerning a proposed development site at 100 Old Saddleback Road Kiama. I concur with your findings and in support have calculated the outcomes in two accepted models which match the outcomes identically.

The inputs used in the calculation process were supplied by yourself and checked by this office by way of desk top assessment. Images of the calculation pages are attached in this report. I also reference the ecological report that supports vegetation classification as mapped by OEH.

Calculation parameters (inputs) used to calculate the BAL are:

Vegetation classification: Littoral Rainforest (Mapped by OEH 2017)

Fuel Load: 10.0 tph surface & near surface fuel load

13.2 tph overall fuel load

(Fuel loads provided by University of Wollongong research Paper Report 5)

Elevated fuel height: 1.4 metres

FDI: 100

Elevation of receiver: 5.1 metres

Flame Temperature: 1200 K

3 Fire runs have been assessed.

Fire Run	Effective slope	Site slope	Fire Run Length	Required APZ	Radiant Heat
Fire Run a	22 degrees	15 degrees	110 metres	48 metres	9.92 kW/m <sup>2</sup>
Fire Run b	22 degrees	17 degrees	110 metres	48 metres	9.67 kW/m <sup>2</sup>
Fire Run c	19.5 degrees	14 degrees	113 metres	45 metres	9.90 kW/m <sup>2</sup>

The above parameters have been supplied by your office.

This office also understands that there is a proposal to remove vegetation as marked on your site drawing.

Calculations were determined using:

RFS Short Fire Run Model for low threat vegetation.

Maximum separation required to achieve 10 kW/m<sup>2</sup> from vegetation located to the southeast of the proposed development site is identified in the above table.

I trust that the above and attached information supports your development application. If you need anything further, please do not hesitate to contact me.

Best Regards



**John Delany JP**  
Managing Director



Graduate Diploma - Design in Bushfire Prone Areas (UWS 2006)  
Assoc. Prof. Cert. Expert Evidence for the Land & Environment Court  
Member (21455) Fire Protection Association of Australia

### **Australian Bushfire Safety & Planning**


Bushfire Protection Consultants

Office: 02 67471567  
Mobile: 0467011168

john@jaydelconsulting.com.au  
www.jaydelconsulting.com.au

ABSP is the trading name of @Jaydel Consulting Pty Ltd.





# Australian Bushfire Safety & Planning

**absp**  
Australian Bushfire  
Safety & Planning

Bushfire Protection Consultants

FOREST & WOODLAND - Bushfire Attack Level (BAL) Calculator

performance based assessment for a developing fire run in Forest & Woodland vegetation formations.

Developing (SFR) fire run in low risk vege

Version: 1.09 - 30/08/2018

Site Particulars:

Date: 16/02/2019 19:02



Site Address: Lot 17 DP 1210621 Old Saddleback Road Kiama

Lot/DP: 17/-/DP1210621

LGA: Kiama (100)

ABSP Job No. BF-00296

Assessment prepared by: John Delany



Field and reporting notes:

## Forest/Woodland - FDF &amp; SFR Calculation page:

Fire run specifics Lot 17 DP 1210621 Old Saddleback Road Kiama - Fire run a

## Common and bushfire behaviour contributor inputs:

Predominant vegetation Littoral Rainforests - 10 &amp; 13.2- Medium - 0.9m - 1.4m

Surface & Elevated Fuel Load	10	tph	Overall fuel load	13.2	tph
Average Canopy Height	12	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1200	Kelvin
Distance to vegetation	48	Metres	Target elevation of receiver	5.1	Metres
Effective slope	22	Degrees	Ambient temperature	308	Kelvin
Site slope	15	Degrees	SFR fire run length	110	Metres
DF nominal head width	100	Metres			

## Outputs - Fully Developed Fire (FDF)

Wind Speed	45	kph
Default elevation of receiver	18.588	Metres
FDF Flame Angle	75	Degrees
FDF Flame Length	37.18	Metres
FDF Intensity	37344	kW/m
FDF FROS	5.4757	kph
FDF Flame transmissivity	0.7885	kW/m
FDF View Factor	0.3079	

## Outputs - Developing Fire Run (SFR)

Wind speed	30	kph
Default elevation of receiver	11.927	Metres
SFR Flame Angle	81	Degrees
SFR Flame Height	23.855	Metres
SFR Intensity	28291	kW/m
SFR FROS	5.4757	kph
SFR Flame transmissivity	0.7839	kW/m
SFR View Factor	0.1133	
Calculated SFR Head Width	40.264	Metres
SFR fire run length	110	Metres
Approx. SFR travel time	20:05	min/sec
FDF Radiant Heat	27.11	kW/m <sup>2</sup>
SFR Radiant Heat	9.92	kW/m <sup>2</sup>

 Input cells

 Locked output cells

## Glossary of abbreviations/terms:

tph = tonnes per hectare  
 kW/m = Kilowatts per metre  
 kW/m<sup>2</sup> = Kilowatts per metre squared

m/h = metres per hour  
 FROS = Forward rate of Spread  
 kph = kilometres an hour

K = Kelvin  
 min = minutes  
 sec = seconds

## Forest/Woodland - FDF &amp; SFR Calculation page:

Fire run specifics Lot 17 DP 1210621 Old Saddleback Road Kiama - Fire run b

## Common and bushfire behaviour contributor inputs:

Predominant vegetation	Littoral Rainforests - 10 & 13.2 - Medium - 0.9m - 1.4m				
Surface & Elevated Fuel Load	10	tph	Overall fuel load	13.2	tph
Average Canopy Height	12	Metres	Fire weather district	100	FDI
Average elevated fuel height	1.4	Metres	Flame temperature	1200	Kelvin
Distance to vegetation	48	Metres	Target elevation of receiver	5.1	Metres
Effective slope	22	Degrees	Ambient temperature	308	Kelvin
Site slope	17	Degrees	SFR fire run length	110	Metres
DF nominal head width	100	Metres			

## Outputs - Fully Developed Fire (FDF)

Wind Speed	45	kph
Default elevation of receiver	18.588	Metres
FDF Flame Angle	78	Degrees
FDF Flame Length	37.18	Metres
FDF Intensity	37344	kW/m
FDF FROS	5.4757	kph
FDF Flame transmissivity	0.7870	kW/m
FDF View Factor	0.3047	

FDF Radiant Heat 26.78 kW/m<sup>2</sup>

## Outputs - Developing Fire Run (DFR)

Wind speed	30	kph
Default elevation of receiver	11.927	Metres
SFR Flame Angle	84	Degrees
SFR Flame Height	23.855	Metres
SFR Intensity	28291	kW/m
SFR FROS	5.4757	kph
SFR Flame transmissivity	0.7829	kW/m
SFR View Factor	0.1106	
Calculated SFR Head Width	40.264	Metres
SFR fire run length	110	Metres
Approx. SFR travel time	20.05	min/sec

SFR Radiant Heat 9.67 kW/m<sup>2</sup> Input cells Locked output cells

## Glossary of abbreviations/terms:

tph = tonnes per hectare  
 kW/m = Kilowatts per metre  
 kW/m<sup>2</sup> = Kilowatts per metre squared

m/h = metres per hour  
 FROS = Forward rate of Spread  
 kph = kilometres an hour

K = Kelvin  
 min = minutes  
 sec = seconds

**Forest/Woodland - FDF & SFR Calculation page:**Fire run specifics **Common and bushfire behaviour contributor inputs:**Predominant vegetation Surface & Elevated Fuel Load  tphOverall fuel load  tphAverage Canopy Height  MetresFire weather district  FDIAverage elevated fuel height  MetresFlame temperature  KelvinDistance to vegetation  MetresTarget elevation of receiver  MetresEffective slope  DegreesAmbient temperature  KelvinSite slope  DegreesSFR fire run length  MetresDF nominal head width  Metres**Outputs - Fully Developed Fire (FDF)**Wind Speed  kphDefault elevation of receiver  MetresFDF Flame Angle  DegreesFDF Flame Length  MetresFDF Intensity  kW/mFDF FROS  kphFDF Flame transmissivity  kW/mFDF View Factor **Outputs - Developing Fire Run (DFR)**Wind speed  kphDefault elevation of receiver  MetresSFR Flame Angle  DegreesSFR Flame Height  MetresSFR Intensity  kW/mSFR FROS  kphSFR Flame transmissivity  kW/mSFR View Factor Calculated SFR Head Width  MetresSFR fire run length  MetresApprox. SFR travel time  min/sec**FDF Radiant Heat**  kW/m<sup>2</sup>**SFR Radiant Heat**  kW/m<sup>2</sup> Input cells Locked output cells**Glossary of abbreviations/terms:**tph = tonnes per hectare  
kW/m = Kilowatts per metre  
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FROS = Forward rate of Spread  
kph = kilometres an hourK = Kelvin  
min = minutes  
sec = seconds

Supplementary Advice 26 September 2018



26<sup>th</sup> September 2018

**WERITON PROPERTIES PTY LTD**

Att: Graham Perry

Lot R169

R A E C A E S 1225

Our Reference: WPPL\_GW\_310809

Subject: Supplementary Bushfire Compliance Advice for  
proposed Seniors Living Development within Lot  
100 D 512 9 of 20 D 1151501 Lots 1 & 2  
D 1165 Id Saddleback Road Iama

Revised: 14 August 2018

Dear Graham,

As per your instruction to review, I make formal comment to the amended architectural plans which were submitted to the Iama Council by Coble Stephens Architects on 22 August 2018. The following supplementary additional advice is provided:

Please feel free to contact me and discuss any of the attached advice.

Sincerely,



**Matt Jones**

BAppSc Environmental Health

Grad. Dip Design for Bushfire Prone Areas

**BPAD-L3-14598 Accredited Practitioner**

**Bushfire Protection Planning & Assessment Services Pty. Ltd**



**Post Office Box 1727  
Queanbeyan NSW 2620**

**Post Office Box 334  
Narooma NSW 2546**

**Mob: 0428 296 526  
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**Bushfire Protection Planning  
& Assessment Services Pty Ltd**

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**ABN. 29 155 412 981 ACN. 155 412 981**

**Member of the Australian Bushfire  
Assessment Consultants Group**  
#



**SUPPLEMENTARY BUSHFIRE COMPLIANCE INFORMATION FOR DEVELOPMENT  
APPLICATION NO: 10.2017.352.1, LOT 100 DP 751279, LOT 1 DP 1165344,  
LOT 2 DP 1165344, OLD SADDLEBACK ROAD KIAMA  
SENIORS LIVING DEVELOPMENT (21 DWELLINGS) – REVISED PLAN**



26<sup>th</sup> September 2018

The following report and advice refers to land identified as Lot 100 DP 751279 Lot 1 DP 1165344 Lot 2 DP 1165344 Old Saddleback Road Kiama S 25 herein *the subject property* and the current development application Reference No 10.2017.352.1 for a 21 Dwelling Seniors Living development herein *the proposed development*

This report and advice has been prepared and documented for the purpose of providing additional or supplementary information to address amended architectural plans which were submitted to the Kiama Council by Coble Stephens Architects on 22<sup>nd</sup> August 2018

This report and advice is provided at the request of Mr Graham Perry Meriton Properties Pty Ltd of R169 Royal Exchange Street 1225 being the applicant for the proposed development

The previously proposed and submitted plan dated August 2016 and associated bush fire compliance requirements are shown in Appendix 1

The amended architectural plan herein the *proposed development* are as attached Appendices 2 and associated bush fire compliance requirements are as shown in Appendix 5

Apart from lots and building sites numbered 18 19 20 the inclusion of eleven additional visitor car parking spaces and removal of a proposed Community kiosks the remainder of the proposed development remains almost entirely unaltered from the previously proposed and submitted plan including footprints estimated distances to potential remnant bush fire vegetation and vehicle access arrangement remains much the same

For the purpose of this advice it is specifically noted that allotments 18 19 20 have been modified to facilitate the retention of relic Morton Bay fig trees within the proposed development area the shape and areas of the modified allotments have been designed to ensure new building sites will be well clear 5.6m of identified main trunks and other use not significantly encroached upon by the existing edge of canopy Each of the proposed new building sites within allotments 18 19 20 will not be located closer to the identified remnant hazard than the previously identified distance 29m or performance based compliance



Considering the above it is concluded that the proposed development could achieve the equivalent level of bush fire safety compliance whether Deemed to satisfy or performance based as previously identified and submitted

The above advice / short report has been prepared by:

**Matt Jones**

BAppSc Environmental Health  
Grad. Dip Design for Bushfire Prone Areas  
**BPAD-L3-14598 Accredited Practitioner**

(I hereby certify that I have undertaken the assessment of the above site and any determined Bushfire Attack Level or threat stated in accordance with the requirements of AS3959-2009 and/or NSW Planning for Bushfire Protection Guidelines 2006 as applicable)

**BUSHFIRE PLANNING AND DESIGN ACCREDITATION SCHEME**  
**ACCREDITED PRACTITIONER**

<b>Name</b>	<b>Matthew Jones</b>
<b>Accreditation No.</b>	<b>BPAD14598</b>
<b>Valid to</b>	<b>February 2019</b>
<b>Jurisdiction</b>	<b>Level 3 - NSW</b>



The holder of this card is accredited in accordance with the FPA Australia Bushfire Planning and Design Accreditation Scheme to perform the services listed on the reverse of this card.

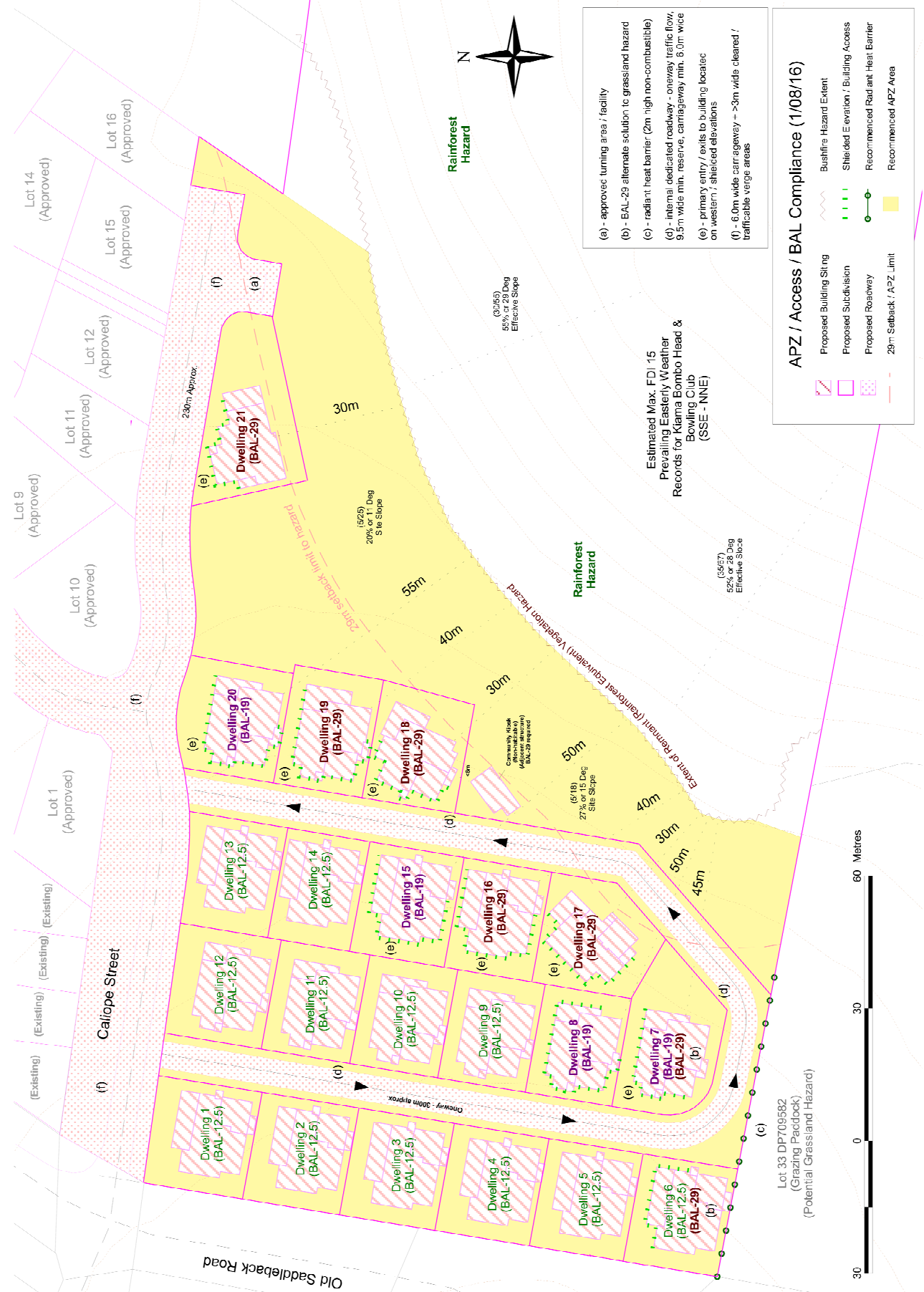
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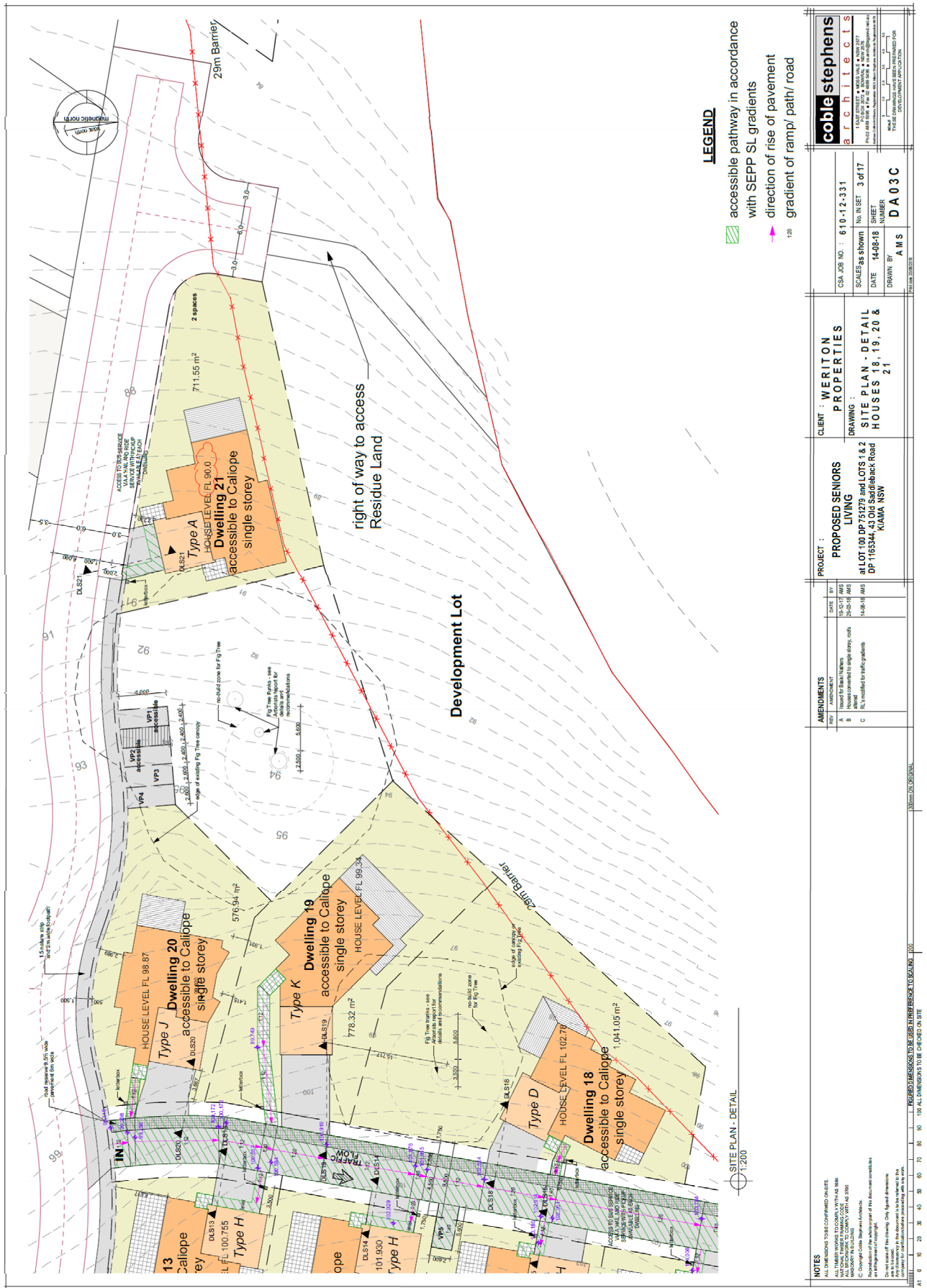
**TERM OF VALIDITY:** Opinions and statements made within the following report will expire 2 years from the date of the report. Should the following report require re-examination with a view to the possible extension of its term of validity, please apply to Bushfire Protection Planning & Assessment Services before the date of expiry. Bushfire Protection Planning & Assessment Services reserves the right at any time to withdraw any opinions or statements in the light of new knowledge.

**DISCLAIMER:** Bushfire mitigation or protection measures as identified, recommended or purported by this report may not guarantee that the proposed building development will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions, and the behaviour of building occupants or fire fighters defending the building when exposed to severe or greater bushfire attack conditions.

## Appendix 2 – Revised Plan (August 2018)







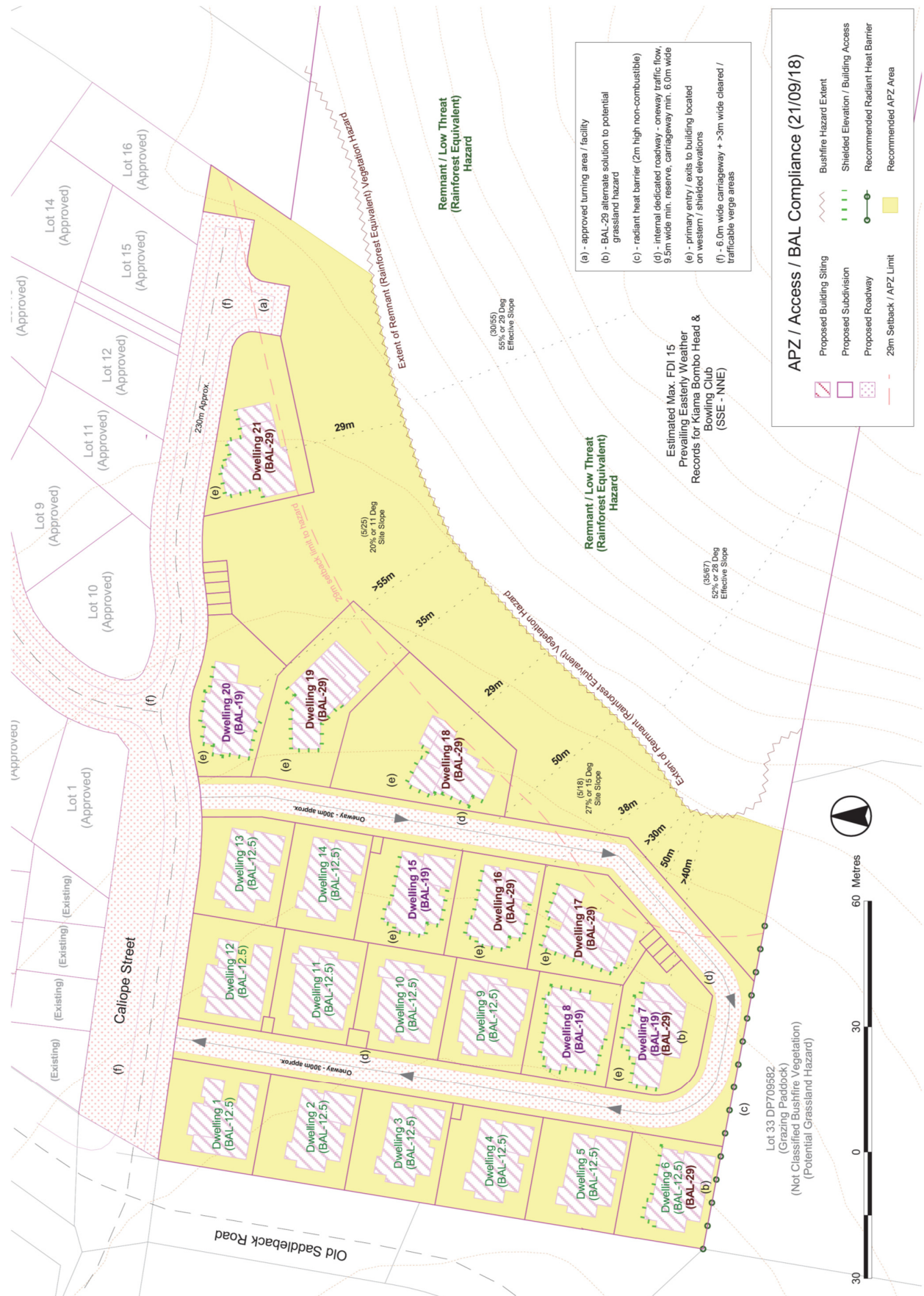




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# Appendix 5 – Revised Plan & Identified Bushfire Design Compliance (September 2018)





Supplementary Advice 12 March 2018

12<sup>th</sup> March 2018

**WERITON PROPERTIES PTY LTD**

Att: Graham Werry  
PO Box R1694  
ROYAL EXCHANGE NSW 1225

Our Reference: WPPL\_GW\_310809

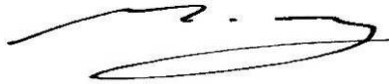
Subject: Supplementary Bushfire Compliance Advice /  
Additional Information for Proposed Seniors  
Living Development within Lot 100 DP751279,  
Lot 20 DP1151501 & Lots 1 & 2 DP1165344 43  
Old Saddleback Road Kiama.

Dear Graham,

As per your instruction (email dated 14/02/18) to respond to the matters raised for attention as listed under Section 13 (A-C) of the initial assessment for the subject development, the following supplementary / additional advice is provided.

Please feel free to contact me and discuss any of the attached advice.

Sincerely



**Matt Jones**

*BAppSc Environmental Health*

*Grad. Dip Design for Bushfire Prone Areas*

**BPAD-L3-14598 Accredited Practitioner**

**Bushfire Protection Planning & Assessment Services Pty. Ltd**



**Post Office Box 1727  
Queanbeyan NSW 2620**

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**ABN. 29 155 412 981 ACN. 155 412 981**

**Member of the Australian  
Bushfire Assessment Consultants Group**



**ADDITIONAL BUSHFIRE COMPLIANCE INFORMATION FOR DEVELOPMENT**  
**APPLICATION NO: 10.2017.352.1, LOT 100 DP 751279, LOT 1 DP 1165344,**  
**LOT 2 DP 1165344, OLD SADDLEBACK ROAD KIAMA**  
**SENIORS LIVING DEVELOPMENT (21 DWELLINGS)**



12<sup>th</sup> March 2018

The following report and advice refers to land identified as Lot 100 DP751279, Lot 1 DP1165344, LOT 2 DP1165344 Old Saddleback Road Kiama NSW 2533 (herein '*the subject property* ') and the current development application (Reference No: 10.2017.352.1) for a 21 Dwelling Seniors Living development (herein '*the proposed development* ').

