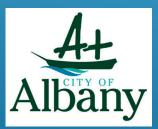


BUILDING BUSHFIRE RESILIENCE IN THE GREAT SOUTHERN













Shire of Denmark, City of Albany, Shire of 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:

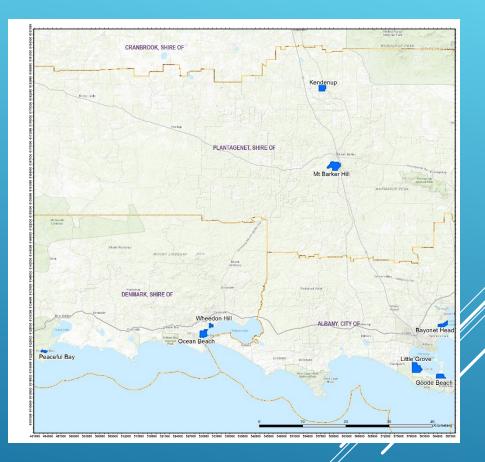
- High fuel loads and extreme bushfire risks;
- Limited access and egress for the communities to evacuate (one-way access);
- High population density in summer (extreme risk) period
- Legacy planning issues. Communities not consistent with the current SPP 3.7

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

PI

@ 159°S

- 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 ٠ vegetation structure.



Plot	3, 5, 6, 7 8	k 13	Classification or Exclusion Clause	Forest Type A
- 17 • 1 • 1	NE 1 • 1 • 1 • 1	E	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 Jaxandria Junicerina, Forest (wet areas). Overstorey of eucalyptus with mid storey species of <i>Gallistachus</i> <i>lanceolatum</i> (Native Willow) juvenile trees, Banksia, Acacia, Kunzea, Hibbertia, Melaleuca and Leopopogon. Understorey
			SAUDGOLE 180228	and Leocopagon, 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 5: D/S > 5 to 10 degrees. Plot 6: D/S > 10 to 15 degrees. Plot 7: D/S > 0 to 5 degrees.
Photo Id 11:	View of Plot 3	Karri F	orest Located to the south west of Harrin	gton Break Estate.
lot	4,8&9	Class	ification or Exclusion Clause	Grassland Type G

4,8 & 9	Classification or Exclusion Clause	Grassland Type G
SE	S 240 110 240 110 240 117°19'14.75" ±30m ▲ 17m	Location: To the north, south, 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.
		Average vegetation height: 200- 300mm.
	and the second second second	Vegetation Coverage: <10% trees.
	and the second second second	Available fuel loading: <4.5t/ha.
	A CONTRACTOR OF A CONTRACTOR	Effective slope:
		Plot 4: Flat/upslope
and the second	A CONTRACTOR	Plot 8: Downslope >5 to 10 degrees
	13 Aug 2019, 18:03:39	Plot 9: Downslope >0 to 5 degrees

Photo Id 20: View to the south of grazed paddocks in Plot 4 located south west of the precinct.

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.



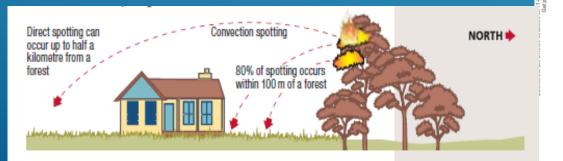


TABLE 2.5

AS 3959:2018

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

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	
	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	
		Down	slope >15 to 20 de	grees		
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

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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)"

