BUILDING BUSHFIRE RESILIENCE IN THE GREAT SOUTHERN

SEMC STATE EMERGENCY MANAGEMENT COMMITTEE

Australian Government Department of Home Affairs

DFES Department of Fire & Emergency Services

CITY OF Albany

Shire of Plantagenet

SHIRE OF DENMARK

BIO DIVERSE SOLUTIONS

Shire of Denmark, City of Albany, Shire of Plantagenet

eco logical AUSTRALIA A TETRA TECH COMPANY

Building bushfire resilience in communities – National strategy for disaster resilience

- "State governments and municipal councils to adopt increased or improved protective management, emergency management and advisory roles."
- Strive to recognize and understand the risks disasters pose to their own and their communities interests.
- Leaders drive development of partnerships and networks to build resilience at government, business, neighborhood and community levels.

What is the "Building Resilience In the Great Southern" [BRIGS] Project?

- The Western Australian and Commonwealth governments have a National Partnership Agreement for Natural Disaster Resilience that delivers the National Disaster Resilience Program (NDRP).
- Application was submitted to the NDRP to fund the three local governments to enhance the evacuation planning and bushfire risk mitigation strategies over 8 precincts.
- Aimed to implement sustained resilience or disaster mitigation strategies that directly benefit the WA community.
- This project reduces identified risks and closes capability gaps, in an effort to reduce future post-disaster funding needs.
- This project aided in the development of a rigorous physical risk mitigation program where possible and develops a greater understanding of bushfire risk in the community.

What is the "Building Resilience In the Great Southern" [BRIGS] Project?

8 precincts in 3 LGA's

- Goode Beach (CoA);
- Little Grove and Big Grove(CoA);
- Bayonet Head(CoA);
- Peaceful Bay (SoD);
- Ocean Beach (SoD);
- Weedon Hill (SoD);
- Kendenup (SoP); and
- Mount Barker Hill (SoP).

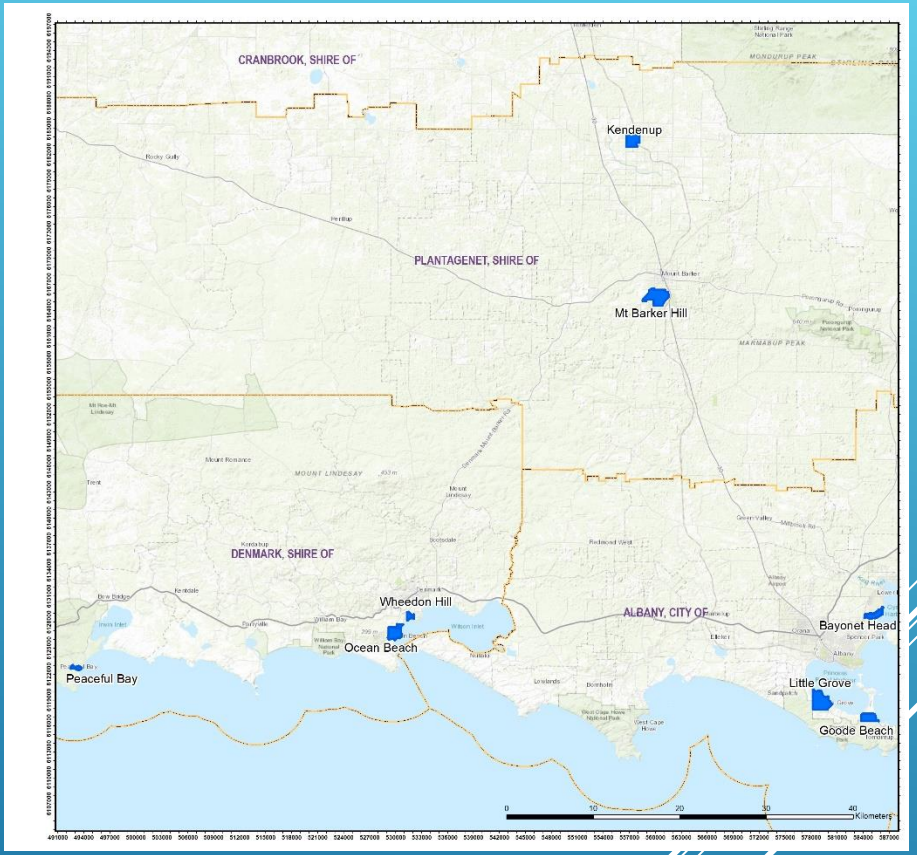
The 8 precincts identified for the project were based on the following parameters:

- High fuel loads and extreme bushfire risks;
- Limited access and egress for the communities to evacuate (one-way access);
- High population density in summer (extreme risk) period
- Legacy planning issues. Communities not consistent with the current SPP 3.7

What is the "Building Resilience In the Great Southern" [BRIGS] Project?

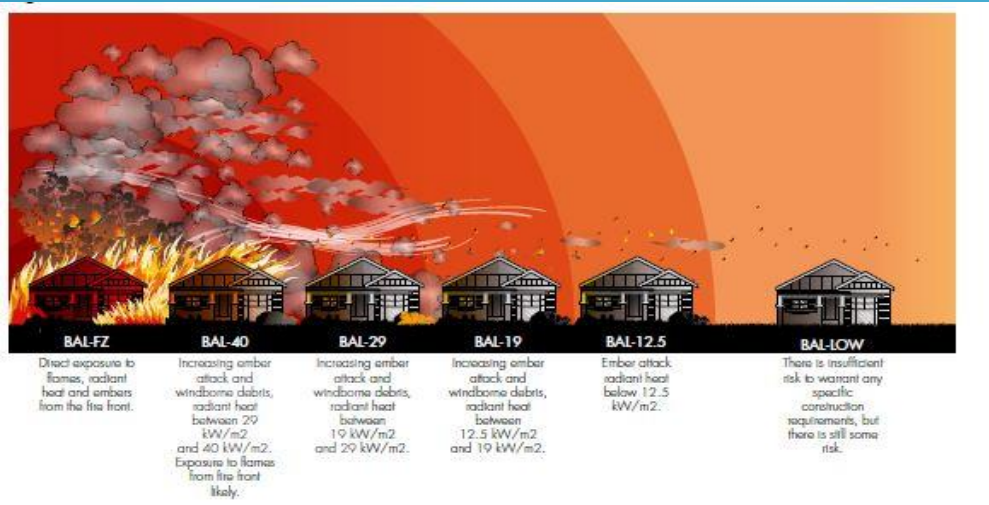
Key processes

- Applying a AS3959 BAL contouring methodological to define and map bushfire risks to our communities.
- CSIRO Spark modelling
- Identification of vulnerable communities where evacuation may be compromised.
- Identifying areas for possible community refuge. Develop Works Programs and treatment schedules with priorities developed.
- Review of gazetted fire notice in each LGA.
- Stakeholder engagement – DBCA, WCWA, DFES, LGA, DoEd,
- Public consultation – during project (in precinct, public sessions and post project through implementation).



AS3959-2018 Measures Bushfire Fuels

- AS3959 provides a measure of radiant heat flux (impact) on a building.
- AS3959 is also used as a planning tool to measure bushfire risk.
- Uses a classification system according to vegetation structure.



Plot	3, 4, 5, 6 & 7	Classification or Exclusion Clause	Forest Type A

Location: Located throughout the subject site.

Dominant species & description: Karri Forest, Jarrah and Marri Forest Peppermint Forest, and *Taxandria juniperina* Forest (wet areas). Overstorey of Eucalyptus with mid storey species of *Callystachys lanceolatum* (Native Willow) juvenile trees. Banksia, Acacia, Kunzea, Hibbertia, Melaleuca and Leucopogon. Understorey of Kangaroo paws, native sedges and herbs.

Average vegetation height: 12-16m (Peppermint and J/M) 15-25m (Karri).

Vegetation Coverage: >30-70% foliage cover.

Available fuel loading: 25-35 t/ha.

Effective slopes:
Plot 3: Flat/upslope.
Plot 4: D/S > 0 to 5 degrees
Plot 5: D/S > 5 to 10 degrees.
Plot 6: D/S > 10 to 15 degrees.
Plot 7: D/S > 15 to 20 degrees.

Photo Id 13: View of Plot 3 Karri Forest located on Weedon Hill central west of the subject site.

Plot	8, 9 & 10	Classification or Exclusion Clause	Grassland Type G

Location: To the north, east and small areas central to the subject site.

Description: Grazed paddocks of bracken, mixed pasture and unmanaged lots with introduced species such as Kikuyu, Hibbertia, Conyza etc. unmanaged grasses on small urban lots.

Average vegetation height: 200-300mm.

Vegetation Coverage: <10% trees and scrubs.

Available fuel loading: <4.5t/ha.

Effective slope:

Plot 8: Downslope >0 to 5 degrees

Plot 9: Downslope >5 to 10 degrees

Plot 10: Upslope (note no photo available due to private property inaccessible).

Photo Id 30: View to the south of unmanaged grasses on southern side Ocean Beach Road verge, occasional scrubs in Plot 8.