The following report and advice has been prepared and documented for the purpose of providing additional or supplementary information to address the matters raised for attention as listed Section 13 A-C of the Kiama Municipal Council initial assessment (as dated 7/02/18, Reference: 10.2017.352.1) for the subject development.

This report and advice is provided at the request of Mr Graham Werry (Weriton Properties Pty Ltd, PO Box R1694, Royal Exchange NSW 1225), being the applicant for the proposed development.

The subject property and surrounds were re-inspected on the 10/03/18 and previously inspected on the 10/10/09 & 4/12/12. The inspection of the subject property on the 4/12/12 was also undertaken in the presence of NSW Rural Fire Service Officers (Ms Merryn Spray & Ms Michelle Streater).

For the purpose of this advice, it is noted that subject property has remained reasonably unchanged since the initial 2009 inspection, albeit the adjacent land to the north and west of the proposed development site has now been developed for residential living purposes.

A recent ortho-photo of the subject property and surrounds is as shown Appendix 1.

Recent site photos (10/03/18), relating to this report and advice, are as shown Appendix 2.

Documents, standards & terminology referred to throughout this report and advice include;

- NSW Planning for Bush Fire Protection Guidelines 2006 (herein '*PBP*'),
- Special Fire Protection Purpose Development (herein '*SFPP*'), as defined Section 100B(6) of the NSW Rural Fire Act 1997,
- Australian Standard 3959 Construction of buildings in bushfire-prone areas (herein '*AS3959*'),
- Bushfire Prone Land Map (herein '*BPLM*'), as defined Part 10 Section 10.3 of the Environmental Planning and Assessment Act 1979, as shown Appendix 3.
- Fire Danger Index (herein '*FDI*'), as expressed by calculated algorithm –  
 $2.0 * \exp(-0.450 + 0.987 * \ln(D) - 0.0345 * H + 0.0338 * T + 0.0234 * V)$ , where D=Drought Factor (defaulted to 10), H=Relative humidity (%), T=Air temp (C°) and V=Average wind velocity in open at height of 10m (km/hr).



To qualify certain statements and assumptions within this report which rely on 'reasonable' or 'common sense' judgement, the basis for the current design & stated compliance primarily relies on a formal discussion & request to the NSW Rural Fire Service (herein '*the RFS*') dated 4/12/12 to consider the extenuating or 'marginal' vegetation circumstances to the proposed development site, which stated;

*Considering the marginality of the remnant hazard on the 'lower' risk aspect (easterly aspect) of the site, the RFS may also consider an assessment of compliance against the performance criteria predicated upon an acceptance that radiant heat levels of greater than 10kW/m<sup>2</sup> will not be experienced by occupants or emergency services workers entering or exiting a building on the basis that all exits are located away from the hazard side of the building.*

The formal email response from the RFS dated 29/05/13 stated;

*'the alternate solution for exits on the non hazard side of the building...would be accepted as an exceptional circumstance due to the low threat vegetation'.*

In this regard, it is still considered that the merits for SFPP and Asset Protection Zone (APZ) compliance have been previously acknowledged by the RFS and an alternate solution for shielded exits to the potential hazard would be the accepted outcome for compliance. The RFS response dated 29/05/13 is considered the pathway to compliance as currently submitted. The matters now raised for attention, particularly those relating to APZ and FDI estimations, could otherwise be interpreted a contradiction to the previous RFS advice.

The full email response from the RFS dated 29/05/13 and associated correspondence is as shown Appendix 4 & 5.

It should also be noted that the current BPLM (Category 2 Vegetation & associated 30m buffer) affecting the subject property lies well to the east or south (>30m) of any proposed new residential building structure and the majority of proposed new public roadway sections. In this regard, it may otherwise be reasonable to suggest that the proposed development area (i.e. proposed new building structures, associated curtilages and vehicle access sections) should not necessarily be considered a bushfire prone location.

Given the proposed development area is itself technically not bushfire prone & the associated bushfire hazard has been formally acknowledged as low threat vegetation, again the pathway to compliance as currently submitted is considered a reasonable & common sense approach for the merits of this location.

The current BPLM and proposed development overlay is as shown Appendix 3.

Additional or identified recommended bushfire safety measures / compliance as described by this report are as denoted Appendix 6

A formal response to each of the matters raised for attention are as follows.



Section 13(A) of the initial assessment states;

*Additional information that demonstrates how the proposed development can accommodate the minimum Asset Protection Zones (APZs) required to ensure all proposed buildings within the Special Fire Protection Purpose (SFPP) development will not be exposed to radiant heat levels greater than 10kW/m<sup>2</sup>.*

*All SFPP developments need to provide for the special characteristics and needs of occupants. Unlike residential subdivisions, which can be built to a construction standard to withstand the fire event, enabling occupants and firefighters to provide property protection after the passage of fire, occupants of SFPP developments may not be able to assist in property protection. They are more likely to be adversely affected by smoke or heat while being evacuated.*

*In order for emergency services to operate in support of those occupants with limited mobility, the requirements for APZs are higher.*

*As outlined in section 4.2.7 of 'Planning for Bush Fire Protection (PBP) 2006', radiant heat levels of greater than 10kW/m<sup>2</sup> must not be experienced by emergency services workers aiding residents within a special fire protection purpose development.*

**Response 1:**

**The RFS response of the 29/05/13 is considered as reasonably addressing the above, being the acceptance of entry / exits on the non-hazard side of the structures to provide a shielded access route to and from the structure.**

**Apart from proposed dwellings 15, 16 & 17, all other proposed dwellings will have a direct and shielded access, from any identified or potential bushfire hazard, to the proposed internal or public roadway system.**

**To ensure absolute and reasonable compliance in this regard, it could be additionally recommended / conditioned that an arrangement of 'shared' pedestrian access routes (≈2m wide) over the adjoining allotments to the west (i.e. Lots 8-10) be incorporated in favour of Dwellings 15, 16 & 17. An indicative location of the recommended pedestrian access is as denoted Appendix 6 of this report.**

*In addition, it is noted that the proposed development relies on the management of adjoining land to achieve the minimum APZ requirements.*

*As outlined in section 3.5(b) of PBP 2006 and the NSW Rural Fire Service (RFS) Community Resilience Practice Notes 1/12, Neither the RFS nor a Council has the power to impose an APZ on an adjoining landowner.*

*While exceptional circumstances may apply, APZs should be contained within the overall development site and not on adjoining lands.*

*Where an APZ is proposed on adjoining land, the land must be managed in perpetuity.*

*In order to achieve this, the land should have an easement created under Section 88B of the 'Conveyancing Act 1919' to ensure all APZs are managed to an acceptable standard and that management occurs in a binding legal agreement in perpetuity.*

*Details of any proposed easement and consent should be submitted with the development application.*

## Response 2:

It is understood that this matter raised refers to proposed Dwelling 6 & 7. The neighbouring paddock to the south (Lot 33 DP709582) has been identified as a grazed paddock, but also is also acknowledged as a potential grassland hazard. In this regard, it is assumed the matter raised refers to the potential for the neighbouring paddock to not be adequately maintained as 'managed land' or 'low threat vegetation' in perpetuity.

AS3959 identifies low threat vegetation as...*grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks*, further noting that...*minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100mm).*

It is difficult to confidently categorize whether or not there is a grassland hazard in this direction (i.e. over neighbouring Lot 33 DP709582 to the south of the proposed development area). Clearly the area is currently (and historically) used for livestock grazing and also appears to be subject to occasional slashing. Whether or not this could reasonably be assumed as a continued practice occurring over the neighbouring land is unclear.

Notwithstanding the above, this particular area of neighbouring Lot 33 DP709582 has NOT been identified as a hazard by the current Kiama Bushfire Prone Land mapping, which would reasonably support a conclusion that this area should not necessarily be classified as a hazard constraint.

The currently recommended radiant heat barrier and increased BAL construction requirement is considered a more than reasonable compromise given any potential or concern regarding a grassland hazard over the adjacent section of neighbouring Lot 33 DP709582 - which is otherwise NOT technically or legally identified as a bushfire hazard.

Section 13(B) of the initial assessment states;

*Information that demonstrates how the proposed development complies with the access road provisions outlined in section 4.1.3(1) and 4.2.7 of 'Planning for Bush Fire Protection (PBP) 2006':*

*As noted in PBP 2006, all proposed access roads within SFPP developments must comply with both the internal access road requirements set out in section 4.2.7 and the public road requirements set out in section 4.1.3(1) of PBP 2006.*

*This includes, but is not limited to, the provision of an internal perimeter road that are at least two traffic lane widths (minimum 8 metre carriageway when measured kerb to kerb), allowing traffic to pass in opposite directions.*

### Response 3:

Whilst perimeter roadway access is acknowledged as a technically preferred option or normal arrangement for an urban area, it is NOT considered an absolute or mandatory requirement (by considered professional opinion and textual interpretation of PBP).

PBP states / identifies;

- *a perimeter road is the preferred option to separate bushland from urban areas. Fire trails will only be considered acceptable in exceptional circumstances.*
- *As a planning principle for rezoning to residential land in bush fire prone areas, the provision of a perimeter road with two way access which delineates the extent of the intended development.*
- *Perimeter roads should be the normal arrangement for urban areas.*

Given the proposed development site has been identified at relatively low risk for a significant bushfire event adversely impacting on this location, additional requirements for larger two way perimeter roadway access is considered unwarranted and excessive. An urban pumper or firefighting tanker should reasonably & easily be able access the proposed development site & any adjacent vegetation hazard by the currently proposed internal loop access, from the Caliope Street extension and from Old Saddleback Road if necessary. It is also reasonable to suggest the current loop road arrangement otherwise effectively provides a perimeter access route to all but three of the proposed Dwellings (No. 18, 19 & 20) and Dwelling 21 which is accessed from Caliope Street.

However, to facilitate reasonable compliance in this regard, it could be additionally recommended / conditioned that a basic vehicle access route or fire trail (to applicable PBP standards) linking the proposed loop access from the southern end of the site to the end of the Caliope Street extension as common sense and fair compromise.

*In addition, all non-perimeter roads must comply with the minimum design and road width requirements as set out in section 4.1.3(1) of PBP 2006.*

### Response 4:

Given the proposed access arrangement will be a one-way arrangement, the maximum prescribed / required roadway width is 4.5m in accordance with Section 4.1.3(1) & Table 4.1 of PBP. As the proposed carriageway will be 6m wide within at least a 9m wide road reserve area, this more than exceeds the required outcome.

All other PBP acceptable solutions for public roadway / non-perimeter roadway access (where considered a mandatory requirement) have been previously addressed by the Bushfire Assessment / Compliance Short Report dated 18/08/16.

Section 13(C) of the initial assessment states;

*The NSW RFS is not in a position to support the proposed reduction of the local Fire Danger Index (FDI) from FDI 100 to FDI 15. This is a considerable reduction in FDI.*

*Whilst some methodology has been included to explain the reduction, it is considered that further justification should be provided as follows to ensure that the fire risk to the proposed site is not underestimated:*

*Generalised Extreme Value (GEV) – provide further information detailing how the GEV approach has been used in calculating the reduced FDI for this site. You may wish to refer to 'Use of the Extreme Value Analysis in Determining Annual Probability of Exceedance for Bushfire Protection Design' by Douglas, He, Xiang and Morris.*

#### **Response 5:**

**GEV modelling using annual maximum values has not been considered at this point in time.**

**It is also noted that GEV research article was published 2014, being subsequent to the RFS response of May 2013 stating acceptance of an acceptable solution for the exceptional circumstances affecting the proposed development site.**

**However, for the purpose of establishing a potential / maximum FDI value (albeit grossly overestimated), the absolute maximum recorded values taken from the Kiama / Bombo Headland & Kiama Bowling Club Weather Stations (as tabled in the previous Bushfire Assessment / Compliance Short Report dated 18/08/16) have been identified.**

**Kiama / Bombo Headland Weather Station (NNE-SSE Values only);**

- Max. Temp: 27°,
  - Max. Wind: 63kph,
  - Min. Humidity: 36%
- } FDI ≈ 38 \*

**Kiama Bowling Club Weather Station (NNE-SSE Values only);**

- Max. Temp: 32°,
  - Max. Wind: 55kph,
  - Min. Humidity: 28%
- } FDI ≈ 49 \*

**Given the above values, it is still considered more than reasonable and common sense judgement to conclude the maximum FDI likely to prevail from the direction of the identified hazard (i.e. NNE-SSE) would be less than half of the prescribed value (100) for the purpose of an assessment against PBP or AS3959.**

*\* estimated using CSIRO MkV Forest Fire Danger Index*



*Time Period – Provide further justification that the time period used to calculate the FDI provides sufficient data to predict the FDI for the site.*

**Response 6:**

The time period is as long as the recorded weather data for the two nearest weather stations. Kiama Bowling Club records were used from 1897 to 2007, and the Bombo Headland records appear to only cover 2001 – 2003.

This data was formally acquired from the Bureau of Meteorology in 2007. Apart from including the additional 10 years of data for the Kiama Bowling Club site (which is assumed to have been recorded since 2007), it is not known if there is more accurate or longer term recorded data for the subject property and surrounding area.

*Wind Direction – The calculated FDI only takes into account winds from a NNE and SSE direction. Please provide further information data*

**Response 7:**

The calculated FDI uses all recorded data for wind directions from NNE to SSE. This includes wind directions;

**NNE - from around 22°**

**NE - from around 45°**

**E - from around 90°**

**ESE - from around 113°**

**SE - from around 135°**

**SSE - from around 158°**

The report clearly stated '*calculated when wind direction NNE-SSE*' and the Appendix 5 Tables clearly identified the above wind directions.

*The above advice / response has been prepared by:*

**Matt Jones**

BAppSc Environmental Health  
Grad. Dip Design for Bushfire Prone Areas  
**BPAD-L3-14598 Accredited Practitioner**

*(I hereby certify that I have undertaken the assessment of the above site and any determined Bushfire Attack Level or threat stated in accordance with the requirements of AS3959-2009 and/or NSW Planning for Bushfire Protection Guidelines 2006 as applicable)*

**BUSHFIRE PLANNING AND DESIGN ACCREDITATION SCHEME**  
**ACCREDITED PRACTITIONER**

<b>Name</b>	<b>Matthew Jones</b>
<b>Accreditation No.</b>	<b>BPAD14598</b>
<b>Valid to</b>	<b>February 2019</b>
<b>Jurisdiction</b>	<b>Level 3 - NSW</b>



 **BPAD**  
Bushfire  
Planning & Design  
Accredited Practitioner

The holder of this card is accredited in accordance with the FPA Australia Bushfire Planning and Design Accreditation Scheme to perform the services listed on the reverse of this card.

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**TERM OF VALIDITY:** Opinions and statements made within the following report will expire 2 years from the date of the report. Should the following report require re-examination with a view to the possible extension of its term of validity, please apply to Bushfire Protection Planning & Assessment Services before the date of expiry. Bushfire Protection Planning & Assessment Services reserves the right at any time to withdraw any opinions or statements in the light of new knowledge.

**DISCLAIMER:** Bushfire mitigation or protection measures as identified, recommended or purported by this report may not guarantee that the proposed building development will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions, and the behaviour of building occupants or fire fighters defending the building when exposed to severe or greater bushfire attack conditions.



## APPENDIX 1 – ORTHOPHOTO / SUBJECT PROPERTY BOUNDARY

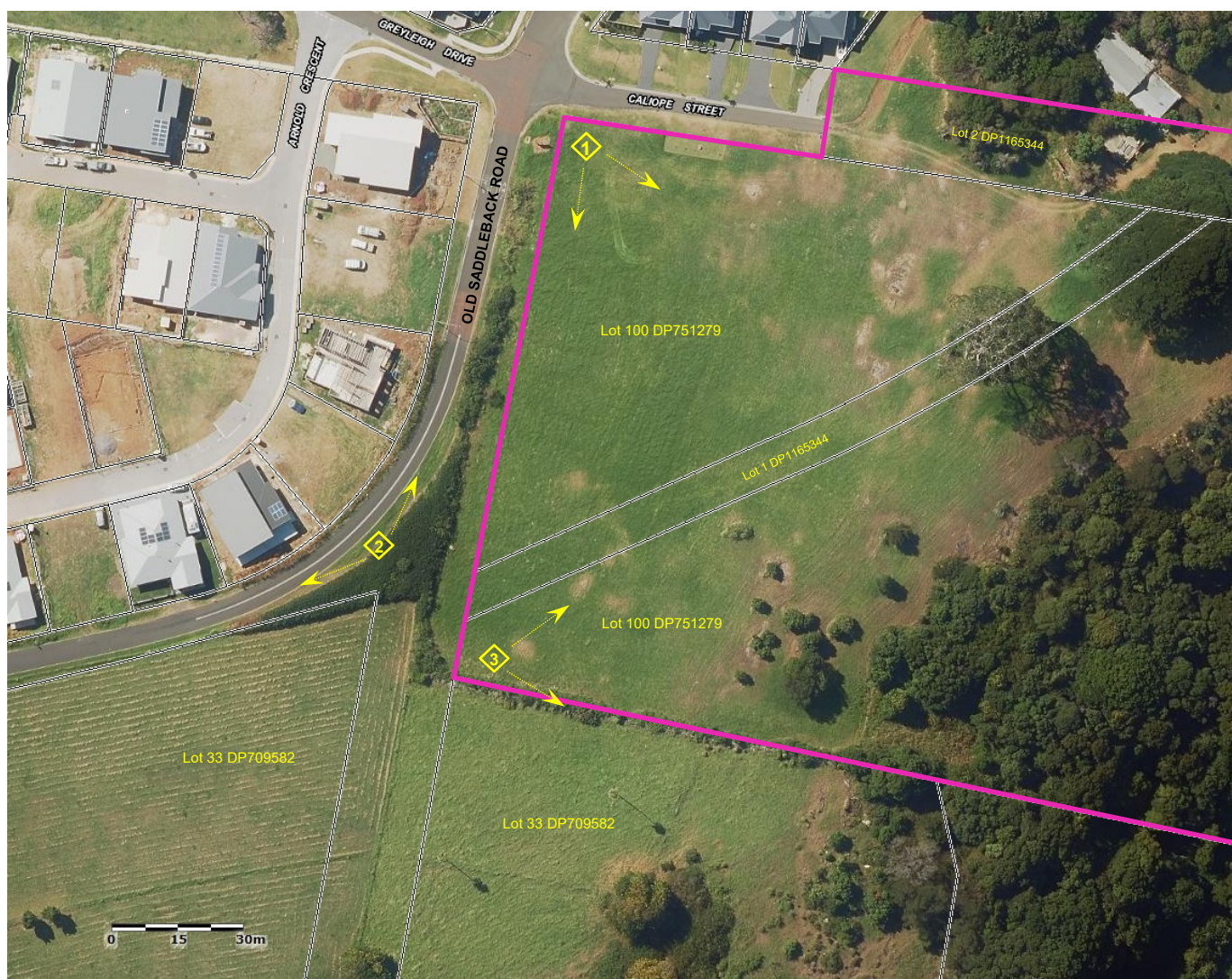


Figure 2.0 – Ortho-photo, courtesy <https://maps.six.nsw.gov.au/> (8/03/18)



Photo Reference Point (10/03/18)



## APPENDIX 2 – SITE PHOTOS (10/03/18)



Photo Point 1 – Looking ESE



Photo Point 1 – Looking S



Photo Point 2 – Looking WSW



Photo Point 2 – Looking N



Photo Point 3 – Looking NE



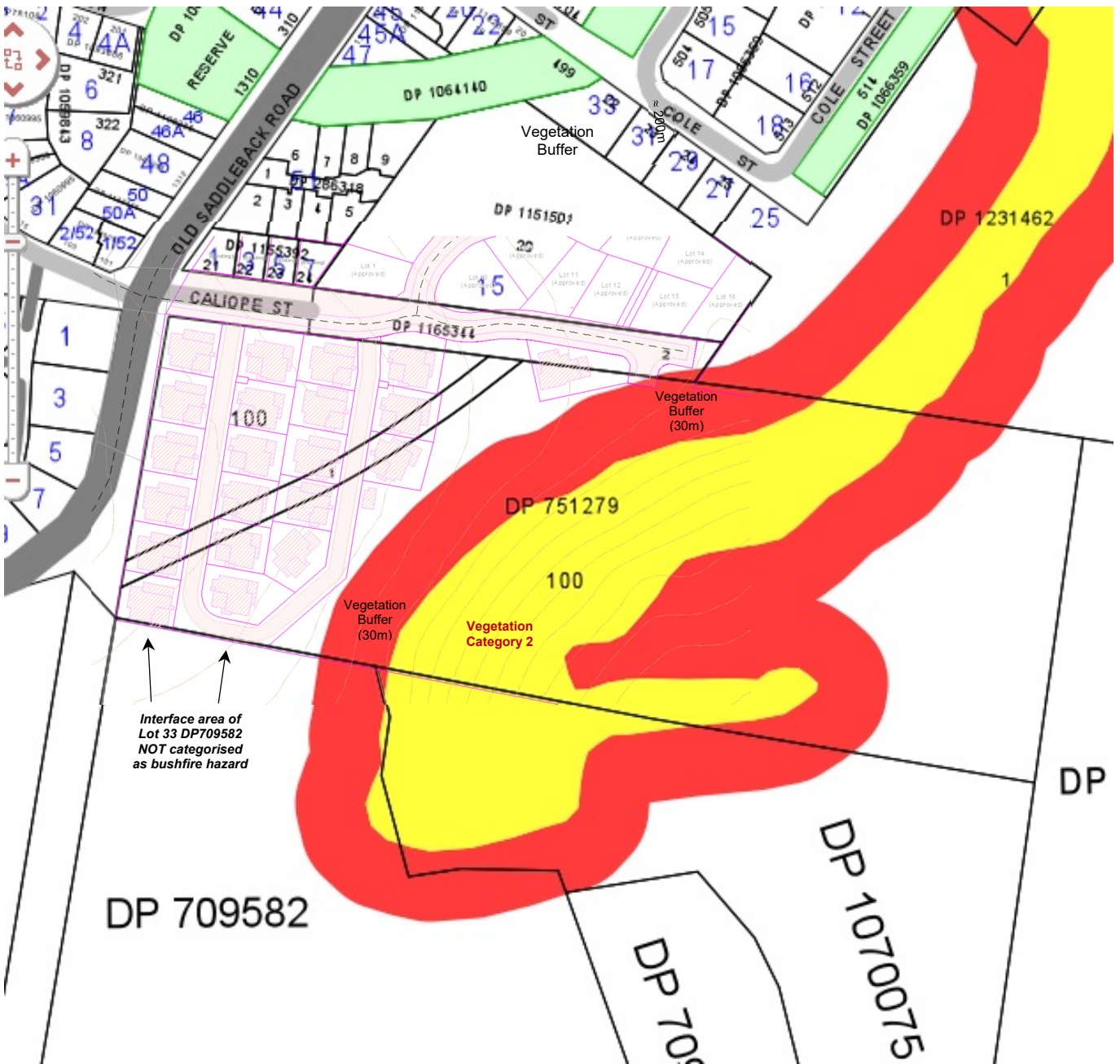
Photo Point 3 – Looking ESE



View from Old Saddleback Road across neighbouring Lot 33 DP709582 – interface to southern boundary of subject property  
(Courtesy Google Earth, 11/03/18)



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**Figure 1.0 – Bushfire Prone Land Map**, courtesy <http://www.kiama.nsw.gov.au/planning-and-development/view-maps/interactive-maps/interactive-maps> (8/03/18)



## APPENDIX 4 – EMAIL CORRESPONDANCE (4<sup>th</sup> DECEMBER 2012)

(BPPASS to RFS)

**From:** Matt Jones (BPPASS - Out of Office) [<mailto:mattj@bushfireconsultants.com.au>]  
**Sent:** Tuesday, 4 December 2012 10:22 PM  
**To:** Merryn Spray ([Merryn.Spray@rfs.nsw.gov.au](mailto:Merryn.Spray@rfs.nsw.gov.au)); 'Michelle Streater'  
**Subject:** FW: Proposed Seniors Living Development - 43 Old Saddle Back Road Kiama

Hi Michelle and Merryn.

Thanks for meeting on-site with me today.

As promised, the key points I understood from our discussion was that;

- Irrespective of the 'marginality' of the remnant closed scrub in question, it will be considered a hazard. A category of Rainforest would be the accepted vegetation in this instance.
- The 65m APZ / separation to the remnant hazard would be the expected setback distance in accordance with PBP Table A2.6 (Rainforest on effective slope >15 Degrees) or the DTS requirement to achieve 10kW/m<sup>2</sup> or less at any adjacent building line.
- The RFS may consider an 'engineered' assessment of potential radiant flux emanating from the remnant hazard based on a determined upper FDI with statistically prevailing weather parameters from the easterly aspects. The determination of a reduced FDI (i.e. <100) may be used to demonstrate a lesser setback to achieve 10kW/m<sup>2</sup> or less at any adjacent building line.
- Considering the marginality of the remnant hazard on the 'lower' risk aspect (easterly aspect) of the site, the RFS may also consider an assessment of compliance against the performance criteria predicated upon an acceptance that *radiant heat levels of greater than 10kW/m<sup>2</sup> will not be experienced by occupants or emergency services workers entering or exiting a building* on the basis that all exits are located away from the hazard side of the building.

If you could confirm or refine the above points, that would be great. If you believe I've misinterpreted or completely missed something, please include the advice so I can advise the Developer of the land appropriately.

Thanks again.

### Matt Jones

BAppSc Environmental Health  
Grad. Dip Design for Bushfire Prone Areas  
**BPAD-A Certified Practitioner BPD-PA-09336**  
Member No. 9336 Fire Protection Association Australia

### Bushfire Protection Planning & Assessment Services Pty Ltd

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PO Box 334 Narooma NSW 2546

Please note that as of February 2012, this Company now trades solely under the name Bushfire Protection Planning and Assessment Services Pty Ltd or BPPASS.



## APPENDIX 5 – EMAIL CORRESPONDANCE (29<sup>th</sup> May 2013)

(RFS to BPPASS)

### **Matt Jones (BPPASS - Out of Office)**

---

**From:** Merryn Spray <Merryn.Spray@rfs.nsw.gov.au>  
**Sent:** Wednesday, 29 May 2013 10:29 AM  
**To:** Matt Jones (BPPASS)  
**Subject:** Proposed Seniors Living Development - 43 Old Saddle Back Road Kiama

Hi Matt,

In reference to the above development, you are advised that the Rural Fire Service will only accept a reduction in the FDI that is based on 50 years of weather data or scientifically proven for the specific area. In regard to the alternate solution for exits on the non hazard side of the building, the application would be accepted as an exceptional circumstance due to the low threat of the vegetation.

