



# Shire of Serpentine Jarrahdale **Bushfire Risk Management Plan**

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**2018 – 2023**

*Office of Bushfire Risk Management (OBRM) Bushfire Risk Management (BRM) Plan reviewed 12 November 2018*

*Local Government Council BRM Plan endorsement 17 December 2018*

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## Document Control

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## Document Endorsements

The Shire of Serpentine Jarrahdale Council endorses that the Bushfire Risk Management Plan (BRM Plan) has been reviewed and assessed by the Office of Bushfire Risk Management as compliant with the standard for bushfire risk management planning in Western Australia, the *Guidelines for Preparing a Bushfire Risk Management Plan*.

The Shire of Serpentine Jarrahdale is the owner of this document and has responsibility, as far as is reasonable, to manage the implementation of the BRM Plan and facilitate the implementation of bushfire risk management treatments by risk owners.

The endorsement of the BRM Plan by the Shire of Serpentine Jarrahdale satisfies their endorsement obligations under *State Hazard Plan - Fire (interim)*.

Local Government	Representative	Signature	Date
Shire of Serpentine Jarrahdale	Kenn Donohoe		

## Amendment List

Version	Date	Author	Section
DRAFT	May 2017	KM	All – Initial Draft
DRAFT	November 2017	RW	Minor update to current OBRM standard/template
DRAFT	June 2018	TB	Update all sections to current OBRM standard, add detail to context and write Appendices
FINAL	October 2018	TB	Final

## Publication Information

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## 1 Introduction

### 1.1 Background

Under the *State Hazard Plan - Fire (Interim)* (OEM 2017) an integrated Bushfire Risk Management Plan (BRM Plan) is to be developed for local government areas with significant bushfire risk. This BRM Plan has been prepared for the Shire of Serpentine Jarrahdale in accordance with the requirements of the *Guidelines for Preparing a Bushfire Risk Management Plan (Guidelines)* (OBRM 2015).

The risk management processes used to develop this BRM Plan are aligned to the key principles of *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines* (AS/NZS ISO 31000:2009), as described in the Second Edition of the *National Emergency Risk Assessment Guidelines* (NERAG 2015). This approach is consistent with *State Emergency Management Policy (State EM Policy) 3.2 - Emergency Risk Management Planning*.

This BRM Plan is a strategic document that identifies assets at risk from bushfire and their priority for treatment. The Treatment Schedule sets out a broad program of coordinated multi-agency treatments to address risks identified in the BRM Plan. Government agencies and other land managers responsible for implementing treatments participate in developing the BRM Plan to ensure treatment strategies are collaborative and efficient, regardless of land tenure.

### 1.2 Aim and Objectives

The aim of the BRM Plan is to document a coordinated and efficient approach toward the identification, assessment and treatment of assets exposed to bushfire risk within the Shire of Serpentine Jarrahdale.

The objective of the BRM Plan is to effectively manage bushfire risk within the Shire of Serpentine Jarrahdale in order to protect people, assets and other things of local value. Specifically, the objectives of this BRM Plan are to:

- Guide and coordinate a tenure blind, multi-agency bushfire risk management program over a five year period;
- Document the process used to identify, analyse and evaluate risk, determine priorities and develop a plan to systematically treat risk;
- Facilitate the effective use of the financial and physical resources available for bushfire risk management activities;
- Integrate bushfire risk management into the business processes of local government, land owners and other agencies;
- Ensure there is integration between land owners and bushfire risk management programs and activities;
- Monitor and review the implementation of treatments to ensure treatment plans are adaptable and risk is managed at an acceptable level.

### 1.3 Legislation, Policy and Standards

The following legislation, policy and standards were considered to be applicable in the development and implementation of the BRM Plan.

#### 1.3.1 Legislation

- *Bush Fires Act 1954*

- *Emergency Management Act 2005*
- *Fire Brigades Act 1942*
- *Fire and Emergency Service Act 1998*
- *Conservation and Land Management Act 1984*
- *Environmental Protection Act 1986*
- *Environmental Protection and Biodiversity Conservation Act 1999*
- *Wildlife Conservation Act 1950*
- *Aboriginal Heritage Act 1972*
- *Metropolitan Water Supply, Sewerage and Drainage Act 1909*
- *Country Areas Water Supply Act 1947*
- *Building Act 2011*
- *Bush Fires Regulations 1954*
- *Emergency Management Regulations 2006*
- *Planning and Development (Local Planning Scheme) Regulations 2015*
- *Draft Shire of Serpentine Jarrahdale Local Planning Scheme*

### **1.3.2 Policies, Guidelines and Standards**

- National Emergency Risk Assessment Guidelines (NERAG) (Second Edition 2015)
- State Emergency Management Policy 2.5 – Local Arrangements
- State Emergency Management Policy 3.2 – Emergency Risk Management Planning
- State Emergency Management Prevention and Mitigation Procedure 1 – Emergency Risk Management Planning
- State Emergency Management Prevention and Mitigation Procedure 7 – Local Emergency Management Committee
- State Emergency Management Prevention and Mitigation Procedure 8 – Local Emergency Management Arrangements
- State Hazard Plan for Fire (Interim)
- State Planning Policy 3.7: Planning in Bushfire Prone Areas
- State Planning Policy 3.4: Natural Hazards and Disasters
- Guidelines for Planning in Bushfire Prone Areas (2015)
- Western Australian Emergency Risk Management Guidelines (OEM 2015)
- Guidelines for Plantation Fire Protection (DFES 2011)
- Firebreak Location, Construction and Maintenance Guidelines (DFES)
- Bushfire Risk Management Planning – Guidelines for preparing a Bushfire Risk Management Plan (2015)
- AS/NZS ISO 31000:2009 - Risk management – Principles and guidelines
- AS 3959-2009 Construction of buildings in bushfire-prone areas
- Building Protection Zone Standards (DFES)
- Shire of Serpentine Jarrahdale Firebreak Notice

### **1.3.3 Other Related Documents**

- Shire of Serpentine Jarrahdale Strategic Community Plan 2017 -2027
- National Strategy for Disaster Resilience
- National Statement of Capability for Fire and Emergency Services (AFAC 2015)
- National Emergency Risk Assessment Guidelines (2015)
- Shire of Serpentine Jarrahdale Local Emergency Management Arrangements
- Shire of Serpentine Jarrahdale Local Recovery Plan

- Shire of Serpentine Jarrahdale Local Biodiversity Strategy
- Public Service Circular No. 88 Use of Herbicides in Water Catchment Areas (Dept. of Health 2007)
- Code of Practice for Timber Plantations in Western Australia (Forest Products Commission 2006)
- Bushfire Risk Management Planning Handbook (DFES)
- Bushfire Risk Management System (BRMS) User Guide (DFES)



## 2 The Risk Management Process

The risk management processes used to identify and address risk in this BRM Plan are aligned with the international standard for risk management, AS/NZS ISO 31000:2009, as described in NERAG (2015). This process is outlined in Figure 1 below.