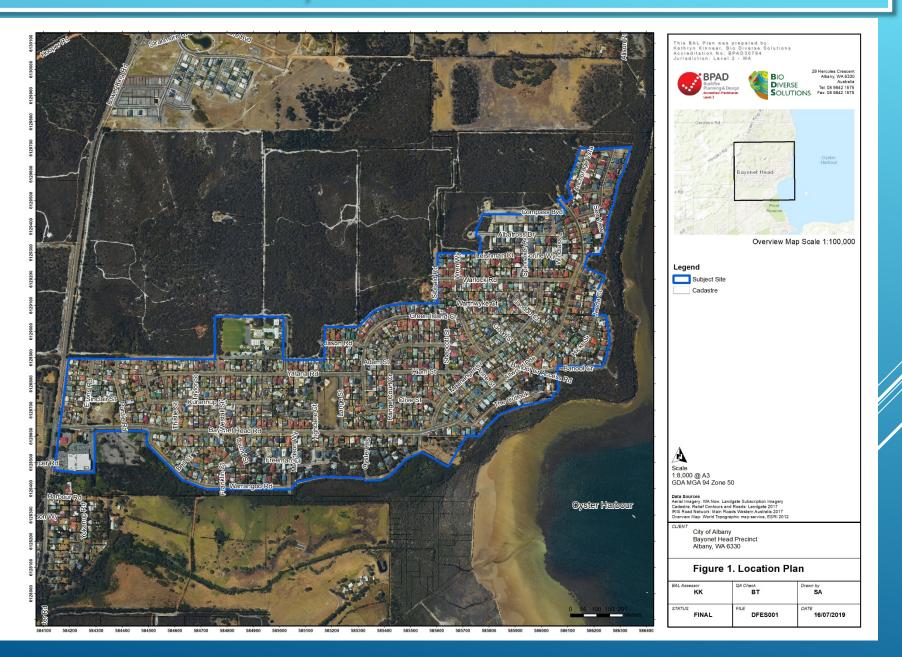
Need to:

- 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?