I apologise for the delay in the response to the enquiry. If you have any further queries, please do not hesitate to contact me.

Kind regards,

**Merryn Spray**  
Development Assessment and Planning Officer  
**NSW RURAL FIRE SERVICE**  
Customer Service Centre - Glendenning  
42 Lamb Street  
Glendenning NSW 2761

**T:** 1300 679 737  
**F:** 02 8867 7983

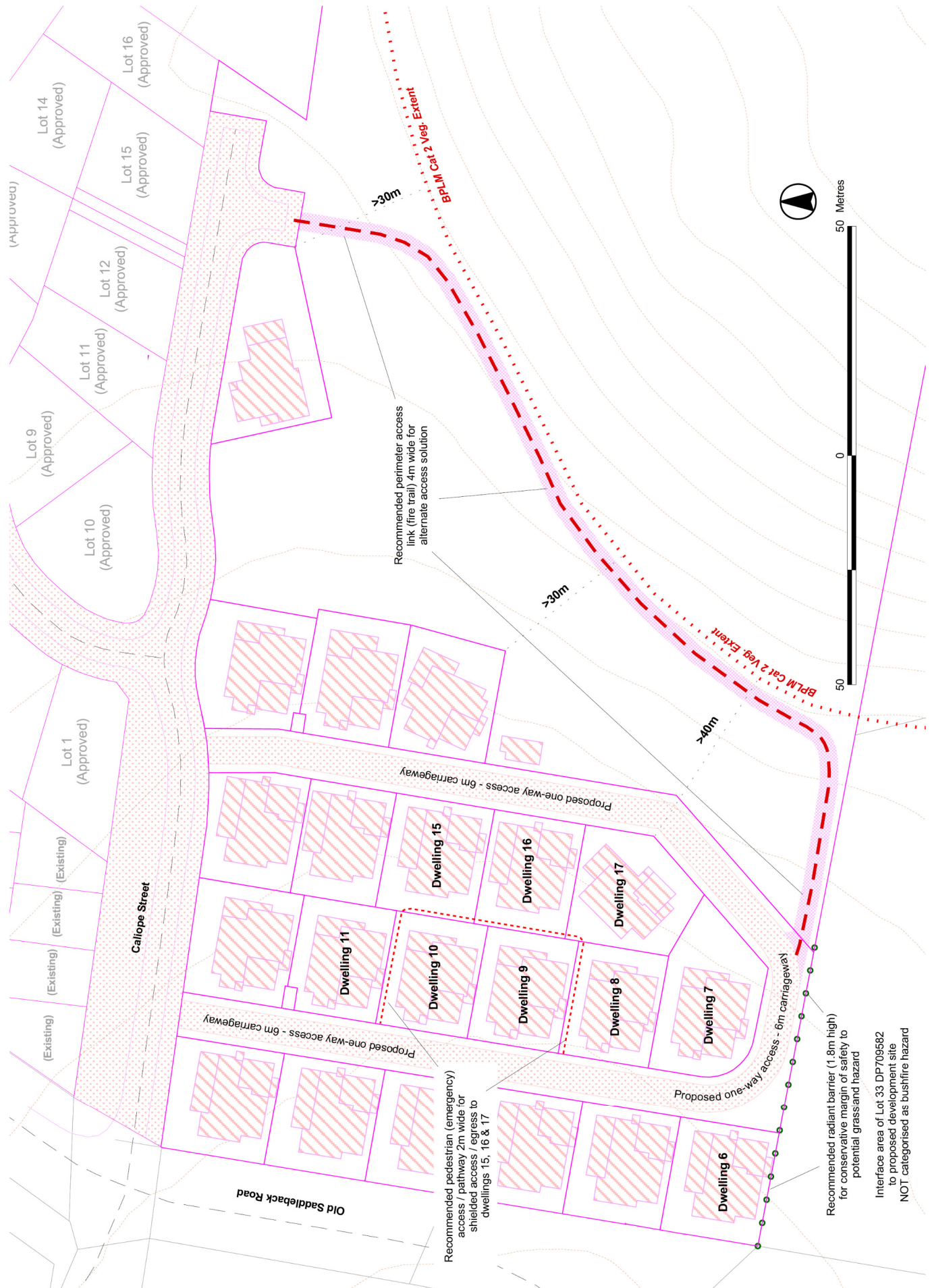
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## APPENDIX 6 – Recommended / Identified Additional Requirements



Supplementary Advice 18 August 2016



18<sup>th</sup> August 2016

**WERITON PROPERTIES PTY LTD**

Att: Graham Werry

PO Box R1694

ROYAL EXCHANGE NSW 1225

Our Reference: WPPL\_GW\_310809 (Short Report – Aug 2016)

Subject: Revised bushfire compliance short report for proposed Seniors Living Development within Lot 100 DP751279, Lot 20 DP1151501 & Lots 1 & 2 DP1165344 43 Old Saddleback Road Kiama.

Dear Graham

As per email advice and various plans from Coble Stephens Architects Pty Ltd (dated 20/07 & 17/08/16) for an updated short report describing bushfire safety and design compliance for a proposed Seniors Living Development within Lot 100 DP751279, Lot 20 DP1151501 & Lots 1 & 2 DP1165344 43 Old Saddleback Road Kiama, the following advice is provided.

This updated report still considers and includes past advice from the NSW Rural Fire Service with regard to shielded building access / egress points for bushfire safety compliance.

Please feel free to contact me and discuss any of the attached advice.

Sincerely



**Matt Jones**

BAppSc Environmental Health

Grad. Dip Design for Bushfire Prone Areas

**BPAD-L3-14598 Accredited Practitioner**

*Bushfire Protection Planning & Assessment Services Pty. Ltd*



**Post Office Box 334  
Narooma NSW 2546**

**Mob: 0428 296 526**

**Bushfire Protection Planning  
& Assessment Services Pty Ltd**

ABN. 29 155 412 981 ACN. 155 412 981

Member of the Australian Bushfire  
Assessment Consultants Group



**SHORT REPORT - Bushfire Assessment / Compliance for  
Proposed Seniors Living Development within Lot 100  
DP751279, Lot 20 DP1151501 & Lots 1 & 2 DP1165344  
Old Saddleback Road Kiama**



18<sup>th</sup> August 2016

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The following short report describes bushfire safety and design compliance for a proposed Senior Living Development within Lot 100 DP751279, Lot 20 DP1151501 & Lots 1 & 2 DP1165344, 43 Old Saddleback Road Kiama (herein '*subject development*' or '*subject property*').

A plan of the subject development, Preliminary Site Plan as prepared by Coble Stephens Architects – 26/07/16 (Job No: 610-12-331), is as attached Appendix 1 to this report.

For the purpose of this assessment and report, the subject development consists of 21 new allotments to each contain a single residential building structure. Twenty (20) of the new allotments / buildings will be accessed by a new internal / loop access roadway section ( $\approx 300\text{m}$ ) and 1 allotment / building to be accessed direct from proposed new public roadway (Caliope Street) to service the subject development. Access to the subject development site will be via Old Saddleback Road (or via Caliope Street).

The proposed new residential allotments will range in size from  $469 - 712\text{m}^2$ , purposefully designed and arranged to maximize the potential separation distance between proposed building structures and any persisting bushfire / heritage vegetation retained within the subject property. In this regard, the western or elevated half of the subject property will be developed, and the eastern or lower / steeper area set aside as residual / community land ( $\approx 34,000\text{m}^2$ ) for open space and retained vegetation.

A 'Community Kiosk' building structure is also proposed to be constructed on the community / residual land, directly adjacent ( $<6\text{m}$ ) to Dwelling 18. For the purpose of this assessment and advice, it is understood that this building structure will be a non-habitable (Class 10a) building structure to provide a community facility for cooking and rest (i.e. kitchen, sitting area and toilets).

The proposed residential dwellings will be designated for Senior Living, and as such are categorised as a 'Special Fire Protection Purpose' (herein '*SFPP*') Development. For the purpose of this report, these buildings are referred to as Dwellings 1-21. Table 1.0 as follows outlines the allotment details and access arrangement

**Table 1.0**

Allotment (Dwelling)	Size (Sqm)	Vehicle Access
1	542	Via internal roadway section, <5m from frontage, ≈25m from Caliope Street
2	542	Via internal roadway section, <5m from frontage, ≈45m from Caliope Street
3	542	Via internal roadway section, <5m from frontage, ≈65m from Caliope Street
4	543	Via internal roadway section, <5m from frontage, ≈90m from Caliope Street
5	543	Via internal roadway section, <5m from frontage, ≈100m from Caliope Street
6	547	Via internal roadway section, <5m from frontage, ≈120m from Caliope Street
7	688	Via internal roadway section, <5m from frontage, ≈115m from Caliope Street
8	500	Via internal roadway section, <5m from frontage, ≈100m from Caliope Street
9	500	Via internal roadway section, <5m from frontage, ≈80m from Caliope Street
10	500	Via internal roadway section, <5m from frontage, ≈60m from Caliope Street
11	491	Via internal roadway section, <5m from frontage, ≈40m from Caliope Street
12	525	Via internal roadway section, <5m from frontage, ≈20m from Caliope Street
13	469	Via internal roadway section, <5m from frontage, ≈20m from Caliope Street
14	500	Via internal roadway section, <5m from frontage, ≈40m from Caliope Street
15	500	Via internal roadway section, <5m from frontage, ≈60m from Caliope Street
16	500	Via internal roadway section, <5m from frontage, ≈80m from Caliope Street
17	600	Via internal roadway section, <5m from frontage, ≈95m from Caliope Street
18	546	Via internal roadway section, <5m from frontage, ≈60m from Caliope Street
19	534	Via internal roadway section, <5m from frontage, ≈40m from Caliope Street
20	562	Via internal roadway section, <5m from frontage, ≈20m from Caliope Street
21	712	Via Caliope Street, <5m from frontage

The subject development also forms part of a larger residential subdivision incorporating an additional 16 allotments also accessed from Caliope Street. These allotments and future residential building development are not considered for the purpose of this report.

Appendix 1 to 3 of this report shows the proposed plan of the subject development, the extent of remnant bushfire vegetation persisting within and adjacent to the subject property, and a spatial analysis of approximate building setback distances to the identified bushfire hazard.

For the purposes of this assessment and report, the potential bushfire hazard is considered equivalent to a 'Rainforest' category / vegetation formation, and is located effectively on steep land estimated to be >18° slope. The extent and location of the potential bushfire hazard (or 'Bushfire Zone') is as denoted Appendix 1 & 3.

This short report broadly identifies Asset Protection Zone (herein 'APZ'), vehicle access, water supply and AS3959 requirements considered applicable for the subject development. These requirements would also most likely be conditions of consent as determined by the NSW Rural Fire Service (herein 'RFS') under section 100B of the NSW Rural Fires Act for Integrated Development.

APZ, vehicle access, water supply and construction standard compliance (technically required) are based upon NSW Planning for Bushfire Protection Guidelines 2006 (herein 'PBP') for SFPP. This report does not comprehensively address every acceptable solution or performance criteria from PBP, only addressing the primary compliance issues considered most applicable and relevant to the subject development.

Any reference or recommendation for 'Internal Roadway' access requirements / compliance is specifically derived from PBP acceptable solutions for Access – Public Roads (Section 4.1.3) & Access – Internal Roads (Section 4.2.7). Internal roadway compliance, as purported by this report, does not infer required compliance or equivalence with standard Council or RTA public roadway requirements.

Recommended APZ requirements for the subject development (as identified or purported by this report) are based on expert judgment and considered opinion relating to the perceived low bushfire risk to the subject property. The recommended APZ / setback areas and access arrangement identified by this report as 'reasonably compliant' is predicated upon an *alternate solution* of shielded building access points to address the associated PBP performance criteria and advice from the NSW Rural Fire Service for the same (Appendix 4).

The recommended APZ area described by this report is based on AS3959 setback requirements.

## APZ Compliance

SFPP APZ requirements are derived from PBP Table A2.6 - *Minimum Specifications for Asset Protection Zones (m) for Special Fire Protection Purposes in bush fire prone areas (<10kW/m<sup>2</sup>)*.

The minimum specified APZ or setback required for rainforest vegetation on an effective down slope of >18° is **65m**.

In this regard, Dwellings 7 - 9 & 15 - 21 technically do not achieve the prescribed APZ / setback distance. All other proposed building structures (Dwellings 1 - 6 & 10 - 14) are reasonably separated from the potential bushfire hazard by the prescribed distance or greater. Table 4.0 lists the respective APZ / Setback distances considered by this report.

Notwithstanding the above, it is reasonable to suggest that exceptional circumstances for the site would be such that a fully developed and intense bushfire event emanating from the adjacent / low threat



hazard is an unlikely and a very low probability event. This exceptional circumstance in this regard based on the coastal aspect of the rainforest hazard (east of the subject development) and assumed significant fire weather conditions<sup>1</sup> prevailing from a south-westerly to north-westerly directions – effectively pushing a fire away from the main development area. Weather conditions from easterly aspects, this close to the NSW South Coast, are not reasonably expected to generate fire weather conditions in excess of Low-Moderate (i.e. Fire Danger Index up to 11).

PBP 'Performance Criteria' for SFPP APZ states that *radiant heat levels of greater than 10kW/m<sup>2</sup> will not be experienced by occupants or emergency services workers entering or exiting a building*. Likewise, the PBP 'Acceptable Solution' for the same requires that *exits are located away from the hazard side of the building*.

In consideration of the sites exceptional circumstance, and for the purpose of demonstrating an alternate solution, an estimated maximum Fire Danger Index (FDI) has been statistically calculated for the study area using 3pm Bureau of Metrology (BoM) recorded weather conditions for the Kiama / Shellharbour Area. This includes known / recorded weather conditions from the nearest 2 local weather stations, with recorded data variables to complete McArthurs Forest Fire Danger Index calculations, expressed as algorithm<sup>2</sup>;

$$F = 2.0 * \exp(-0.450 + 0.987 * \ln(D) - 0.0345 * H + 0.0338 * T + 0.0234 * V),$$

where F=FFDI, D=Drought Factor (defaulted to 10), H=Relative humidity (%), T=Air temp (degrees C) and V=Average wind velocity in open at height of 10m (km/hr)

Table 2.0 as follows lists the nearest three local weather stations and extent<sup>3</sup> of recorded / calculated data for the purposes of this advice

**Table 2.0**

Location (Distance to Study Area)	BoM No.	Start (Year)	Finish (Year)	No. Years	No. Days <sup>4</sup>	FDI Max.	FDI Mean	Sta. Dev.
Kiama Bowling Club (≈1km)	68038	1897	2007	106	1260	<b>15.5</b>	3.6	1.6
Kiama - Bombo Headland (≈3km)	68242	2001	2003	1	138	<b>11.5</b>	4.2	1.5

The locations of the BoM weather stations as denoted Figure 1.0 following.

Appendix 5 lists the identified weather records calculated for FDI analysis.

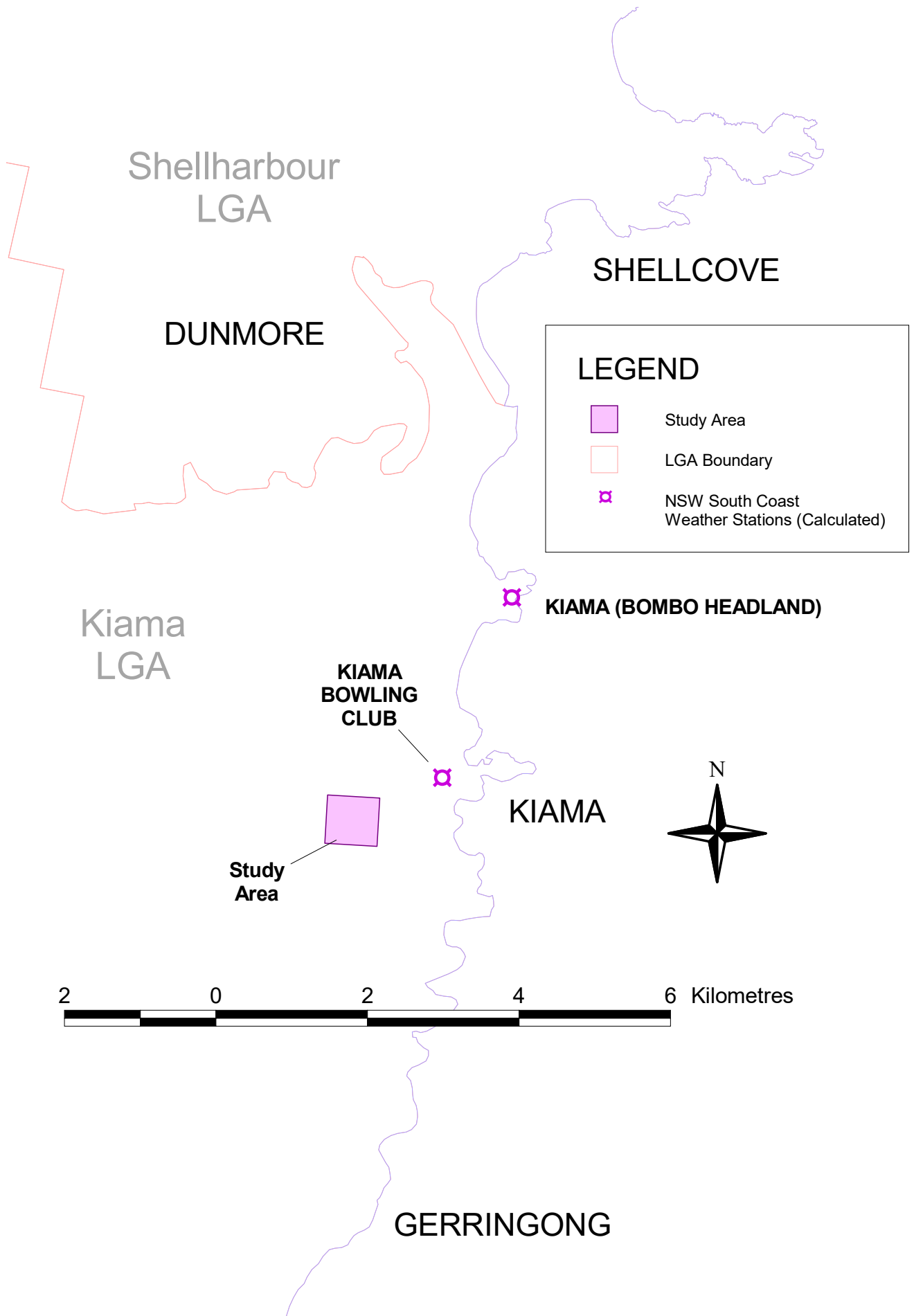
<sup>1</sup> High to Catastrophic

<sup>2</sup> McArthur's fire-danger meters expressed as equations 1980. Australian Journal of Ecology. 5, 201-203

<sup>3</sup> Available weather data at the time of this report (up to 2007). More recent weather records are available.

<sup>4</sup> Calculated when wind direction NNE - SSE

Figure 1.0



To quantify that no greater than 10kW/m<sup>2</sup> would technically be received at the external walls of any new residentially occupied building structures, an FDI of 15 is considered the reasonable maximum estimate based on recorded weather data from the nearest BoM weather stations.

Derived from calculated outputs provided courtesy of [Flamesol.com.au](http://www.flamesol.com.au) Bushfire Attack Level Calculator<sup>5</sup> 1/08/16, the maximum radiant heat flux is estimated not to exceed 10kW/m<sup>2</sup> for the identified building structures less than the prescribed setback (65m) limit.

Calculated site conditions and outputs are as shown Table 3.0.

Mapped site analysis and effective / site slope is a shown Appendix 3.

**Table 3.0**

		Dwelling								
		7	8	15	16	17	18	19	20	21
Input	Effective slope (Deg)	28	28	28	28	28	28	28	28	29
	Site slope (Deg)	15	15	15	15	15	15	15	15	11
	Vegetation Class.	RF	RF	RF	RF	RF	RF	RF	RF	RF
	Distance to Veg (m)	45	50	50	40	30	30	40	55	30
	Elevation receiver (m)	2	2	2	2	2	2	2	2	2
	Fire Danger Index (FDI)	15	15	15	15	15	15	15	15	15
	Surface fuel load (t/ha)	10	10	10	10	10	10	10	10	10
	Overall fuel load (t/ha)	12	12	12	12	12	12	12	12	12
	Wind speed (km/h)	45	45	45	45	45	45	45	45	45
	Combustion (kj/kg)	18600	18600	18600	18600	18600	18600	18600	18600	18600
	Flame temp (K)	1090	1090	1090	1090	1090	1090	1090	1090	1090
Output	Rate of spread (km/h)	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.33
	Flame length ( m )	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52	10.09
	View factor	0.084	0.073	0.073	0.098	0.141	0.141	0.098	0.063	0.153
	Flame angle ( ° )	97	98	98	97	95	95	97	98	90
	Transmissivity	0.775	0.767	0.767	0.783	0.804	0.804	0.783	0.76	0.805
	Intensity (kW/m <sup>2</sup> )	7704	7704	7704	7704	7704	7704	7704	7704	8254
	<b>Radiant heat flux (RHF - kW/m<sup>2</sup>)</b>	<b>4.96</b>	<b>4.24</b>	<b>4.24</b>	<b>5.86</b>	<b>8.6</b>	<b>8.6</b>	<b>5.86</b>	<b>3.66</b>	<b>9.38</b>

<sup>5</sup> <http://www.flamesol.com.au/BALc.php>

For the purposes of this report and future discussion / planning, it is conservatively recommended that any future building development within the subject development should be sited to facilitate at least AS3959 BAL-29. Table 2.4.2 of AS3959 requires **29m** or greater separation from rainforest vegetation on an effective slope  $>15^\circ$  to facilitate BAL-29.

Similarly, it is also conservatively recommended that where any proposed building will be less than the prescribed distance (i.e. 65m) from the potential bushfire hazard, that building shall be designed to provide 'shielded' access points away from the adjacent rainforest hazard. An indicative location of the 'Shielded Elevation' for buildings less than the prescribed distance are as shown Appendix 3. Buildings recommended to incorporate shielded access points are as listed Table 4.0.

It is also acknowledged that the Dwelling 6 will be located  $<10\text{m}$  from a potential grassland hazard on neighbouring land to the south (Lot 33 DP709582). The land appears to be historically 'managed' in as far as being grazing land for livestock. However, given any potential for the grassland hazard to persist as unmanaged, it is recommended that a radiant heat barrier (e.g. non-combustible fencing) of at least 1.8m high be installed entirely along the southern boundary of Dwelling 6.

Similarly, Dwelling 7 would be located  $\approx 12\text{m}$  from a potential grassland hazard on neighbouring Lot 33 DP709582. In this regard, it is also recommended that radiant heat barrier afforded to Dwelling 6 be further extended along the common boundary between the subject property and Lot 33 DP709582. The purpose of which to not only provide additional radiant heat mitigation for the building structures, but also as shielding for persons or vehicles using the internal roadway system during a potential grassfire event.



Table 3.0

Dwelling	Primary Vegetation (& Effective Slope)	Estimated Setback or Available APZ Area (Approx.)	Performance Solution Recommended	AS3959 BAL Estimate
1	Rainforest / Remnant (>18° down slope)	>100m	Nil	LOW
2	“ “	>100m	Nil	LOW
3	“ “	95m	Nil	12.5
4	“ “	85m	Nil	12.5
5	“ “	80m	Nil	12.5
6	“ “ (+ Potential Grassland Hazard) (Lot 33 DP709582)	80m (<2m to potential grassland)	Radiant heat barrier to neighbouring Lot 33 DP709582 + fire resistant building construction for exposed elevations/sections to hazard (i.e. BAL 29) + shielded access / entry	12.5 (29)
7	“ “ (+ Potential Grassland Hazard) (Lot 33 DP709582)	45m (≈12m to potential grassland)	Radiant heat barrier to neighbouring Lot 33 DP709582 + fire resistant building construction for exposed elevations/sections to hazard (i.e. BAL 29) + shielded access / entry	19 (29)
8	“ “	50m	Shielded access	19
9	“ “	60m	Nil	12.5
10	“ “	70m	Nil	12.5
11	“ “	85m	Nil	12.5
12	“ “	95m	Nil	12.5
13	“ “	75m	Nil	12.5
14	“ “	65m	Nil	12.5
15	“ “	50m	Shielded access	19
16	“ “	40m	Shielded access	29
17	“ “	30m	Shielded access	29
18	“ “	30m	Shielded access	29
19	“ “	40m	Shielded access	29
20	“ “	55m	Shielded access	19
21	“ “	30m	Shielded access	29

## Internal / Public Roadway Vehicle Access Compliance

SFPP vehicle access requirements (considered applicable to the subject development) are derived from PBP Section 4.2.7 Standards for Bush Fire Protection Measures for Special Fire Protection Purpose Developments, Access – Internal Roads, which states;

*The public road system in a bush fire prone area should provide alternative access or egress for firefighters and residents during a bush fire emergency if part of the road system is cut by fire. This is of critical importance for areas with the higher densities associated with SFPP developments.*

*Where those developments are being established, the requirements for public roads and car parking apply in the same way as new residential subdivisions. (See Section 4.1.3, Access - Public Roads).*

PBP (Section 4.1.3 Access – Public Roads) provides the minimum widths for public roads that are not perimeter roads for the safe access of fire fighting vehicles (*Category 1 Tanker - Medium Rigid Vehicle*, Table shown below) in urban areas.

Curve radius (inside edge) (metres)	Swept Path (metres width)	Single lane (metres width)	Two way (metres width)
<40	3.5	4.5	8.0
40-69	3.0	3.9	7.5
70-100	2.7	3.6	6.9
>100	2.5	3.5	6.5

Source: AS 2890.2 – 2002.

### *Caliope Street (Public Roadway)*

The subject development will be primarily accessed from Caliope Street (off Old Saddleback Road).

Caliope Street will also be a new public roadway extension, contained within a 13-20m wide reserve area, to service the subject development and adjoining residential subdivision. The proposed carriageway will be 6m wide, with another 3-4m wide designated verge areas to facilitate traffic movement and access to the subject development and adjoining residential subdivision.

The total length of Caliope Street is approximately 220m and will also provide a turning area / facility at its eastern end – adjacent to Dwelling 21. Caliope Street will be over a gradient of approximately 6-7°.