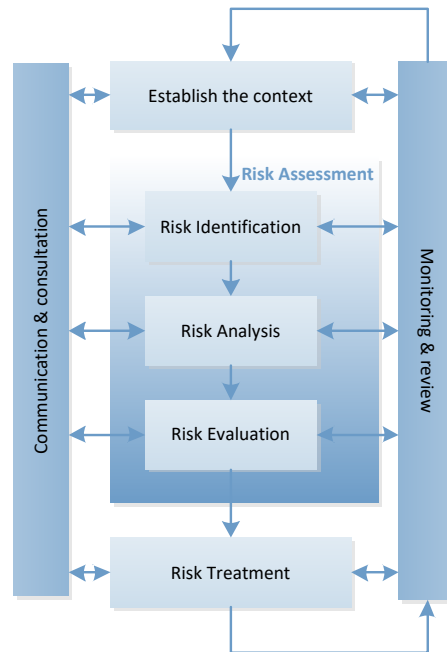


Figure 1 - An overview of the risk management process <sup>1</sup>

### 2.1 Roles and Responsibilities

Table 1 – Roles and Responsibilities

Stakeholder Name	Roles and Responsibilities
<b>Local Government</b>	<ul style="list-style-type: none"> <li>▪ As custodian of the BRM Plan, coordination of the development and ongoing review of the integrated BRM Plan.</li> <li>▪ Negotiation of commitment from land owners to treat risks identified in the BRM Plan.</li> <li>▪ As treatment manager, implementation of treatment strategies.</li> <li>▪ As part of the approval process, submission of the draft BRM Plan to the Office of Bushfire Risk Management (OBRM) to review it for consistency with the Guidelines.</li> <li>▪ As part of the approval process, submission of the final BRM Plan to council for their endorsement and adoption.</li> </ul>
<b>Department of Fire and Emergency Services (DFES)</b>	<ul style="list-style-type: none"> <li>▪ Participation in and contribution to the development and implementation of BRM Plans, as per their agency responsibilities as the Hazard Management Agency for fire.</li> <li>▪ Support to local government through expert knowledge and advice in relation to the identification, prevention and treatment of bushfire risk.</li> <li>▪ Facilitation of local government engagement with state and federal government agencies in the local planning process.</li> </ul>

<sup>1</sup> Source: AS/NZS ISO 31000:2009, Figure 3, reproduced under SAI Global copyright Licence 1411-c083.

Stakeholder Name	Roles and Responsibilities
	<ul style="list-style-type: none"> <li>▪ Undertake treatment strategies, including prescribed burning on behalf of Department of Lands for Unmanaged Reserves and Unallocated Crown Land within gazetted town site boundaries.</li> <li>▪ In accordance with Memorandums of Understanding and other agreements, implementation of treatment strategies for other landholders.</li> </ul>
<b>Office of Bushfire Risk Management (OBRM)</b>	<ul style="list-style-type: none"> <li>▪ Under the OBRM Charter, to ensure bushfire risk is managed in accordance with AS/NZS ISO 31000 and reporting on the state of bushfire risk across Western Australia.</li> <li>▪ Review BRM Plans for consistency with the Guidelines prior to final endorsement by council.</li> </ul>
<b>Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service (PWS)</b>	<ul style="list-style-type: none"> <li>▪ Participation in and contribution to the development and implementation of BRM Plans.</li> <li>▪ Providing advice for the identification of environmental assets that are vulnerable to fire and planning appropriate treatment strategies for their protection.</li> <li>▪ As treatment manager, implementation of treatment strategies on department managed land and for Unmanaged Reserves and Unallocated Crown Land outside gazetted town site boundaries.</li> <li>▪ In accordance with Memorandums of Understanding and other agreements, implementation of treatment strategies for other landholders.</li> </ul>
<b>Other State and Federal Government Agencies</b>	<ul style="list-style-type: none"> <li>▪ Assist the local government by providing information about their assets and current risk treatment programs.</li> <li>▪ Participation in and contribution to the development and implementation of BRM Plans.</li> <li>▪ As treatment manager, implementation of treatment strategies.</li> </ul>
<b>Public Utilities</b>	<ul style="list-style-type: none"> <li>▪ Assist the local government by providing information about their assets and current risk treatment programs.</li> <li>▪ Participation in and contribution to the development and implementation of BRM Plans.</li> <li>▪ As treatment manager, implementation of treatment strategies.</li> </ul>
<b>Corporations and Private Land Owners</b>	<ul style="list-style-type: none"> <li>▪ As treatment manager, implementation of treatment strategies.</li> </ul>

## 2.2 Communication & Consultation

As indicated in Figure 1 (page 8), communication and consultation throughout the risk management process is fundamental to the preparation of an effective BRM Plan. To ensure appropriate and effective communication occurred with relevant stakeholders in the development of the BRM Plan, a *Communication Strategy* was prepared. The strategy is provided at Appendix A.

### 3 Establishing the Context

#### 3.1 Description of the Local Government and Community Context

The Shire of Serpentine Jarrahdale is located in Perth’s south-east metropolitan area, straddling the Peel and Perth Metropolitan regions. The Shire has a Local Emergency Management Committee (LEMC) established in accordance with the *Emergency Management Act 2005* and a Bush Fire Advisory Committee (BFAC) established in accordance with the *Bush Fires Act 1954*. The LEMC and the BFAC will be involved in the development and implementation of the BRM Plan.

In accordance with State EM Procedure, the Shire has been identified as a local government with a high or extreme bushfire risk that requires development of a specific BRM Plan.

An organisational overview is provided in the following graphic, showing the relationship between the local government staff and Council.

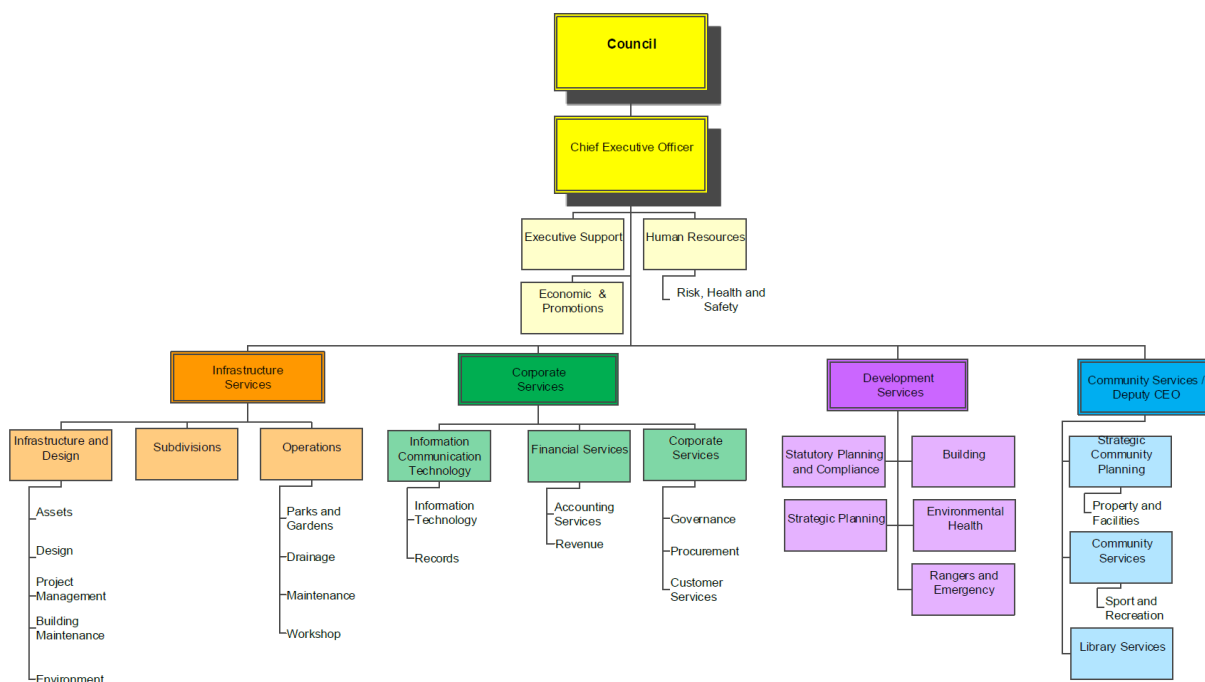


Figure 2 - Shire of Serpentine Jarrahdale Organisational Structure

The Shire is home to over 27,000 people, an increase of 10,000 since 2011. Covering three wards across 905 square kilometres, the region is geographically diverse with forested hills and coastal flats, incorporating urban, suburban and rural communities. The majority of residents are located in the towns of Byford, Mundijong, Serpentine and Jarrahdale, as well as in the rural residential areas of Oakford and Darling Downs.

