

# BUILDING BUSHFIRE RESILIENCE IN THE GREAT SOUTHERN





Albany

Shire of Denmark, City of Albany, Shire of Plantagenet

Plantagenet



# 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:

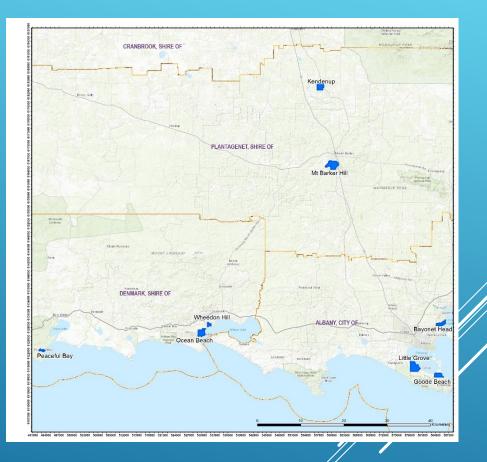
- High fuel loads and extreme bushfire risks;
- Limited access and egress for the communities to evacuate (one-way access);
- High population density in summer (extreme risk) period
- Legacy planning issues. Communities not consistent with the current SPP 3.7



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

#### Key processes

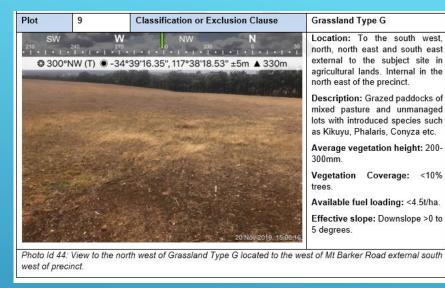
- Applying a AS3959 BAL contouring methodological to define and map bushfire risks to our communities.
- CSIRO Spark modelling
- Identification of vulnerable communities where evacuation may be compromised.
- Identifying areas for possible community refuge. Develop Works Programs and treatment schedules 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.







Jarrah

Gum

of

of

Photo Id 30: View to the south east of Plot 5 located in private property along the southern boundary of the precinct near Braidwood Road.

## 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.



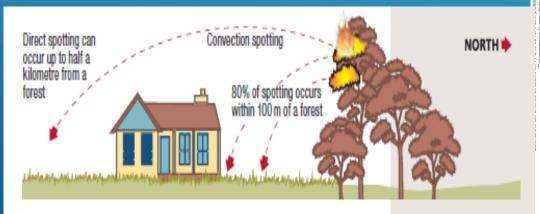


TABLE 2.5 DETERMINATION OF BUSHFIRE ATTACK LEVEL (BAL)—FDI 80 (1090 K)

AS 3959:2018

31

			BALs				
Vegetation	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5		
classification	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		
		Dow	nslope >5 to 10 de	grees			
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		
		Down	slope >10 to 15 de	grees			
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		

www.standards.org.au

## 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)"

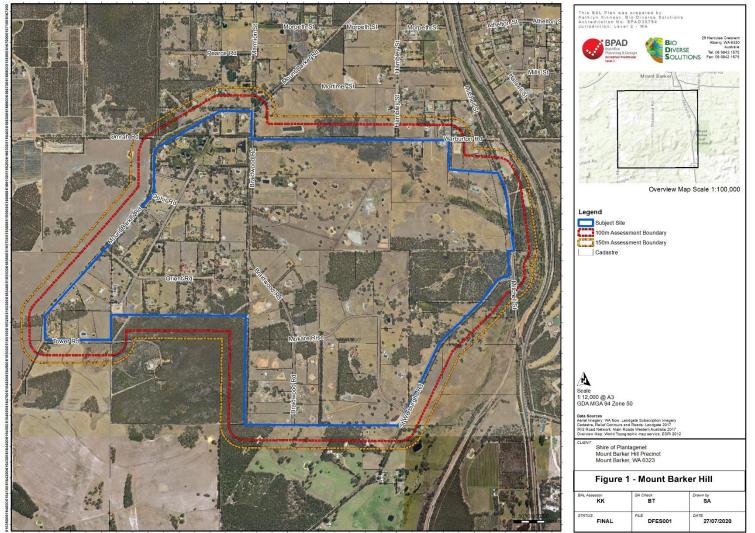
Need to:

- 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?