Given the proposed length of Caliope Street, technically this public roadway section would not fully facilitate PBP acceptable solutions for public or internal roadway requirements (i.e. <100m for internal roadway or <200m for public roadway access compliance). However, the proposed roadway area would nevertheless be reasonably clear and free of any adjacent bushfire vegetation, and the egress direction (i.e. the west) is away from the identified hazard. As the proposed roadway area (i.e. carriageway and additional verges) would also provide a relatively wide access area (i.e. 9-10m total trafficable area), this would otherwise reasonably achieve the PBP Performance Criteria to *enable safe access for emergency services and allow crews to work with equipment about the vehicle*.

### *Internal Access Loop*

The proposed internal roadway loop to service the subject development will be contained within a 9.5m road reserve area which directly services Dwellings 1 - 20. The proposed carriageway will be 6m wide, with another 1.5m wide designated verge areas to facilitate traffic movement and access to the adjoining allotments.

The loop section will be approximately 300m in length, proposed to provide one way access commencing from Caliope Street at the designated entry point to the subject development and looping back around to Caliope Street at an interval of approximately 50m.

The entire length of the loop section will generally be located on land not reasonably exceeding 5° slope.

Apart from Dwellings 6 & 7, all other proposed building structures will be located within 100m or less from Caliope Street via the proposed internal roadway area. Vehicle access distances are as previously listed Table 1.0.

Dwellings 6 & 7 will be approximately 115 - 120m from Caliope Street.

Table 3.0 lists the respective vehicle access requirements for the subject development.

Table 3.0

PBP Acceptable Solution	Compliance	Comment
<i>internal roads are two-wheel drive, sealed, all-weather roads;</i>	Can comply	-
<i>internal perimeter roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions.</i>	N/A	The subject development does not propose nor necessary require perimeter roadway access.
<i>Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle).</i>	Can comply	The proposed 9.5m wide road reserve area directly servicing Dwellings 1-20 is a looped section and wide enough to contain the prescribed roadway width (4.5m for one way or 6.5m minimum for two way).  Similarly, the identified road reserve and verges areas for Caliope St are 13-30m wide over a relatively straight section, easily wide enough to contain the prescribed roadway width (6.5m minimum).
<i>the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas.</i>	N/A	The subject development does not propose nor necessary require perimeter / public roadway access.
<i>roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard.</i>	Performance Based Solution Required	The proposed internal access arrangement will effectively provide through / loop access from Caliope Street.  Caliope St will be 220m in total length with Dwelling 21 being ≈170m from Old Saddleback Road. Predicated upon the full carriageway and verge areas being unobstructed and cleared at all times, Caliope St would reasonably <i>enable safe access for emergency services and allow crews to work with equipment about the vehicle</i>
<i>traffic management devices are constructed to facilitate access by emergency services vehicles.</i>	Can comply	
<i>a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided.</i>	Can comply	-
<i>curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.</i>	Can comply	



<i>the minimum distance between inner and outer curves is six metres.</i>	Can comply	-
<i>maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees.</i>	Can comply	The maximum grade of the subject development area does not exceed 10 degrees.
<i>cross-fall of the pavement is not more than 10 degrees.</i>	Can comply	-
<i>roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge).</i>	Can comply	-
<i>roads are clearly sign-posted and bridges clearly indicate load ratings.</i>	Can comply	-
<i>the internal road surfaces and bridges have a capacity to carry fully-loaded fire fighting vehicles (15 tonnes).</i>	Can comply	-

## Water Supply Compliance

Water supply requirements (considered applicable to the subject development) are derived from PBP Section 4.2.7 Standards for Bush Fire Protection Measures for Special Fire Protection Purpose Developments, Services – Water, gas and electricity, and Section 4.1.3 Standards for Bush Fire Protection Measures for Residential and Rural Residential Subdivisions – Public Roads.

For the purpose of this assessment, it is noted that the subject property will be connected to the existing reticulated water supply servicing existing residential development along Old Saddleback Road. It is also assumed that any future reticulated water supply services and infrastructure within the subject development shall be designed and installed in accordance with normal Council, BCA and associated Standard requirements.

*PBP states that adequate water supply is critical for any fire fighting operation and particularly where property protection is envisaged. Water supplies must be easily accessible and located at regular intervals. The amount of water to be supplied may vary with differing geographical and topographical conditions.*

*In SFPP areas, reticulated water should be available for fire fighting purposes and fire hydrants should be regularly spaced and comply with Australian Standards (AS 2419.1 - 2005). Where mains water supply is available, the determination of a guaranteed water supply can only be made by the water supply authority.*

Table 4.0 lists the respective water supply requirements for the subject development.

**Table 4.0**

PBP Acceptable Solution	Compliance	Comment
<i>access points for reticulated water supply to SFPP developments incorporate a ring main system for all internal roads.</i>	Can comply	-
<i>fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority, once development has been completed. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles.</i>	Can comply	-
<i>the provisions of public roads in section 4.1.3 in relation to parking are met.</i>	See below	-
<i>(4.1.3) public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression.</i>	N/A	-
<i>(4.1.3) public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression.</i>	Can comply	-
<i>(4.1.3) public roads up to 6.5 metres wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.</i>	Can comply	
<i>(4.1.3) one way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.</i>	Can comply	-
<i>(4.1.3) parking bays are a minimum of 2.6 metres wide from kerb edge to road pavement. No services or hydrants are located within the parking bays.</i>	Can comply	-

## Construction Standard Compliance

Construction standard requirements are determined in accordance with AS3959, Simplified Methodology – Bushfire Attack Level (BAL). The respective BAL estimate for each proposed new building structure is as shown Table 2.0 of this report.

AS3959 BAL-40 or lower is accepted as the ‘Deemed-to-satisfy’ construction standard on bushfire prone land.

Predicated upon the recommended APZ extent (as purported by this report) being accepted for the subject development, each proposed new building would reasonably achieve AS3959 BAL-29 or lower – which is considered compliant for normal residential subdivision development.

The proposed arrangement and siting of all Dwellings within the subject development reasonably achieve 29m or greater separation from the adjacent rainforest hazard.

As previously acknowledged, Dwelling 6 would be located <10m from a potential grassland hazard on neighbouring land to the south (Lot 33 DP709582). PBP states *that a significant threat can exist for developments in grassland areas. Construction requirements are not specified in relation to grassland areas and these areas may not be mapped as being bush fire prone. Grass fires can threaten the sub floor spaces of a building and may generate significant embers. The RFS supports protection of the sub floor or the integration of 1.8 metre high protective (non-combustible) fencing in conjunction with screened windows and a basic APZ of 10 metres for these situations.*

In this regard, it is recommended that a radiant heat barrier (e.g. non-combustible fencing) of at least 1.8m high be additionally installed along the southern boundary of Dwelling 6 and the new building structure be designed and constructed to AS3949 BAL-29 as a conservative margin of safety.

This assessment also notes that the proposed Community Kiosk adjacent to Dwelling 18 will be separated by <6m from a building structure required to comply with AS3959. In accordance with AS3959 Cl.3.2.3 (Adjacent Structures), it is recommended that the Community Kiosk building structure be designed and constructed in accordance with AS3959, being BAL-29 in this instance.

## Conclusion:

Predicated upon the acceptance of the identified / recommended APZ and shielded building / boundary arrangement, the subject development should reasonably facilitate the acceptable solutions or performance criteria of PBP as required under section 100B of the NSW Rural Fires Act 1997.

Whilst the proximity of a small remnant area of rainforest vegetation may technically confound the prescribed APZ requirements for SFPP bushfire setback compliance, the location and extent of the remnant rainforest vegetation is restricted and unlikely to promote a significantly intense fire event towards the subject development site.

As acknowledged by the NSW Rural Fire Service (Appendix 4 – Email dated 29/05/13), the vegetation is *low threat* and an alternate solution of *exits on the non-hazard side of the building* should be accepted for compliance.

All proposed new building structures will achieve BAL-29 or lower and can facilitate an alternate solution for shielded access / egress to the building structure where technically exposed to radiant heat levels  $>10\text{kW/m}^2$ . In this regard, the PBP performance criteria can reasonably be facilitated in as far as *radiant heat levels of greater than  $10\text{kW/m}^2$  will not be experienced by occupants or emergency services workers entering or exiting a building*.

Further to the above, the statistical analysis of weather records for the two nearest BoM weather stations indicates that the maximum FDI for prevailing easterly weather conditions would not reasonably exceed 15. Based on view factor modelling and the prescribed setback distance of 29m or greater, the estimated radiant heat flux in this regard would not exceed  $10\text{kW/m}^2$ .

The proposed location of Dwelling 21 also arguably extends beyond the compliant distance from a through road (Old Saddleback Road). However, the proposed access to Dwelling 21 (via Caliope Street) would provide a substantial and relatively wide access area (i.e. 9-10m total trafficable area) which also services the adjacent residential subdivision. Egress from Dwelling 21 via Caliope Street directs traffic away from the primary bushfire hazard, and is unlikely to be ever cut or overrun by a bushfire event. In this regard, again the PBP performance criteria can reasonably be facilitated to *enable safe access for emergency services and allow crews to work with equipment about the vehicle*.

This report also acknowledges the potential grassland hazard within vicinity of the subject development (i.e. Dwelling 6 & 7 to a lesser extent). Should the neighbouring land (Lot 33 DP709582) be considered a hazard in this regard, compliance for Dwelling 6 would reasonably require integration of non-combustible fencing (1.8m or higher) in conjunction with AS3959 design and construction measures - BAL-29 recommended in this instance.



Vehicle access to the subject development site should reasonably facilitate the PBP performance criteria. Given the suggested low bushfire threat to the subject development site and reasonable open area within vicinity of the proposed roadway area, emergency services and fire crews should have ample room to work with equipment about the vehicle.

Water supply for bushfire fighting purposes can reasonably comply with the acceptable PBP solutions, and buildings (main / enclosed sections) should reasonably achieve AS3959 BAL-29 or lower.

*The above short report has been prepared by:*

**Matt Jones**

BAppSc Environmental Health

Grad. Dip Design for Bushfire Prone Areas

**BPAD-L3-14598 Accredited Practitioner**

**Bushfire Protection Planning & Assessment Services Pty. Ltd**

**BUSHFIRE PLANNING AND DESIGN ACCREDITATION SCHEME**  
**ACCREDITED PRACTITIONER**

<b>Name</b>	<b>Matthew Jones</b>
<b>Accreditation No.</b>	<b>BPAD14598</b>
<b>Valid to</b>	<b>February 2017</b>
<b>Jurisdiction</b>	<b>Level 3 - NSW</b>





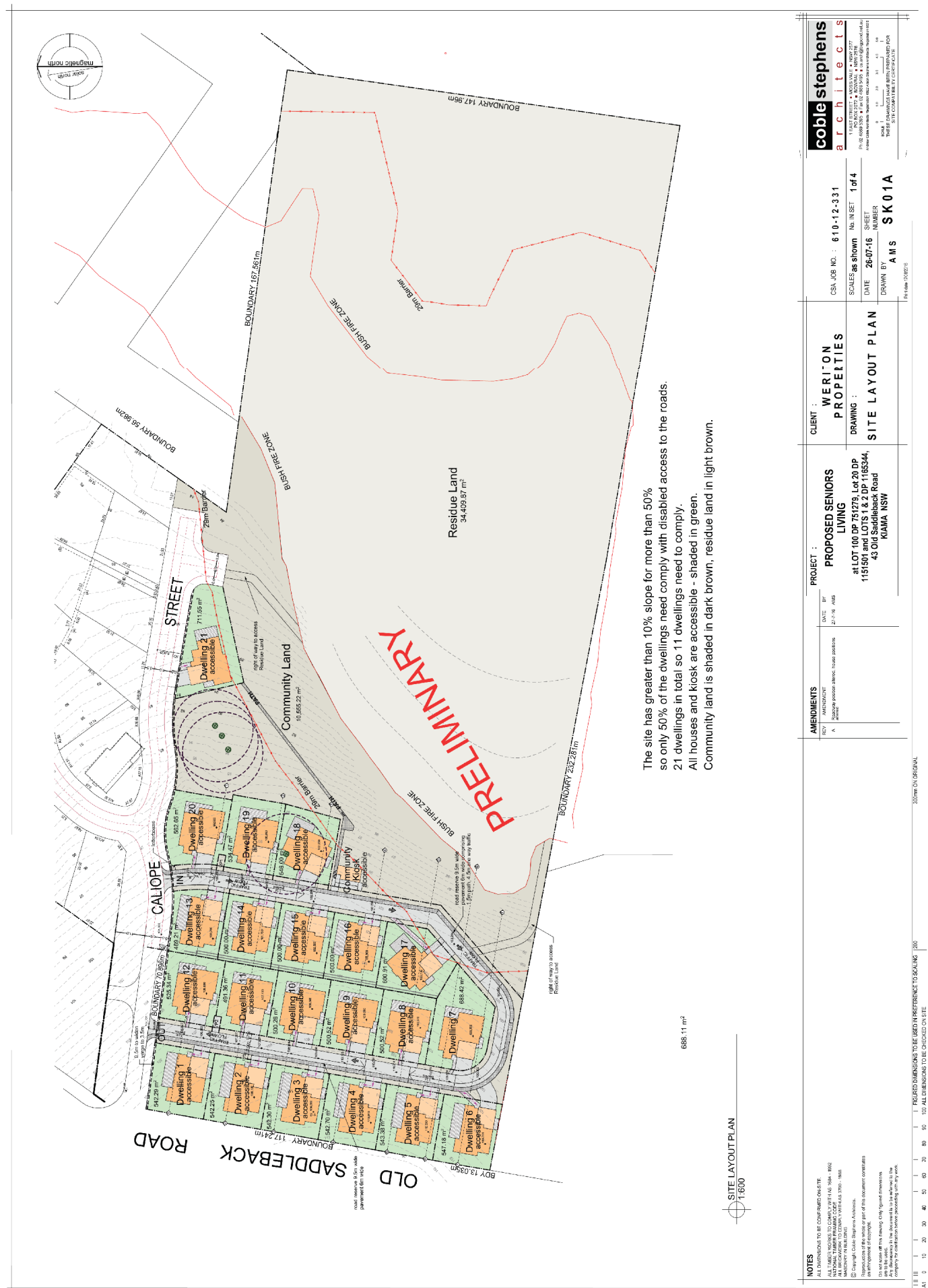
The holder of this card is accredited in accordance with the FPA Australia Bushfire Planning and Design Accreditation Scheme to perform the services listed on the reverse of this card.

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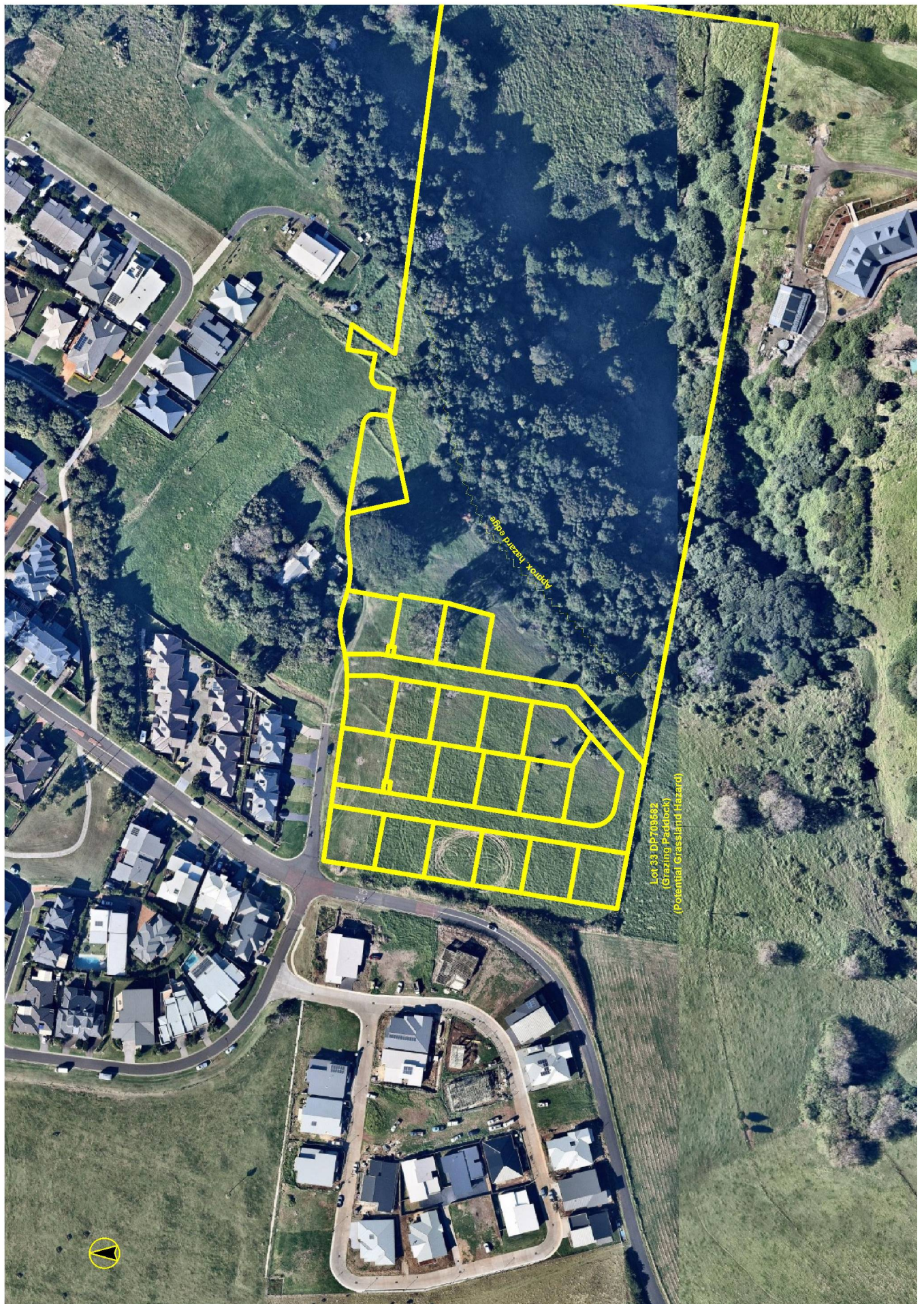
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**DISCLAIMER:** Bushfire mitigation or protection measures as recommended or purported by the following report may not guarantee that the proposed building development will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions, and the behaviour of building occupants or fire fighters defending the building when exposed to severe or greater bushfire attack conditions.



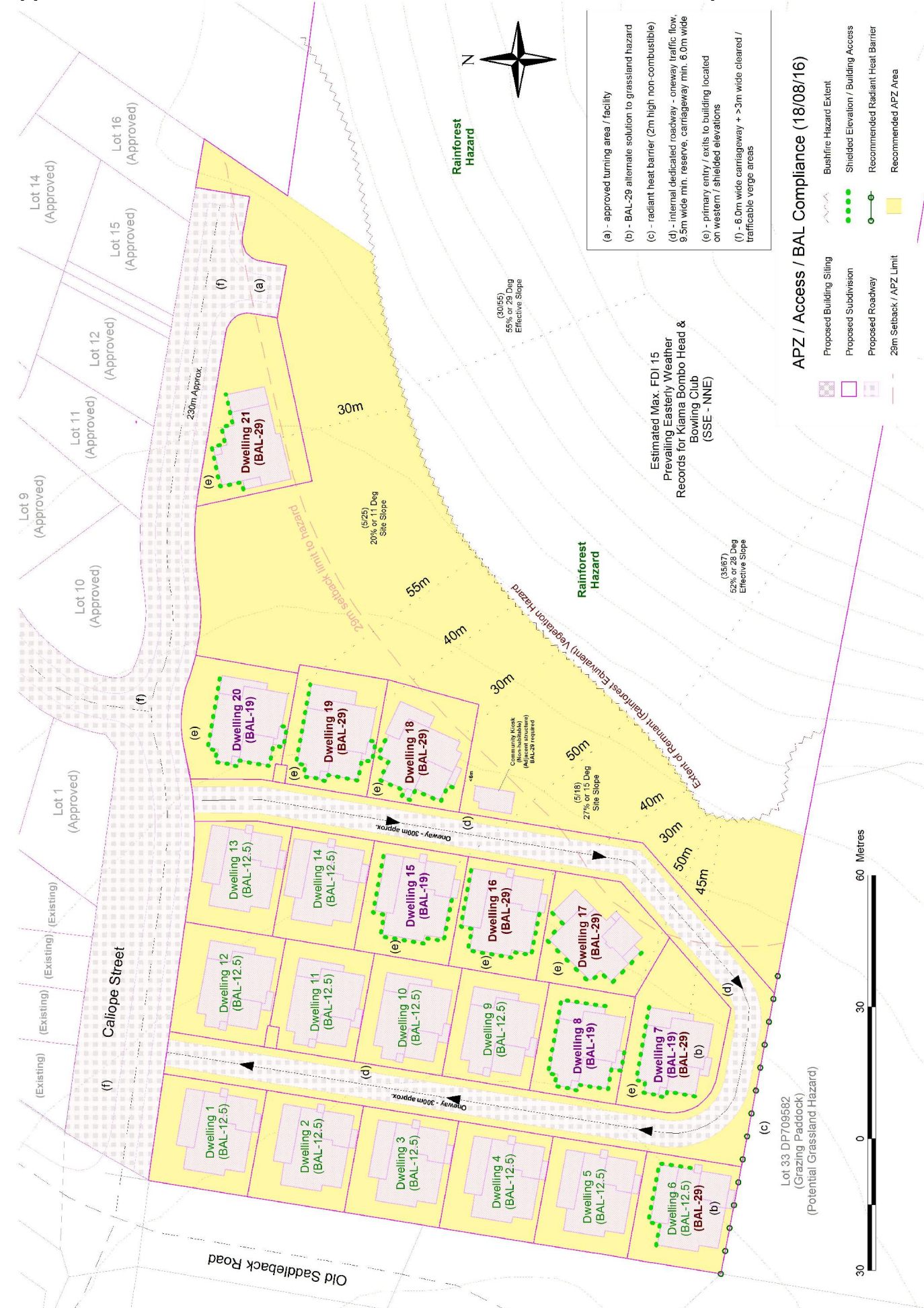


## Appendix 2 – Ortho photo / Boundary Overlay





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## Appendix 4 – RFS Email Re. Shielded Building Access / Alternate Solution

### Matt Jones (BPPASS - Out of Office)

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**From:** Merryn Spray <Merryn.Spray@rfs.nsw.gov.au>  
**Sent:** Wednesday, 29 May 2013 10:29 AM  
**To:** Matt Jones (BPPASS)  
**Subject:** Proposed Seniors Living Development - 43 Old Saddle Back Road Kiama

Hi Matt,

In reference to the above development, you are advised that the Rural Fire Service will only accept a reduction in the FDI that is based on 50 years of weather data or scientifically proven for the specific area. In regard to the alternate solution for exits on the non hazard side of the building, the application would be accepted as an exceptional circumstance due to the low threat of the vegetation.

I apologise for the delay in the response to the enquiry. If you have any further queries, please do not hesitate to contact me.