Located approximately 45 kilometres from the Perth CBD, Serpentine Jarrahdale is set against the picturesque backdrop of the Darling Scarp, within the Peel region of Western Australia.

##### 3.1.1 Strategic and Corporate Framework

The Shire of Serpentine Jarrahdale has developed this Bushfire Risk Management Plan to establish strategies to effectively plan for and mitigate the potential impacts of bushfires.

The issue of bushfire hazard mitigation is acknowledged within the Shire of Serpentine Jarrahdale's *Draft Local Planning Strategy* (December 2017) and the *Strategic Community Plan 2017 – 2027*.

The *Draft Local Planning Strategy* incorporates a vision, principles, strategic objectives and a strategic plan to address the key opportunities, issues and challenges within the Shire. The Bushfire Risk Management Plan will support an integral part of the *Draft Local Planning Strategy* by working to strengthen the Shire's capacity to achieve the following objectives:

*Ensure the safety of the community from bushfire risk; and*

*Achieve a balance between managing bushfire risk and preserving natural landscapes, the environment and biodiversity values<sup>2</sup>*

The *Draft Local Planning Strategy* also acknowledges the impacts of climate change, coupled with natural climate variability, will result in more frequent extreme weather events including storms and bushfire, which may require improved emergency management responses and plans, infrastructure to adequately withstand and manage extreme weather conditions, and generally more resilient built environments<sup>3</sup>.

During the consultation for the *Strategic Community Plan 2017 – 2027*, the issue of bushfire mitigation was raised as a community concern and was reflected in Outcome 1.3: A Safe Place to Live:

*Comply with relevant local and state laws, in the interest of the community;*

*Support local emergency services; and*

*Enhance community safety<sup>4</sup>*

The Shire of Serpentine Jarrahdale's *Draft Local Planning Strategy*, under section 1.0 Local Context and Challenges states:

*The Local Planning Strategy has been developed relative to current State, regional and local planning policies and strategies. The result is a LPS that provides an integrated and coordinated solution that emphasises and reinforces the State Government's objectives, whilst providing bespoke responses and priorities to particular issues affecting the Shire of Serpentine Jarrahdale<sup>5</sup>.*

The relationship between this document and associated State Planning Policies (SPP's), including *SPP 3.7 - Planning in Bushfire Prone Areas (2015)* and the Shire's Firebreak Order contribute to bushfire hazard reduction within the Shire. In addition, the Bushfire risk Management Plan will be referenced and integrated into the Shire's strategic documents.

In accordance with the Shire's current organisational structure, bushfire risk management sits within the Rangers and Emergency Services business unit in the Development Services Directorate. The custodian of the Bushfire Risk Management Planning process is the Director Development Services.

<sup>2</sup> Shire of Serpentine Jarrahdale Local Planning Strategy| Draft December 2017 | Page 52

<sup>3</sup> Ibid | Page 8

<sup>4</sup> Shire of Serpentine Jarrahdale Strategic Community Plan 2017 – 2027 | Page 27

<sup>5</sup> Shire of Serpentine Jarrahdale Local Planning Strategy| Draft December 2017 | Page 6

### 3.1.2 Location, Boundaries and Tenure

The Shire of Serpentine Jarrahdale located on the southern fringe of metropolitan Perth in the foothills of the Darling Scarp, approximately 45km south of the Perth CBD. Its area of 905 km<sup>2</sup> (90,534ha) makes it Western Australia's second largest metropolitan Council. The Shire's seat of government is located in the town of Mundijong.

The Shire is surrounded by and shares boundaries with:

- Shires of Murray and Boddington to the south
- Wandering to the east
- City of Armadale to the north
- City of Rockingham and City of Kwinana to the west.

It is arterially served by the Albany Highway, South Western Highway, Tonkin Highway and the Perth-Bunbury railway line.

The table below shows a breakdown of land ownership/management responsibility for the Shire. The Shire contains a large percentage state forest, which is managed by the Department of Parks and Wildlife. The Shire and the Department of Parks and Wildlife work closely together to coordinate and integrate fuel reduction strategies within the Shire.

**Table 2 - Overview of Land Tenure and Management within the BRM Plan Area**

Land Manager/Agency*	% of Plan Area
<b>Local Government</b>	0.75%
<b>Private</b>	47.90%
<b>Parks and Wildlife Service</b>	48.25%
<b>Department of Lands</b>	Negligible
<b>Other</b>	3.10%
<b>Total</b>	100%

Source: Landgate Tenure Data sourced from SLIP.

### 3.1.3 Population and Demographics

The officially accepted and most accurate measure of Australia's population is the estimated resident population (ERP) statistic produced by the Australian Bureau of Statistics (ABS).

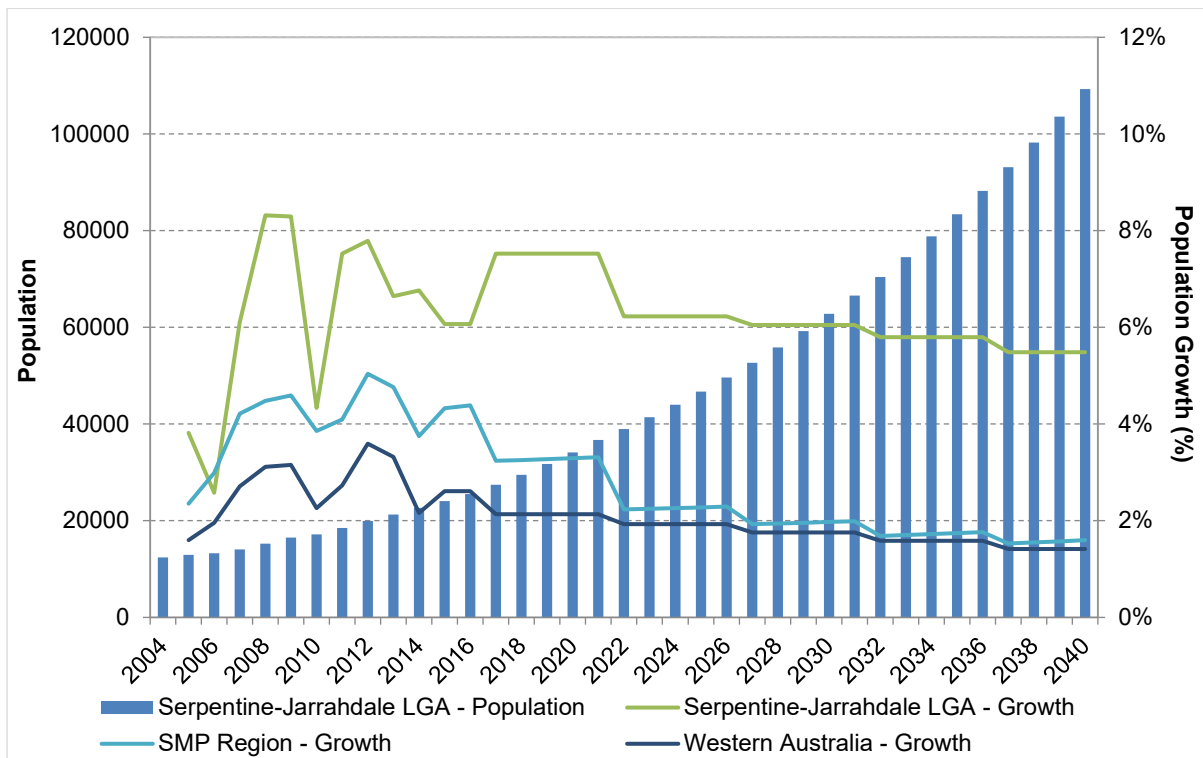
The population of the Shire at 30 June 2014 was estimated at 22,698. This has grown strongly from 12,438 in 2004, an average annual rate of 6.2%. Since 2006, population has grown at a higher rate than the South Metropolitan Peel Region and Western Australia overall.