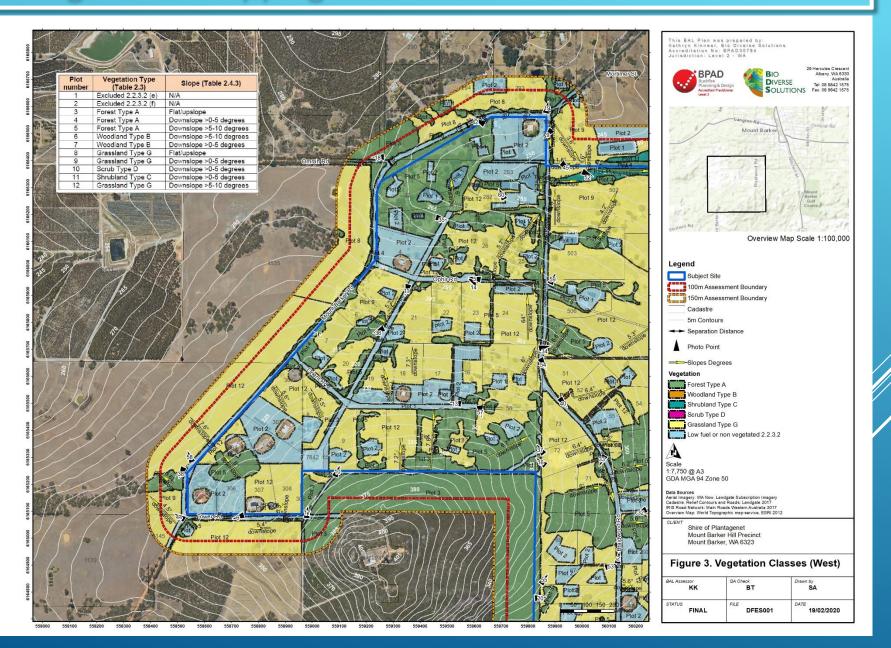




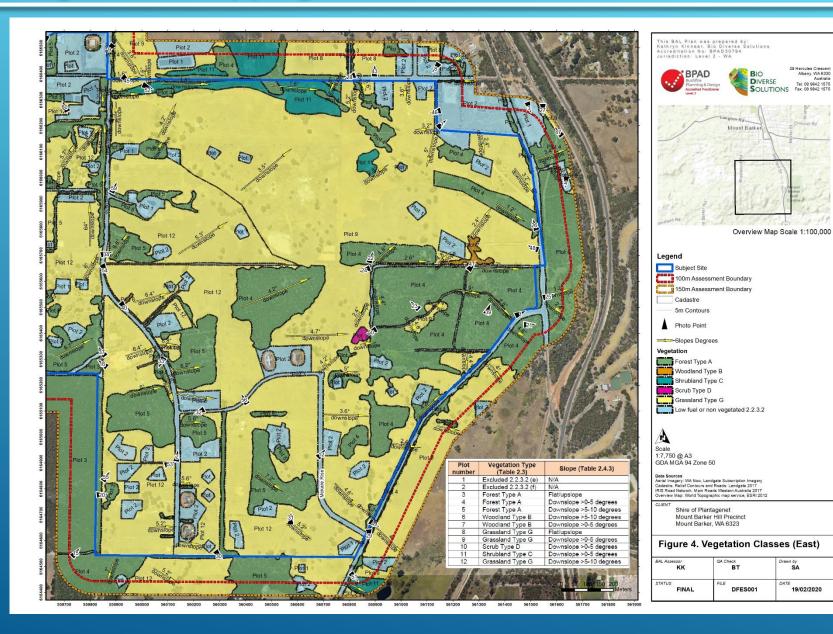
# Mount Barker Precinct



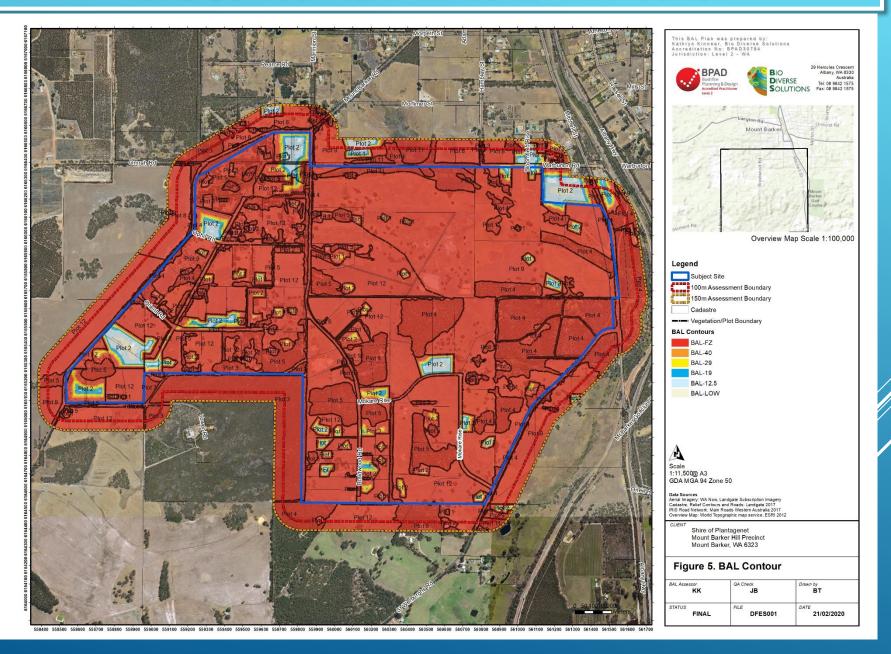
# Vegetation Mapping Mount Barker Hill Precinct