Kind regards,

**Merryn Spray**  
Development Assessment and Planning Officer  
**NSW RURAL FIRE SERVICE**  
Customer Service Centre - Glendenning  
42 Lamb Street  
Glendenning NSW 2761

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## Appendix 5 – Recorded / Calculated Fire Weather Results

(Kiama / Bombo Headland)

Station				3 PM Values				
Station Number	Date	Month #	Drought Index	Temperature	Wind Speed	Wind Direction	Humidity	FDI
68242	22/12/2001	12	10	22.8999996	20.5	SSE	71	3.7435
68242	13/01/2002	1	10	21.2999992	27.700001	SSE	52	8.0843
68242	16/01/2002	1	10	19.1000004	27.700001	SSE	74	3.5133
68242	10/02/2002	2	10	20.5	22.299999	SSE	72	3.4782
68242	1/03/2002	3	10	21.3999996	18.4	SSE	61	4.7835
68242	12/03/2002	3	10	22.5	18.4	SSE	71	3.5161
68242	29/03/2002	3	10	20.1000004	35.299999	SSE	87	2.7724
68242	5/04/2002	4	10	18	22.299999	SSE	61	4.6717
68242	15/04/2002	4	10	20	16.6	SSE	80	2.271
68242	19/04/2002	4	10	21.7000008	13	SSE	81	2.1361
68242	26/04/2002	4	10	21.2000008	14.8	SSE	80	2.2675
68242	29/04/2002	4	10	18.7999992	11.2	SSE	61	3.7018
68242	1/05/2002	5	10	19	16.6	SSE	67	3.4382
68242	2/05/2002	5	10	19.5	14.8	SSE	68	3.2389
68242	25/08/2002	8	10	14.5	22.299999	SSE	62	4.0097
68242	26/08/2002	8	10	15.1000004	20.5	SSE	64	3.6615
68242	10/09/2002	9	10	13.6999998	31.299999	SSE	53	6.5717
68242	15/08/2003	8	10	12.8999996	24.1	SSE	55	5.0443
68242	19/12/2001	12	10	23.1000004	20.5	SE	72	3.6411
68242	17/01/2002	1	10	21.2000008	16.6	SE	57	5.2294
68242	30/01/2002	1	10	24.1000004	14.8	SE	83	2.2551
68242	3/03/2002	3	10	20	31.299999	SE	91	2.1918
68242	9/03/2002	3	10	20.7000008	24.1	SE	70	3.9134
68242	21/03/2002	3	10	20.1000004	14.8	SE	76	2.508
68242	22/03/2002	3	10	21.3999996	7.5999999	SE	52	5.0681
68242	1/04/2002	4	10	20.8999996	16.6	SE	63	4.2087
68242	16/04/2002	4	10	21.2999992	11.2	SE	80	2.0914
68242	20/04/2002	4	10	22.5	13	SE	69	3.3201
68242	6/05/2002	5	10	21.1000004	13	SE	61	4.1732
68242	8/08/2002	8	10	16	13	SE	64	3.167
68242	30/09/2002	9	10	15.3999996	20.5	SE	58	4.5495
68242	18/12/2001	12	10	21.7000008	31.299999	NNE	75	4.0317
68242	20/12/2001	12	10	26.2000008	18.4	NNE	73	3.7189
68242	23/12/2001	12	10	24.2999992	27.700001	NNE	70	4.8082
68242	4/01/2002	1	10	25.7999992	24.1	NNE	54	8.075
68242	6/01/2002	1	10	24.2999992	33.5	NNE	70	5.5071
68242	19/01/2002	1	10	23	42.5	NNE	69	6.7342
68242	20/01/2002	1	10	24.1000004	35.299999	NNE	76	4.6385
68242	22/01/2002	1	10	23.2000008	13	NNE	89	1.7052
68242	28/01/2002	1	10	24.2000008	31.299999	NNE	74	4.5411
68242	7/02/2002	2	10	21.3999996	13	NNE	84	1.9066
68242	14/02/2002	2	10	23.6000004	22.299999	NNE	65	4.9175
68242	15/02/2002	2	10	23.2999992	29.5	NNE	69	5.0185
68242	16/02/2002	2	10	26.6000004	18.4	NNE	71	4.0388
68242	20/02/2002	2	10	24.7999992	29.5	NNE	80	3.6123
68242	24/02/2002	2	10	24.2000008	16.6	NNE	67	4.0988
68242	26/02/2002	2	10	23.7999992	33.5	NNE	78	4.1088
68242	28/02/2002	2	10	21.5	14.8	NNE	77	2.5404
68242	6/03/2002	3	10	23.5	18.4	NNE	63	4.793
68242	7/03/2002	3	10	26.1000004	20.5	NNE	76	3.5102

68242	11/03/2002	3	10	22.8999996	14.8	NNE	55	5.6896
68242	14/03/2002	3	10	22.2000008	14.8	NNE	65	3.9353
68242	16/03/2002	3	10	25.2999992	14.8	NNE	76	2.99
68242	18/03/2002	3	10	24.5	27.7000001	NNE	76	3.9357
68242	20/03/2002	3	10	24.6000004	18.4	NNE	77	3.069
68242	23/03/2002	3	10	22.7999992	29.5	NNE	59	6.9674
68242	25/03/2002	3	10	23.2999992	29.5	NNE	72	4.5251
68242	3/04/2002	4	10	22.2000008	29.5	NNE	73	4.2121
68242	8/04/2002	4	10	21.3999996	16.6	NNE	69	3.4801
68242	10/04/2002	4	10	21.1000004	22.299999	NNE	78	2.8858
68242	25/04/2002	4	10	22.7000008	20.5	NNE	77	3.023
68242	5/05/2002	5	10	20.7000008	16.6	NNE	72	3.0645
68242	24/06/2002	6	10	16.2999992	14.8	NNE	55	4.552
68242	13/07/2002	7	10	17	24.1	NNE	59	5.0472
68242	19/07/2002	7	10	17.3999996	24.1	NNE	55	5.873
68242	28/07/2002	7	10	17.7999992	29.5	NNE	55	6.7547
68242	3/08/2002	8	10	18	27.7000001	NNE	79	2.8487
68242	2/09/2002	9	10	17.5	44.299999	NNE	70	5.6346
68242	5/09/2002	9	10	19.8999996	25.9	NNE	65	4.7208
68242	8/09/2002	9	10	18.1000004	16.6	NNE	45	7.1244
68242	12/09/2002	9	10	17.7999992	16.6	NNE	58	4.5036
68242	13/09/2002	9	10	18.2999992	22.299999	NNE	67	3.8369
68242	20/09/2002	9	10	17	18.4	NNE	56	4.8986
68242	27/09/2002	9	10	18.6000004	13	NNE	60	3.9697
68242	1/10/2002	10	10	18.7999992	18.4	NNE	67	3.5619
68242	5/10/2002	10	10	20.5	18.4	NNE	76	2.7656
68242	17/08/2003	8	10	17.1000004	24.1	NNE	72	3.234
68242	21/08/2003	8	10	14.8999996	24.1	NNE	51	6.1957
68242	28/12/2001	12	10	23.5	20.5	NE	62	5.2111
68242	1/01/2002	1	10	26	20.5	NE	64	5.2925
68242	7/01/2002	1	10	26.2000008	27.7000001	NE	76	4.1684
68242	11/01/2002	1	10	22.3999996	20.5	NE	57	5.9663
68242	18/01/2002	1	10	23	20.5	NE	53	6.9894
68242	27/01/2002	1	10	24.7999992	13	NE	61	4.7291
68242	2/02/2002	2	10	24.6000004	13	NE	77	2.7047
68242	13/02/2002	2	10	22.8999996	14.8	NE	67	3.7608
68242	15/03/2002	3	10	23.7000008	11.2	NE	64	3.939
68242	24/03/2002	3	10	22.8999996	29.5	NE	65	5.6838
68242	26/03/2002	3	10	23.3999996	27.7000001	NE	83	2.9784
68242	2/04/2002	4	10	21.7000008	24.1	NE	63	5.1536
68242	24/04/2002	4	10	22.7000008	11.2	NE	76	2.5172
68242	3/05/2002	5	10	20.3999996	13	NE	74	2.6026
68242	4/05/2002	5	10	20.2000008	14.8	NE	78	2.3487
68242	7/05/2002	5	10	21.2999992	13	NE	66	3.5358
68242	8/05/2002	5	10	21.7000008	16.6	NE	65	4.0358
68242	12/05/2002	5	10	20	14.8	NE	61	4.1938
68242	3/06/2002	6	10	17.5	11.2	NE	62	3.4225
68242	4/06/2002	6	10	18.3999996	22.299999	NE	72	3.2399
68242	8/07/2002	7	10	15.8999996	14.8	NE	54	4.6485
68242	22/07/2002	7	10	16	20.5	NE	58	4.6427
68242	23/07/2002	7	10	18.2999992	7.5999999	NE	36	7.9262
68242	27/07/2002	7	10	17.7999992	16.6	NE	57	4.6617
68242	31/07/2002	7	10	16.7000008	11.2	NE	64	3.1091
68242	1/08/2002	8	10	18.5	16.6	NE	63	3.8808
68242	5/08/2002	8	10	16.1000004	14.8	NE	57	4.2198
68242	9/08/2002	8	10	18.1000004	14.8	NE	66	3.3098
68242	10/08/2002	8	10	21.1000004	13	NE	53	5.4996

68242	19/08/2002	8	10	17.8999996	24.1	NE	57	5.5748
68242	20/08/2002	8	10	17.6000004	14.8	NE	55	4.7564
68242	21/08/2002	8	10	17.2999992	11.2	NE	48	5.5103
68242	28/08/2002	8	10	17.1000004	25.9	NE	56	5.8582
68242	31/08/2002	8	10	19.2000008	14.8	NE	50	5.966
68242	21/09/2002	9	10	19.7000008	16.6	NE	52	5.9068
68242	16/08/2003	8	10	16.1000004	18.4	NE	50	5.8447
68242	22/08/2003	8	10	15.3000002	16.6	NE	61	3.7318
68242	5/01/2002	1	10	23.2000008	16.6	ESE	67	3.9626
68242	15/01/2002	1	10	20.7999992	9.3999996	ESE	70	2.7837
68242	4/02/2002	2	10	18.3999996	31.299999	ESE	95	1.8088
68242	6/04/2002	4	10	21	9.3999996	ESE	64	3.4472
68242	22/08/2002	8	10	16.5	5.4000001	ESE	72	2.0459
68242	27/08/2002	8	10	15.6999998	13	ESE	64	3.1351
68242	3/01/2002	1	10	24.7000008	25.9	ENE	44	11.458
68242	26/01/2002	1	10	24.7000008	14.8	ENE	63	4.5882
68242	27/05/2002	5	10	17.2999992	9.3999996	ENE	62	3.2593
68242	2/07/2002	7	10	15.8999996	11.2	ENE	54	4.2729
68242	11/07/2002	7	10	16	9.3999996	ENE	48	5.0559
68242	2/08/2002	8	10	18.2999992	9.3999996	ENE	72	2.3876
68242	24/09/2002	9	10	19.7000008	7.5999999	ENE	75	2.1641
68242	17/12/2001	12	10	22.1000004	16.6	E	66	3.952
68242	27/12/2001	12	10	20.3999996	14.8	E	43	7.9101
68242	25/01/2002	1	10	23.7999992	9.3999996	E	72	2.8754
68242	23/02/2002	2	10	23.7000008	13	E	64	4.1085
68242	2/03/2002	3	10	23.7999992	13	E	61	4.5719
68242	30/04/2002	4	10	19.7999992	11.2	E	71	2.7118
68242	15/06/2002	6	10	19	11.2	E	74	2.3799
68242	30/08/2002	8	10	19.1000004	11.2	E	50	5.4655
68242	25/09/2002	9	10	19.8999996	7.5999999	E	65	3.0764
68242	3/10/2002	10	10	22.3999996	7.5999999	E	51	5.4263

*(Kiama Bowling Club)*

Station				3 PM Values				
Station Number	Date	Month #	Drought Index	Temperature	Wind Speed	Wind Direction	Humidity	FDI
68038	4/09/1985	9	10	15.5	13	SSE	53	4.5512
68038	14/10/1985	10	10	16	22.299999	SSE	94	1.3985
68038	26/10/1985	10	10	15.3000002	18.4	SSE	81	1.9523
68038	10/11/1985	11	10	22.5	11.2	SSE	63	3.9152
68038	12/11/1985	11	10	19.2999992	18.4	SSE	63	4.1587
68038	1/12/1985	12	10	20.6000004	13	SSE	58	4.5507
68038	12/12/1985	12	10	23.5	14.8	SSE	55	5.8062
68038	23/01/1986	1	10	19.8999996	18.4	SSE	69	3.4504
68038	22/02/1986	2	10	23.2000008	18.4	SSE	73	3.3603
68038	17/04/1986	4	10	20.5	5.4000001	SSE	80	1.7772
68038	10/06/1986	6	10	16.2999992	9.3999996	SSE	47	5.2867
68038	29/11/1986	11	10	17.7999992	14.8	SSE	60	4.03
68038	4/08/1987	8	10	15	7.5999999	SSE	51	4.2255
68038	6/09/1985	9	10	15.8999996	7.5999999	SE	59	3.3054
68038	27/09/1985	9	10	16	3.5999999	SE	45	4.8956
68038	2/10/1985	10	10	18.8999996	3.5999999	SE	69	2.3593
68038	7/10/1985	10	10	19.5	7.5999999	SE	75	2.1495
68038	10/10/1985	10	10	18.5	5.4000001	SE	66	2.6925
68038	15/10/1985	10	10	19.5	3.5999999	SE	85	1.3863



68038	20/10/1985	10	10	16.3999996	7.5999999	SE	54	3.9947
68038	21/10/1985	10	10	16.7000008	3.5999999	SE	49	4.3667
68038	28/10/1985	10	10	19	3.5999999	SE	68	2.4504
68038	31/10/1985	10	10	18.5	7.5999999	SE	54	4.2885
68038	2/11/1985	11	10	20.2000008	9.3999996	SE	72	2.546
68038	3/11/1985	11	10	20.7999992	3.5999999	SE	69	2.5158
68038	27/11/1985	11	10	21.5	5.4000001	SE	71	2.5077
68038	28/11/1985	11	10	21	14.8	SE	69	3.2917
68038	30/11/1985	11	10	20.6000004	13	SE	70	3.008
68038	13/12/1985	12	10	22.5	3.5999999	SE	71	2.4869
68038	29/12/1985	12	10	23	13	SE	69	3.3767
68038	13/01/1986	1	10	22.3999996	5.4000001	SE	63	3.4068
68038	3/02/1986	2	10	20.5	3.5999999	SE	62	3.1707
68038	6/02/1986	2	10	22.5	9.3999996	SE	71	2.8484
68038	11/02/1986	2	10	23.5	7.5999999	SE	67	3.2428
68038	14/02/1986	2	10	24	7.5999999	SE	54	5.1647
68038	21/02/1986	2	10	23.3999996	5.4000001	SE	67	3.0697
68038	25/02/1986	2	10	19.5	3.5999999	SE	85	1.3863
68038	28/03/1986	3	10	20	13	SE	78	2.2367
68038	31/03/1986	3	10	21.5	3.5999999	SE	80	1.7625
68038	1/04/1986	4	10	22.5	3.5999999	SE	76	2.0929
68038	9/04/1986	4	10	20.7999992	7.5999999	SE	65	3.1714
68038	3/06/1986	6	10	17.5	9.3999996	SE	50	4.9642
68038	26/07/1986	7	10	13.3999996	3.5999999	SE	37	5.9089
68038	3/09/1986	9	10	18	3.5999999	SE	64	2.7195
68038	11/09/1986	9	10	15.1000004	3.5999999	SE	72	1.8709
68038	22/09/1986	9	10	15.6000004	3.5999999	SE	69	2.1103
68038	29/09/1986	9	10	15.3999996	9.3999996	SE	91	1.1239
68038	5/10/1986	10	10	21.5	11.2	SE	51	5.7264
68038	8/10/1986	10	10	16.5	3.5999999	SE	46	4.8102
68038	11/10/1986	10	10	18	3.5999999	SE	59	3.2315
68038	27/10/1986	10	10	16.2000008	7.5999999	SE	67	2.5337
68038	22/11/1986	11	10	16.5	5.4000001	SE	65	2.6048
68038	24/11/1986	11	10	19	3.5999999	SE	73	2.0621
68038	28/11/1986	11	10	16.8999996	3.5999999	SE	60	3.0079
68038	1/12/1986	12	10	20.2000008	7.5999999	SE	45	6.196
68038	22/12/1986	12	10	18.6000004	9.3999996	SE	70	2.5843
68038	29/12/1986	12	10	19	3.5999999	SE	83	1.4604
68038	23/01/1987	1	10	19.5	14.8	SE	51	5.8224
68038	27/01/1987	1	10	22.5	3.5999999	SE	67	2.8549
68038	30/01/1987	1	10	24.6000004	11.2	SE	67	3.6614
68038	4/02/1987	2	10	20	5.4000001	SE	64	3.0348
68038	9/02/1987	2	10	25.5	3.5999999	SE	67	3.1596
68038	12/02/1987	2	10	24	3.5999999	SE	65	3.2179
68038	16/02/1987	2	10	23	14.8	SE	61	4.6414
68038	13/03/1987	3	10	20.1000004	5.4000001	SE	72	2.3107
68038	16/03/1987	3	10	22	11.2	SE	69	3.1298
68038	25/03/1987	3	10	21.8999996	3.5999999	SE	74	2.1974
68038	1/04/1987	4	10	19.5	7.5999999	SE	62	3.366
68038	8/04/1987	4	10	23.8999996	7.5999999	SE	50	5.9089
68038	21/04/1987	4	10	16.7000008	7.5999999	SE	53	4.177
68038	24/04/1987	4	10	18.6000004	7.5999999	SE	75	2.0851
68038	1/05/1987	5	10	17.5	3.5999999	SE	80	1.5396
68038	5/05/1987	5	10	18.7000008	7.5999999	SE	61	3.3913
68038	7/05/1987	5	10	19.1000004	14.8	SE	68	3.1954
68038	8/05/1987	5	10	19	14.8	SE	64	3.6558
68038	20/05/1987	5	10	16.8999996	7.5999999	SE	64	2.8773

68038	23/06/1987	6	10	17.5	3.5999999	SE	50	4.3342
68038	6/08/1987	8	10	17	5.4000001	SE	59	3.2585
68038	12/08/1987	8	10	15	11.2	SE	63	3.0385
68038	11/09/1987	9	10	16	9.3999996	SE	48	5.0559
68038	17/09/1987	9	10	17	3.5999999	SE	77	1.6789
68038	21/09/1987	9	10	17.5	7.5999999	SE	66	2.7405
68038	22/09/1987	9	10	16.5	7.5999999	SE	61	3.1482
68038	7/10/1987	10	10	19	7.5999999	SE	60	3.5461
68038	8/10/1987	10	10	16.5	9.3999996	SE	57	3.7696
68038	14/10/1987	10	10	18.5	7.5999999	SE	58	3.7357
68038	19/10/1987	10	10	15.5	3.5999999	SE	85	1.211
68038	22/10/1987	10	10	18	7.5999999	SE	52	4.5179
68038	27/10/1987	10	10	21	1.8	SE	64	2.8856
68038	6/11/1987	11	10	20	1.8	SE	68	2.4301
68038	11/11/1987	11	10	14	18.4	SE	94	1.1931
68038	24/11/1987	11	10	21	18.4	SE	73	3.1195
68038	26/11/1987	11	10	20	9.3999996	SE	53	4.8708
68038	27/11/1987	11	10	20	18.4	SE	60	4.7226
68038	4/12/1987	12	10	19	7.5999999	SE	46	5.7479
68038	7/12/1987	12	10	21	3.5999999	SE	56	3.9663
68038	8/12/1987	12	10	19	9.3999996	SE	60	3.6986
68038	14/12/1987	12	10	23	18.4	SE	57	5.7965
68038	17/12/1987	12	10	24	9.3999996	SE	50	6.184
68038	29/12/1987	12	10	20.5	18.4	SE	62	4.4828
68038	30/12/1987	12	10	24	18.4	SE	50	7.6336
68038	5/01/1988	1	10	22	9.3999996	SE	65	3.4448
68038	25/01/1988	1	10	21	9.3999996	SE	46	6.4145
68038	2/02/1988	2	10	23	11.2	SE	50	6.2356
68038	16/02/1988	2	10	22	18.4	SE	50	7.1346
68038	17/02/1988	2	10	22	5.4000001	SE	58	3.9939
68038	23/02/1988	2	10	24	5.4000001	SE	74	2.4605
68038	29/02/1988	2	10	25	9.3999996	SE	61	4.3765
68038	7/03/1988	3	10	22	18.4	SE	57	5.6039
68038	9/03/1988	3	10	24	1.8	SE	57	4.0658
68038	15/03/1988	3	10	20	9.3999996	SE	53	4.8708
68038	16/03/1988	3	10	20	14.8	SE	68	3.2941
68038	17/03/1988	3	10	22	9.3999996	SE	88	1.5579
68038	18/03/1988	3	10	22	9.3999996	SE	50	5.7797
68038	25/03/1988	3	10	24	18.4	SE	50	7.6336
68038	29/03/1988	3	10	23	9.3999996	SE	78	2.2754
68038	13/04/1988	4	10	21	5.4000001	SE	60	3.6037
68038	19/04/1988	4	10	20	7.5999999	SE	68	2.7833
68038	21/04/1988	4	10	21	9.3999996	SE	64	3.4472
68038	4/05/1988	5	10	21	3.5999999	SE	73	2.2063
68038	10/05/1988	5	10	18.5	14.8	SE	58	4.4212
68038	25/05/1988	5	10	18	37.099998	SE	59	7.0769
68038	26/05/1988	5	10	17	1.8	SE	68	2.1957
68038	1/06/1988	6	10	17	3.5999999	SE	68	2.2902
68038	8/06/1988	6	10	16.5	9.3999996	SE	57	3.7696
68038	14/06/1988	6	10	17	1.8	SE	59	2.9952
68038	1/07/1988	7	10	16	9.3999996	SE	59	3.4593
68038	12/07/1988	7	10	17.5	7.5999999	SE	61	3.2565
68038	30/08/1988	8	10	17.5	3.5999999	SE	66	2.4956
68038	14/09/1988	9	10	17	1.8	SE	52	3.8134
68038	16/09/1988	9	10	18	18.4	SE	77	2.4553
68038	19/09/1988	9	10	16	3.5999999	SE	39	6.0215
68038	21/09/1988	9	10	16.5	9.3999996	SE	65	2.8604

68038	31/10/1988	10	10	21	9.3999996	SE	64	3.4472
68038	11/11/1988	11	10	20	9.3999996	SE	68	2.903
68038	18/11/1988	11	10	20	9.3999996	SE	68	2.903
68038	25/11/1988	11	10	20	9.3999996	SE	68	2.903
68038	1/12/1988	12	10	20.5	9.3999996	SE	75	2.3191
68038	13/12/1988	12	10	20	3.5999999	SE	53	4.2526
68038	15/12/1988	12	10	20.5	11.2	SE	91	1.3927
68038	21/12/1988	12	10	18.5	5.4000001	SE	97	0.924
68038	23/12/1988	12	10	24.5	18.4	SE	81	2.6643
68038	28/12/1988	12	10	21	27.700001	SE	40	12.107
68038	4/01/1989	1	10	23	9.3999996	SE	78	2.2754
68038	5/01/1989	1	10	22	18.4	SE	83	2.2852
68038	24/01/1989	1	10	23	9.3999996	SE	50	5.9784
68038	25/01/1989	1	10	23.5	9.3999996	SE	52	5.6749
68038	27/01/1989	1	10	24	18.4	SE	65	4.5497
68038	30/01/1989	1	10	25	22.299999	SE	61	5.9187
68038	31/01/1989	1	10	23.5	18.4	SE	71	3.637
68038	6/02/1989	2	10	23	14.8	SE	94	1.4866
68038	10/02/1989	2	10	24	14.8	SE	100	1.2502
68038	17/02/1989	2	10	25	9.3999996	SE	100	1.1397
68038	20/02/1989	2	10	20	18.4	SE	88	1.7974
68038	21/02/1989	2	10	22.5	9.3999996	SE	76	2.3971
68038	27/02/1989	2	10	25	9.3999996	SE	61	4.3765
68038	1/03/1989	3	10	25	9.3999996	SE	61	4.3765
68038	29/03/1989	3	10	21	7.5999999	SE	64	3.305
68038	30/03/1989	3	10	20.5	9.3999996	SE	81	1.8854
68038	18/04/1989	4	10	22	9.3999996	SE	38	8.7439
68038	27/04/1989	4	10	22	9.3999996	SE	65	3.4448
68038	17/05/1989	5	10	20	9.3999996	SE	78	2.056
68038	27/07/1989	7	10	15	7.5999999	SE	67	2.433
68038	9/08/1989	8	10	16	14.8	SE	59	3.9252
68038	21/08/1989	8	10	16	5.4000001	SE	51	4.1515
68038	27/09/1989	9	10	16.5	18.4	SE	50	5.9243
68038	28/09/1989	9	10	17	3.5999999	SE	52	3.9774
68038	6/10/1989	10	10	20	3.5999999	SE	49	4.8819
68038	16/10/1989	10	10	19	14.8	SE	56	4.8178
68038	19/10/1989	10	10	21	11.2	SE	56	4.7383
68038	9/11/1989	11	10	17	5.4000001	SE	52	4.1485
68038	10/11/1989	11	10	19	5.4000001	SE	56	3.8665
68038	21/11/1989	11	10	20	9.3999996	SE	49	5.5916
68038	27/11/1989	11	10	20	3.5999999	SE	56	3.8345
68038	4/12/1989	12	10	17.5	9.3999996	SE	85	1.484
68038	8/12/1989	12	10	23	9.3999996	SE	65	3.5632
68038	12/12/1989	12	10	22	9.3999996	SE	69	3.0007
68038	15/12/1989	12	10	19	3.5999999	SE	46	5.2343
68038	21/12/1989	12	10	19	3.5999999	SE	52	4.2556
68038	28/12/1989	12	10	20	9.3999996	SE	56	4.3919
68038	2/01/1990	1	10	22	7.5999999	SE	57	4.3524
68038	4/01/1990	1	10	20	5.4000001	SE	56	3.9995
68038	9/01/1990	1	10	18.5	9.3999996	SE	91	1.248
68038	10/01/1990	1	10	21	5.4000001	SE	64	3.1392
68038	15/01/1990	1	10	19	1.8	SE	83	1.4002
68038	22/01/1990	1	10	21	9.3999996	SE	60	3.9573
68038	1/02/1990	2	10	24	5.4000001	SE	83	1.8037
68038	7/02/1990	2	10	21	5.4000001	SE	73	2.3013
68038	9/02/1990	2	10	22	1.8	SE	83	1.5496
68038	23/02/1990	2	10	25	5.4000001	SE	74	2.5451

68038	1/03/1990	3	10	24	5.4000001	SE	83	1.8037
68038	2/03/1990	3	10	25	5.4000001	SE	61	3.9855
68038	6/03/1990	3	10	22.5	1.8	SE	97	0.9723
68038	20/03/1990	3	10	22	9.3999996	SE	57	4.5397
68038	21/03/1990	3	10	23	3.5999999	SE	57	4.0998
68038	2/04/1990	4	10	22	5.4000001	SE	65	3.137
68038	4/04/1990	4	10	23	11.2	SE	65	3.7165
68038	23/04/1990	4	10	23	1.8	SE	57	3.9307
68038	4/05/1990	5	10	20	1.8	SE	72	2.1168
68038	28/05/1990	5	10	20	5.4000001	SE	64	3.0348
68038	8/06/1990	6	10	18	7.5999999	SE	64	2.9863
68038	10/07/1990	7	10	16	5.4000001	SE	59	3.1502
68038	1/08/1990	8	10	16	18.4	SE	82	1.9312
68038	2/08/1990	8	10	17.5	5.4000001	SE	70	2.2675
68038	7/08/1990	8	10	15	9.3999996	SE	48	4.8879
68038	28/08/1990	8	10	16	3.5999999	SE	59	3.0202
68038	5/09/1990	9	10	19	9.3999996	SE	37	8.1781
68038	17/09/1990	9	10	15	1.8	SE	55	3.2137
68038	28/09/1990	9	10	14	9.3999996	SE	67	2.4534
68038	3/10/1990	10	10	16	1.8	SE	88	1.0647
68038	12/10/1990	10	10	16	5.4000001	SE	68	2.3093
68038	26/10/1990	10	10	19	3.5999999	SE	64	2.813
68038	20/11/1990	11	10	19	9.3999996	SE	56	4.2459
68038	23/11/1990	11	10	20	11.2	SE	53	5.0803
68038	26/11/1990	11	10	18	9.3999996	SE	68	2.7133
68038	30/11/1990	11	10	21	9.3999996	SE	64	3.4472
68038	1/12/1990	12	10	24	9.3999996	SE	74	2.7019
68038	3/12/1990	12	10	23	11.2	SE	78	2.3733
68038	19/12/1990	12	10	21	1.8	SE	78	1.7802
68038	20/12/1990	12	10	23	11.2	SE	65	3.7165
68038	21/12/1990	12	10	22	1.8	SE	69	2.5118
68038	16/01/1991	1	10	21	7.5999999	SE	64	3.305
68038	18/01/1991	1	10	25	7.5999999	SE	74	2.6795
68038	22/01/1991	1	10	25	3.5999999	SE	65	3.3286
68038	29/01/1991	1	10	24	14.8	SE	69	3.643
68038	1/02/1991	2	10	25	7.5999999	SE	65	3.6552
68038	6/02/1991	2	10	25	3.5999999	SE	83	1.7888
68038	11/02/1991	2	10	24	3.5999999	SE	65	3.2179
68038	26/02/1991	2	10	26	27.700001	SE	65	6.0513
68038	27/02/1991	2	10	19	3.5999999	SE	88	1.229
68038	20/03/1991	3	10	24	5.4000001	SE	65	3.3564
68038	2/04/1991	4	10	20	18.4	SE	64	4.1138
68038	5/04/1991	4	10	22	9.3999996	SE	69	3.0007
68038	9/04/1991	4	10	22	9.3999996	SE	41	7.8842
68038	16/05/1991	5	10	18	1.8	SE	68	2.2712
68038	6/06/1991	6	10	20	1.8	SE	64	2.7897
68038	2/09/1991	9	10	15	5.4000001	SE	59	3.0455
68038	5/09/1991	9	10	18	9.3999996	SE	73	2.2834
68038	12/09/1991	9	10	15	27.700001	SE	59	5.1319
68038	23/09/1991	9	10	16	3.5999999	SE	59	3.0202
68038	24/09/1991	9	10	17	5.4000001	SE	55	3.7406
68038	27/09/1991	9	10	16.5	3.5999999	SE	70	2.1017
68038	30/09/1991	9	10	19	11.2	SE	64	3.3605
68038	8/10/1991	10	10	20	7.5999999	SE	56	4.2107
68038	17/10/1991	10	10	16	5.4000001	SE	59	3.1502
68038	23/10/1991	10	10	19	1.8	SE	52	4.0801
68038	28/10/1991	10	10	17	3.5999999	SE	68	2.2902