This population growth has presented challenges to fire management within the Shire. To meet this challenge the Shire has targeted fire safety messaging to Oakford (in 2017) and Byford (in 2018), as well as continuing public education programs including 'Are You Ready', Fire Break Notices and Hazard Reduction Programs.

Figure 3 outlines the historical population growth across the Shire over the decade June 2004 to June 2014. The population in 2004 was 12,438 people, and was most recently estimated to be 22,698 people in June 2014, representing a growth of 6.8% from 2013.

Population growth has been influenced by both supply and demand elements.

**Figure 3: Historic Population Snapshot and Growth Trends**



Source: ABS (2015), WAPC (2105) in AEC Group 2016

### 3.1.3.1 Population distribution and density

The majority of residents are located in the towns of Byford, Mundijong, Serpentine and Jarrahdale, as well as in rural-residential areas in Oakford and Darling Downs. These are the most densely subdivided and developed areas of the Shire. Growth in the Byford and Mundijong-Whitby areas in particular will continue to be significant, with Oakford/Oldbury also expected to contribute to the overall growth in the Shire's population.

**Table 3 Population Projection by Settlement Area**

Area	2011	2036	Total change	% change
Shire of Serpentine-Jarrahdale	18,501	63,336	+44,835	242%
Byford area	7,239	30,636	+23,397	323%
Cardup area	1,593	2,016	+424	27%
Darling Downs area	2,762	4,323	+1,561	57%
Hopeland - Keysbrook area	501	683	+182	36%
Jarrahdale area	2,338	2,623	+285	12%
Mundijong area	1,676	17,769	+16,093	960%
Oakford - Oldbury area	666	2,677	+2,011	302%
Serpentine area	1,726	2,608	+882	51%

Source: id.forecast

The population density data identifies that persons per square kilometre in the Shire area compared to the South Metropolitan Peel Region is significantly less, but that over time the gap is projected to narrow. In 2004 the average number of people per square kilometre in the Shire was 13.8, compared to 26.6 in 2015. This is projected to increase to 120.9 by 2040.

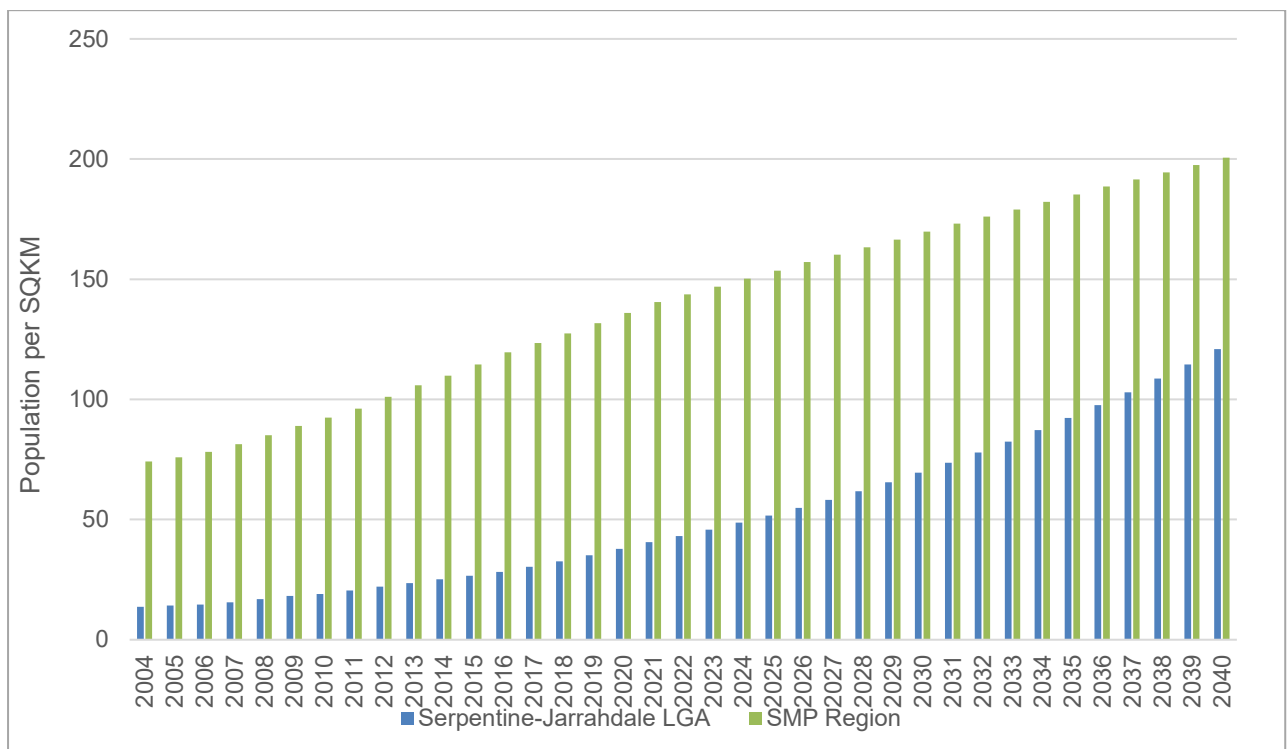
This data further emphasises the potential challenges that the Shire will face in relation to a growing population within a confined urban boundary.

**3.1.3.2 Demographic Profile**

The 2011 Census indicated that the median age across the Shire was 35 years, that families had an average of two children per family and the average household (families and non-related) had an average of three people each.

In 2014 the highest number of people in the Shire is represented in the 0 to 9 years (16.1%) and 40 to 49 years (15.5%) age brackets, in comparison with the South Metropolitan Peel Region, which had its highest representation in the 20 to 29 years (15.5%) and 30 to 39 years (15.3%) age brackets. In the combined 40 to 59 years age brackets the Shire has 27.9% of the population compared to 25.4% for the South Metropolitan Peel Region, which indicates that the Shire has a slightly older population than the comparison areas. This difference is not anticipated to generate challenges beyond the national ageing population trend that all regions across Australia are facing.

The major differences in age brackets for the Shire over the comparison periods is in the 20 to 29 age bracket, which in 2009 was 10.2% and in 2014 was 13.4%. This could relate to the transition of people aged 10 to 19 years into the next age bracket, and more people continuing to live in the local area, which is a positive for the continued generation and provision of local jobs.



Source: ABS (2015),WAPC (2105) in AEC Group 2016

Figure 4: Shire of Serpentine-Jarrahdale Age Structure 2009-14

The changes to the demographic profile has not significantly affected bushfire management activities. The volunteer fire brigade numbers have remained consistent over the past 10 years, and increases in population are largely in lower fire risk areas ( i.e., newly urban areas that are separated from high and extreme fire risk areas). However, the Shire and Volunteer Brigades have continued to visit schools, attended community events and maintained strong communications strategies with all groups within the Shire to ensure changes to the demographic profile will not affect overall bushfire readiness ( see also Appendix A: Communications Strategy).