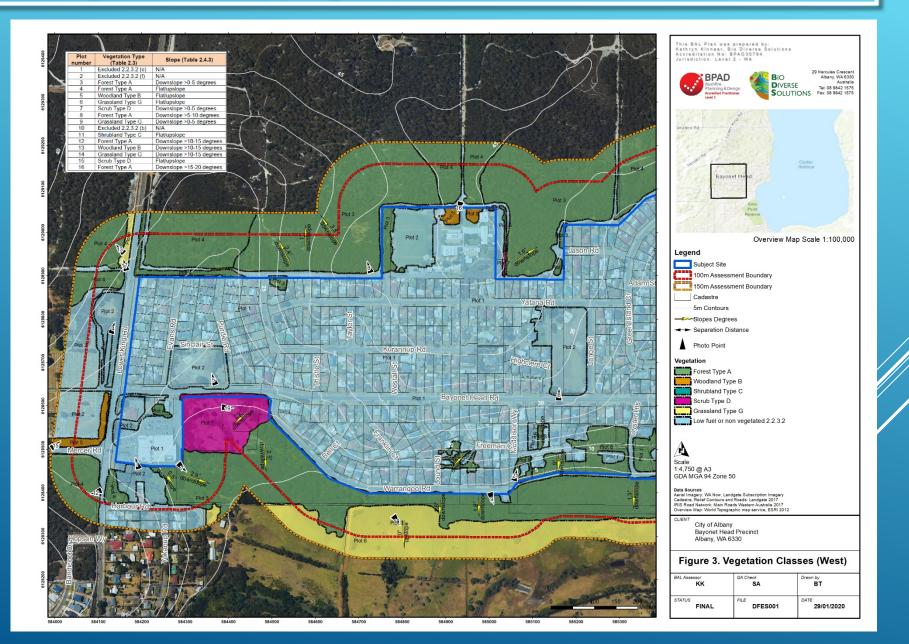




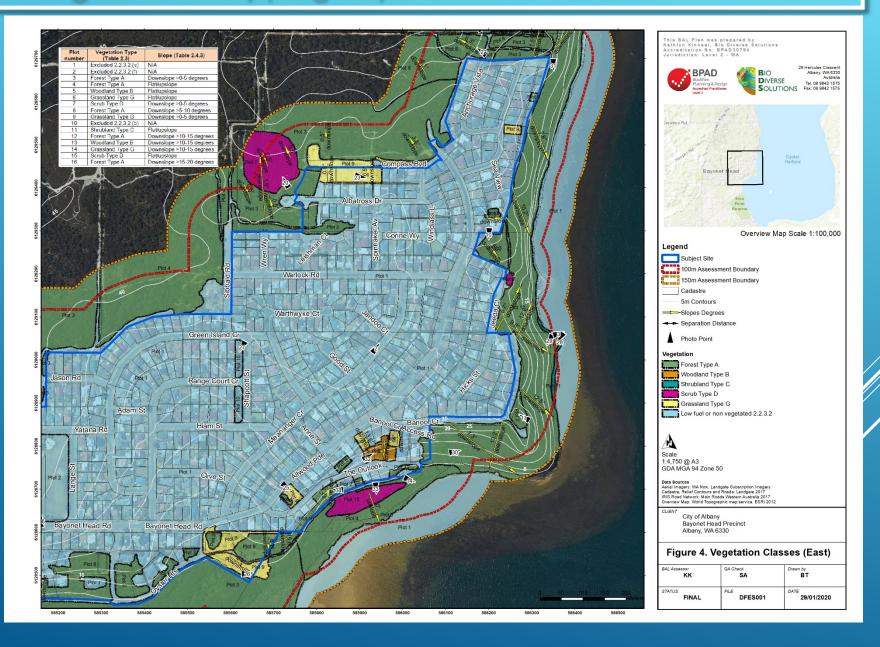
Bayonet Head Precinct



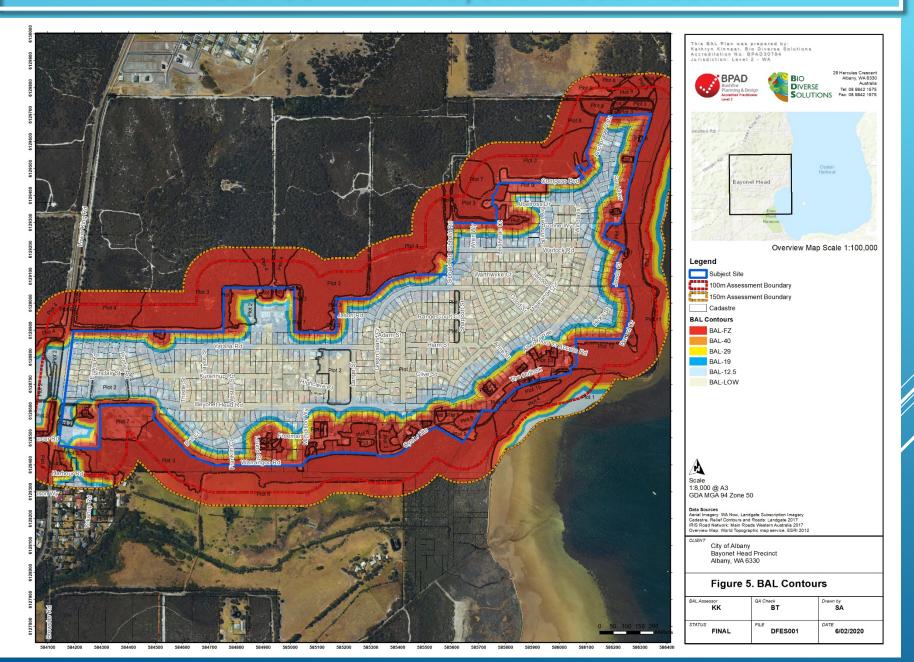
Vegetation Mapping Bayonet Head Precinct to AS3959