Plot	9	Classification or Exclusion Clause	Grassland Type G

AS3959-2018 Measures Bushfire Fuels

- Once vegetation structure and slope is classified uses a matrix to determine the impact of bushfire onto a building or subject site.
- Fire Danger Index (FDI) of 80.

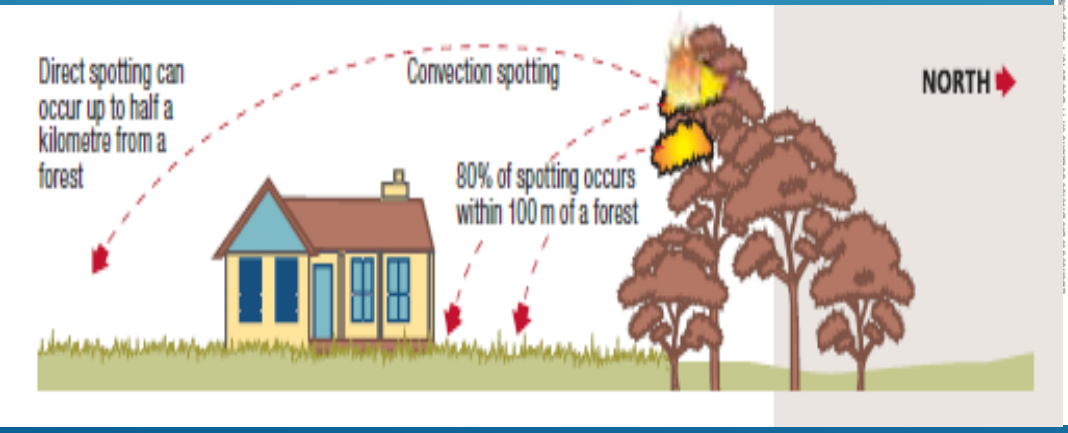


TABLE 2.5

DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 80 (1090 K)

Vegetation classification	BALs				
	BAL—FZ	BAL—40	BAL—29	BAL—19	BAL—12.5
	Distance (m) of the site from the predominant vegetation class				
	All upslopes and flat land (0 degrees)				
A. Forest	<16	16–<21	21–<31	31–<42	42–<100
B. Woodland	<10	10–<14	14–<20	20–<29	29–<100
C. Shrubland	<7	7–<9	9–<13	13–<19	19–<100
D. Scrub	<10	10–<13	13–<19	19–<27	27–<100
E. Mallee/Mulga	<6	6–<8	8–<12	12–<17	17–<100
F. Rainforest	<6	6–<9	9–<13	13–<19	19–<100
G. Grassland	<6	6–<8	8–<12	12–<17	17–<50
	Downslope >0 to 5 degrees				
A. Forest	<20	20–<27	27–<37	37–<50	50–<100
B. Woodland	<13	13–<17	17–<25	25–<35	35–<100
C. Shrubland	<7	7–<10	10–<15	15–<22	22–<100
D. Scrub	<11	11–<15	15–<22	22–<31	31–<100
E. Mallee/Mulga	<7	7–<9	9–<13	13–<20	20–<100
F. Rainforest	<8	8–<11	11–<17	17–<24	24–<100
G. Grassland	<7	7–<9	9–<14	14–<20	20–<50
	Downslope >5 to 10 degrees				
A. Forest	<26	26–<33	33–<46	46–<61	61–<100
B. Woodland	<16	16–<22	22–<31	31–<43	43–<100
C. Shrubland	<8	8–<11	11–<17	17–<25	25–<100
D. Scrub	<12	12–<17	17–<24	24–<35	35–<100
E. Mallee/Mulga	<7	7–<10	10–<15	15–<23	23–<100
F. Rainforest	<11	11–<15	15–<22	22–<31	31–<100
G. Grassland	<8	8–<10	10–<16	16–<23	23–<50
	Downslope >10 to 15 degrees				
A. Forest	<33	33–<42	42–<56	56–<73	73–<100
B. Woodland	<21	21–<28	28–<39	39–<53	53–<100
C. Shrubland	<9	9–<13	13–<19	19–<28	28–<100
D. Scrub	<14	14–<19	19–<28	28–<39	39–<100
E. Mallee/Mulga	<8	8–<11	11–<18	18–<26	26–<100
F. Rainforest	<14	14–<19	19–<28	28–<39	39–<100
G. Grassland	<9	9–<12	12–<18	18–<26	26–<50
	Downslope >15 to 20 degrees				
A. Forest	<42	42–<52	52–<68	68–<87	87–<100
B. Woodland	<27	27–<35	35–<48	48–<64	64–<100
C. Shrubland	<10	10–<15	15–<22	22–<31	31–<100
D. Scrub	<15	15–<21	21–<31	31–<43	43–<100
E. Mallee/Mulga	<9	9–<13	13–<20	20–<29	29–<100
F. Rainforest	<18	18–<25	25–<36	36–<48	48–<100
G. Grassland	<10	10–<14	14–<21	21–<30	30–<50

How do we get people out

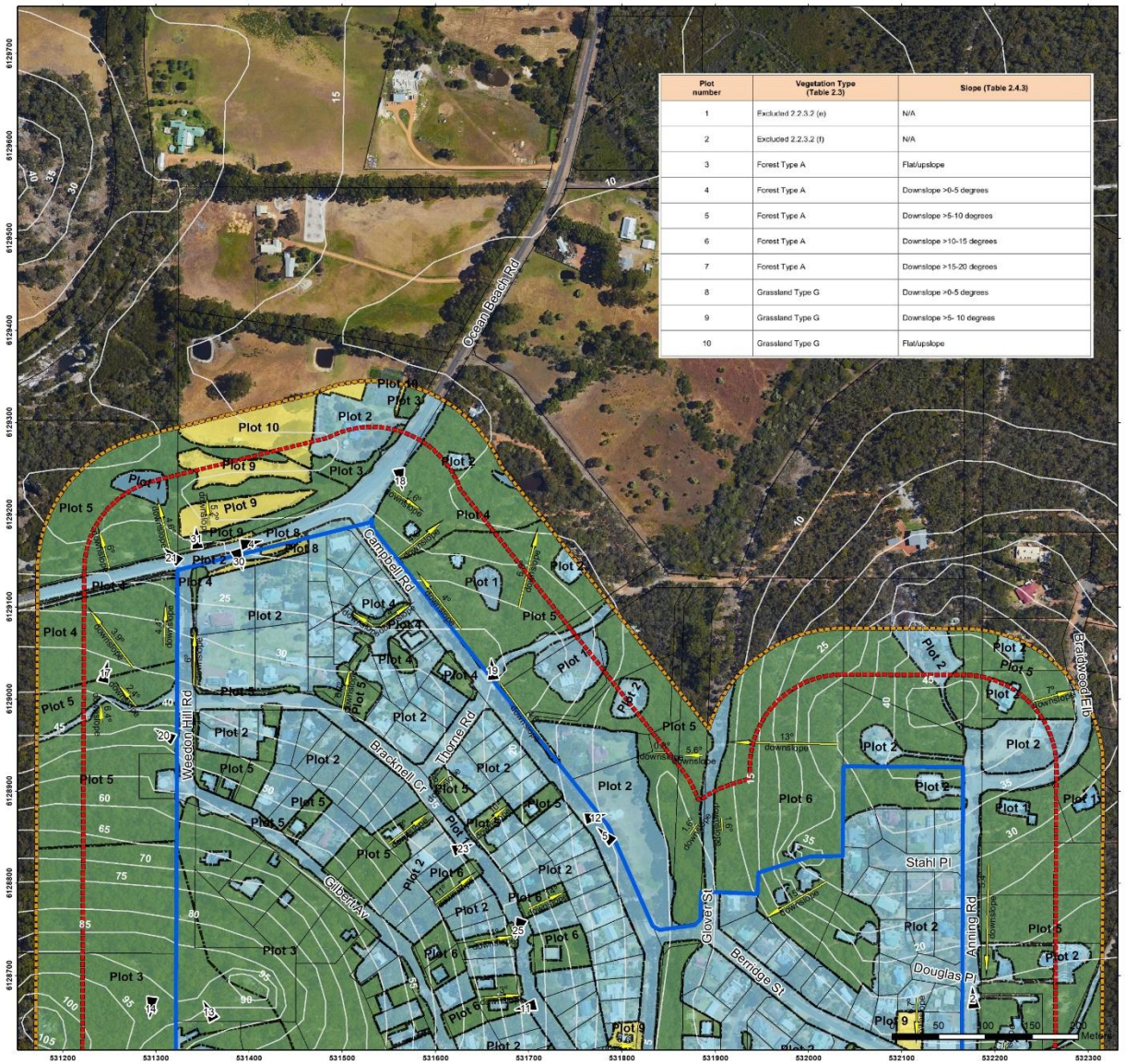
"Bushfire fatality data from 260 fire events from 1901 to 2011 analysed by CSIRO, shows that whilst late evacuation represents the primary activity taken at the time of death, there is a rising trend of fatalities occurring within structures (sheltering in place)"

Need to:

- Examine evacuation travel times and routes. Bring together studies already done and build on what we don't know.
- If route justified do we have community refuge?
- Is our community prepared?
- Summer visitors prepared? Absentee land owners?