### **3.1.3.3 Population and bushfire risk**

The threat of bushfires remains a substantial risk during the summer months and a challenging experience for the community of Serpentine Jarrahdale. To this end, the Shire of Serpentine Jarrahdale commits to continue to implement the following measures;

- Engage and educate the community and stakeholders in bushfire preparedness
- Enforce the compliance of the annual Local Government Firebreak Notice
- Implement State Planning Policies into all new developments
- Manage bushfire risk on Shire of Serpentine Jarrahdale owned or managed land
- Work with and form strategic partnerships with all stakeholders to reduce bushfire risk

### **3.1.4 Economic Activities and Industry**

Industry and commerce in the Shire is in growth as is the development of the built environment. Further, tourism is a growing industry in the Shire, celebrating the Shire's rural charm, cultural and heritage attractions. There are a number of regional parks and trails in the Shire including Serpentine Dam and the Munda Biddi trail. The Shire considers public use of the trails and other tourism activities when developing fuel reduction plans.

Mining has a number of sites in the high ground areas, along with sand mining commencing in the south west corner of Keysbrook.

Traditional farming activities are still undertaken but are being threatened by the expansion of housing as Perth metropolitan area grows.

Aligned with the growth in population is the expansion of the service aligned business and retail to service the needs of the growing population. A new major shopping complex is currently under construction in Byford with a projected business park in Cardup and a new industrial area in West Mundijong.

Rural business is aligned to service the needs of the growing Western Australia population. The production of eggs makes a major contribution to the Perth supply chain. Equine trade is also a contribution factor to the maintenance of rural lots in the shire. The Shire is aware of the impact of smoke on these industries and adjusts its burning activities after communication with affected businesses.

## **3.2 Description of the Environment and Bushfire Context**

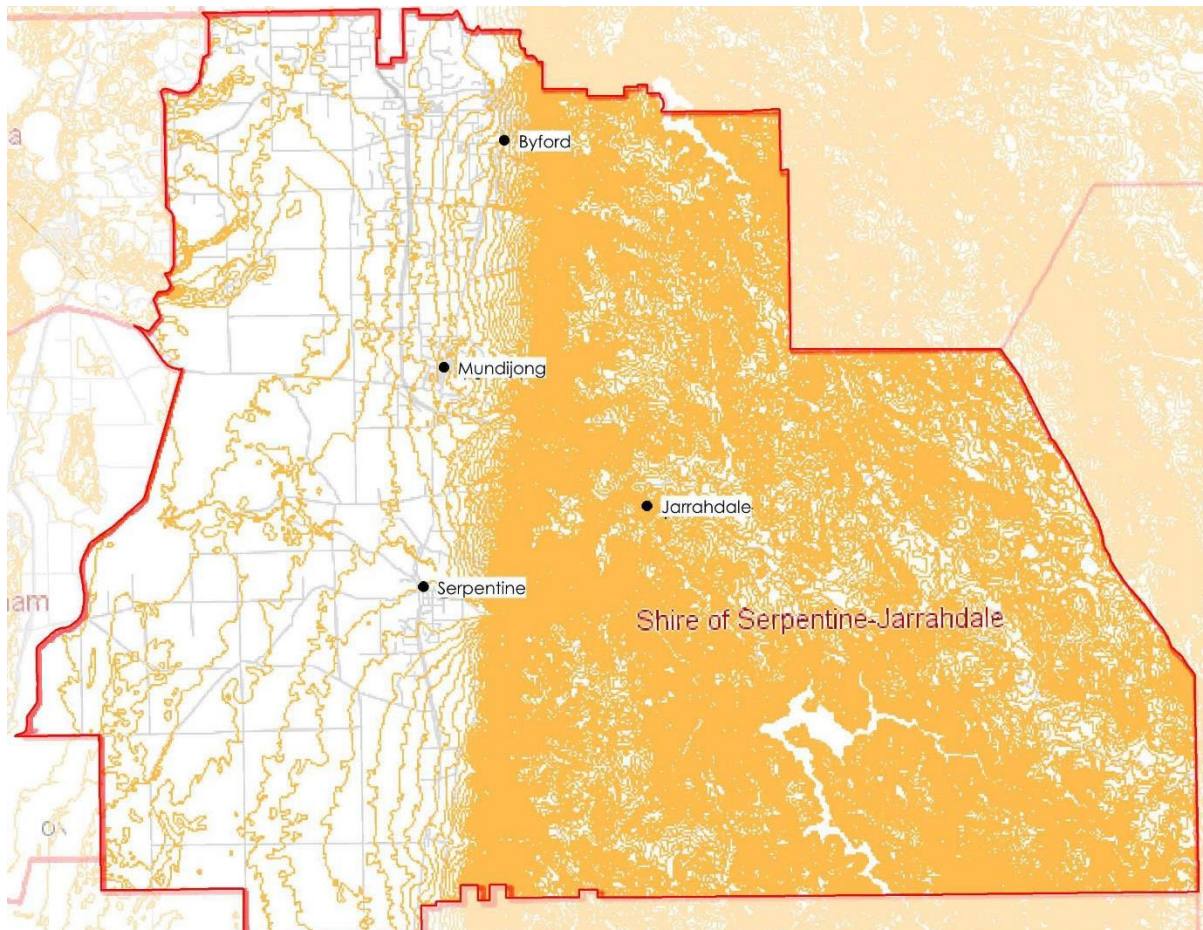
### **3.2.1 Topography and Landscape Features**

The Shire area is unique in its topography and landform with two distinct halves (See Figure 4 and Table 4). The western portion of the Shire area comprises low flat topography, typical Shire of Serpentine Jarrahdale Bushfire Risk Management Plan 2018 - 2023



of the Swan Coastal Plain, whilst the eastern portion is characterised by undulating ridge peaks and troughs of the landform of the Darling Plateau. At the junction of the two landforms, known as the Darling Scarp, the topography is steep, with an average gradient of five percent. Figure 2, shows how contours vary between the Swan Coastal Plain, the Darling Scarp and Darling Plateau.

The topographic features of the Darling Plateau and Darling Scarp allow for substantial water bodies to form, such as the Serpentine and Wungong Dams, and are an important catchment for surface water runoff.



**Figure 5: Topography showing 5m contours in the Shire of Serpentine Jarrahdale**

The condition of most of the plateau is good, as vegetation cover has been retained. Most is managed as State Forest, water catchment or conservation reserves. Along the Scarp, slopes have been cleared for agriculture, leading to erosion and loss of sediments, nutrients, organic matter and water retention capacity.

The Swan Coastal Plain has changed significantly, most importantly by draining of the extensive wetlands that once covered it for much of the year. Many of the drains intersect the groundwater, causing drawdown and reducing soil moisture content. The plain soils have been extensively cleared for agricultural and residential uses. The Pinjarra soils are highly productive and less than 3% of the original vegetation remains. The Bassendean soils retain more vegetation.

**Table 4: Landform and soil classifications**

Geomorphic region	Soil landscape zone	Soil landscape system	Approximate area (ha)
<b>Darling Plateau</b>	Western Darling range	Darling Plateau	35,150
		Murray Valley (includes Darling Scarp)	14,970
<b>Swan Coastal Plain</b>	Pinjarra	Forrestfield	4,640
		Pinjarra	15,740
	Bassendean	Bassendean	19,800

The eastern region of the Shire is significantly conservation, timber and water catchment areas with the Wungong Reservoir (part) and Serpentine Dam both being major water storage facilities for Perth, in the locality. The thriving western region of the Shire is predominantly rural land, used mainly for agriculture and equine activities.