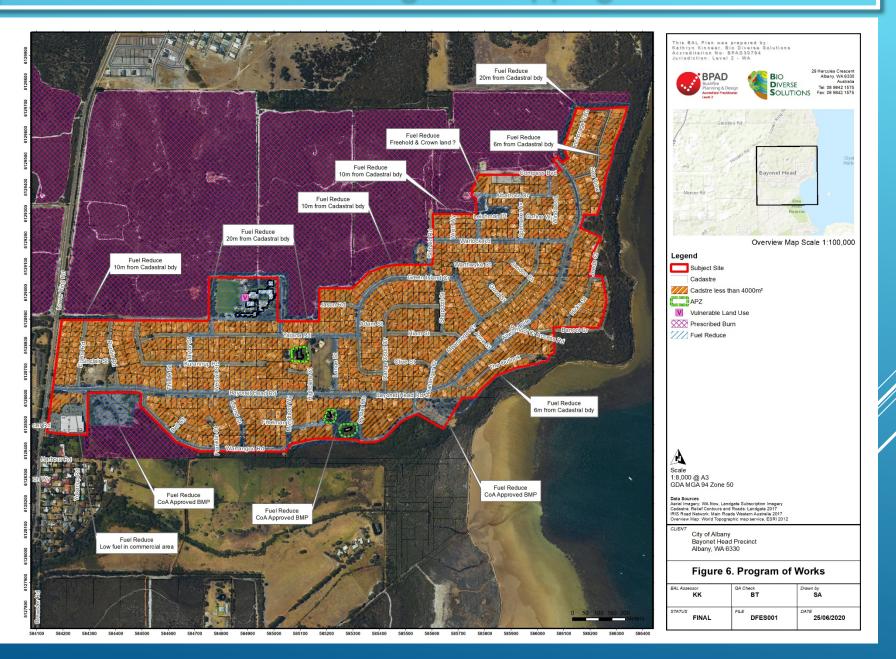
Vegetation Mapping Bayonet Head Precinct to AS3959