Weedon Hill Precinct

Vegetation Mapping Weedon Hill Precinct to AS3959



Plot number	Vegetation Type (Table 2.3)	Slope (Table 2.4.3)
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Flat/upslope
4	Forest Type A	Downslope >0-5 degrees
5	Forest Type A	Downslope >5-10 degrees
6	Forest Type A	Downslope >10-15 degrees
7	Forest Type A	Downslope >15-20 degrees
8	Grassland Type G	Downslope >0-5 degrees
9	Grassland Type G	Downslope >5- 10 degrees
10	Grassland Type G	Flat/upslope

This BAL Plan was prepared by:
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BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

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Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Photo Point
- 5m Contours
- Slope Degrees

Vegetation

- Forest Type A
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:4,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Shire of Denmark
Weedon Hill Precinct
Denmark WA 6333

Figure 3. Vegetation Classes (North)

BAL Assessor	QA Check	Drawn by
KK	BT	SA
STATUS	FILE	DATE
FINAL	DFES001	6/01/2020

Vegetation Mapping Weedon Hill Precinct to AS3959

Plot number	Vegetation Type (Table 2.3)	Slope (Table 2.4.3)
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Flat/Upslope
4	Forest Type A	Downslope >0-5 degrees
5	Forest Type A	Downslope >5-10 degrees
6	Forest Type A	Downslope >10-15 degrees
7	Forest Type A	Downslope >15-20 degrees
8	Grassland Type G	Downslope >0-5 degrees
9	Grassland Type G	Downslope >5- 10 degrees
10	Grassland Type G	Flat/Upslope

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Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Photo Point
- 5m Contours
- Slope Degrees

Vegetation

- Forest Type A
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:4,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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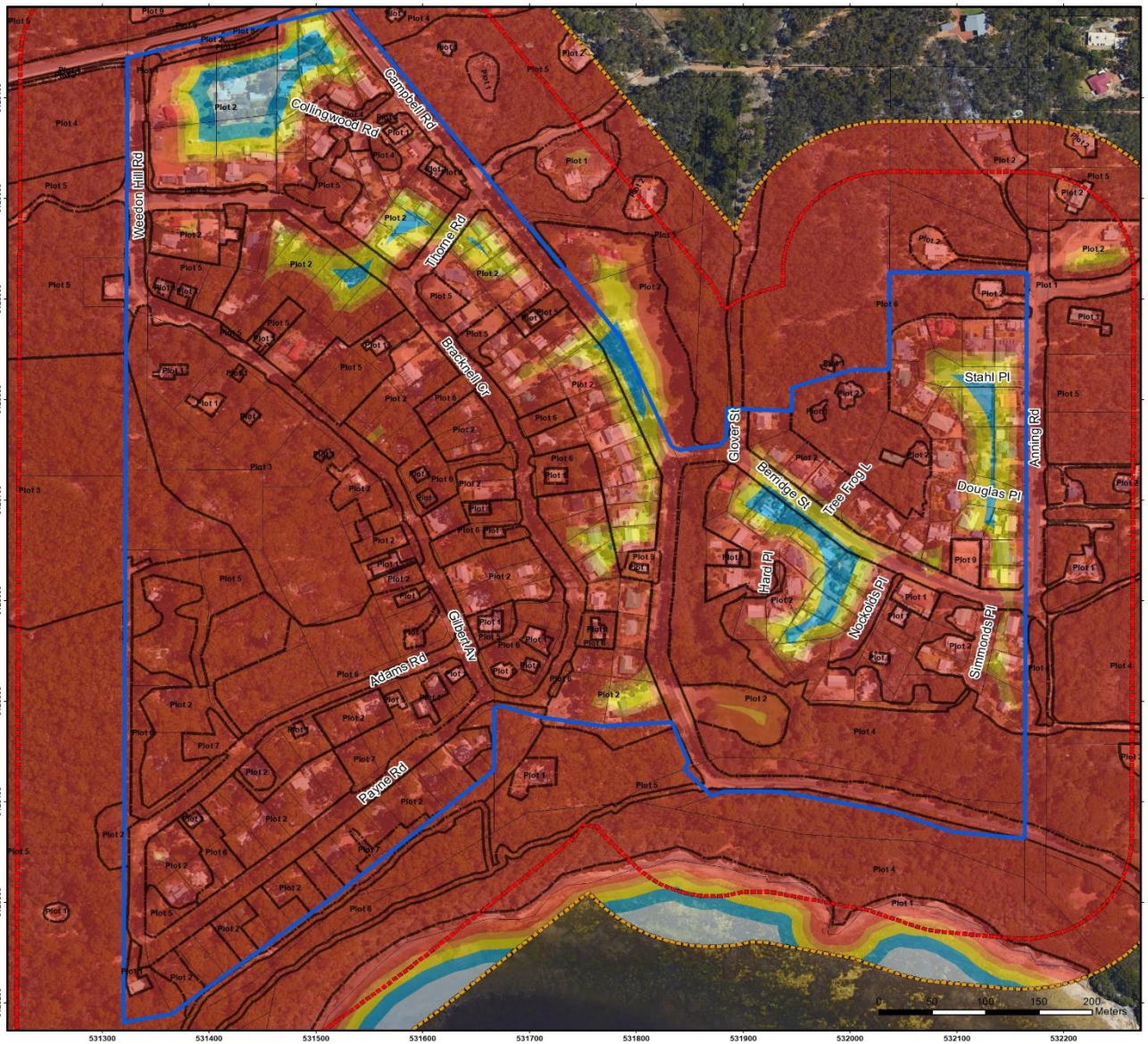
Weedon Hill Precinct
Denmark WA 6333

Figure 4. Vegetation Classes (South)

BAL Assessor	QA Check	Drawn by
KK	BT	SA
STATUS	FILE	DATE
FINAL	DFES001	6/01/2020

BAL Contour Plan – Weedon Hill Precinct



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Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

Scale
1:3,600 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Weedon Hill Precinct
Denmark WA 6333

Figure 5. BAL Contour

BAL Assessor	QA Check	Drawn by
KK	BT	SA
STATUS	**FILE**	**DATE**
FINAL	DFES001	23/01/2020

Works Program Mapping

This BAL Plan was prepared by:
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BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

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Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- Freehold greater than 5000m² (2A & 2B)
- Freehold between 2500 & 5000m² (2A)
- Freehold less than 2500m² (1)
- Existing Dwelling
- APZ 20m
- Water Tank
- Fuel Reduce
- Prescribed Burn
- FSA/EAW (existing)
- FSA/EAW (proposed)