### 3.2.2 Topography and Bushfire Risk

Topography has a major impact on the speed with which a fire will spread. A fire will move faster uphill than across flat ground or downhill. The Darling Plateau, which is located to the east of the South Western Highway, rises to about 300 metres with rolling topography of hills and valleys.

The vegetation within these landforms present an obvious bushfire risk, with this risk further exacerbated by access challenges. Slopes of more than 10 degrees are critical for fire management as the rate of spread of a fire can double. To counter this increased risk, the Shire has increased fuel reduction activities in these locations and ensured firebreaks are maintained to a high standard.

Careful planning is required when determining bushfire suppression strategies and bushfire mitigation works due to both environmental and safety requirements.

#### 3.2.2.1 Designated Bushfire Prone Areas

In December 2015, the Planning in Bushfire Prone Areas Bushfire Policy Framework introduced a suite of reforms to help protect lives and property against the threat of bushfires throughout Western Australia. This included the release of SPP 3.7 Guidelines for Planning in Bushfire Prone Areas.

The intent of this policy is to implement effective, risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure.

97% of the Shire of Serpentine-Jarrahdale has been declared bushfire prone by the Fire and Emergency Services Commissioner and SPP 3.7 provides essential guidance on how the Shire can best protect its community and infrastructure from this natural hazard. Integration of bushfire mitigation and protection measures into the Shire's planning instruments is required.

### 3.2.3 Climate and Bushfire Season

The climate in the Shire is typical of the south-west of Western Australia with hot dry summers and cool wet winters. The Bureau of Meteorology stations nearest to the Shire with available climate data are located approximately seven kilometres north-east of Byford at Wungong Dam, and 18 kilometres west of Byford at Medina Research Centre. Rainfall and temperature data collected at these stations are considered to reflect the climate of Serpentine-Jarrahdale

in general. The bushfire season is typically from December 1 – March 31, however this can vary due to seasonal factors.

A large body of climate research has been undertaken for the Australian region in recent years and this, along with international climate change research including conclusions from the International Panel on Climate Change fifth assessment report, has informed Climate Change in Australia (CSIRO, 2007, updated 2015) was developed by the Australian Greenhouse Office together with CSIRO and the Bureau of Meteorology.

The CSIRO has provided a number of projections based on the outputs of global climate models that estimate likely changes in regional climate for defined natural resource management clusters around 2030 (near future) and 2090 (late century). Regional clusters correspond to the broad-scale climate and biophysical regions of Australia. The Shire is located in the Western Australian Southern and South-Western Flatlands sub-cluster (the sub-cluster). The following paragraphs address both existing climate and predicted likely changes in climate based on the aforementioned research.

### **3.2.3.1 Temperature**

Maximum temperatures at Medina Research Centre occur in summer and minimum temperatures occur in winter, with average temperatures peaking in February at approximately 32°C, and dropping to approximately 8°C in July-August.

Temperature is predicted to increase by 0.5°C to 1.2°C by 2030. This has the potential to impact on plants, animals, and people, through increased heat stress and increased risk of bushfires.

### **3.2.3.2 Rainfall**

The average annual rainfall recorded at Wungong Dam since 1911 is 1,225mm but this has declined in recent years to an average of 1,012mm since 1975, and 998mm since 1995. The minimum recorded annual rainfall occurred in 2010 at just 520mm and the maximum was recorded in 1917 at 1,958mm.

The average annual rainfall on the Swan Coastal Plain is generally less than that on the Darling Plateau, ranging from 800mm to 1,000mm.

The majority of rainfall occurs in winter between May and September, with the driest months being January and February. Whilst average annual rainfall has generally declined in recent years, it has actually increased in the late winter and early autumn months of August and September. This may be indicative of changing rainfall patterns bringing more frequent intense rainfall events later in the year, with longer dry periods in between.

The CSIRO predicts that winter rainfall will decline by up to approximately 15% in the near future (2030), and up to around 30% in the late century (2090) under an intermediate emissions scenario. This projection increases to a 45% decline in rainfall under a high emissions scenario.

It has also been reported that climate change is likely to result in lower rainfall in spring and winter, coupled with more intense rainfall events and longer periods of drought linked to reduced soil moisture and increased evaporation rates. This variability has the potential to result in localised flooding from stormwater during extreme events, which may become more frequent in the future.

Furthermore, declining stream flows and superficial groundwater levels have been observed over the past ten years, most likely as a result of declining annual rainfall. Continuing reductions are likely to maintain this pattern and may have significant impacts on surface and groundwater availability for both human and environmental needs. As groundwater levels decrease, climate change may also increase the risk of acidification and heavy metal contamination resulting from the disturbance of acid-sulphate soils.

Reduced annual rainfall can increase the intensity of fire behaviour and reduce mitigation windows. However, this fluctuates on an annual basis.

### 3.2.3.3 Wind

Wind is caused by differences in air pressure, affected by factors such as topography and the presence of water bodies. Wind data collected at Medina Research Centre shows that prevailing winds at the station are seasonally variable. Mean wind speeds are higher in late spring (November) in the morning (9am), and in early summer (December) in the afternoon (3pm), with mean monthly speeds ranging from 14 – 21 km/h at these times. Wind direction at Medina Research Centre is typically west-south-westerly in the morning (9am) and north-easterly in the afternoon (3pm). However, given that this weather station is located near to the coast and approximately 19 kilometres west of Serpentine-Jarrahdale, it should be noted that the strength and direction of winds further inland at the Shire may not necessarily be reflected by these patterns.

The impacts of climate change on wind will be related to differences in temperature and other climatic conditions. There does not appear to be much information available that can be directly related to the Shire, however a recently released study involving the Australian National University suggests that southward shifts in westerly winds that circled the Southern Ocean as a result of climate change have been detected. This is affecting rainfall. Rising temperatures, particularly in summer, will affect wind direction and speed, which in turn can affect the severity of bushfires. As was observed in the summer of 2015-16 with the Yarloop bushfire, large fires can also create their own weather systems.

Extreme weather caused by climate change, which can include severe storms causing flooding or destructive winds, temperature extremes and drought – may require improved emergency management responses and plans. Infrastructure may have to be designed to adequately manage extreme weather conditions.