BAL Contour Plan – Bayonet Head Precinct

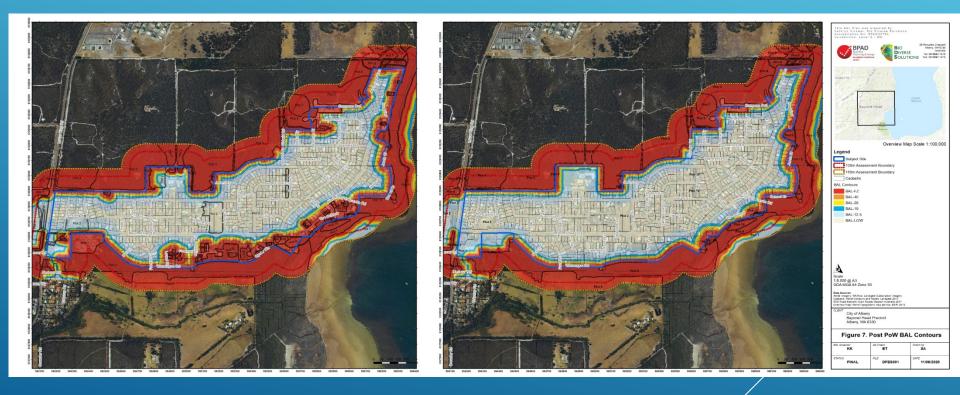


Works Program Mapping

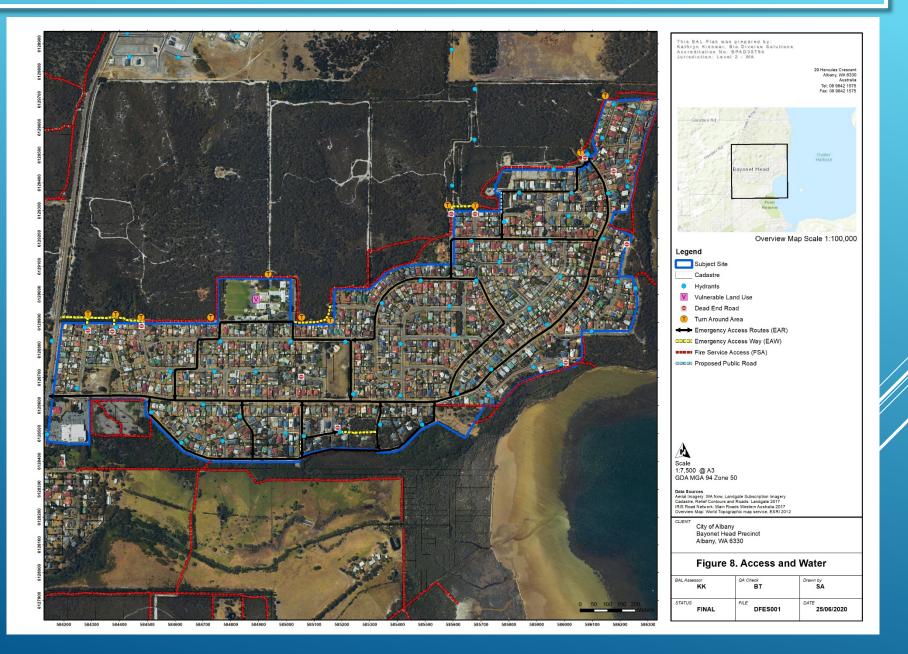


BAL Contour Plan Pre & Post Program of Works

- Applying the CoA Fire Management Notice to the precinct on private property
- Road reserves contribute to the bushfire risk
- Impacts are seen throughout the fringe of the precinct reducing properties from FZ/40 to 29.

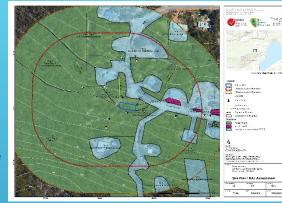


Access and Water



Program of Works

- Applying the CoA 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
- Mechanical fuel reduction in road reserves in Emergency Access Routes to assist in safe evacuation and egress into and exiting the precinct.
- 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 and FSA's -The Emergency Access Routes (EAR) apply and vegetation is fuel reduced in identified in EAR's to cadastral boundaries to low fuel standards for strategic firefighting capabilities and for safe and timely public evacuation.
- EAR through the precinct include:Bayonet Head Road;Thistle Street;Taylor Street;Yatana Road;Greenland Crescent;Warlock Road Albatross Drive Meananger Crescent;Lange Street;Oyster heights;Maddison Way;Warrangaroo Road; and Allwood Parade.
- Emergency Access Ways (EAW) apply to link cul-de-sac roads at: Oyster Heights to Maddison Way; Wren Way to Sibbald Road;Evans Road to Lower King Road;Purdie Road to Lower King Road; and Kurannup Road to Lower King Road.







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

- Water sources into the precinct are via a pipe from Angove and the Albany CBD 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 gravity fed supply from the Albany CBD has the capacity to supply up to 3days supply
- A model for water supply for bushfire preparedness is outlined in the proposed PACE model below:

PACE

Primary: Roadside Hydrants.

Ancillary: Kalgan & King River

Contingency/Emergency : Private property Dams Supply

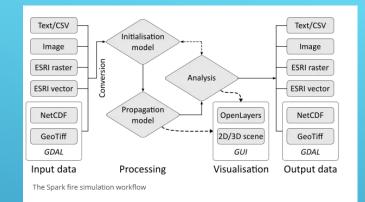


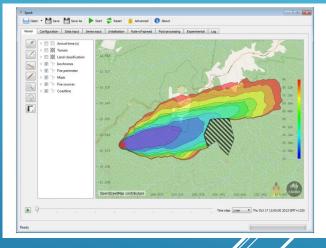
CSIRO SPARK Modelling



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.
- The inputs associated with FFDI 80 for each wind direction (Relative Humidity of 11%, Temperature of 41.8°C, Wind speed of 40.1 km/h and Drought factor of 9).
- 5km Broadscale Vegetation mapping undertaken by BDS.
- 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/m².