Scale
1:4,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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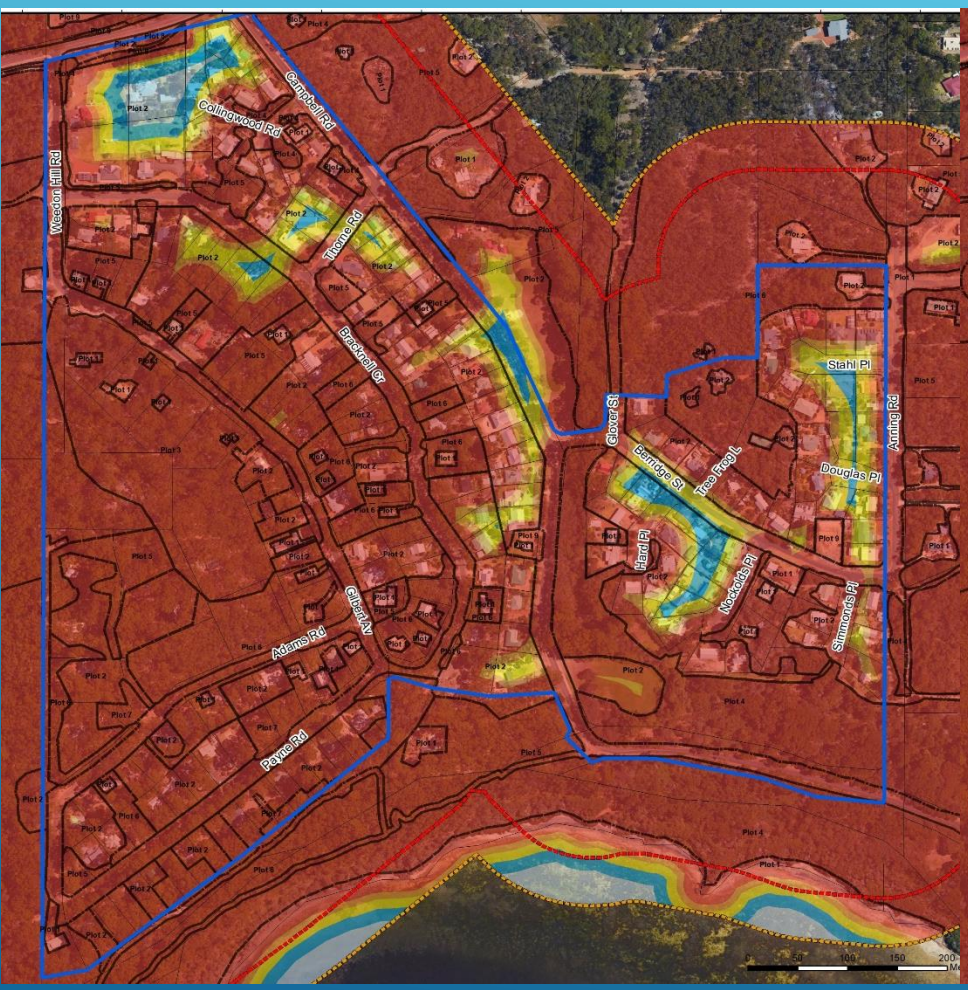
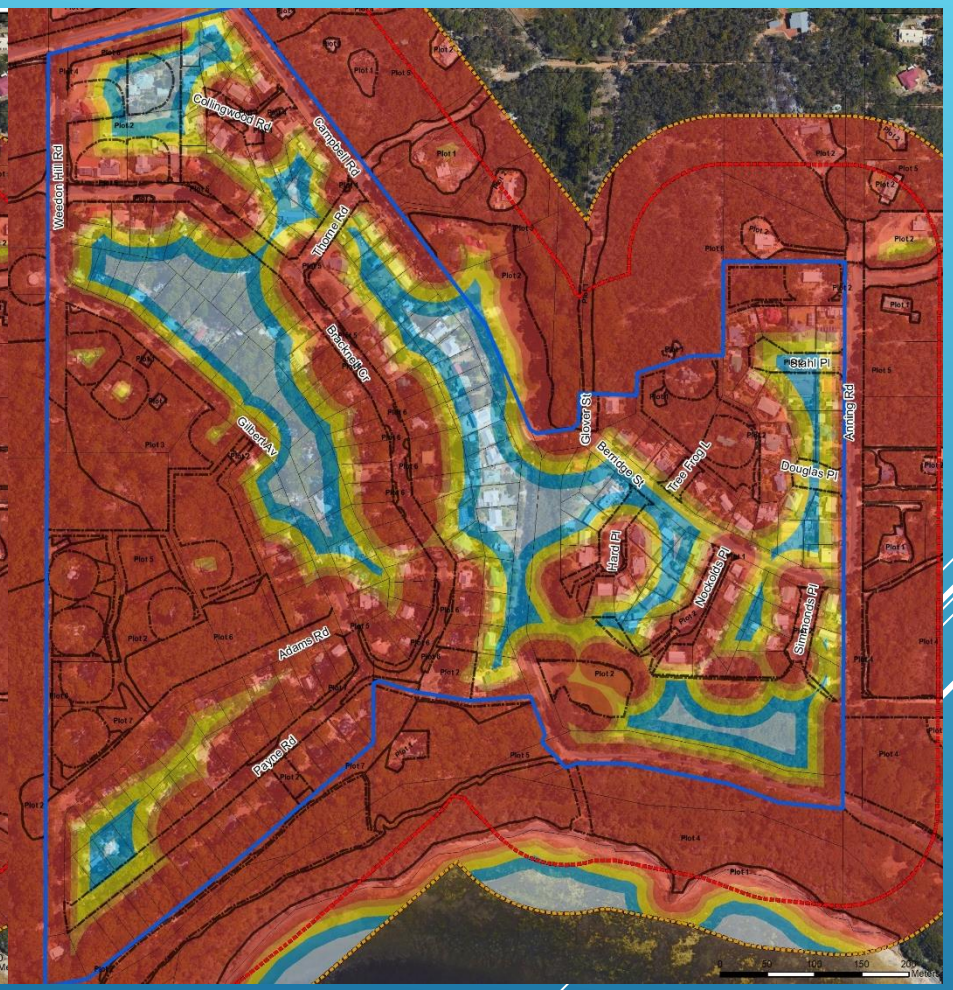
Denmark WA 6333

Figure 6. Works Program

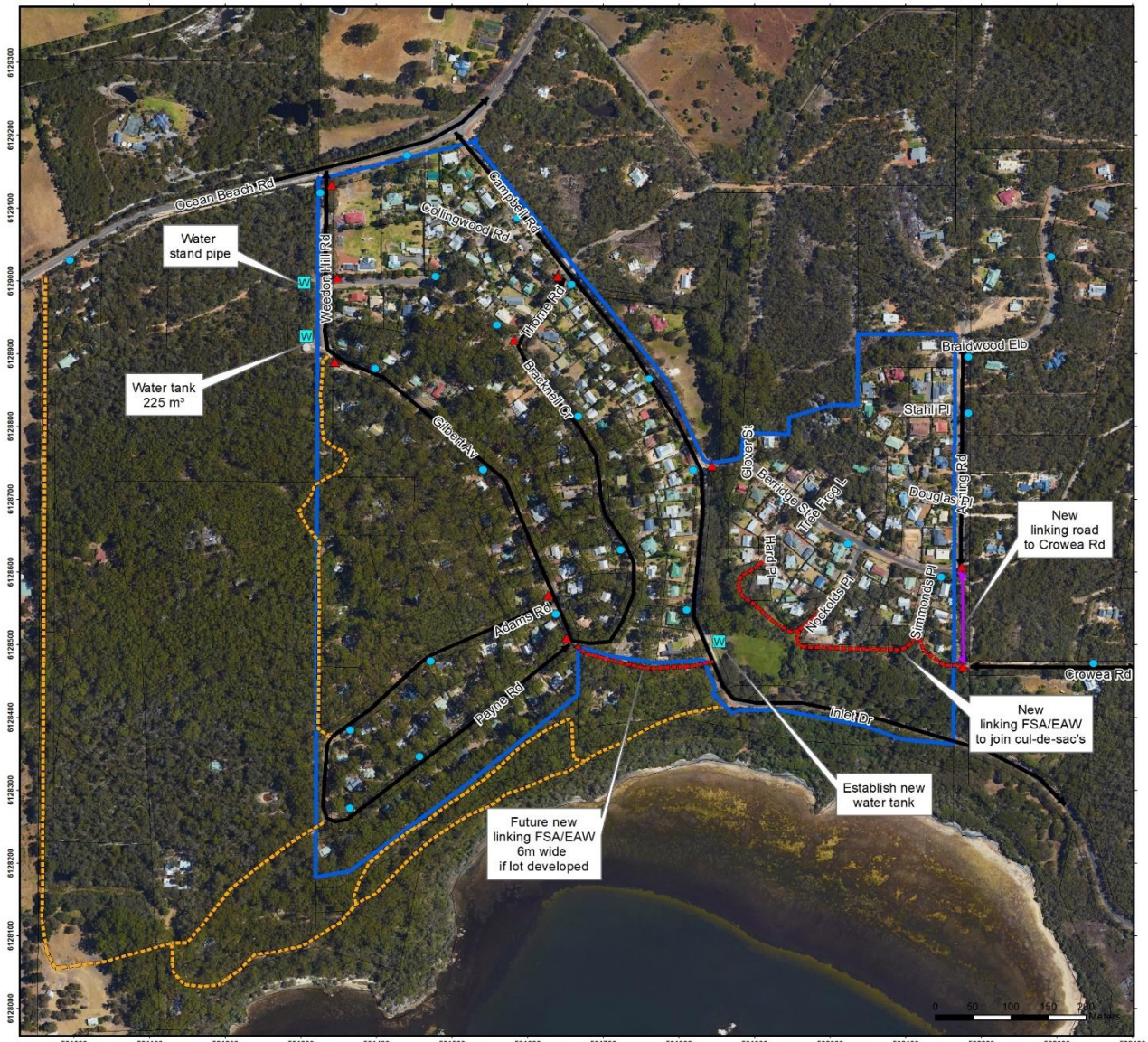
BAL Assessor	QA Check	Drawn by
KK	BT	SA
STATUS	FILE	DATE
FINAL	DFES001	28/01/2020

BAL Contour Plan Pre & Post Program of Works





Access and Water



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Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- Water Point
- Hydrants
- FSA/EAW (Not locked)
- FSA/EAW 6m wide (new)
- Emergency Access Routes
- Proposed new road
- Access signage

Scale
1:5,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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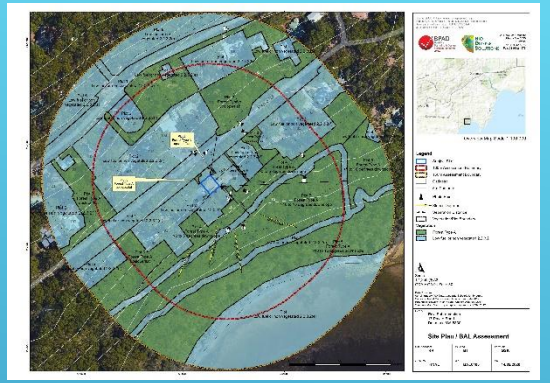
Figure 8. Access and Water

BAL Assessor	QA Check	Drawn by
KK	BT	SA
STATUS	FILE	DATE
FINAL	DFES001	28/01/2020

Program of Works

- Applying the SoD Fire Management Notice to the precinct on private property
- Retrofitting buildings within the precinct to BAL and AS3959.
- Undertake individual BAL assessments on dwellings to install a compliant APZ associated with BAL-29 or less and AS3959 setbacks/APZ area..
- Undertake systematic review of the FMN
- Retrofitting buildings within the precinct to BAL and AS3959.
- Mechanical fuel reduction in road reserves in Emergency Access Routes to assist in safe evacuation and egress into and exiting the precinct.
- Government agencies and private land owners (larger special residential lots) to consider small, cool burns to assist reduction of fuel loads on private property/reserves and managing of fuels adjacent to other residents
- A regular maintenance regime on all internal public roads, mowing verges, trimming overhead branches and all powerlines.
- Linking future public roads, assigning Emergency Access Routes, Emergency Access Ways and Fire Service Access Routes for assisting in rapid flow of traffic in a bushfire emergency.
- Upgrading and/or maintaining access to a minimum of trafficable standards and ensuring turnaround areas are provided to WAPC guidelines technical standards.
- Investigate through Mitigation Activities Funding arrangements (MAF) opportunities to link the public road network.
- Linking public roads Anning Road to Crowea ; Payne to Inlet Drive, widen access to Wilson Inlet.