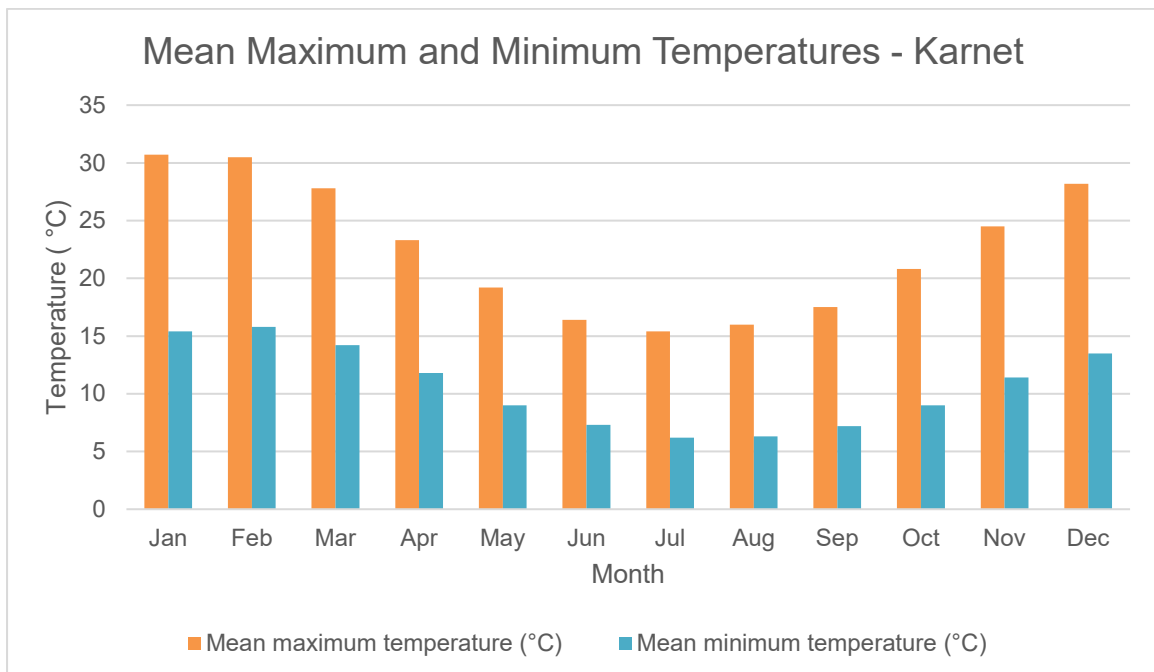
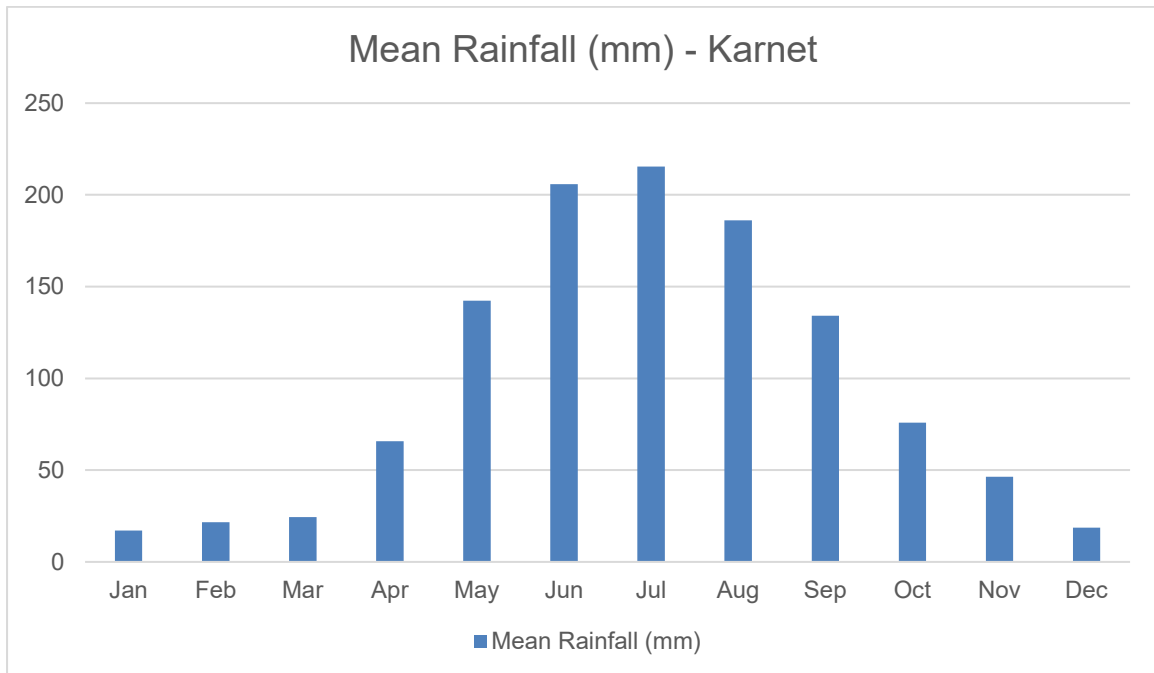
In Perth and surrounding coastal areas, the fire risk is greatest from summer through autumn, when the moisture content in vegetation is low. Summer and autumn days with high temperatures, low humidity and strong winds are especially conducive to the spread of fire (Blanchi, 2010). This risk of bushfires is enhanced if thunderstorms develop, accompanied by lightning with little or no rain.

The Bureau of Meteorology (BoM) states that extreme fire weather conditions in the Perth region typically occur with strong easterly or north easterly winds associated with a strong high to the south of the state and a trough offshore. Easterly winds represent about 60 per cent of extreme fire weather days, compared to less than 5 per cent associated with southerly winds (Bureau of Meteorology, 2014).

Extreme weather conditions often follow a sequence of hot days and easterly winds that culminate when the trough deepens near the coast and moves inland. Winds can change from

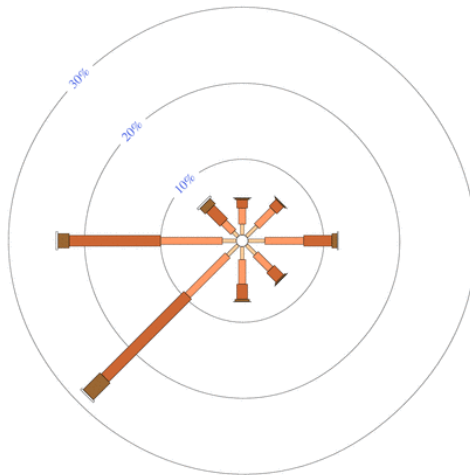
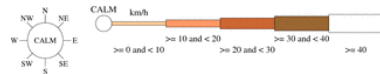
easterly to northerly and then to westerly during this sequence of climatic events (Blanchi, 2010).

Data from the Bureau of Meteorology site at Karnet provides the following statistics for rainfall, temperature and wind direction/strength.



3 pm  
26246 Total Observations

Calm 4%



**3.2.3.4 Bushfire Season**

The *Bush Fires Act 1954*, sections 17 and 18, provides for the declaration and gazettal of prohibited and restricted burning times ( see Figure 6) as well as the ability to adjust burning times to suit changing weather conditions.

The fire season for the Shire of Serpentine Jarrahdale is typically from October through to May.

	What can I burn?		
	1m by 1m Garden Refuse 6pm to 11pm	Wood and Solid Fuel Barbecue	Grass, Paddock, Bonfire, Bush
<b>Restricted Burning Period</b> 1 October to 30 November**	<b>Allowed</b> In accordance with conditions listed on pages 26 to 31	<b>Allowed</b> In accordance with conditions listed on pages 26 to 31	<b>Permit Required</b> Contact your local Fire Control Officer
<b>Prohibited Burning Period</b> 15 December to 31 March**	<b>Prohibited</b>	<b>Allowed</b> In accordance with conditions listed on pages 26	<b>Prohibited</b>
<b>Restricted Burning Period</b> 1 April to 31 May**	<b>Allowed</b> In accordance with conditions listed on pages 26 to 31	<b>Allowed</b> In accordance with conditions listed on pages 26 to 31	<b>Permit Required</b> Contact your local Fire Control Officer

Figure 6: Shire of Serpentine Jarrahdale Prohibited and Restricted Burning Times

The Shire of Serpentine Jarrahdale also distributes a Firebreak Notice and Fuel Hazard Reduction Notice<sup>6</sup>, which describes;

- Legal requirements
- Firebreak installation guide
- Hazard reduction tips
- Asset protection zones
- Hazard separation zones
- Firebreak variation guidelines
- Burning information
- Bushfire survival and preparedness information

This document is promulgated on the Shire's website, by volunteers at community preparedness events and is posted to all ratepayers in late September each year.