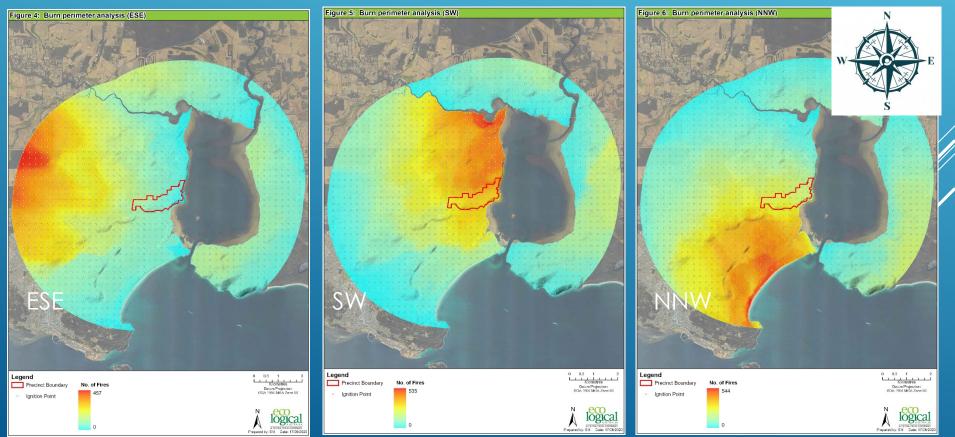






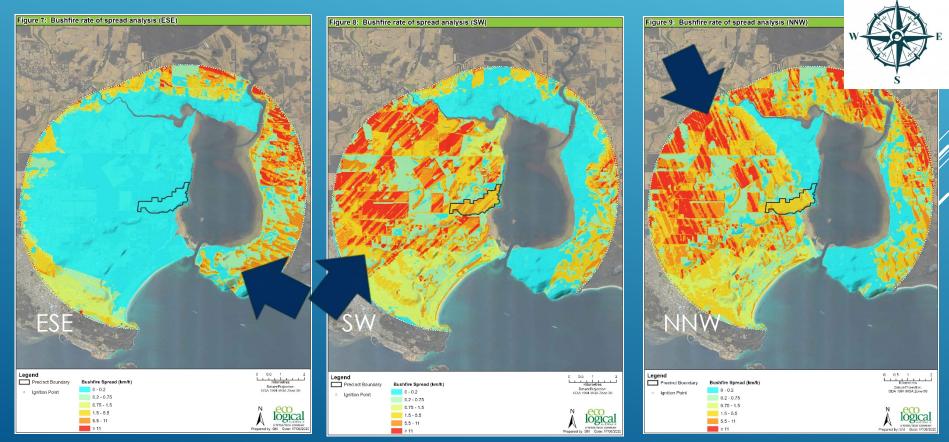
CSIRO – SPARK burn perimeter analysis

- The precinct is most at risk from fires spreading under an NNW or SW wind.
- The SW wind scenario also resulted in a large number of fires impacting buildings within the precinct, with a maximum of 251 fires projected. As with the NNW wind scenario, this result reflects the largely uninterrupted vegetation to the southwest of the precinct. The ESE wind direction resulted in the lowest number of fires impacting buildings within the precinct.
- Fires in the landscape have the potential to be very fast moving, when associated with grass and shrub/scrub fires.
- Fires spreading under NNW and SW winds are modelled as fast-moving and have the potential to cut off Lower King Road which may compromise off-site evacuation.