Project BAL Build

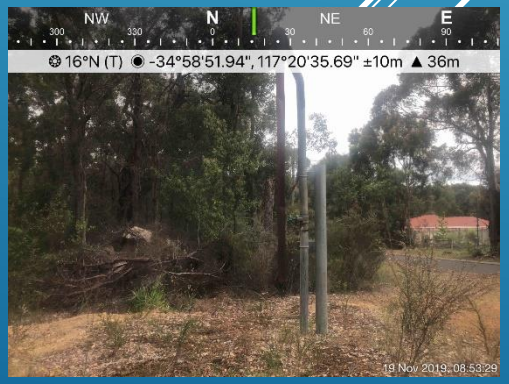
Building a BAL-rated house, like this BAL 19 home, is not as expensive as often thought. Credit: Lee Griffith.

How much does it really cost to build homes that will survive bushfire?

A new West Australian study by Kathryn Kinnear (Bio Diverse Solutions) and Julie de Jong (H + H Architects), Project BAL Build, has sought to address the misinformation and confusion about the cost of building bushfire-resistant houses.

Water.. Do we have it when we need it?

Precinct	Water infrastructure	Capacity	Location	Comments
Weedon Hill	1 service Tank	225m3	Corner Weedon Hill Rd & Gilbert Ave	Mains Supply Maintains Hydrant pressure Residential Supply



- Water sources into the precinct are via a pipe and gravitated tank network into the reticulated scheme pipe and hydrant network.
- As power outages are anticipated it can be assumed these primary sources may be unavailable during a large fire event.
- A model for water supply for bushfire preparedness is outlined in the proposed PACE model below:

PACE

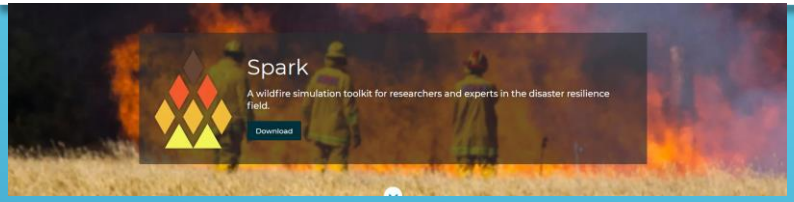
Primary: Weedon Hill Standpipe, Hydrants in street reserves

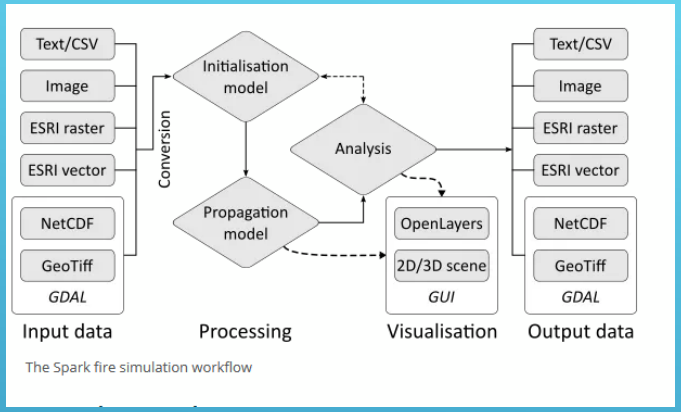
Alternative: Ocean beach Fire Shed, 50,000L via roof top capture. Shire depot 150,000L via roof top capture.

Contingency: New strategic tank located in Shire reserve along Campbell Road filled from local hydrant in Reserve 32279

Emergency: Wilson Inlet

CSIRO SPARK Modelling

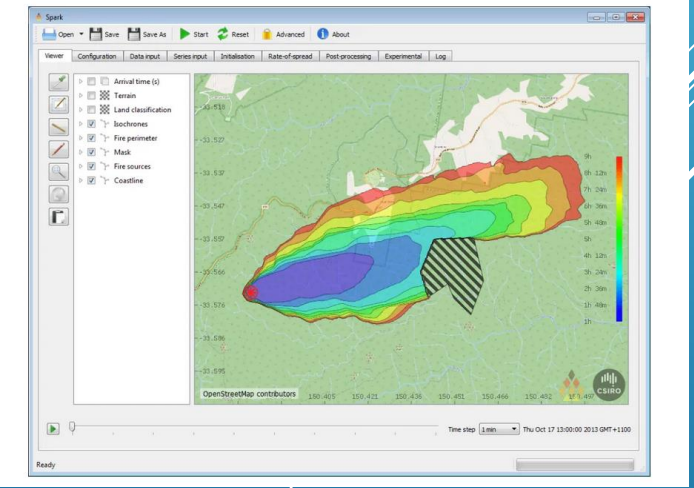




The Spark fire simulation workflow

SPARK is s system developed by CSIRO that enables the simulation of hours of fire spread at a landscape scale.

- System based on a level set propagation model allowing simulation of any number of distinct fire fronts.
- BRIGS used SPARK to assess the likelihood and consequence of bushfire attack on life and property.
- Undertaken on each precinct for
  - Landscape risk – how large is the bushfire catchment of the precinct;
  - Locality risk – quantity and degree of the bushfire hazard;
  - Building risk – AS3959 to assess amount of buildings at risk; and
  - Analysis of evacuation and refuge options – safer place options within the precinct based on a radiant heat flux of ≤.10kW/m^2.



CSIRO – SPARK burn perimeter analysis

- The precinct is most at risk from fires spreading under an NNW wind;
- Fires in the landscape have the potential to be very fast moving, when burning in grassy vegetation; and
- The modelled fast-moving grass fires have the potential to cut off Ocean Beach Road very quickly, thereby highlighting that offsite evacuation may not be appropriate for the precinct under all conditions.

Figure 5: Burn perimeter analysis (SW)

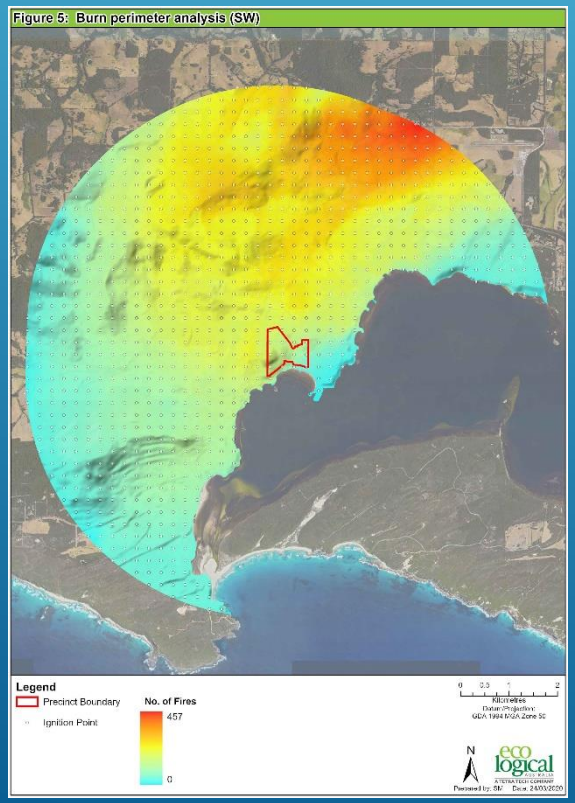


Figure 4: Burn perimeter analysis (ESE)