68038	1/11/1991	11	10	16	3.5999999	SE	77	1.6231
68038	5/11/1991	11	10	21.5	3.5999999	SE	55	4.1755
68038	11/11/1991	11	10	18	5.4000001	SE	73	2.0794
68038	12/11/1991	11	10	19.5	9.3999996	SE	71	2.5737
68038	14/11/1991	11	10	18	14.8	SE	64	3.5343
68038	5/12/1991	12	10	18	7.5999999	SE	52	4.5179
68038	12/12/1991	12	10	19	9.3999996	SE	94	1.1445
68038	30/12/1991	12	10	19	7.5999999	SE	83	1.6037
68038	2/01/1992	1	10	22	9.3999996	SE	94	1.2666
68038	3/01/1992	1	10	22	1.8	SE	73	2.1881
68038	6/01/1992	1	10	23.5	5.4000001	SE	59	4.0591
68038	7/01/1992	1	10	23	14.8	SE	73	3.068
68038	16/01/1992	1	10	23	7.5999999	SE	73	2.5923
68038	24/01/1992	1	10	21	9.3999996	SE	73	2.5271
68038	29/01/1992	1	10	20	5.4000001	SE	56	3.9995
68038	4/02/1992	2	10	23	5.4000001	SE	69	2.8266
68038	27/02/1992	2	10	22	7.5999999	SE	65	3.3027
68038	28/02/1992	2	10	23	3.5999999	SE	61	3.5713
68038	12/03/1992	3	10	23	14.8	SE	73	3.068
68038	19/03/1992	3	10	22.5	3.5999999	SE	51	4.9582
68038	25/03/1992	3	10	23	9.3999996	SE	69	3.1039
68038	26/03/1992	3	10	21	9.3999996	SE	88	1.5062
68038	2/04/1992	4	10	22.5	18.4	SE	76	2.959
68038	10/04/1992	4	10	20	9.3999996	SE	64	3.3326
68038	4/05/1992	5	10	20	7.5999999	SE	73	2.3423
68038	7/05/1992	5	10	22	7.5999999	SE	65	3.3027
68038	14/05/1992	5	10	19	1.8	SE	56	3.5542
68038	16/06/1992	6	10	15	9.3999996	SE	59	3.3443
68038	22/07/1992	7	10	14	5.4000001	SE	58	3.0476
68038	3/08/1992	8	10	15.5	9.3999996	SE	57	3.6443
68038	9/09/1992	9	10	15	9.3999996	SE	48	4.8879
68038	17/09/1992	9	10	16	55.400002	SE	77	5.4546
68038	30/09/1992	9	10	18.5	9.3999996	SE	38	7.7684
68038	7/10/1992	10	10	18.5	9.3999996	SE	62	3.3942
68038	5/11/1992	11	10	17	27.700001	SE	59	5.4908
68038	10/12/1992	12	10	20	9.3999996	SE	64	3.3326
68038	30/12/1992	12	10	21.5	14.8	SE	71	3.1246
68038	8/01/1993	1	10	22	18.4	SE	73	3.2267
68038	12/01/1993	1	10	20.5	9.3999996	SE	80	1.9516
68038	2/02/1993	2	10	26.5	5.4000001	SE	72	2.8687
68038	5/02/1993	2	10	20	9.3999996	SE	88	1.4561
68038	4/03/1993	3	10	19.5	9.3999996	SE	54	4.6268
68038	9/03/1993	3	10	22	3.5999999	SE	83	1.6163
68038	15/03/1993	3	10	23	7.5999999	SE	73	2.5923
68038	18/03/1993	3	10	22	9.3999996	SE	73	2.6139
68038	30/03/1993	3	10	23	27.700001	SE	38	13.879
68038	5/05/1993	5	10	18	11.2	SE	52	4.9149
68038	7/05/1993	5	10	21	3.5999999	SE	73	2.2063
68038	20/05/1993	5	10	18	3.5999999	SE	73	1.9936
68038	26/05/1993	5	10	18	3.5999999	SE	64	2.7195
68038	2/06/1993	6	10	17	1.8	SE	77	1.6097
68038	15/07/1993	7	10	17.5	9.3999996	SE	50	4.9642
68038	22/09/1993	9	10	18	9.3999996	SE	37	7.9063
68038	23/09/1993	9	10	16	9.3999996	SE	55	3.9712
68038	24/09/1993	9	10	18	9.3999996	SE	64	3.1148
68038	11/10/1993	10	10	15	9.3999996	SE	59	3.3443
68038	13/10/1993	10	10	19	9.3999996	SE	78	1.9877

68038	15/10/1993	10	10	17.5	1.8	SE	75	1.754
68038	22/10/1993	10	10	20	9.3999996	SE	43	6.8775
68038	27/10/1993	10	10	18	9.3999996	SE	56	4.1048
68038	5/11/1993	11	10	17.5	9.3999996	SE	44	6.1059
68038	9/11/1993	11	10	17.5	5.4000001	SE	61	3.0931
68038	30/11/1993	11	10	22	9.3999996	SE	78	2.1998
68038	15/12/1993	12	10	24	9.3999996	SE	65	3.6857
68038	19/01/1994	1	10	24	9.3999996	SE	74	2.7019
68038	2/02/1994	2	10	26	18.4	SE	61	5.5882
68038	7/02/1994	2	10	25	9.3999996	SE	83	2.0488
68038	17/02/1994	2	10	24	9.3999996	SE	69	3.2106
68038	4/03/1994	3	10	24	18.4	SE	65	4.5497
68038	15/03/1994	3	10	22	3.5999999	SE	57	3.9635
68038	25/03/1994	3	10	21.5	5.4000001	SE	58	3.9269
68038	28/03/1994	3	10	22	3.5999999	SE	73	2.2822
68038	29/03/1994	3	10	22	5.4000001	SE	73	2.3804
68038	7/04/1994	4	10	22	9.3999996	SE	47	6.41
68038	8/04/1994	4	10	20	9.3999996	SE	48	5.7878
68038	18/04/1994	4	10	19	9.3999996	SE	59	3.8284
68038	19/04/1994	4	10	20	5.4000001	SE	56	3.9995
68038	5/05/1994	5	10	18.2000008	5.4000001	SE	69	2.4032
68038	10/05/1994	5	10	17	9.3999996	SE	52	4.5556
68038	4/07/1994	7	10	22	14.8	SE	42	8.6427
68038	6/07/1994	7	10	20.2000008	5.4000001	SE	28	10.58
68038	4/08/1994	8	10	14	5.4000001	SE	67	2.2341
68038	15/08/1994	8	10	14.8000002	9.3999996	SE	50	4.5313
68038	19/08/1994	8	10	15	9.3999996	SE	53	4.1134
68038	25/08/1994	8	10	17.5	9.3999996	SE	66	2.8584
68038	29/08/1994	8	10	17	3.5999999	SE	70	2.1375
68038	1/09/1994	9	10	17.5	14.8	SE	66	3.2434
68038	15/09/1994	9	10	17.5	14.8	SE	75	2.3777
68038	5/10/1994	10	10	18.6000004	9.3999996	SE	64	3.1786
68038	13/10/1994	10	10	15.5	27.7000001	SE	74	3.1108
68038	19/10/1994	10	10	16.5	9.3999996	SE	69	2.4917
68038	20/10/1994	10	10	14	9.3999996	SE	91	1.0719
68038	21/10/1994	10	10	16.2999992	18.4	SE	57	4.6219
68038	14/11/1994	11	10	21.5	9.3999996	SE	58	4.3122
68038	18/11/1994	11	10	20.5	9.3999996	SE	61	3.759
68038	21/11/1994	11	10	20	9.3999996	SE	60	3.8258
68038	22/11/1994	11	10	17.7000008	9.3999996	SE	55	4.206
68038	2/12/1994	12	10	21	9.3999996	SE	53	5.0382
68038	29/12/1994	12	10	20.5	9.3999996	SE	57	4.3153
68038	3/01/1995	1	10	19	9.3999996	SE	81	1.7922
68038	23/01/1995	1	10	21	9.3999996	SE	57	4.3888
68038	24/01/1995	1	10	22.5	9.3999996	SE	59	4.3092
68038	25/01/1995	1	10	22	9.3999996	SE	66	3.328
68038	31/01/1995	1	10	21	27.7000001	SE	57	6.7347
68038	1/02/1995	2	10	21	9.3999996	SE	61	3.8231
68038	6/02/1995	2	10	21	9.3999996	SE	73	2.5271
68038	10/02/1995	2	10	22.2000008	18.4	SE	69	3.7293
68038	15/02/1995	2	10	25	9.3999996	SE	73	2.8929
68038	21/02/1995	2	10	22.7999992	9.3999996	SE	56	4.8278
68038	1/03/1995	3	10	19.1000004	18.4	SE	94	1.4176
68038	3/03/1995	3	10	19.1000004	14.8	SE	93	1.3488
68038	6/03/1995	3	10	22.5	14.8	SE	90	1.678
68038	7/03/1995	3	10	24.7000008	9.3999996	SE	71	3.0683
68038	8/03/1995	3	10	24.5	5.4000001	SE	83	1.8345

68038	10/03/1995	3	10	21	18.4	SE	60	4.8849
68038	13/03/1995	3	10	19.7999992	9.3999996	SE	54	4.6739
68038	14/03/1995	3	10	24.5	9.3999996	SE	43	8.0073
68038	15/03/1995	3	10	18.7999992	18.4	SE	60	4.5349
68038	16/03/1995	3	10	20.5	5.4000001	SE	61	3.4231
68038	22/03/1995	3	10	25.6000004	9.3999996	SE	55	5.4934
68038	29/03/1995	3	10	20.6000004	5.4000001	SE	60	3.5553
68038	11/04/1995	4	10	19.5	37.099998	SE	47	11.263
68038	18/04/1995	4	10	20.5	9.3999996	SE	52	5.1277
68038	19/04/1995	4	10	20	9.3999996	SE	45	6.419
68038	15/05/1995	5	10	18.7000008	5.4000001	SE	53	4.2449
68038	31/05/1995	5	10	16.7000008	5.4000001	SE	65	2.6225
68038	23/06/1995	6	10	15	5.4000001	SE	63	2.6529
68038	21/08/1995	8	10	17.5	14.8	SE	68	3.0271
68038	22/08/1995	8	10	18.2000008	5.4000001	SE	78	1.7618
68038	27/09/1995	9	10	15	18.4	SE	58	4.2732
68038	17/10/1995	10	10	22	9.3999996	SE	60	4.0933
68038	27/10/1995	10	10	18.8999996	9.3999996	SE	76	2.1225
68038	30/10/1995	10	10	15.1999998	9.3999996	SE	67	2.5549
68038	31/10/1995	10	10	15.8000002	14.8	SE	57	4.1773
68038	20/11/1995	11	10	15.5	18.4	SE	89	1.4915
68038	27/11/1995	11	10	25.5	9.3999996	SE	64	4.0135
68038	1/12/1995	12	10	19.7999992	18.4	SE	77	2.6093
68038	6/02/1996	2	10	22	5.4000001	SE	79	1.9353
68038	11/03/1996	3	10	22.1000004	5.4000001	SE	71	2.5591
68038	14/03/1996	3	10	21.1000004	18.4	SE	73	3.13
68038	18/03/1996	3	10	19.2999992	5.4000001	SE	56	3.9059
68038	28/03/1996	3	10	23.7999992	5.4000001	SE	71	2.7104
68038	10/04/1996	4	10	15	18.4	SE	94	1.2341
68038	9/07/1996	7	10	13.5	5.4000001	SE	62	2.6103
68038	21/08/1996	8	10	13.5	9.3999996	SE	76	1.7684
68038	30/08/1996	8	10	14	27.7000001	SE	78	2.5758
68038	27/09/1996	9	10	16.5	5.4000001	SE	62	2.8889
68038	21/10/1996	10	10	15.1999998	9.3999996	SE	48	4.921
68038	22/10/1996	10	10	16.2000008	9.3999996	SE	72	2.224
68038	28/10/1996	10	10	18	9.3999996	SE	81	1.7327
68038	5/10/1985	10	10	22.5	9.3999996	NNE	59	4.3092
68038	8/10/1985	10	10	19.8999996	9.3999996	NNE	69	2.7951
68038	17/10/1985	10	10	19.7000008	7.5999999	NNE	79	1.8851
68038	5/12/1985	12	10	21.8999996	7.5999999	NNE	74	2.413
68038	30/12/1985	12	10	25.3999996	9.3999996	NNE	77	2.5543
68038	30/01/1986	1	10	26.3999996	9.3999996	NNE	68	3.6041
68038	17/02/1986	2	10	24.7000008	11.2	NNE	58	5.0115
68038	9/03/1986	3	10	21.5	9.3999996	NNE	58	4.3122
68038	18/03/1986	3	10	23.2999992	7.5999999	NNE	77	2.2811
68038	19/03/1986	3	10	24.5	11.2	NNE	76	2.6751
68038	2/04/1986	4	10	24.8999996	5.4000001	NNE	66	3.3427
68038	1/07/1986	7	10	15	5.4000001	NNE	67	2.3109
68038	4/07/1986	7	10	18.3999996	3.5999999	NNE	62	2.9534
68038	1/10/1986	10	10	20.6000004	9.3999996	NNE	75	2.3269
68038	5/11/1986	11	10	21.2000008	13	NNE	63	3.9081
68038	16/11/1986	11	10	19.5	3.5999999	NNE	85	1.3863
68038	25/11/1986	11	10	21.2999992	5.4000001	NNE	67	2.8594
68038	26/11/1986	11	10	23	7.5999999	NNE	69	2.9759
68038	7/02/1987	2	10	27.2000008	22.299999	NNE	57	7.319
68038	23/02/1987	2	10	21.5	3.5999999	NNE	58	3.765
68038	27/07/1987	7	10	15.8000002	5.4000001	NNE	68	2.2938

68038	7/09/1985	9	10	17	9.3999996	NE	59	3.5782
68038	8/09/1985	9	10	18.6000004	9.3999996	NE	61	3.5252
68038	9/10/1985	10	10	20.5	3.5999999	NE	66	2.762
68038	29/10/1985	10	10	20.5	18.4	NE	62	4.4828
68038	1/11/1985	11	10	20.5	7.5999999	NE	54	4.5884
68038	9/11/1985	11	10	22	3.5999999	NE	65	3.0076
68038	14/11/1985	11	10	23.2999992	7.5999999	NE	72	2.7106
68038	20/11/1985	11	10	20.3999996	7.5999999	NE	62	3.47
68038	25/11/1985	11	10	18.5	5.4000001	NE	91	1.1365
68038	3/12/1985	12	10	21.5	9.3999996	NE	58	4.3122
68038	4/12/1985	12	10	17.6000004	3.5999999	NE	90	1.0941
68038	16/12/1985	12	10	23.2000008	9.3999996	NE	82	1.9955
68038	17/12/1985	12	10	24.2000008	7.5999999	NE	50	5.9691
68038	18/12/1985	12	10	23.5	3.5999999	NE	55	4.4675
68038	19/12/1985	12	10	24.5	5.4000001	NE	59	4.1986
68038	28/12/1985	12	10	22.5	11.2	NE	71	2.9709
68038	1/01/1986	1	10	23	9.3999996	NE	57	4.6958
68038	3/01/1986	1	10	22	9.3999996	NE	53	5.2115
68038	8/01/1986	1	10	24.1000004	5.4000001	NE	69	2.9336
68038	10/01/1986	1	10	23.3999996	7.5999999	NE	46	6.6696
68038	21/01/1986	1	10	24.3999996	9.3999996	NE	72	2.9343
68038	26/01/1986	1	10	22.5	9.3999996	NE	63	3.7538
68038	27/01/1986	1	10	25	5.4000001	NE	69	3.0242
68038	29/01/1986	1	10	24.2999992	11.2	NE	64	4.0197
68038	5/02/1986	2	10	25.7999992	7.5999999	NE	75	2.6596
68038	15/02/1986	2	10	23	9.3999996	NE	57	4.6958
68038	28/02/1986	2	10	23.3999996	7.5999999	NE	63	3.7101
68038	4/03/1986	3	10	26	7.5999999	NE	70	3.1818
68038	6/03/1986	3	10	25.7999992	7.5999999	NE	62	4.1648
68038	14/03/1986	3	10	23.2000008	7.5999999	NE	60	4.0869
68038	20/03/1986	3	10	25.2000008	9.3999996	NE	73	2.9125
68038	25/03/1986	3	10	24	11.2	NE	69	3.3487
68038	3/04/1986	4	10	27.6000004	3.5999999	NE	63	3.8939
68038	4/04/1986	4	10	29.8999996	3.5999999	NE	49	6.822
68038	8/04/1986	4	10	23	13	NE	69	3.3767
68038	11/04/1986	4	10	24.7999992	3.5999999	NE	66	3.194
68038	14/04/1986	4	10	22	3.5999999	NE	65	3.0076
68038	15/04/1986	4	10	22.1000004	11.2	NE	64	3.7317
68038	16/04/1986	4	10	22.2999992	18.4	NE	72	3.374
68038	19/04/1986	4	10	22.5	3.5999999	NE	55	4.3191
68038	21/04/1986	4	10	21.3999996	3.5999999	NE	59	3.625
68038	22/04/1986	4	10	22.2000008	3.5999999	NE	64	3.1343
68038	2/06/1986	6	10	18	3.5999999	NE	59	3.2315
68038	5/06/1986	6	10	18.5	3.5999999	NE	62	2.9634
68038	7/07/1986	7	10	14	5.4000001	NE	55	3.3799
68038	14/07/1986	7	10	16.5	7.5999999	NE	70	2.3079
68038	15/07/1986	7	10	16.3999996	14.8	NE	80	1.9279
68038	16/07/1986	7	10	17.8999996	5.4000001	NE	73	2.0723
68038	22/07/1986	7	10	15.6000004	3.5999999	NE	65	2.4225
68038	12/09/1986	9	10	15.5	9.3999996	NE	85	1.387
68038	16/09/1986	9	10	15.8000002	14.8	NE	56	4.3239
68038	24/09/1986	9	10	20.2999992	9.3999996	NE	67	3.0356
68038	25/09/1986	9	10	23	9.3999996	NE	61	4.0905
68038	26/09/1986	9	10	22.2000008	5.4000001	NE	56	4.3082
68038	2/10/1986	10	10	22.7000008	3.5999999	NE	66	2.9752
68038	6/10/1986	10	10	18.7000008	9.3999996	NE	74	2.2588
68038	12/10/1986	10	10	19.7000008	9.3999996	NE	50	5.3474



68038	15/10/1986	10	10	18.7999992	5.4000001	NE	40	6.6699
68038	16/10/1986	10	10	20	5.4000001	NE	40	6.9459
68038	17/10/1986	10	10	20.5	5.4000001	NE	71	2.4243
68038	18/10/1986	10	10	18.7999992	3.5999999	NE	89	1.1794
68038	21/10/1986	10	10	19	11.2	NE	40	7.6912
68038	29/10/1986	10	10	18.6000004	3.5999999	NE	70	2.2563
68038	30/10/1986	10	10	21	13	NE	69	3.156
68038	31/10/1986	10	10	22.6000004	7.5999999	NE	66	3.2561
68038	3/11/1986	11	10	21.3999996	7.5999999	NE	67	3.0206
68038	4/11/1986	11	10	21.8999996	7.5999999	NE	65	3.2916
68038	6/11/1986	11	10	23.2999992	9.3999996	NE	68	3.2456
68038	9/11/1986	11	10	19	3.5999999	NE	64	2.813
68038	12/11/1986	11	10	17	5.4000001	NE	68	2.3887
68038	2/12/1986	12	10	22	9.3999996	NE	53	5.2115
68038	4/12/1986	12	10	23	9.3999996	NE	53	5.3906
68038	5/12/1986	12	10	21.3999996	11.2	NE	67	3.2861
68038	16/12/1986	12	10	23.2000008	9.3999996	NE	68	3.2346
68038	19/12/1986	12	10	24	37.099998	NE	57	9.2872
68038	21/12/1986	12	10	24	9.3999996	NE	61	4.2311
68038	23/12/1986	12	10	23	11.2	NE	61	4.2664
68038	30/12/1986	12	10	24.3999996	11.2	NE	72	3.0606
68038	2/01/1987	1	10	23.8999996	3.5999999	NE	79	1.9785
68038	5/01/1987	1	10	24.7000008	9.3999996	NE	75	2.6728
68038	6/01/1987	1	10	26	3.5999999	NE	70	2.8975
68038	7/01/1987	1	10	26	7.5999999	NE	70	3.1818
68038	9/01/1987	1	10	22.3999996	3.5999999	NE	63	3.2663
68038	11/01/1987	1	10	26.5	3.5999999	NE	72	2.7504
68038	13/01/1987	1	10	25.6000004	3.5999999	NE	71	2.7616
68038	15/01/1987	1	10	27	9.3999996	NE	54	5.9617
68038	18/01/1987	1	10	25.3999996	14.8	NE	77	2.8983
68038	19/01/1987	1	10	22.5	3.5999999	NE	63	3.2774
68038	26/01/1987	1	10	27	9.3999996	NE	70	3.4327
68038	29/01/1987	1	10	27.7999992	18.4	NE	59	6.363
68038	2/02/1987	2	10	29.1000004	14.8	NE	62	5.5107
68038	5/02/1987	2	10	24.6000004	7.5999999	NE	63	3.8637
68038	6/02/1987	2	10	27.2000008	7.5999999	NE	65	3.9373
68038	8/02/1987	2	10	26.7999992	7.5999999	NE	66	3.7527
68038	13/02/1987	2	10	26.5	9.3999996	NE	46	7.725
68038	18/02/1987	2	10	25.7000008	3.5999999	NE	48	6.127
68038	19/02/1987	2	10	26.5	11.2	NE	60	4.9708
68038	20/02/1987	2	10	27.2000008	11.2	NE	65	4.2834
68038	24/02/1987	2	10	26.2999992	18.4	NE	64	5.0901
68038	11/03/1987	3	10	23.7999992	7.5999999	NE	51	5.6893
68038	17/03/1987	3	10	24.6000004	9.3999996	NE	52	5.8899
68038	18/03/1987	3	10	26.2000008	9.3999996	NE	61	4.5577
68038	26/03/1987	3	10	25	7.5999999	NE	69	3.184
68038	3/04/1987	4	10	23.2000008	7.5999999	NE	64	3.5601
68038	7/04/1987	4	10	24.6000004	11.2	NE	63	4.2033
68038	13/04/1987	4	10	24.2000008	7.5999999	NE	60	4.2274
68038	26/04/1987	4	10	23.8999996	3.5999999	NE	65	3.2071
68038	2/05/1987	5	10	19.5	9.3999996	NE	91	1.2909
68038	12/05/1987	5	10	22	3.5999999	NE	73	2.2822
68038	13/05/1987	5	10	23.2000008	3.5999999	NE	73	2.3767
68038	16/05/1987	5	10	20.5	3.5999999	NE	48	5.1394
68038	29/05/1987	5	10	19	3.5999999	NE	46	5.2343
68038	1/06/1987	6	10	18.2999992	7.5999999	NE	67	2.7201
68038	11/06/1987	6	10	22.1000004	7.5999999	NE	53	5.0134

68038	14/07/1987	7	10	17	1.8	NE	42	5.3845
68038	17/07/1987	7	10	18	3.5999999	NE	56	3.5839
68038	28/07/1987	7	10	15.5	7.5999999	NE	75	1.8777
68038	7/08/1987	8	10	17.7999992	11.2	NE	64	3.2269
68038	13/08/1987	8	10	16.6000004	11.2	NE	79	1.8468
68038	21/08/1987	8	10	18	7.5999999	NE	64	2.9863
68038	14/09/1987	9	10	19	3.5999999	NE	56	3.7071
68038	15/09/1987	9	10	19	1.8	NE	68	2.3493
68038	16/09/1987	9	10	20	1.8	NE	60	3.2025
68038	18/09/1987	9	10	20	13	NE	68	3.1582
68038	24/09/1987	9	10	24.5	1.8	NE	59	3.8594
68038	2/10/1987	10	10	19.5	5.4000001	NE	62	3.1971
68038	9/10/1987	10	10	20.5	3.5999999	NE	51	4.6341
68038	16/10/1987	10	10	17.5	14.8	NE	91	1.3691
68038	30/10/1987	10	10	22	7.5999999	NE	50	5.5414
68038	2/11/1987	11	10	23	3.5999999	NE	89	1.3593
68038	5/11/1987	11	10	23	3.5999999	NE	50	5.2197
68038	19/11/1987	11	10	24.5	9.3999996	NE	71	3.0476
68038	20/11/1987	11	10	20	3.5999999	NE	88	1.2713
68038	23/11/1987	11	10	22	18.4	NE	65	4.2523
68038	1/12/1987	12	10	22	13	NE	88	1.6949
68038	9/12/1987	12	10	22.5	9.3999996	NE	55	4.9469
68038	10/12/1987	12	10	26	9.3999996	NE	61	4.527
68038	15/12/1987	12	10	25.5	18.4	NE	59	5.8871
68038	16/12/1987	12	10	26	9.3999996	NE	65	3.9435
68038	18/12/1987	12	10	25	7.5999999	NE	74	2.6795
68038	23/12/1987	12	10	24	11.2	NE	57	5.0661
68038	31/12/1987	12	10	25	9.3999996	NE	61	4.3765
68038	6/01/1988	1	10	26	9.3999996	NE	61	4.527
68038	12/01/1988	1	10	27	11.2	NE	70	3.5804
68038	13/01/1988	1	10	25	11.2	NE	61	4.5648
68038	14/01/1988	1	10	27	9.3999996	NE	54	5.9617
68038	19/01/1988	1	10	26	18.4	NE	62	5.3987
68038	20/01/1988	1	10	27	9.3999996	NE	62	4.5238
68038	22/01/1988	1	10	25	5.4000001	NE	74	2.5451
68038	27/01/1988	1	10	27	9.3999996	NE	54	5.9617
68038	28/01/1988	1	10	28	9.3999996	NE	55	5.9575
68038	3/02/1988	2	10	27	9.3999996	NE	54	5.9617
68038	5/02/1988	2	10	27.5	14.8	NE	60	5.5936
68038	22/02/1988	2	10	26	9.3999996	NE	70	3.3187
68038	24/02/1988	2	10	25	1.8	NE	65	3.1913
68038	26/02/1988	2	10	27	5.4000001	NE	62	4.1196
68038	1/03/1988	3	10	28	9.3999996	NE	62	4.6793
68038	2/03/1988	3	10	28	3.5999999	NE	62	4.0855
68038	3/03/1988	3	10	28	9.3999996	NE	62	4.6793
68038	10/03/1988	3	10	27	3.5999999	NE	51	5.7727
68038	21/03/1988	3	10	25	9.3999996	NE	61	4.3765
68038	28/03/1988	3	10	24.5	18.4	NE	55	6.5336
68038	31/03/1988	3	10	22.5	9.3999996	NE	74	2.5683
68038	6/04/1988	4	10	21.5	5.4000001	NE	76	2.1104
68038	11/04/1988	4	10	16.5	3.5999999	NE	70	2.1017
68038	14/04/1988	4	10	23	3.5999999	NE	57	4.0998
68038	26/04/1988	4	10	22	5.4000001	NE	65	3.137
68038	5/05/1988	5	10	20	5.4000001	NE	68	2.6436
68038	13/05/1988	5	10	20	5.4000001	NE	60	3.4839
68038	27/05/1988	5	10	18	5.4000001	NE	59	3.3705
68038	2/06/1988	6	10	19	3.5999999	NE	60	3.2292