to AS3959



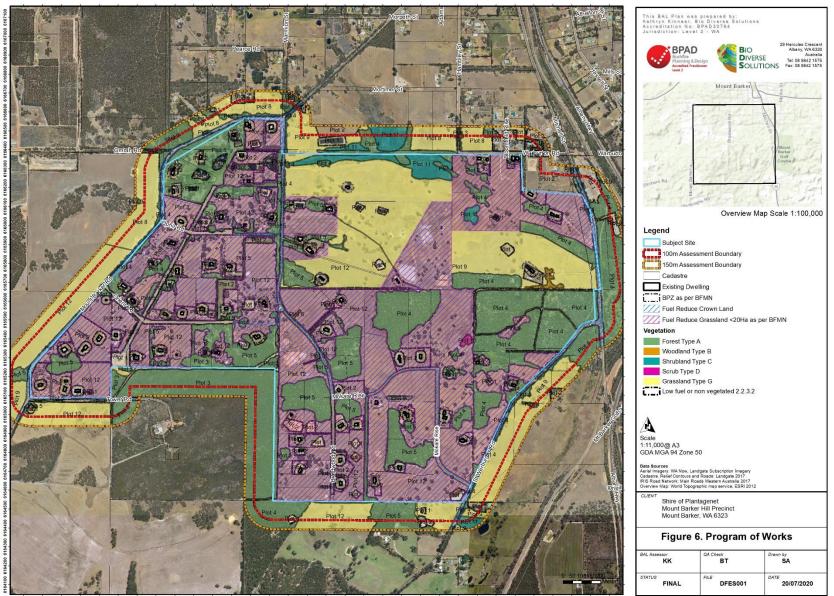
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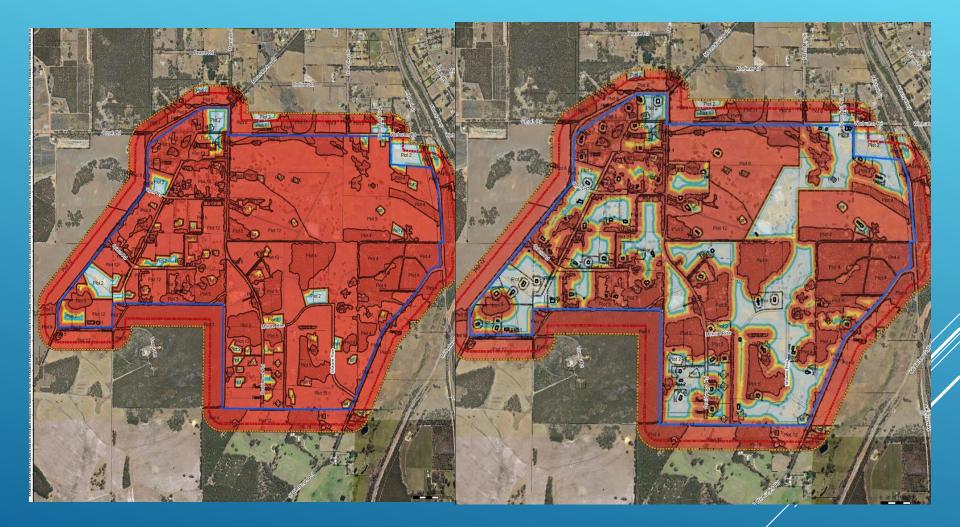
#### BAL Contour Plan – Mt Barker Hill Precinct