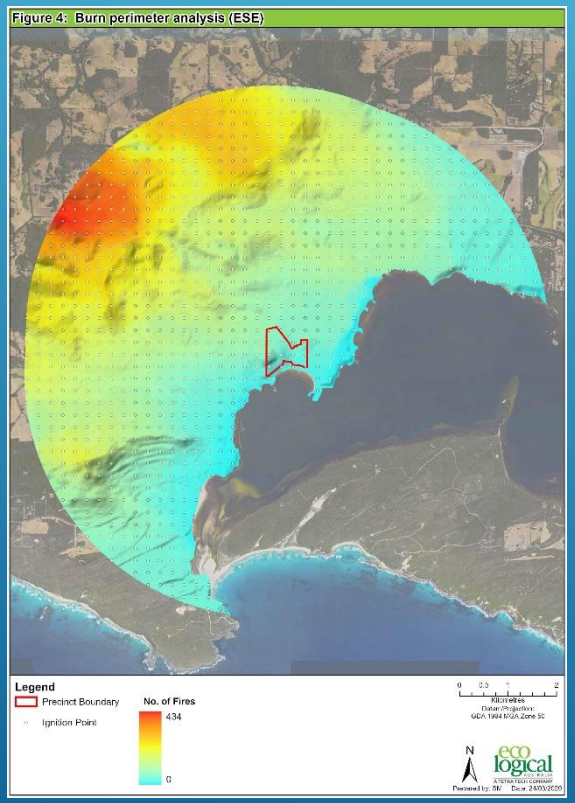
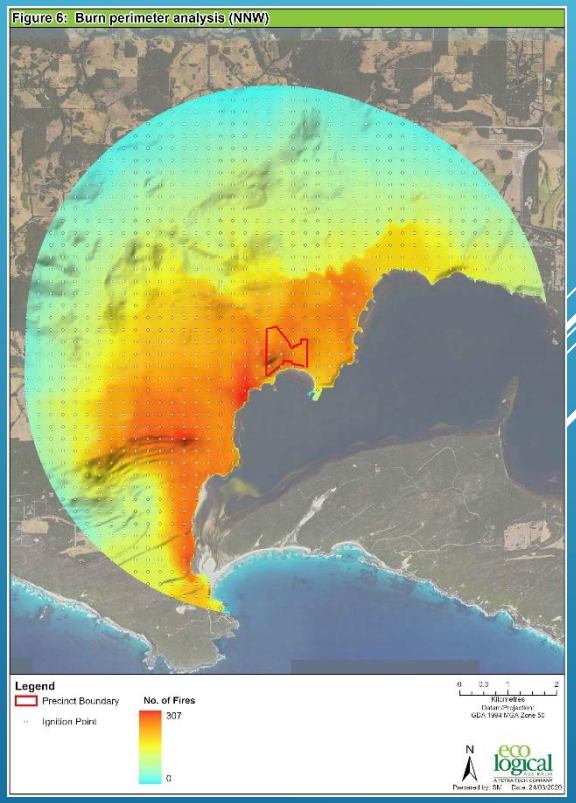


Figure 6: Burn perimeter analysis (NNW)



CSIRO – SPARK bushfire rate of spread analysis

- Assesses the potential bushfire spread and speed from different bushfire attack scenarios.
- Provides insights into the potential time to impact of assets within the precinct as well as the road network providing access.
- Fast ‘bands’ related to the wind direction, topography of the land and grassland vegetation.
- Fast-moving grass fires (≥12 km/h) modelled have the potential to cut off roads very quickly, offsite evacuation may not be appropriate for the precinct under all conditions.

Figure 7: Bushfire rate of spread analysis (ESE)

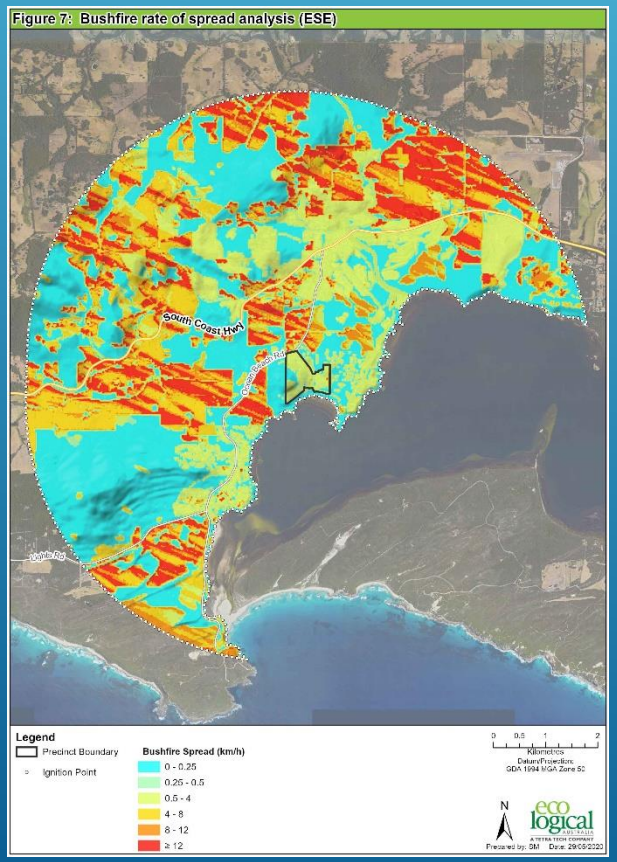


Figure 8: Bushfire rate of spread analysis (SW)

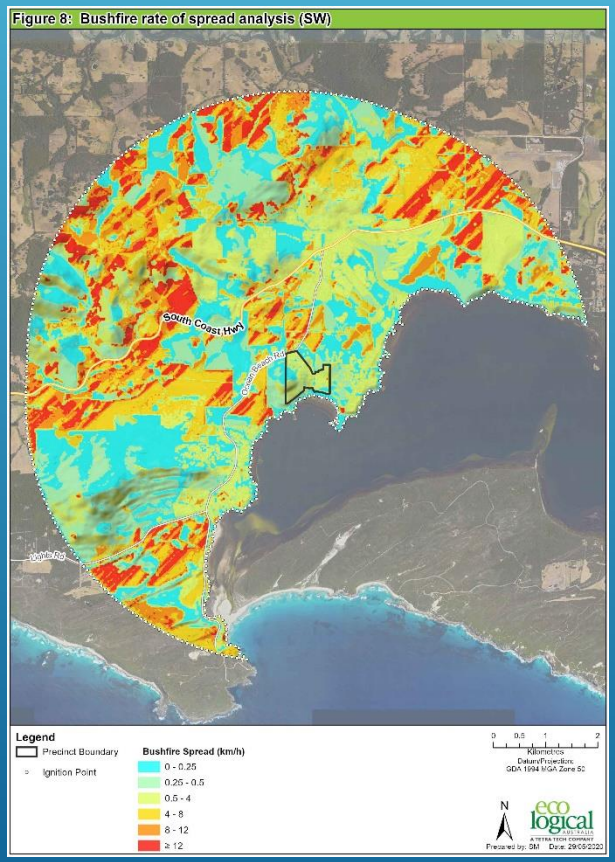
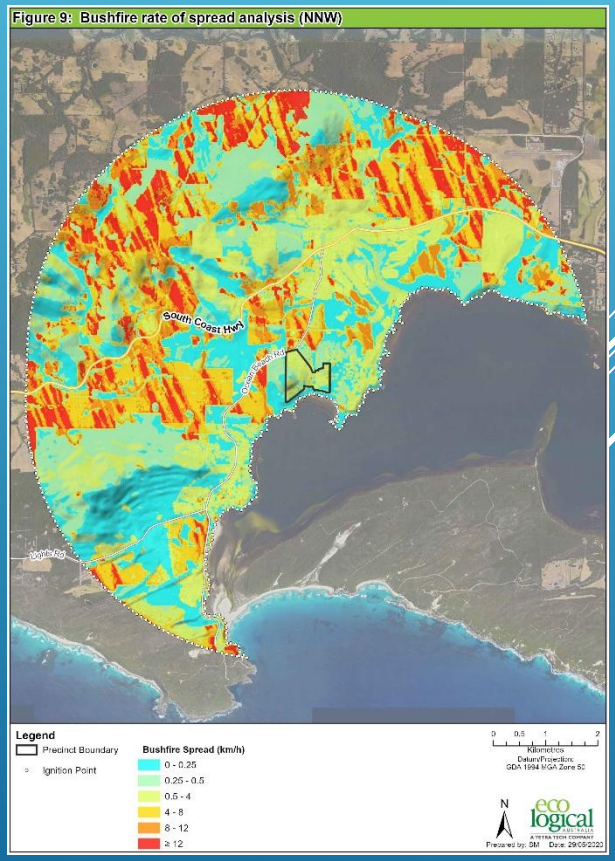


Figure 9: Bushfire rate of spread analysis (NNW)



Locality risk for the Precinct

- To assess the quantity and degree of bushfire hazard in the immediate locality of the buildings associated with the precinct as a measure of the increased potential for more severe bushfire attack.
- Fires spreading under an NNW wind have the highest modelled intensities at the precinct boundary to the north.
- Fires spreading under a SW wind are also are modelled to potentially expose buildings within the precinct to high bushfire intensity as a result of connectivity of forest vegetation west of the precinct on Weedon Hill, deep into the centre of the precinct itself.
- In general terms, the results indicate that the highest locality risks to the precinct are fires spreading under NNW winds.