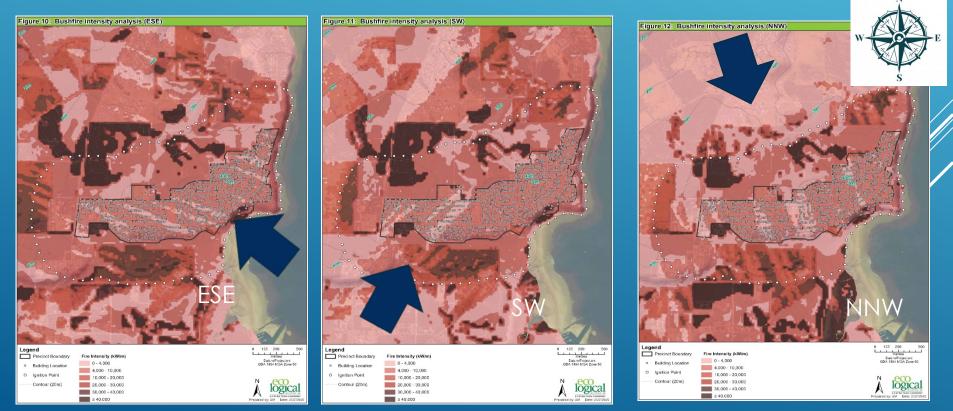
CSIRO – SPARK bushfire rate of spread analysis

- Assesses the potential bushfire spread and speed from different bushfire attack scenarios.
- Three directions were selected ESE, SW and NNW. These directions were selected after assessing Bureau of Meteorology (BoM) weather data for Albany (Station 9500) and the data available from the National Historical Fire Weather Dataset (Lucas 2010) for the Albany weather station.
- Provides insights into the potential time to impact of assets within the precinct as well as the road network providing access.
- Shows NNW and SW wind directions pose the greatest risk to the precinct.
- Fast 'bands' related to the wind direction, topography of the land and grassland vegetation.
- Fast-moving grass fires (≥11km/h) 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 – Bushfire intensity

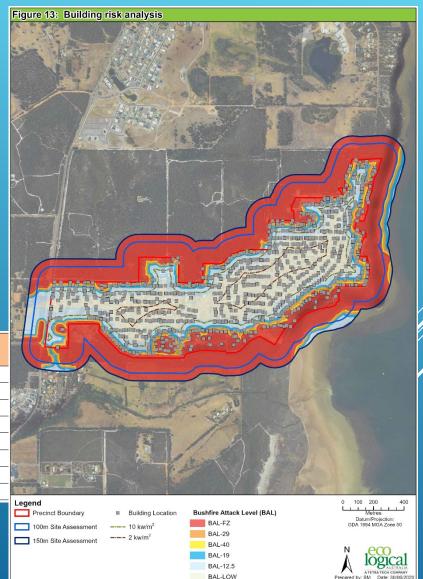
- To assess the quantity and degree of bushfire hazard in the immediate locality of the buildings associated with the precinct as a measure of the increased potential for more severe bushfire attack.
- Bushfire intensity is a function of the heat yield of fuel, rate of spread and fuel load.
- The results show similar bushfire intensity at the precinct interface under all three wind directions. intensities are not as high as some areas in the surrounding landscape, they do illustrate a high level of risk given the elongated shape of the precinct resulting in a long bushfire hazard interface and limited evacuation options (i.e. only one road located on the western boundary of the precinct).
- intensities under SW and NNW winds are likely to pose the highest risk to the precinct given the potential for high intensities in the fire catchments to the north, west and south that could result in intense bushfire attack.
- High intensities in the east of the precinct are likely exaggerated as the narrow band of wetland/riparian vegetation in this area would likely not reach its full rate of spread potential as the interfaces of the precinct.



Building risk assessment

- 19% buildings within the precinct occur within areas potentially subject to BAL-FZ (i.e. flame zone)
- 38% buildings were rated as BAL-LOW
- Regular maintenance of vegetation on private properties as per requirements of all private property owners under the Current CoA Firebreak and Fuel Management Notice
- Fuel reduction along road reserves would likely result in a reduction of building and evacuation risk .