## Works Program Mapping

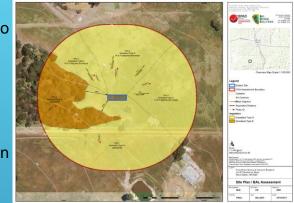


# BAL Contour Plan Pre & Post Program of Works



#### Program of Works

- Applying the SoP Bush Fire Mitigation Notice to the precinct on private property
- Apply BAL assessments for APZs on larger (>2500m<sup>2</sup>) Special Residential lots to achieve an APZ compliant to BAL 29 or less
- Undertake systematic review of the BFMN
- 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
- 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.
- Undertake review of scheme text pertaining to the Rural Residential and Rural Small Holdings to reflect the more current WAPC guidelines standards/terminology in relation to bushfire.





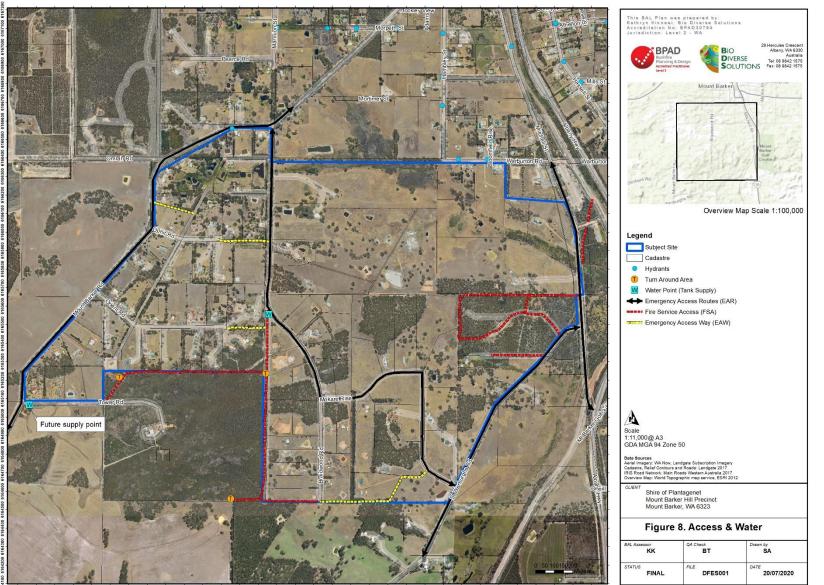
low much does it really cost to build homes that will survive bushfire?

Project BAL Build

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 bushtifre-existent houses.



#### Access and Water



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

Precinct	Water infrastructure	Capacity	Location	Comments
Mt Barker	Reservoir Tank	4500m3 225m3	Marmion St	Albany Supply Hydrant pressure Residential Supply

- Water supply through reticulated scheme and three tanks
- power outages anticipated is 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:** Reticulation scheme through hydrant supply.

Alternative: Tank supply and standpipe at Braidwood Road.

**Contingency:** Shire depot and recreation centre new storage tanks isolated from hydrant supply in event of power failure or supply failure from Albany. Consider developer to provide 150,000L when RR6 area developed in the north of precinct as per the current and endorsed WAPC guidelines.

**Emergency:** Private tank supply or dams on private property (minimum 10,000L stand-alone supply at each property, camlock fittings).