68038	3/06/1988	6	10	20	3.5999999	NE	60	3.3402
68038	9/06/1988	6	10	17	5.4000001	NE	52	4.1485
68038	5/07/1988	7	10	17	9.3999996	NE	94	1.0697
68038	6/07/1988	7	10	18.5	9.3999996	NE	80	1.824
68038	7/07/1988	7	10	18	3.5999999	NE	68	2.3689
68038	14/07/1988	7	10	18	9.3999996	NE	68	2.7133
68038	20/07/1988	7	10	17	3.5999999	NE	59	3.1241
68038	28/07/1988	7	10	18	3.5999999	NE	59	3.2315
68038	1/08/1988	8	10	17	1.8	NE	52	3.8134
68038	15/08/1988	8	10	17	1.8	NE	77	1.6097
68038	25/08/1988	8	10	16	7.5999999	NE	48	4.8474
68038	31/08/1988	8	10	19	9.3999996	NE	60	3.6986
68038	1/09/1988	9	10	19.5	9.3999996	NE	64	3.2768
68038	2/09/1988	9	10	19	9.3999996	NE	72	2.4448
68038	5/09/1988	9	10	18	9.3999996	NE	59	3.7012
68038	8/09/1988	9	10	18	9.3999996	NE	59	3.7012
68038	9/09/1988	9	10	20	9.3999996	NE	68	2.903
68038	22/09/1988	9	10	20.5	9.3999996	NE	51	5.3077
68038	23/09/1988	9	10	22	9.3999996	NE	57	4.5397
68038	30/09/1988	9	10	19	9.3999996	NE	46	5.9952
68038	5/10/1988	10	10	22	3.5999999	NE	60	3.5738
68038	7/10/1988	10	10	20	9.3999996	NE	40	7.6275
68038	11/10/1988	10	10	19	9.3999996	NE	52	4.8742
68038	13/10/1988	10	10	18.5	9.3999996	NE	54	4.473
68038	14/10/1988	10	10	25.5	11.2	NE	46	7.7895
68038	20/10/1988	10	10	19.5	9.3999996	NE	62	3.5109
68038	21/10/1988	10	10	22	14.8	NE	73	2.966
68038	25/10/1988	10	10	19	7.5999999	NE	56	4.0708
68038	28/10/1988	10	10	19.5	9.3999996	NE	54	4.6268
68038	1/11/1988	11	10	20	5.4000001	NE	68	2.6436
68038	2/11/1988	11	10	23	18.4	NE	69	3.8315
68038	7/11/1988	11	10	21	11.2	NE	53	5.255
68038	8/11/1988	11	10	21.5	18.4	NE	55	5.9036
68038	10/11/1988	11	10	20	5.4000001	NE	49	5.0919
68038	14/11/1988	11	10	23.5	14.8	NE	63	4.4058
68038	22/11/1988	11	10	19.5	3.5999999	NE	62	3.0653
68038	24/11/1988	11	10	21.5	5.4000001	NE	71	2.5077
68038	29/11/1988	11	10	20.5	9.3999996	NE	62	3.6315
68038	30/11/1988	11	10	21	9.3999996	NE	56	4.5429
68038	2/12/1988	12	10	22	9.3999996	NE	73	2.6139
68038	5/12/1988	12	10	26	14.8	NE	65	4.4746
68038	8/12/1988	12	10	18	9.3999996	NE	100	0.8996
68038	9/12/1988	12	10	23	9.3999996	NE	89	1.5568
68038	19/12/1988	12	10	24.5	9.3999996	NE	81	2.1584
68038	20/12/1988	12	10	25	14.8	NE	79	2.6688
68038	22/12/1988	12	10	22.5	9.3999996	NE	86	1.6977
68038	3/01/1989	1	10	21	18.4	NE	73	3.1195
68038	10/01/1989	1	10	26	11.2	NE	84	2.1355
68038	16/01/1989	1	10	25.5	9.3999996	NE	59	4.7691
68038	17/01/1989	1	10	25.5	9.3999996	NE	56	5.2892
68038	20/01/1989	1	10	25	5.4000001	NE	61	3.9855
68038	7/02/1989	2	10	25	9.3999996	NE	89	1.6657
68038	8/02/1989	2	10	26	9.3999996	NE	100	1.1789
68038	9/02/1989	2	10	25.5	14.8	NE	100	1.3152
68038	13/02/1989	2	10	26	14.8	NE	61	5.1367
68038	14/02/1989	2	10	26.5	9.3999996	NE	56	5.471
68038	15/02/1989	2	10	25	16.6	NE	65	4.512

68038	16/02/1989	2	10	26	3.5999999	NE	100	1.0293
68038	23/02/1989	2	10	25	9.3999996	NE	61	4.3765
68038	28/02/1989	2	10	24.5	9.3999996	NE	63	4.0163
68038	2/03/1989	3	10	25	9.3999996	NE	61	4.3765
68038	3/03/1989	3	10	24.5	9.3999996	NE	63	4.0163
68038	6/03/1989	3	10	25	18.4	NE	74	3.4499
68038	7/03/1989	3	10	26.6000004	14.8	NE	67	4.2618
68038	9/03/1989	3	10	27	9.3999996	NE	62	4.5238
68038	31/03/1989	3	10	19	18.4	NE	88	1.7377
68038	4/04/1989	4	10	21.5	9.3999996	NE	86	1.6413
68038	5/04/1989	4	10	22	14.8	NE	78	2.4961
68038	6/04/1989	4	10	22.5	9.3999996	NE	71	2.8484
68038	11/04/1989	4	10	22.5	9.3999996	NE	67	3.2699
68038	12/04/1989	4	10	23	9.3999996	NE	73	2.7038
68038	17/04/1989	4	10	24	9.3999996	NE	57	4.8572
68038	20/04/1989	4	10	23	5.4000001	NE	57	4.2762
68038	1/05/1989	5	10	21	5.4000001	NE	64	3.1392
68038	4/05/1989	5	10	22	7.5999999	NE	88	1.4937
68038	10/05/1989	5	10	20	3.5999999	NE	68	2.5346
68038	18/05/1989	5	10	21.5	5.4000001	NE	76	2.1104
68038	22/05/1989	5	10	18	14.8	NE	68	3.0787
68038	24/05/1989	5	10	19	9.3999996	NE	64	3.2219
68038	5/06/1989	6	10	17.5	3.5999999	NE	75	1.8295
68038	13/06/1989	6	10	19	9.3999996	NE	56	4.2459
68038	30/06/1989	6	10	17	9.3999996	NE	77	1.9229
68038	28/07/1989	7	10	18	14.8	NE	52	5.3469
68038	31/08/1989	8	10	16	11.2	NE	68	2.645
68038	6/09/1989	9	10	18	5.4000001	NE	73	2.0794
68038	8/09/1989	9	10	18	14.8	NE	52	5.3469
68038	25/09/1989	9	10	21	5.4000001	NE	56	4.1369
68038	4/10/1989	10	10	17	5.4000001	NE	59	3.2585
68038	12/10/1989	10	10	25	14.8	NE	28	15.504
68038	18/10/1989	10	10	20	7.5999999	NE	73	2.3423
68038	24/10/1989	10	10	22	9.3999996	NE	65	3.4448
68038	25/10/1989	10	10	21	3.5999999	NE	73	2.2063
68038	30/10/1989	10	10	23	14.8	NE	53	6.1167
68038	1/11/1989	11	10	20	14.8	NE	40	8.6548
68038	2/11/1989	11	10	20	9.3999996	NE	56	4.3919
68038	6/11/1989	11	10	23	14.8	NE	65	4.0431
68038	8/11/1989	11	10	20	14.8	NE	64	3.7815
68038	13/11/1989	11	10	21	11.2	NE	64	3.5955
68038	14/11/1989	11	10	23	9.3999996	NE	65	3.5632
68038	15/11/1989	11	10	22	5.4000001	NE	83	1.6858
68038	16/11/1989	11	10	22	5.4000001	NE	78	2.0032
68038	22/11/1989	11	10	22	14.8	NE	65	3.9088
68038	28/11/1989	11	10	21.6000004	3.5999999	NE	48	5.3341
68038	29/11/1989	11	10	22.5	9.3999996	NE	67	3.2699
68038	30/11/1989	11	10	23	13	NE	65	3.8764
68038	1/12/1989	12	10	24	5.4000001	NE	74	2.4605
68038	13/12/1989	12	10	22	14.8	NE	73	2.966
68038	18/12/1989	12	10	22.5	9.3999996	NE	59	4.3092
68038	19/12/1989	12	10	23	14.8	NE	65	4.0431
68038	29/12/1989	12	10	22	9.3999996	NE	65	3.4448
68038	3/01/1990	1	10	25.5	14.8	NE	76	3.0102
68038	5/01/1990	1	10	21	14.8	NE	64	3.9115
68038	11/01/1990	1	10	22.5	1.8	NE	81	1.6886
68038	12/01/1990	1	10	24	9.3999996	NE	74	2.7019



68038	17/01/1990	1	10	21	9.3999996	NE	46	6.4145
68038	23/01/1990	1	10	23	9.3999996	NE	57	4.6958
68038	24/01/1990	1	10	24	14.8	NE	65	4.1821
68038	30/01/1990	1	10	25	11.2	NE	65	3.9764
68038	31/01/1990	1	10	25	11.2	NE	83	2.1369
68038	8/02/1990	2	10	21	5.4000001	NE	78	1.9366
68038	28/02/1990	2	10	25	11.2	NE	61	4.5648
68038	9/03/1990	3	10	26	5.4000001	NE	84	1.8644
68038	14/03/1990	3	10	24	11.2	NE	57	5.0661
68038	15/03/1990	3	10	24.5	9.3999996	NE	67	3.4986
68038	27/03/1990	3	10	24.5	18.4	NE	63	4.9578
68038	28/03/1990	3	10	25	5.4000001	NE	74	2.5451
68038	30/03/1990	3	10	23	3.5999999	NE	65	3.111
68038	11/04/1990	4	10	23	9.3999996	NE	78	2.2754
68038	9/05/1990	5	10	22	5.4000001	NE	73	2.3804
68038	15/06/1990	6	10	17	3.5999999	NE	59	3.1241
68038	20/06/1990	6	10	16	5.4000001	NE	77	1.6929
68038	22/06/1990	6	10	17.5	5.4000001	NE	44	5.5603
68038	27/06/1990	6	10	16	9.3999996	NE	48	5.0559
68038	29/06/1990	6	10	17	9.3999996	NE	39	7.1339
68038	13/07/1990	7	10	15	5.4000001	NE	67	2.3109
68038	16/07/1990	7	10	18	1.8	NE	68	2.2712
68038	18/07/1990	7	10	18	9.3999996	NE	68	2.7133
68038	29/08/1990	8	10	16	5.4000001	NE	59	3.1502
68038	30/08/1990	8	10	20	1.8	NE	53	4.0772
68038	6/09/1990	9	10	17	1.8	NE	52	3.8134
68038	10/09/1990	9	10	16.5	9.3999996	NE	57	3.7696
68038	11/09/1990	9	10	17.5	9.3999996	NE	66	2.8584
68038	18/09/1990	9	10	16.5	9.3999996	NE	85	1.4347
68038	19/09/1990	9	10	18	14.8	NE	68	3.0787
68038	20/09/1990	9	10	19	1.8	NE	68	2.3493
68038	24/09/1990	9	10	19	5.4000001	NE	68	2.5558
68038	25/09/1990	9	10	22	3.5999999	NE	57	3.9635
68038	4/10/1990	10	10	19	9.3999996	NE	73	2.3619
68038	8/10/1990	10	10	18	11.2	NE	83	1.6867
68038	10/10/1990	10	10	18	5.4000001	NE	88	1.2393
68038	15/10/1990	10	10	18	14.8	NE	64	3.5343
68038	17/10/1990	10	10	19	7.5999999	NE	73	2.2645
68038	18/10/1990	10	10	21	5.4000001	NE	56	4.1369
68038	31/10/1990	10	10	20	9.3999996	NE	73	2.4431
68038	5/11/1990	11	10	21	7.5999999	NE	64	3.305
68038	7/11/1990	11	10	21	9.3999996	NE	64	3.4472
68038	8/11/1990	11	10	22	18.4	NE	73	3.2267
68038	9/11/1990	11	10	20	3.5999999	NE	78	1.7951
68038	12/11/1990	11	10	21	7.5999999	NE	78	2.039
68038	14/11/1990	11	10	21	9.3999996	NE	78	2.1267
68038	15/11/1990	11	10	23	3.5999999	NE	65	3.111
68038	21/11/1990	11	10	21	14.8	NE	73	2.8674
68038	27/11/1990	11	10	21	18.4	NE	64	4.2553
68038	28/11/1990	11	10	24.5	9.3999996	NE	67	3.4986
68038	29/11/1990	11	10	25	5.4000001	NE	65	3.4717
68038	6/12/1990	12	10	25	3.5999999	NE	74	2.4401
68038	7/12/1990	12	10	27	1.8	NE	70	2.8735
68038	12/12/1990	12	10	25	3.5999999	NE	61	3.8211
68038	17/12/1990	12	10	23.5	9.3999996	NE	71	2.9463
68038	18/12/1990	12	10	32	1.8	NE	43	8.6367
68038	27/12/1990	12	10	25	11.2	NE	65	3.9764

68038	31/12/1990	12	10	26	9.3999996	NE	74	2.8909
68038	3/01/1991	1	10	27	11.2	NE	62	4.7184
68038	4/01/1991	1	10	28	3.5999999	NE	55	5.2015
68038	7/01/1991	1	10	25	9.3999996	NE	47	7.0941
68038	9/01/1991	1	10	24	5.4000001	NE	65	3.3564
68038	11/01/1991	1	10	27	5.4000001	NE	62	4.1196
68038	14/01/1991	1	10	26	9.3999996	NE	74	2.8909
68038	17/01/1991	1	10	23	3.5999999	NE	73	2.3607
68038	24/01/1991	1	10	25	7.5999999	NE	83	1.9643
68038	25/01/1991	1	10	29	5.4000001	NE	62	4.4077
68038	30/01/1991	1	10	25	3.5999999	NE	39	8.1624
68038	4/02/1991	2	10	30	3.5999999	NE	59	4.8479
68038	5/02/1991	2	10	29	3.5999999	NE	62	4.2259
68038	7/02/1991	2	10	27	9.3999996	NE	70	3.4327
68038	13/02/1991	2	10	26	9.3999996	NE	74	2.8909
68038	21/02/1991	2	10	24	3.5999999	NE	89	1.406
68038	22/02/1991	2	10	25	7.5999999	NE	65	3.6552
68038	28/02/1991	2	10	22	18.4	NE	58	5.4138
68038	6/03/1991	3	10	26	5.4000001	NE	65	3.5911
68038	7/03/1991	3	10	25	5.4000001	NE	74	2.5451
68038	8/03/1991	3	10	25	5.4000001	NE	65	3.4717
68038	11/03/1991	3	10	24	18.4	NE	74	3.3353
68038	13/03/1991	3	10	23	1.8	NE	50	5.0044
68038	14/03/1991	3	10	25	1.8	NE	74	2.3395
68038	18/03/1991	3	10	25	3.5999999	NE	65	3.3286
68038	25/03/1991	3	10	21	7.5999999	NE	64	3.305
68038	26/03/1991	3	10	23	5.4000001	NE	53	4.9089
68038	27/03/1991	3	10	24	5.4000001	NE	38	8.5195
68038	28/03/1991	3	10	24	18.4	NE	74	3.3353
68038	3/04/1991	4	10	22	7.5999999	NE	50	5.5414
68038	4/04/1991	4	10	24	5.4000001	NE	57	4.4232
68038	10/04/1991	4	10	22	3.5999999	NE	57	3.9635
68038	11/04/1991	4	10	21	3.5999999	NE	64	3.0097
68038	17/04/1991	4	10	21	3.5999999	NE	46	5.6004
68038	19/04/1991	4	10	21	7.5999999	NE	73	2.4228
68038	30/04/1991	4	10	20.1000004	9.3999996	NE	99	0.9996
68038	23/05/1991	5	10	19	1.8	NE	60	3.096
68038	20/06/1991	6	10	17	1.8	NE	59	2.9952
68038	25/06/1991	6	10	18	3.5999999	NE	68	2.3689
68038	28/06/1991	6	10	20.6000004	9.3999996	NE	51	5.3257
68038	19/08/1991	8	10	17	3.5999999	NE	68	2.2902
68038	27/08/1991	8	10	18.5	9.3999996	NE	54	4.473
68038	29/08/1991	8	10	16.5	18.4	NE	53	5.3418
68038	6/09/1991	9	10	20	9.3999996	NE	68	2.903
68038	25/09/1991	9	10	19	9.3999996	NE	73	2.3619
68038	1/10/1991	10	10	21	7.5999999	NE	73	2.4228
68038	4/10/1991	10	10	20	9.3999996	NE	88	1.4561
68038	14/10/1991	10	10	20	18.4	NE	83	2.1358
68038	18/10/1991	10	10	19	18.4	NE	64	3.9771
68038	24/10/1991	10	10	19	7.5999999	NE	73	2.2645
68038	6/11/1991	11	10	21	3.5999999	NE	73	2.2063
68038	15/11/1991	11	10	20	27.700001	NE	56	6.7395
68038	18/11/1991	11	10	20	7.5999999	NE	83	1.6589
68038	19/11/1991	11	10	22	18.4	NE	73	3.2267
68038	22/11/1991	11	10	20	14.8	NE	64	3.7815
68038	25/11/1991	11	10	22	9.3999996	NE	83	1.8512
68038	29/11/1991	11	10	22	7.5999999	NE	83	1.7749

68038	2/12/1991	12	10	21	7.5999999	NE	94	1.174
68038	3/12/1991	12	10	23	3.5999999	NE	73	2.3607
68038	6/12/1991	12	10	22	9.3999996	NE	53	5.2115
68038	10/12/1991	12	10	23	9.3999996	NE	69	3.1039
68038	19/12/1991	12	10	21	5.4000001	NE	49	5.267
68038	20/12/1991	12	10	23.5	9.3999996	NE	67	3.3823
68038	13/01/1992	1	10	24	9.3999996	NE	74	2.7019
68038	15/01/1992	1	10	22	1.8	NE	65	2.8835
68038	20/01/1992	1	10	25	14.8	NE	83	2.3248
68038	21/01/1992	1	10	25	7.5999999	NE	83	1.9643
68038	22/01/1992	1	10	26	9.3999996	NE	79	2.4328
68038	23/01/1992	1	10	27	5.4000001	NE	70	3.126
68038	31/01/1992	1	10	23	5.4000001	NE	69	2.8266
68038	6/02/1992	2	10	23	9.3999996	NE	89	1.5568
68038	12/02/1992	2	10	25.5	5.4000001	NE	81	2.0331
68038	18/02/1992	2	10	25	3.5999999	NE	74	2.4401
68038	2/03/1992	3	10	24.5	9.3999996	NE	76	2.5647
68038	4/03/1992	3	10	22	1.8	NE	94	1.0603
68038	5/03/1992	3	10	25	5.4000001	NE	69	3.0242
68038	10/03/1992	3	10	25	7.5999999	NE	61	4.196
68038	11/03/1992	3	10	25	3.5999999	NE	65	3.3286
68038	23/03/1992	3	10	21	7.5999999	NE	73	2.4228
68038	27/03/1992	3	10	25	9.3999996	NE	65	3.8124
68038	31/03/1992	3	10	24	1.8	NE	69	2.6875
68038	6/04/1992	4	10	23	11.2	NE	61	4.2664
68038	13/04/1992	4	10	22	9.3999996	NE	73	2.6139
68038	15/04/1992	4	10	23	5.4000001	NE	69	2.8266
68038	21/04/1992	4	10	22	7.5999999	NE	65	3.3027
68038	5/05/1992	5	10	21	11.2	NE	83	1.8667
68038	8/05/1992	5	10	21	9.3999996	NE	73	2.5271
68038	1/06/1992	6	10	20.5	9.3999996	NE	54	4.7858
68038	17/06/1992	6	10	18.5	9.3999996	NE	54	4.473
68038	22/06/1992	6	10	17	3.5999999	NE	59	3.1241
68038	6/07/1992	7	10	16	3.5999999	NE	45	4.8956
68038	14/07/1992	7	10	17	7.5999999	NE	52	4.3677
68038	15/07/1992	7	10	17	9.3999996	NE	59	3.5782
68038	17/07/1992	7	10	17	3.5999999	NE	68	2.2902
68038	27/07/1992	7	10	17	9.3999996	NE	48	5.2297
68038	30/07/1992	7	10	20	7.5999999	NE	56	4.2107
68038	5/08/1992	8	10	17	14.8	NE	59	4.0601
68038	12/08/1992	8	10	18	9.3999996	NE	52	4.7122
68038	1/09/1992	9	10	19	9.3999996	NE	46	5.9952
68038	14/09/1992	9	10	16.5	9.3999996	NE	50	4.7992
68038	21/09/1992	9	10	17	13	NE	68	2.8536
68038	28/09/1992	9	10	19	14.8	NE	64	3.6558
68038	1/10/1992	10	10	17	5.4000001	NE	55	3.7406
68038	8/10/1992	10	10	17.5	18.4	NE	80	2.1768
68038	14/10/1992	10	10	19.5	9.3999996	NE	62	3.5109
68038	19/10/1992	10	10	19	9.3999996	NE	56	4.2459
68038	27/10/1992	10	10	16	14.8	NE	88	1.4433
68038	29/10/1992	10	10	21.5	18.4	NE	80	2.4919
68038	30/10/1992	10	10	21	9.3999996	NE	94	1.2245
68038	2/11/1992	11	10	19.5	5.4000001	NE	97	0.9558
68038	3/11/1992	11	10	22	1.8	NE	57	3.8001
68038	9/11/1992	11	10	23	18.4	NE	69	3.8315
68038	16/11/1992	11	10	20	9.3999996	NE	64	3.3326
68038	23/11/1992	11	10	23	5.4000001	NE	61	3.725

68038	24/11/1992	11	10	23	9.3999996	NE	53	5.3906
68038	26/11/1992	11	10	19	18.4	NE	46	7.4006
68038	27/11/1992	11	10	21.5	5.4000001	NE	42	6.82
68038	2/12/1992	12	10	21	5.4000001	NE	60	3.6037
68038	3/12/1992	12	10	20.5	11.2	NE	71	2.7767
68038	18/12/1992	12	10	23.5	9.3999996	NE	71	2.9463
68038	21/12/1992	12	10	22	3.5999999	NE	83	1.6163
68038	23/12/1992	12	10	24.5	9.3999996	NE	76	2.5647
68038	24/12/1992	12	10	26	9.3999996	NE	58	5.0206
68038	11/01/1993	1	10	24	27.700001	NE	74	4.1461
68038	13/01/1993	1	10	21	5.4000001	NE	73	2.3013
68038	14/01/1993	1	10	24	14.8	NE	74	3.0658
68038	15/01/1993	1	10	27	9.3999996	NE	70	3.4327
68038	19/01/1993	1	10	23.5	9.3999996	NE	71	2.9463
68038	21/01/1993	1	10	26	9.3999996	NE	74	2.8909
68038	29/01/1993	1	10	25.5	9.3999996	NE	81	2.2326
68038	1/02/1993	2	10	27	5.4000001	NE	74	2.7231
68038	3/02/1993	2	10	27	13	NE	70	3.7344
68038	4/02/1993	2	10	28.5	5.4000001	NE	72	3.0693
68038	9/02/1993	2	10	24	5.4000001	NE	83	1.8037
68038	11/02/1993	2	10	25	9.3999996	NE	74	2.7948
68038	15/02/1993	2	10	24	5.4000001	NE	74	2.4605
68038	16/02/1993	2	10	25	9.3999996	NE	74	2.7948
68038	17/02/1993	2	10	24	1.8	NE	61	3.5417
68038	19/02/1993	2	10	25	3.5999999	NE	69	2.8995
68038	23/02/1993	2	10	22	9.3999996	NE	43	7.3585
68038	24/02/1993	2	10	25	7.5999999	NE	47	6.8015
68038	25/02/1993	2	10	24	9.3999996	NE	69	3.2106
68038	5/03/1993	3	10	22.5	9.3999996	NE	59	4.3092
68038	22/03/1993	3	10	23	3.5999999	NE	44	6.4201
68038	23/03/1993	3	10	22	9.3999996	NE	73	2.6139
68038	25/03/1993	3	10	22.5	9.3999996	NE	81	2.0173
68038	26/03/1993	3	10	24	9.3999996	NE	83	1.9807
68038	7/04/1993	4	10	22	3.5999999	NE	43	6.4246
68038	19/04/1993	4	10	22	9.3999996	NE	73	2.6139
68038	22/04/1993	4	10	23	9.3999996	NE	73	2.7038
68038	6/05/1993	5	10	20	11.2	NE	64	3.476
68038	21/05/1993	5	10	19	11.2	NE	64	3.3605
68038	28/05/1993	5	10	19	7.5999999	NE	73	2.2645
68038	7/06/1993	6	10	17	3.5999999	NE	52	3.9774
68038	9/06/1993	6	10	17	3.5999999	NE	59	3.1241
68038	15/06/1993	6	10	15.5	3.5999999	NE	70	2.0318
68038	16/06/1993	6	10	17	3.5999999	NE	59	3.1241
68038	17/06/1993	6	10	19	9.3999996	NE	40	7.374
68038	29/06/1993	6	10	14.5	3.5999999	NE	74	1.7111
68038	1/07/1993	7	10	17	3.5999999	NE	68	2.2902
68038	22/07/1993	7	10	15.5	9.3999996	NE	53	4.1835
68038	30/07/1993	7	10	16.5	5.4000001	NE	80	1.5525
68038	9/08/1993	8	10	17.5	9.3999996	NE	66	2.8584
68038	12/08/1993	8	10	18	3.5999999	NE	64	2.7195
68038	13/08/1993	8	10	18.5	5.4000001	NE	58	3.5483
68038	20/08/1993	8	10	16.5	9.3999996	NE	70	2.4072
68038	23/08/1993	8	10	18.5	9.3999996	NE	38	7.7684
68038	24/08/1993	8	10	17.5	9.3999996	NE	47	5.5056
68038	25/08/1993	8	10	18	1.8	NE	73	1.9114
68038	26/08/1993	8	10	18	9.3999996	NE	77	1.9891
68038	1/09/1993	9	10	22	9.3999996	NE	65	3.4448