Figure 10: Bushfire intensity analysis (ESE)

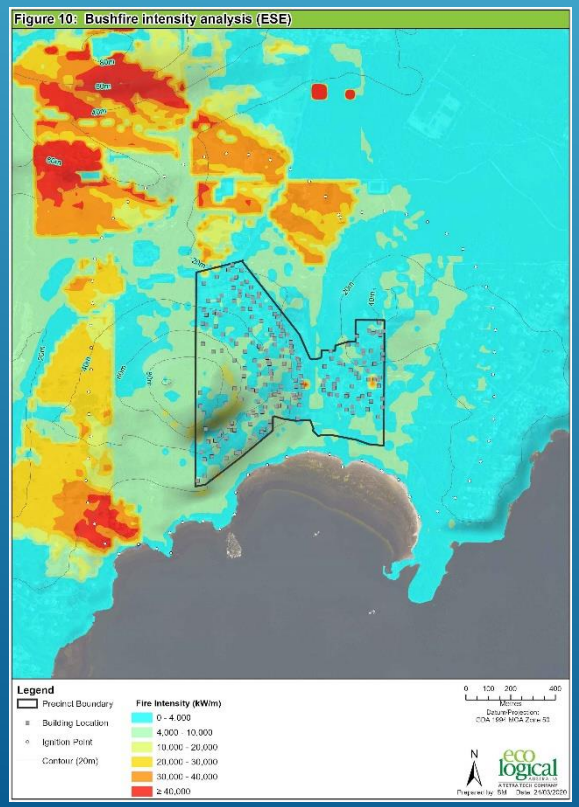


Figure 11: Bushfire intensity analysis (SW)

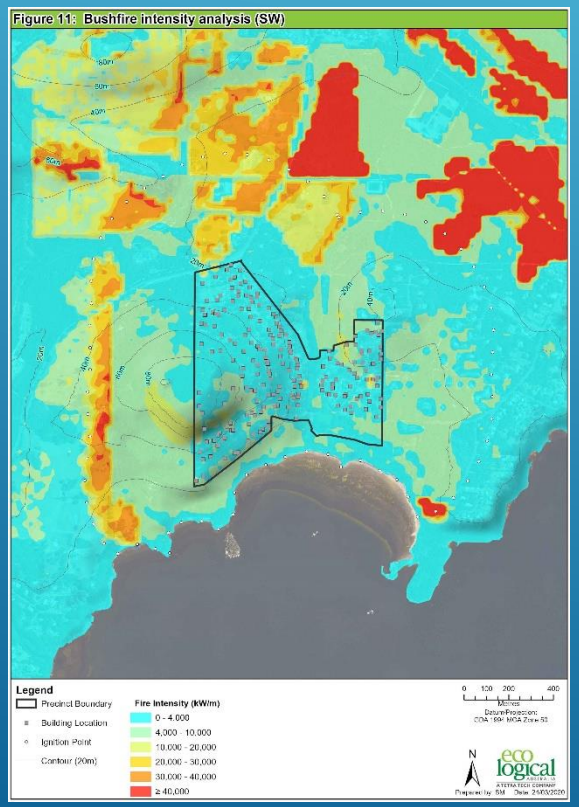
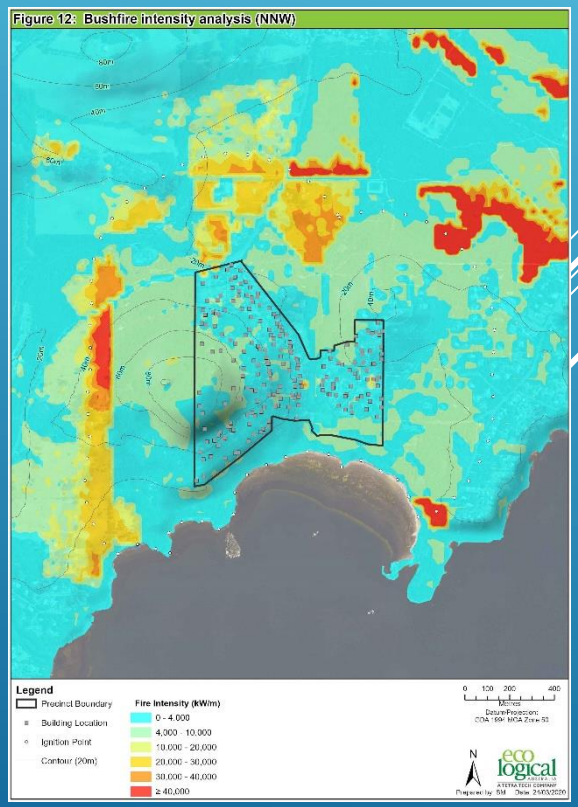


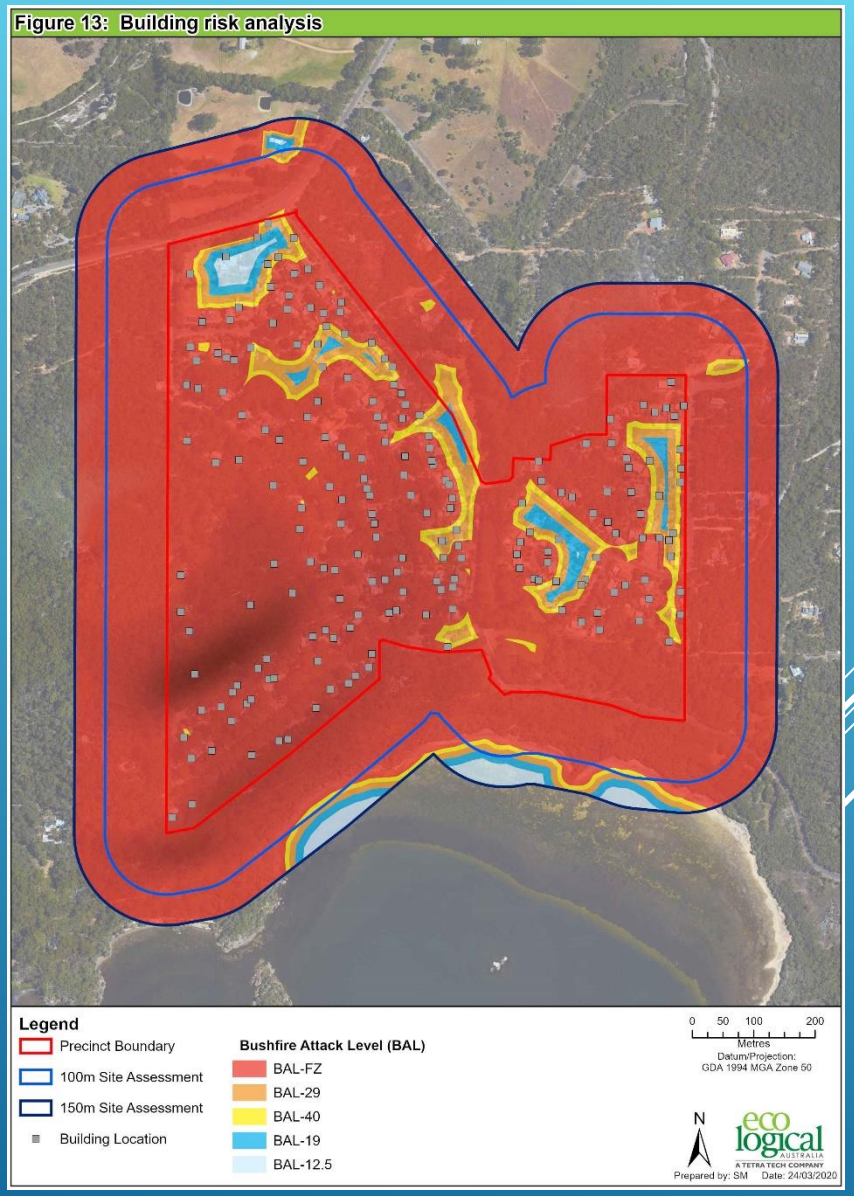
Figure 12: Bushfire intensity analysis (NNW)



Building risk assessment

- The majority of buildings within the precinct (approx. 87%) occur within areas potentially subject to BAL-FZ (i.e. flame zone) and no buildings were rated as BAL-LOW attributable to the large amount of forest vegetation within and surrounding the precinct
- Regular maintenance of vegetation on private properties as per requirements of all private property owners under the Shire of Denmark 2019/2020 Firebreak and Fuel Management Notice (SoD 2019) and fuel reduction along road reserves would likely result in a major reduction of building risk.