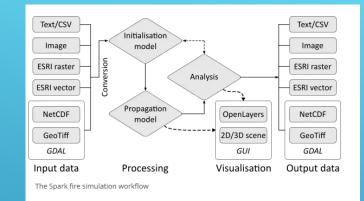


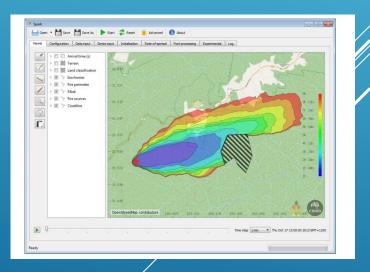
## CSIRO SPARK Modelling



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

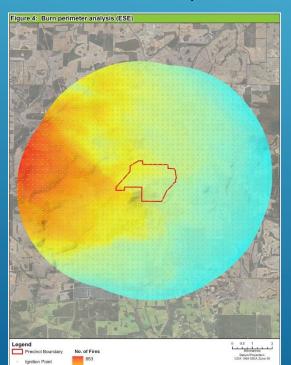
- System based on a level set propagation model allowing simulation of any number of distinct fire fronts.
- BRIGS used SPARK to assess the likelihood and consequence of bushfire attack on life and property.
- Undertaken on each precinct for
  - Landscape risk how large is the bushfire catchment of the 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<sup>2</sup>.



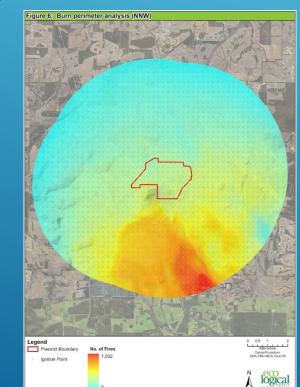


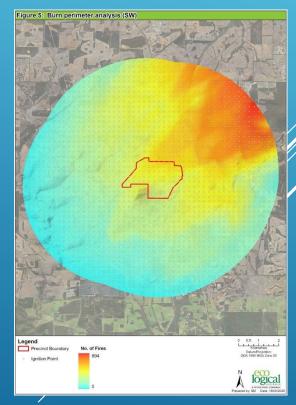
### CSIRO – SPARK burn perimeter analysis

- Fires spreading under a SW wind resulting in the largest impact to the precinct.
- Location of the precinct in an agricultural area, largely surrounded by semi-managed to unmanaged grasslands in all directions means that there are large fire catchments in virtually every direction.
- Primarily grassland bushfire fuels surrounding the precinct which facilitate fast-moving fires easier to mitigate through regular slashing and installation/maintenance of firebreaks.
- Firebreaks in grassland fuels should aid the reduction of fire spread and therefore the size of bushfire catchment upwind of the precinct.



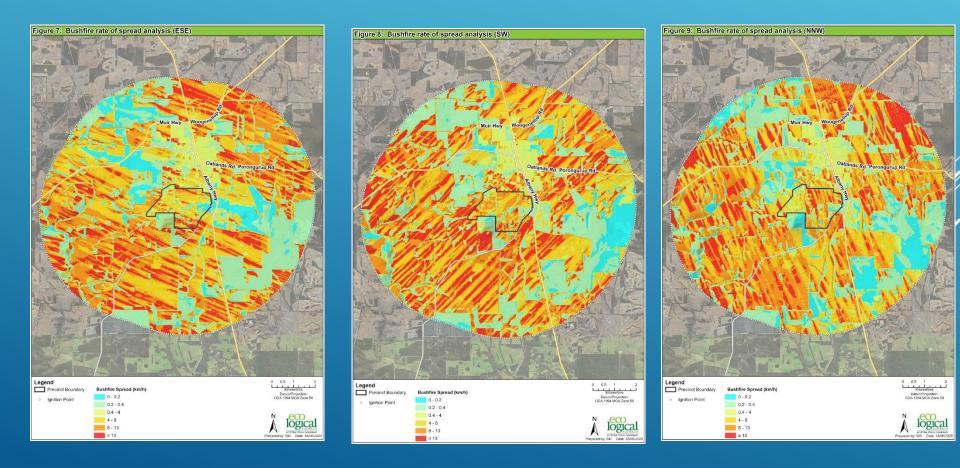
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### CSIRO – SPARK bushfire rate of spread analysis

- 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 modelled have the potential to cut off roads very quickly, offsite evacuation may not be appropriate for the precinct under all conditions.



# Locality risk for the Precinct

- Results show the potential for high bushfire intensity at the precinct interface under all three wind directions.
- Potential for high bushfire intensities being experienced deep within the Precinct itself.
- High intensities are related to large areas containing grass fuels as well as wooded vegetation in the areas in and surrounding the precinct, which would facilitate very fast-moving, intense bushfires driven by the direction of prevailing winds.
- Results indicate that intense bushfire is possible at all interfaces of the precinct (as well as within).
   Consequently, the maintenance of existing, and installation of new, fuel breaks (e.g. perimeter roads) would be beneficial to reducing this aspect of bushfire risk.