68038	7/09/1993	9	10	17	18.4	NE	68	3.238
68038	8/09/1993	9	10	20	11.2	NE	64	3.476
68038	17/09/1993	9	10	16.5	9.3999996	NE	65	2.8604
68038	29/09/1993	9	10	21	3.5999999	NE	64	3.0097
68038	30/09/1993	9	10	23	9.3999996	NE	53	5.3906
68038	1/10/1993	10	10	22	9.3999996	NE	65	3.4448
68038	5/10/1993	10	10	18	9.3999996	NE	39	7.3792
68038	6/10/1993	10	10	20	9.3999996	NE	60	3.8258
68038	7/10/1993	10	10	19	9.3999996	NE	78	1.9877
68038	8/10/1993	10	10	21.5	9.3999996	NE	71	2.7537
68038	14/10/1993	10	10	19.5	9.3999996	NE	71	2.5737
68038	28/10/1993	10	10	19.5	9.3999996	NE	71	2.5737
68038	1/11/1993	11	10	20.5	9.3999996	NE	58	4.1689
68038	2/11/1993	11	10	20	9.3999996	NE	68	2.903
68038	3/11/1993	11	10	19	5.4000001	NE	52	4.4387
68038	8/11/1993	11	10	20	11.2	NE	64	3.476
68038	12/11/1993	11	10	20.5	9.3999996	NE	58	4.1689
68038	16/11/1993	11	10	21	7.5999999	NE	56	4.3555
68038	17/11/1993	11	10	22	7.5999999	NE	65	3.3027
68038	24/11/1993	11	10	21.5	7.5999999	NE	62	3.6015
68038	26/11/1993	11	10	21	13	NE	56	4.9421
68038	29/11/1993	11	10	21.5	14.8	NE	62	4.2623
68038	1/12/1993	12	10	25.5	18.4	NE	72	3.7594
68038	3/12/1993	12	10	20	9.3999996	NE	78	2.056
68038	6/12/1993	12	10	21.5	18.4	NE	58	5.3231
68038	10/12/1993	12	10	22.5	9.3999996	NE	59	4.3092
68038	14/12/1993	12	10	22	7.5999999	NE	88	1.4937
68038	21/12/1993	12	10	20.6000004	3.5999999	NE	80	1.7097
68038	22/12/1993	12	10	23.5	9.3999996	NE	81	2.0866
68038	30/12/1993	12	10	23.5	9.3999996	NE	59	4.4574
68038	31/12/1993	12	10	25.5	9.3999996	NE	67	3.6189
68038	7/01/1994	1	10	27.5	9.3999996	NE	68	3.7406
68038	10/01/1994	1	10	23	9.3999996	NE	69	3.1039
68038	11/01/1994	1	10	25.5	9.3999996	NE	67	3.6189
68038	12/01/1994	1	10	26	9.3999996	NE	74	2.8909
68038	13/01/1994	1	10	25	18.4	NE	83	2.5291
68038	17/01/1994	1	10	26	5.4000001	NE	74	2.6326
68038	18/01/1994	1	10	25.5	5.4000001	NE	76	2.4159
68038	20/01/1994	1	10	26	9.3999996	NE	74	2.8909
68038	24/01/1994	1	10	24.5	18.4	NE	52	7.2461
68038	25/01/1994	1	10	25.5	14.8	NE	67	4.1063
68038	31/01/1994	1	10	26	9.3999996	NE	74	2.8909
68038	1/02/1994	2	10	26	18.4	NE	70	4.0966
68038	3/02/1994	2	10	23.5	9.3999996	NE	63	3.8828
68038	4/02/1994	2	10	24	18.4	NE	69	3.9632
68038	8/02/1994	2	10	26	9.3999996	NE	70	3.3187
68038	9/02/1994	2	10	24	9.3999996	NE	83	1.9807
68038	10/02/1994	2	10	25	9.3999996	NE	74	2.7948
68038	11/02/1994	2	10	24	9.3999996	NE	78	2.3536
68038	14/02/1994	2	10	25	9.3999996	NE	74	2.7948
68038	15/02/1994	2	10	23	13	NE	73	2.9414
68038	16/02/1994	2	10	28	5.4000001	NE	62	4.2612
68038	22/02/1994	2	10	24	18.4	NE	69	3.9632
68038	24/02/1994	2	10	25	18.4	NE	69	4.0995
68038	25/02/1994	2	10	25	9.3999996	NE	74	2.7948
68038	2/03/1994	3	10	23.5	5.4000001	NE	67	3.0801
68038	3/03/1994	3	10	25	18.4	NE	69	4.0995

68038	8/03/1994	3	10	23	9.3999996	NE	73	2.7038
68038	9/03/1994	3	10	20	14.8	NE	94	1.3433
68038	21/03/1994	3	10	21.5	9.3999996	NE	58	4.3122
68038	30/03/1994	3	10	22.5	5.4000001	NE	81	1.837
68038	31/03/1994	3	10	23.5	5.4000001	NE	71	2.6831
68038	5/04/1994	4	10	23	9.3999996	NE	74	2.6121
68038	6/04/1994	4	10	23.5	18.4	NE	71	3.637
68038	26/04/1994	4	10	23	9.3999996	NE	71	2.897
68038	27/04/1994	4	10	24	5.4000001	NE	56	4.5784
68038	28/04/1994	4	10	27	1.8	NE	40	8.0891
68038	2/05/1994	5	10	23.2000008	5.4000001	NE	58	4.1592
68038	13/05/1994	5	10	19	9.3999996	NE	54	4.5492
68038	17/05/1994	5	10	18.5	3.5999999	NE	45	5.3273
68038	24/05/1994	5	10	23	9.3999996	NE	52	5.5798
68038	30/05/1994	5	10	18.5	5.4000001	NE	62	3.0909
68038	23/06/1994	6	10	18.5	9.3999996	NE	45	6.1016
68038	15/07/1994	7	10	15.5	3.5999999	NE	59	2.9696
68038	25/07/1994	7	10	16.5	9.3999996	NE	51	4.6365
68038	29/07/1994	7	10	18.5	3.5999999	NE	54	3.9053
68038	11/08/1994	8	10	17.2000008	9.3999996	NE	50	4.9141
68038	12/08/1994	8	10	19.5	3.5999999	NE	32	8.6291
68038	16/08/1994	8	10	16.5	9.3999996	NE	51	4.6365
68038	24/08/1994	8	10	16.5	9.3999996	NE	51	4.6365
68038	31/08/1994	8	10	17.5	9.3999996	NE	66	2.8584
68038	2/09/1994	9	10	18.6000004	14.8	NE	70	2.9323
68038	12/09/1994	9	10	21	9.3999996	NE	65	3.3303
68038	26/09/1994	9	10	16.5	9.3999996	NE	51	4.6365
68038	4/10/1994	10	10	20.5	9.3999996	NE	61	3.759
68038	6/10/1994	10	10	20	14.8	NE	72	2.8694
68038	10/10/1994	10	10	19.5	27.7000001	NE	64	5.0283
68038	12/10/1994	10	10	17	9.3999996	NE	56	3.9684
68038	14/10/1994	10	10	18	9.3999996	NE	58	3.8311
68038	17/10/1994	10	10	23.5	9.3999996	NE	56	4.9434
68038	25/10/1994	10	10	20.5	27.7000001	NE	65	5.0248
68038	26/10/1994	10	10	23.2000008	9.3999996	NE	62	3.9786
68038	27/10/1994	10	10	19.5	14.8	NE	81	2.0683
68038	31/10/1994	10	10	21	18.4	NE	69	3.5811
68038	1/11/1994	11	10	20.5	14.8	NE	77	2.456
68038	11/11/1994	11	10	23.7000008	9.3999996	NE	58	4.6451
68038	16/11/1994	11	10	19	18.4	NE	63	4.1167
68038	23/11/1994	11	10	21	18.4	NE	57	5.4176
68038	24/11/1994	11	10	22.5	14.8	NE	70	3.3455
68038	25/11/1994	11	10	21	18.4	NE	82	2.2868
68038	5/12/1994	12	10	22.5	9.3999996	NE	70	2.9484
68038	6/12/1994	12	10	22.2999992	18.4	NE	68	3.8733
68038	7/12/1994	12	10	25	18.4	NE	61	5.4025
68038	12/12/1994	12	10	23	9.3999996	NE	74	2.6121
68038	23/12/1994	12	10	23	5.4000001	NE	91	1.3232
68038	28/12/1994	12	10	24.5	14.8	NE	79	2.624
68038	30/12/1994	12	10	23.5	9.3999996	NE	63	3.8828
68038	4/01/1995	1	10	21	9.3999996	NE	95	1.183
68038	5/01/1995	1	10	23.5	9.3999996	NE	83	1.9475
68038	11/01/1995	1	10	23.5	27.7000001	NE	71	4.5212
68038	16/01/1995	1	10	23.5	9.3999996	NE	71	2.9463
68038	17/01/1995	1	10	24	9.3999996	NE	79	2.2738
68038	27/01/1995	1	10	23	9.3999996	NE	63	3.8177
68038	2/02/1995	2	10	23.5	14.8	NE	71	3.3432

68038	7/02/1995	2	10	21.5	14.8	NE	62	4.2623
68038	9/02/1995	2	10	24.3999996	9.3999996	NE	65	3.7359
68038	13/02/1995	2	10	25.3999996	14.8	NE	61	5.0336
68038	16/02/1995	2	10	20.6000004	5.4000001	NE	95	1.0628
68038	22/02/1995	2	10	24	9.3999996	NE	67	3.44
68038	17/03/1995	3	10	25	14.8	NE	61	4.966
68038	20/03/1995	3	10	22	9.3999996	NE	54	5.0347
68038	21/03/1995	3	10	24	9.3999996	NE	64	3.8151
68038	30/03/1995	3	10	22.7999992	18.4	NE	44	9.016
68038	20/04/1995	4	10	20	9.3999996	NE	64	3.3326
68038	26/04/1995	4	10	19.6000004	14.8	NE	76	2.466
68038	28/04/1995	4	10	19.7999992	9.3999996	NE	75	2.2648
68038	1/05/1995	5	10	20.3999996	9.3999996	NE	69	2.8428
68038	11/05/1995	5	10	21.8999996	9.3999996	NE	65	3.4332
68038	12/05/1995	5	10	23.5	9.3999996	NE	60	4.3062
68038	24/05/1995	5	10	19	9.3999996	NE	61	3.5732
68038	6/06/1995	6	10	16.8999996	14.8	NE	62	3.6486
68038	9/06/1995	6	10	19.7999992	5.4000001	NE	75	2.0625
68038	26/06/1995	6	10	18.1000004	3.5999999	NE	48	4.739
68038	5/07/1995	7	10	14.5	5.4000001	NE	38	6.1796
68038	10/07/1995	7	10	15.8000002	9.3999996	NE	43	5.9673
68038	17/07/1995	7	10	16.7999992	18.4	NE	64	3.6921
68038	20/07/1995	7	10	14	9.3999996	NE	43	5.6151
68038	11/08/1995	8	10	15.1000004	9.3999996	NE	61	3.1319
68038	14/08/1995	8	10	18	18.4	NE	66	3.5886
68038	18/08/1995	8	10	20.6000004	14.8	NE	63	3.9944
68038	23/08/1995	8	10	18.1000004	9.3999996	NE	57	3.979
68038	8/09/1995	9	10	15.3000002	9.3999996	NE	64	2.8431
68038	12/09/1995	9	10	16.3999996	5.4000001	NE	62	2.8791
68038	14/09/1995	9	10	19.5	5.4000001	NE	64	2.984
68038	22/09/1995	9	10	18.7999992	9.3999996	NE	63	3.3125
68038	5/10/1995	10	10	18	14.8	NE	69	2.9743
68038	10/10/1995	10	10	19.2000008	9.3999996	NE	66	3.0274
68038	16/10/1995	10	10	19.1000004	18.4	NE	58	4.9084
68038	25/10/1995	10	10	17.8999996	7.5999999	NE	64	2.9762
68038	1/11/1995	11	10	18.6000004	14.8	NE	56	4.7531
68038	2/11/1995	11	10	23.5	9.3999996	NE	67	3.3823
68038	14/11/1995	11	10	20.1000004	9.3999996	NE	74	2.3682
68038	21/11/1995	11	10	16.2000008	5.4000001	NE	90	1.0884
68038	24/11/1995	11	10	19.5	9.3999996	NE	64	3.2768
68038	4/12/1995	12	10	24.3999996	14.8	NE	68	3.8222
68038	8/12/1995	12	10	23	5.4000001	NE	71	2.6381
68038	15/12/1995	12	10	23	9.3999996	NE	74	2.6121
68038	18/12/1995	12	10	23.8999996	14.8	NE	76	2.8518
68038	29/12/1995	12	10	22	14.8	NE	81	2.2506
68038	15/01/1996	1	10	24.8999996	14.8	NE	70	3.6282
68038	8/02/1996	2	10	22.7000008	9.3999996	NE	90	1.4889
68038	19/02/1996	2	10	23	9.3999996	NE	72	2.7987
68038	4/03/1996	3	10	22	9.3999996	NE	82	1.9162
68038	6/03/1996	3	10	23	9.3999996	NE	79	2.1982
68038	15/03/1996	3	10	20.5	18.4	NE	73	3.0672
68038	27/03/1996	3	10	24	5.4000001	NE	75	2.377
68038	5/06/1996	6	10	17.8999996	5.4000001	NE	45	5.4449
68038	28/06/1996	6	10	17	9.3999996	NE	52	4.5556
68038	12/07/1996	7	10	15.1000004	3.5999999	NE	37	6.2584
68038	27/08/1996	8	10	17.2999992	9.3999996	NE	71	2.3893
68038	23/09/1996	9	10	19.3999996	18.4	NE	47	7.2469

68038	23/10/1996	10	10	18	18.4	NE	75	2.6307
68038	24/10/1996	10	10	18.7999992	9.3999996	NE	59	3.8027
68038	8/11/1985	11	10	22.5	3.5999999	ESE	81	1.7613
68038	13/11/1985	11	10	21.7999992	3.5999999	ESE	65	2.9873
68038	24/03/1986	3	10	23.7999992	3.5999999	ESE	75	2.2637
68038	10/12/1986	12	10	21.6000004	3.5999999	ESE	62	3.2908
68038	18/12/1986	12	10	19.7999992	5.4000001	ESE	69	2.5368
68038	25/08/1987	8	10	17.6000004	7.5999999	ESE	65	2.8463
68038	7/09/1987	9	10	14.5	7.5999999	ESE	74	1.879
68038	3/04/1992	4	10	24	7.5999999	ESE	61	4.0566
68038	30/09/1985	9	10	17	3.5999999	ENE	68	2.2902
68038	11/10/1985	10	10	19.5	3.5999999	ENE	85	1.3863
68038	18/10/1985	10	10	20.2999992	5.4000001	ENE	67	2.7643
68038	6/11/1985	11	10	22.6000004	3.5999999	ENE	71	2.4953
68038	10/12/1985	12	10	22.5	3.5999999	ENE	63	3.2774
68038	9/01/1986	1	10	24	3.5999999	ENE	38	8.1681
68038	27/02/1986	2	10	23.2999992	3.5999999	ENE	60	3.7344
68038	5/03/1986	3	10	26	3.5999999	ENE	65	3.443
68038	17/03/1986	3	10	22.6000004	5.4000001	ENE	62	3.5503
68038	9/09/1986	9	10	17.5	3.5999999	ENE	54	3.7755
68038	23/09/1986	9	10	18.1000004	5.4000001	ENE	52	4.3057
68038	4/10/1986	10	10	19	7.5999999	ENE	49	5.1828
68038	9/10/1986	10	10	14	5.4000001	ENE	88	1.0826
68038	26/10/1986	10	10	17.5	3.5999999	ENE	61	2.9655
68038	28/12/1986	12	10	22.5	9.3999996	ENE	59	4.3092
68038	27/08/1987	8	10	17	7.5999999	ENE	72	2.1907
68038	4/09/1987	9	10	17.7000008	11.2	ENE	49	5.3959
68038	23/09/1985	9	10	19	3.5999999	E	64	2.813
68038	22/10/1985	10	10	20.5	9.3999996	E	51	5.3077
68038	2/12/1985	12	10	20	5.4000001	E	60	3.4839
68038	10/02/1986	2	10	21	9.3999996	E	69	2.901
68038	26/02/1986	2	10	22	3.5999999	E	69	2.6199
68038	6/06/1986	6	10	19.7999992	3.5999999	E	57	3.6795
68038	2/09/1986	9	10	17.3999996	5.4000001	E	62	2.9781
68038	14/11/1986	11	10	19.2999992	3.5999999	E	92	1.0815
68038	10/02/1987	2	10	21	7.5999999	E	88	1.444
68038	4/03/1987	3	10	20.1000004	14.8	E	68	3.3052
68038	5/03/1987	3	10	25.2000008	22.299999	E	57	6.8406
68038	24/03/1987	3	10	19.8999996	3.5999999	E	69	2.4404
68038	8/03/1988	3	10	25	3.5999999	E	65	3.3286
68038	3/05/1988	5	10	22	5.4000001	E	65	3.137
68038	13/07/1988	7	10	18	7.5999999	E	59	3.5485
68038	27/09/1988	9	10	18	3.5999999	E	68	2.3689
68038	18/10/1988	10	10	20	3.5999999	E	53	4.2526
68038	14/12/1988	12	10	22	7.5999999	E	60	3.9245
68038	30/12/1988	12	10	23	18.4	E	50	7.3799
68038	2/02/1989	2	10	22	5.4000001	E	88	1.4187
68038	22/02/1989	2	10	23	9.3999996	E	57	4.6958
68038	24/04/1989	4	10	21.5	18.4	E	55	5.9036
68038	26/04/1989	4	10	20	9.3999996	E	83	1.7302
68038	21/06/1989	6	10	13.5	14.8	E	85	1.471
68038	24/07/1989	7	10	12	7.5999999	E	76	1.6116
68038	11/09/1989	9	10	19	1.8	E	56	3.5542
68038	23/10/1989	10	10	20	7.5999999	E	60	3.668
68038	26/10/1989	10	10	24	7.5999999	E	61	4.0566
68038	3/11/1989	11	10	21	11.2	E	49	6.0326
68038	22/12/1989	12	10	22	5.4000001	E	50	5.2633



68038	5/02/1990	2	10	24.5	3.5999999	E	100	0.9784
68038	15/02/1990	2	10	24	3.5999999	E	57	4.2407
68038	21/02/1990	2	10	26	7.5999999	E	74	2.7716
68038	22/02/1990	2	10	25	3.5999999	E	61	3.8211
68038	22/03/1990	3	10	23	1.8	E	65	2.9827
68038	23/03/1990	3	10	23	7.5999999	E	73	2.5923
68038	26/03/1990	3	10	24	3.5999999	E	57	4.2407
68038	10/04/1990	4	10	21	9.3999996	E	73	2.5271
68038	6/08/1990	8	10	15	9.3999996	E	41	6.223
68038	1/11/1990	11	10	24	1.8	E	65	3.0852
68038	2/11/1990	11	10	21	5.4000001	E	64	3.1392
68038	16/11/1990	11	10	20	1.8	E	68	2.4301
68038	4/12/1990	12	10	24	1.8	E	65	3.0852
68038	13/12/1990	12	10	25	1.8	E	89	1.3943
68038	14/12/1990	12	10	26	3.5999999	E	42	7.6129
68038	24/12/1990	12	10	22	7.5999999	E	65	3.3027
68038	2/01/1991	1	10	26	5.4000001	E	74	2.6326
68038	31/01/1991	1	10	27	1.8	E	62	3.7868
68038	18/02/1991	2	10	25	5.4000001	E	61	3.9855
68038	8/04/1991	4	10	20	7.5999999	E	64	3.1952
68038	12/04/1991	4	10	21	1.8	E	64	2.8856
68038	15/04/1991	4	10	20	1.8	E	53	4.0772
68038	18/04/1991	4	10	21	1.8	E	46	5.3694
68038	29/04/1991	4	10	18.6000004	3.5999999	E	57	3.5333
68038	1/05/1991	5	10	21	1.8	E	64	2.8856
68038	7/06/1991	6	10	17	5.4000001	E	94	0.9741
68038	11/06/1991	6	10	16.5	27.700001	E	80	2.6161
68038	4/09/1991	9	10	18	5.4000001	E	77	1.8113
68038	2/10/1991	10	10	18	11.2	E	73	2.3816
68038	8/11/1991	11	10	22	3.5999999	E	29	10.414
68038	21/11/1991	11	10	17	1.8	E	68	2.1957
68038	13/12/1991	12	10	17	9.3999996	E	94	1.0697
68038	31/12/1991	12	10	20	7.5999999	E	83	1.6589
68038	10/02/1992	2	10	23.5	9.3999996	E	86	1.756
68038	3/03/1992	3	10	24	3.5999999	E	74	2.359
68038	9/03/1992	3	10	24	1.8	E	69	2.6875
68038	18/03/1992	3	10	23	1.8	E	61	3.424
68038	27/04/1992	4	10	19	5.4000001	E	83	1.5233
68038	5/06/1992	6	10	17.5	5.4000001	E	44	5.5603
68038	27/08/1992	8	10	15	3.5999999	E	59	2.9199
68038	18/09/1992	9	10	17	3.5999999	E	59	3.1241
68038	23/09/1992	9	10	20	5.4000001	E	64	3.0348
68038	13/10/1992	10	10	19	9.3999996	E	56	4.2459
68038	17/11/1992	11	10	19	7.5999999	E	64	3.089
68038	25/11/1992	11	10	23	9.3999996	E	38	9.0445
68038	22/12/1992	12	10	22.5	1.8	E	81	1.6886
68038	29/12/1992	12	10	23.5	5.4000001	E	45	6.5795
68038	7/01/1993	1	10	20.5	5.4000001	E	66	2.8808
68038	20/04/1993	4	10	22	5.4000001	E	73	2.3804
68038	21/04/1993	4	10	23	1.8	E	73	2.2633
68038	12/05/1993	5	10	21	11.2	E	64	3.5955
68038	21/07/1993	7	10	15.5	5.4000001	E	53	3.8097
68038	23/07/1993	7	10	16.5	3.5999999	E	50	4.1902
68038	18/08/1993	8	10	20	1.8	E	43	5.757
68038	30/08/1993	8	10	16.5	5.4000001	E	70	2.1921
68038	27/09/1993	9	10	18	9.3999996	E	64	3.1148
68038	11/11/1993	11	10	19	7.5999999	E	46	5.7479

68038	18/11/1993	11	10	28	1.8	E	48	6.3491
68038	7/12/1993	12	10	20	5.4000001	E	83	1.5756
68038	8/12/1993	12	10	22.5	9.3999996	E	59	4.3092
68038	9/12/1993	12	10	22.5	9.3999996	E	55	4.9469
68038	17/12/1993	12	10	22	9.3999996	E	57	4.5397
68038	29/12/1993	12	10	24.5	14.8	E	49	7.387
68038	4/01/1994	1	10	24	9.3999996	E	54	5.3868
68038	27/01/1994	1	10	25.6000004	9.3999996	E	55	5.4934
68038	22/03/1994	3	10	22	9.3999996	E	65	3.4448
68038	21/04/1994	4	10	20	7.5999999	E	60	3.668
68038	6/05/1994	5	10	19.7999992	3.5999999	E	69	2.4322
68038	16/05/1994	5	10	16.5	1.8	E	56	3.2662
68038	26/08/1994	8	10	19	7.5999999	E	72	2.344
68038	30/08/1994	8	10	16	9.3999996	E	64	2.9112
68038	22/09/1994	9	10	20	9.3999996	E	40	7.6275
68038	9/11/1994	11	10	17.2999992	9.3999996	E	71	2.3893
68038	13/12/1994	12	10	24.5	18.4	E	76	3.166
68038	16/12/1994	12	10	22.7999992	14.8	E	68	3.621
68038	21/12/1994	12	10	28.5	9.3999996	E	58	5.4633
68038	10/01/1995	1	10	23.6000004	14.8	E	67	3.8509
68038	13/01/1995	1	10	24	14.8	E	67	3.9033
68038	30/01/1995	1	10	25	9.3999996	E	72	2.9944
68038	8/02/1995	2	10	24	9.3999996	E	60	4.3796
68038	14/02/1995	2	10	24.1000004	9.3999996	E	78	2.3616
68038	24/02/1995	2	10	23.6000004	9.3999996	E	55	5.1343
68038	28/03/1995	3	10	19.7000008	3.5999999	E	66	2.6883
68038	4/04/1995	4	10	20.5	18.4	E	55	5.7074
68038	13/04/1995	4	10	20	5.4000001	E	50	4.9193
68038	10/05/1995	5	10	19.5	9.3999996	E	70	2.6641
68038	16/05/1995	5	10	17.3999996	1.8	E	81	1.4213
68038	4/07/1995	7	10	14.5	3.5999999	E	43	4.986
68038	25/07/1995	7	10	13.8999996	9.3999996	E	46	5.0459
68038	9/10/1995	10	10	16.5	9.3999996	E	46	5.5094
68038	13/11/1995	11	10	19.7999992	14.8	E	55	5.1236
68038	7/12/1995	12	10	20.7999992	14.8	E	50	6.2975
68038	31/01/1996	1	10	24.2000008	18.4	E	80	2.73
68038	5/02/1996	2	10	25.3999996	5.4000001	E	77	2.3261
68038	5/03/1996	3	10	23.6000004	5.4000001	E	74	2.4274
68038	3/06/1996	6	10	19.8999996	5.4000001	E	72	2.2951
68038	19/07/1996	7	10	19.5	14.8	E	43	7.6731
68038	24/09/1996	9	10	20.7000008	18.4	E	69	3.5449
68038	25/09/1996	9	10	19.6000004	9.3999996	E	67	2.9646
68038	4/10/1996	10	10	19.2999992	9.3999996	E	73	2.386
68038	1/11/1996	11	10	19.2999992	18.4	E	42	8.5823