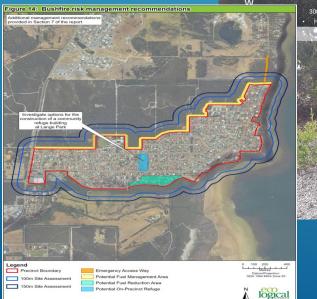
BAL Rating	Number of buildings	% of Buildings
BAL-FZ	166	19%
BAL-40	33	4%
BAL-29	77	9%
BAL-19	52	6%
BAL-12.5	217	25%
BAL-LOW (100-300 m from hazard)	336	38%
BAL-LOW (>300 m from hazard)	0	0
Grand Total	881	100%



Analysis of evacuation and refuge options

- Early evacuation from the precinct to the designated evacuation centre in the City of Albany is likely to be the safest option available to residents and visitors. The distance from the precinct to Albany CBD is aprox 9km traveling on the Lower King Rd
- Travel time by road is expected to take approximately 12 minutes with minimal traffic.
- Single access route to the off-precinct evacuation location, early evacuation, well in advance of a bushfire is recommended.
- Majority of houses within the precinct are old housing stock, and not built to AS3959-2018 (or previous versions). As such, the safety of an on-site sheltering option is not deemed to be high, in most instances. However, sheltering on-site in a well-prepared and defendable property is preferable to being caught out in the open.









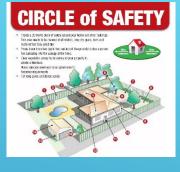
On-precinct evacuation

- The analysis of safer place refuge options identified a number of areas of a suitable size within the precinct that could currently be used to locate a refuge building based on the radiant heat flux thresholds
- Two areas within the precinct were also identified as meeting the radiant heat flux threshold for open space refuge areas, however are not on public land.
- Early evacuation to the Albany CBD or designated evacuation centre, 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 City of Albany 2019/2020 Annual Bush Fire Mitigation Notice (CoA 2019).
- Residents should be encouraged to prepare their own bushfire survival plan.



IN A BUSHFIRE EVERY FIVE MINUTES COUNTS ESPECIALLY YOUR NEXT FIVE MINUTES







FIRST AND FINAL NOTICE IS HEREBY SERVED TO ALL LAND OWNERS AND OCCUPIERS IN THE CITY OF ALBANY

These are your legal requirements. Please rea carefully and retain for future reference.

This Notice constitutes the City of Albany Fire Management Notice and is issued under Section 33 of the *Bush Fires Act 1954*.

You are required to prepare your property for the fire season. This includes installing and maintaining fire breaks and reducing fuel loads on your property. This Notice sets out the actions you must take.

All fire mitigation measures must remain in place for the following periods:

NORTH EAST SECTOR				
1 October 2019 to 30 April 2020				
SOUTH WEST SECTOR				
1 November 2019 - 14 May 2020				

These dates are subject to change. Any changes will be published in local newspapers and on the City of Albany website at www.albany.wa.gov.au









 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..

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)
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 on precinct refuge area within the precinct and associated vegetation management. Federal assistance may be required.	DFES/SEMC & DoHA (fed)
4	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
5	Assist with funding options to private landowners to clear/fuel reduce as necessary along the northern boundary of the precinct. A 10m low fuel setback along the northern boundary of the precinct, increased to 20m adjacent to the school site.	DFES /MAF extensions?
6	DFES to provide advice on a Section 33 notice implemented or a "Permanent Management Agreement" in line with S 33 of the <i>Bushfires Act</i> with property owners – either for access requirements or fuel reduction processes.	DFES policy Branch
7	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
8	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
9	LEMC to assist with Investigation of options for the construction or designation of an off-precinct community refuge (or safer place) building and associated vegetation management.	LEMC
10	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
11	DPLH assist through provisions of advice to the LGA and Department of Communities with Structure Plan to the north of the precinct to ensure access links to the precinct in future plans.	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 <u>of partnerships and networks to build resilience at government, business,</u> <u>neighborhood and community levels.</u>
- 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







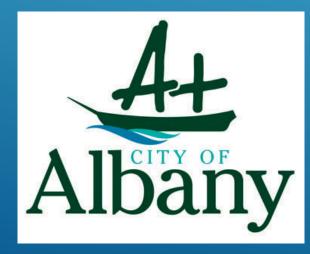




Where to from here...lets talk about it its your community..

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









Australian Government
Department of Home Affairs