> 40.000

logica



> 40.000

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≥ 40,000

#### Building risk assessment

- The majority of buildings within the precinct (approx. 66%) occur within areas potentially subject to BAL-FZ (i.e. flame zone) and no buildings were rated as BAL-LOW Caused by the mixture of unmanaged to semi-managed grasslands, shrublands and forest vegetation within the precinct.
- Regular maintenance of vegetation on private properties as per requirements of all private property owners under the Shire of Plantagenet 2019/2020 Annual Bush Fire Mitigation Notice (SoP 2019) would likely lead to a major reduction in building risk.

Table 6: Results of building risk assessment (ELA)					
BAL Rating	Number of buildings	% of Buildings			
BAL-FZ	66	66%			
BAL-40	11	11%			
BAL-29	12	12%			
BAL-19	6	6%			
BAL-12.5	5	5%			
BAL-LOW	0	0%			
BAL-LOW (100-300 m from hazard)	0	0%			
Grand Total	100	100%			

Table C. Daaulta of building siah assessment (ELA)

# Figure 13: Building risk analysis Legend Precinct Boundary **Bushfire Attack Level (BAL)** Datum/Projectio GDA 1994 MGA Zone 5 BAL-FZ 100m Site Assessment BAL-29 150m Site Assessment BAL-40 **Building Location** BAL-19 BAL-12.5 10 kw/m<sup>2</sup> Prepared by: SM Date: 26/

#### Analysis of evacuation and refuge options

- Early evacuation from the precinct to the Mount Barker townsite is likely to be the safest offsite option currently available to residents and visitors.
- Very fast-moving grass fires could impact on the precinct and roads to the town centre before evacuation can commence or be completed safely off-precinct evacuation should only be at the direction of emergency services.
- Off-precinct evacuation may not be a suitable primary recommendation for the precinct, however every fire is different and if off-precinct evacuation is to occur, 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 if there is an out of control bushfire within 20 km on Extreme or Catastrophic Fire Danger Rating (FDR) days.



#### On-precinct evacuation

- No area located within the precinct on public land is suitable for a community refuge.
- The precinct is situated very close to the Mount Barker town centre
- Surrounded by/contains grassy fuels that could facilitate rapid bushfire spread,
- Houses not built to AS3959 are not considered a safe sheltering option.
- Management of grassy fuels on private properties and sheltering on-site in a wellprepared and defendable property will enhance safety.
- Homeowners need awareness of the bushfire risk they are exposed to and comply with the Shire of Plantagenet 2019/2020 Annual Bush Fire Mitigation Notice (SoP 2019).
- Residents should be encouraged to prepare their own bushfire survival plan.





ANNUAL BUSH FIRE MITIGATION NOTICE 2020/21



All Shire of Plantagenet landowners and occupiers must prepare their property for the bush fire season.

This includes homeowners, tenants, absentee landowners, holiday homeowners and people living on rural properties.

PLAY YOUR PART IN KEEPING THE COMMUNITY SAFE FROM BUSH FIRES

Please read this notice carefully and store it for future reference. Do not discard.

#### For all bush fire emergencies dial 000

For current information relating to harvest and vehicle movement bans or restricted and prohibited burning times, phone 9892 1102.





CHOOSE YOUR BUSHFIRE PLAN

Fill out our quick questionnaire to help you decide whether you want to leave early or stay and defend in the event of a bushfire. Answer yes, no or unsure to each question.

Who am I putting in danger? Will any children, guests, dependents, elderly or sick household members leave early and be cared for?

UNSURE





 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 83year-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..

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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	Assist with provision of guiding policy to the LGA on "space open refuge areas" and "community refuge buildings" to assist in development of these areas within the precinct by the LGA/LEMC.	DFES/LEMC			
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	Asist the LGA through provision of advice on the legal wording in regards to the Fire Management Notice.	DFES			
6	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			
7	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			
8	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			
9	DPLH assist through any scheme review or local planning strategy with advice in regards to bushfire protection compliance.	DPLH			

# 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 Plantagenet
- Next fire season 2020/21 preparations
- Feedback on the project







Australian Government
Department of Home Affairs

DFES Department of Fire & Emergency Services