BAL Rating	Number of buildings	% of Buildings
BAL-FZ	178	87.3%
BAL-40	13	6.4%
BAL-29	12	5.9%
BAL-19	1	0.5%
BAL-12.5	0	0
BAL-LOW	0	0
BAL-LOW (100-300 m from hazard)	0	0
Grand Total	**204**	**100%**

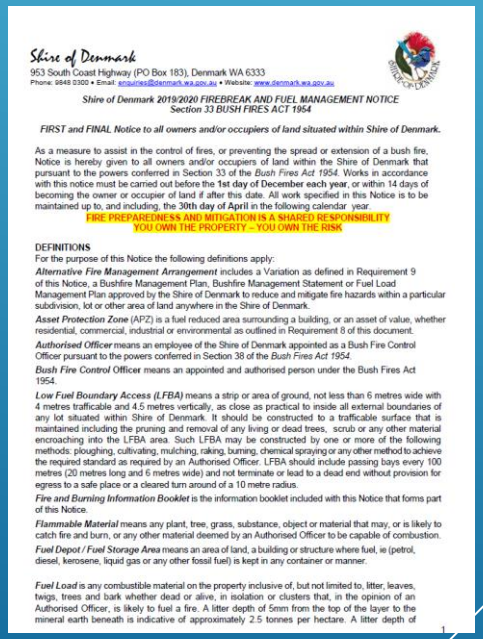


Analysis of evacuation and refuge options

- Early evacuation from the precinct to the Denmark townsite is likely to be the safest option available to residents and visitors.
- Potential impact from bushfire on access routes, early evacuation, well in advance of a bushfire is recommended
- Consideration should be given to advising residents and visitors to pre-emptively relocate from the precinct during Extreme or Catastrophic Fire Danger Ratings (FDRs) or if there is an out of control bushfire within 20 km on a Severe or Very High FDR day.

On-precinct evacuation

- No area located within the precinct on public land is suitable for a community refuge.
- Early evacuation to Denmark, well in advance of a bushfire is strongly recommended.
- Houses not built to AS3959 are not considered a safe sheltering option.
- Homeowners need awareness of the bushfire risk they are exposed to and comply with the Shire of Denmark 2019/2020 Annual Bush Fire Mitigation Notice (SoD 2019).
- Residents should be encouraged to prepare their own bushfire survival plan.



Shire of Denmark
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Shire of Denmark 2019/2020 FIREBREAK AND FUEL MANAGEMENT NOTICE
Section 33 BUSH FIRES ACT 1954

FIRST and FINAL Notice to all owners and/or occupiers of land situated within Shire of Denmark.

As a measure to assist in the control of fires, or preventing the spread or extension of a bush fire, Notice is hereby given to all owners and/or occupiers of land within the Shire of Denmark that pursuant to the powers conferred in Section 33 of the *Bush Fires Act 1954*. Works in accordance with this notice must be carried out before the **1st day of December each year**, or within 14 days of becoming the owner or occupier of land if after this date. All work specified in this Notice is to be maintained up to, and including, the **30th day of April** in the following calendar year.

FIRE PREPAREDNESS AND MITIGATION IS A SHARED RESPONSIBILITY
YOU OWN THE PROPERTY – YOU OWN THE RISK

DEFINITIONS
For the purpose of this Notice the following definitions apply:

Alternative Fire Management Arrangement includes a Variation as defined in Requirement 9 of this Notice, a Bushfire Management Plan, Bushfire Management Statement or Fuel Load Management Plan approved by the Shire of Denmark to reduce and mitigate fire hazards within a particular subdivision, lot or other area of land anywhere in the Shire of Denmark.

Asset Protection Zone (APZ) is a fuel reduced area surrounding a building, or an asset of value, whether residential, commercial, industrial or environmental as outlined in Requirement 8 of this document.

Authorised Officer means an employee of the Shire of Denmark appointed as a Bush Fire Control Officer pursuant to the powers conferred in Section 38 of the *Bush Fires Act 1954*.

Bush Fire Control Officer means an appointed and authorised person under the Bush Fires Act 1954.

Low Fuel Boundary Access (LFBA) means a strip or area of ground, not less than 6 metres wide with 4 metres trafficable and 4.5 metres vertically, as close as practical to inside all external boundaries of any lot situated within Shire of Denmark. It should be constructed to a trafficable surface that is maintained including the pruning and removal of any living or dead trees, scrub or any other material encroaching into the LFBA area. Such LFBA may be constructed by one or more of the following methods: ploughing, cultivating, mulching, raking, burning, chemical spraying or any other method to achieve the required standard as required by an Authorised Officer. LFBA should include passing bays every 100 metres (20 metres long and 6 metres wide) and not terminate or lead to a dead end without provision for egress to a safe place or a cleared turn around of a 10 metre radius.

Fire and Burning Information Booklet is the information booklet included with this Notice that forms part of this Notice.

Flammable Material means any plant, tree, grass, substance, object or material that may, or is likely to catch fire and burn, or any other material deemed by an Authorised Officer to be capable of combustion.

Fuel Depot / Fuel Storage Area means an area of land, a building or structure where fuel, ie (petrol, diesel, kerosene, liquid gas or any other fossil fuel) is kept in any container or manner.

Fuel Load is any combustible material on the property inclusive of, but not limited to, litter, leaves, twigs, trees and bark whether dead or alive, in isolation or clusters that, in the opinion of an Authorised Officer, is likely to fuel a fire. A litter depth of 5mm from the top of the layer to the mineral earth beneath is indicative of approximately 2.5 tonnes per hectare. A litter depth of

1

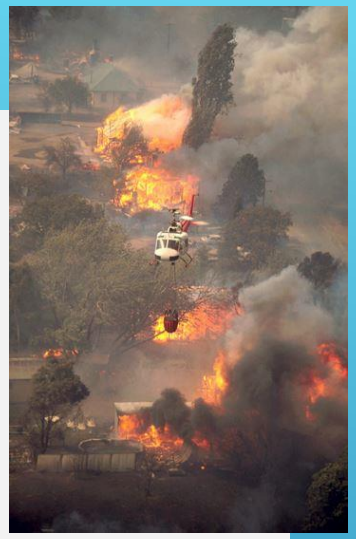
Cost

- Community cost post fire: Trauma, Re-establishment costs and time to rebuild.

  "Canberra suffered not just economic loss but significant social devastation. The first person to suffer from the smoke was a 61-year old man in Duffy. He died of asphyxiation fighting the fire in his backyard. Tragically there were also three more to follow, among them an 83-year-old woman and a 37-year-old woman. Many people were affected by depression, particularly those who had lost their homes in the fires. The community began to question the lack of preparation for the fires and the total confusion at the time."

- *LGA recovery cost: rebuilding, cost to government.*
- *Personal cost: trauma and rebuilding.*

The red indicates the families and homes destroyed in Duffy



Stakeholder assistance..

Priority and ranking No	Implementation Action	Agency
1	Assist with funding options to private landowners to retrofitting dwellings to BAL and AS3959.	DFES/SEMC & DoHA (fed)
2	Assist with funding options/mechanism through provision of advice to the LGA and private landowners to undertake individual BAL assessments on dwellings to install a compliant APZ associated with BAL-29 or less (where able to achieve) and AS3959 setbacks/APZ area.	DFES/SEMC & DoHA
3	Investigate options for construction of community refuge building within the precinct and associated vegetation management. Federal assistance may be required.	DFES/SEMC & DoHA (fed)
4	Consideration to updating the DFES Homeowner's Bushfire Survival Manual (DFES 2014) or similar public available information to assist with current public available information and dissemination from the LGA.	DFES
5	Encourage residents to prepare their property pre-season and inform them of their evacuation and refuge options (i.e. off-precinct, in future precinct refuge building or locations, and at their house) and the risk of late evacuation	DFES
6	Investigate the possibility of establishing a Community Fire Unit for the precinct similar to the New South Wales Community Fire Unit initiative (Lowe 2008, NSWFR 2020).	DFES
7	LEMC to assist with Investigation of options for the construction or designation of a Community Fire Unit (or safer place) building and associated vegetation management.	LEMC
8	Continue to undertake vegetation management to 20m APZ (low fuel) around all water infrastructure within the precinct as shown on Figure 8. Seek adjacent neighbour compliance to meet 20m protection zone where applicable.	WCWA
9	WCWA assist the LGA by providing baseline mapping of water supply to the precinct/greater town to assist with planning, mitigation and suppression activities.	WCWA
10	DPLH assist through provisions of advice to the LGA with planning strategies and schemes to ensure that SPP3.7 is applied consistently throughout the precinct.	DPLH

Building bushfire resilience in communities – National strategy for disaster resilience

- "State governments and municipal councils to adopt increased or improved protective management, emergency management and advisory roles."
- Strive to recognize and understand the risks disasters pose to their own and their communities interests.
- Leaders drive development of partnerships and networks to build resilience at government, business, neighborhood and community levels.
- We have local, state and federal government listening….
- This is your community/precinct and the bushfire risks affect you….

Where to from here..

- How to establish Asset Protection Zones and biological values – talks with the community.
- Stakeholder working groups – from established BRIGS group.
- Bushfire ready group developed.
- Mitigation Activities funding priorities.
- Fire control notice review.
- Continue engaging with community/precinct.

Photo: R.Hedderwick, 2020

Where to from here..lets talk about it its your community..

- Questions
- Suggestions
- Funding options
- Bushfire ready groups
- Stakeholders not considered?
- Next steps from Shire Of Denmark
- Next fire season 2020/21 preparations
- Feedback on the project

SHIRE OF DENMARK

SEMC
STATE EMERGENCY MANAGEMENT COMMITTEE

Australian Government
Department of Home Affairs

DFES
Department of Fire & Emergency Services

BIO DIVERSE SOLUTIONS

eco logical AUSTRALIA
A TETRA TECH COMPANY