### 3.2.4 Vegetation

The protection of remnant vegetation and the retention of biodiversity is a high priority in the Shire. The Shire currently has a Local Biodiversity Strategy<sup>7</sup> in place, which establishes goals for biodiversity and native vegetation retention. In addition, a Draft Urban and Rural Forest Strategy<sup>8</sup> was developed in May 2018 to guide actions to maintain and improve tree canopy and vegetation within the Shires communities now and into the future

The Shire has diverse geographic areas including vegetation of the Swan Coastal Plain, the Darling Scarp and Jarrah Forests. Most areas have their own distinct types of vegetation and local climatic conditions from open Banksia woodland on the foothills/plains to heath on the scarp and open woodland slopes of Jarrah, Marri, Wandoo and Butter gum to the eastern areas.

The vegetation types provided below in Figure 7 will influence fire behaviour in the region and will be essential to evaluate potential rate of spread and spotting.

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<sup>6</sup> <http://www.sjshire.wa.gov.au/assets/Uploads/Firebreak-Notice-and-Fuel-Hazard-Reduction-Notice-2017-2018.pdf>

<sup>7</sup> Shire of Serpentine Jarrahdale Local Biodiversity Strategy | 2008

<sup>8</sup> Shire of Serpentine Jarrahdale Urban and Rural Forest Strategy | Draft May 2018)  
Shire of Serpentine Jarrahdale Bushfire Risk Management Plan 2018 - 2023  
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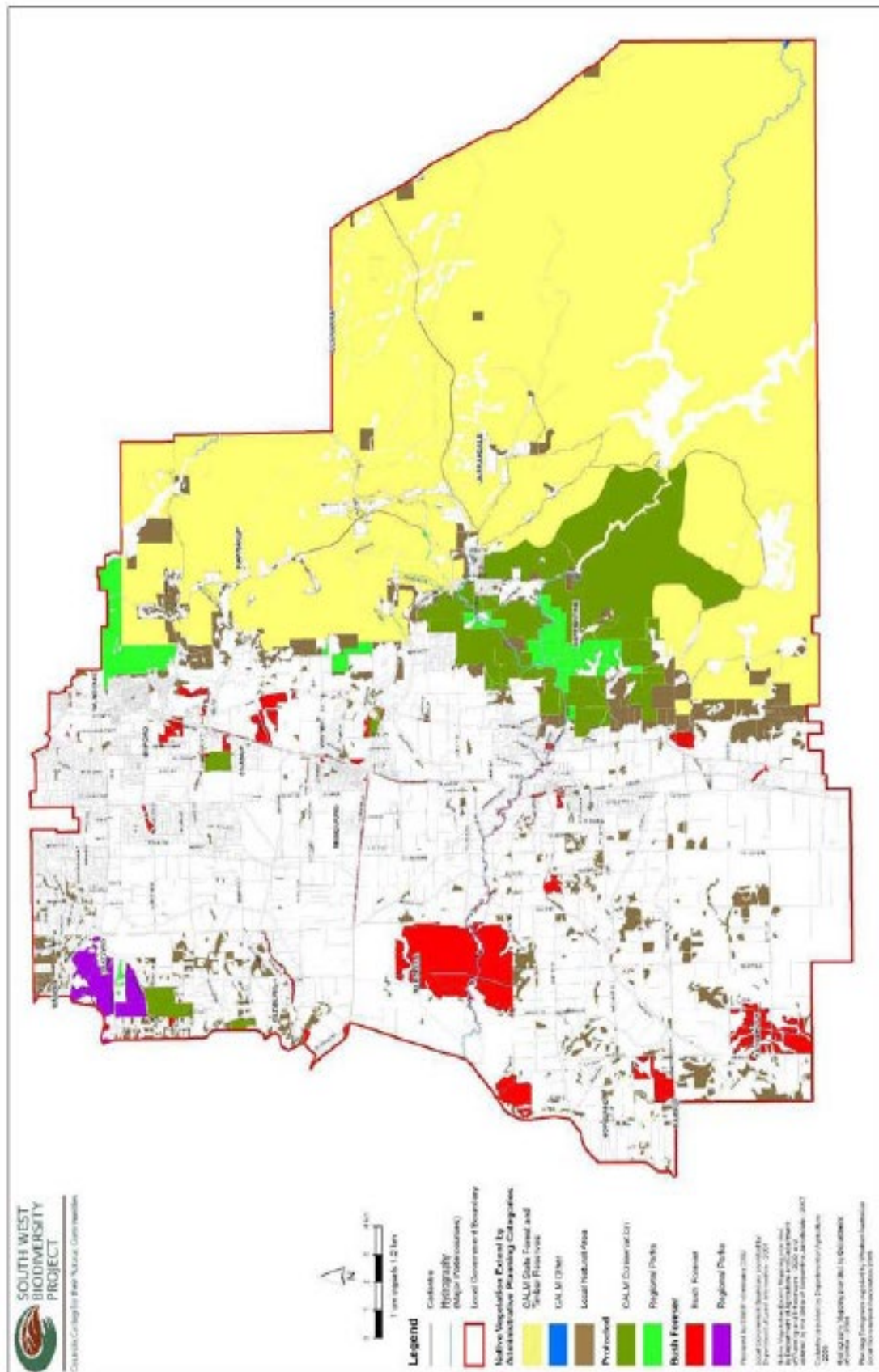


Figure 7: Native vegetation extent in Serpentine Jarrahdale Shire<sup>9</sup>

<sup>9</sup> Shire of Serpentine Jarrahdale Local Biodiversity Strategy  
 Shire of Serpentine Jarrahdale Bushfire Risk Management Plan 2018 - 2023  
 HPRM Ref E18/6845



Currently the Shire has 28.6% vegetation coverage (see table 4 below), of which 13.5% is considered to be canopy (trees). The canopy data excludes areas of State Forest so the percentage calculations are based on approximately 58,000 ha over which the data was collected, rather than the total area of the Shire. In extreme conditions, fires can burn through the canopy of trees, called ‘crowning’ but even in this situation, the fire must be supported by the fuel in the understorey of the forest.

Precinct	% Vegetation coverage - total					Total vegetation	Total canopy*
	Grass	0 - 3 m	3 - 8 m	8 - 15 m	>15 m		
<b>Shire</b>	<b>5.7</b>	<b>9.4</b>	<b>5.3</b>	<b>5.5</b>	<b>2.5</b>	<b>28.6</b>	<b>13.5%</b>
Byford	5.9	10.0	6.3	9.0	4.8	36.1	20.2%
Mundijong Whitby	5.4	8.8	5.4	7.3	2.7	29.6	15.4%
Serpentine	7.1	11.5	6.4	8.0	3.5	36.4	17.9%
Jarrahdale	11.7	18.8	7.0	9.3	8.8	55.6	25.2%
Rural living	6.3	10.8	5.7	3.9	1.5	28.3	11.2%

\*sum of area with vegetation >3 m

Table 5: Vegetation Coverage in the Shire of Serpentine Jarrahdale<sup>10</sup>

### 3.2.4.1 Biodiversity

The Shire is located within the Kwongan ecoregion of the South West Australian Floristic Region, which is one of only twenty-five biodiversity hotspots in the world. The Shire is part of two of Western Australia’s bioregions - the Northern Jarrah Forest subregion, which includes the plateau and Darling Scarp in the east of the Shire, and the flat low lying Swan Coastal Plain subregion in the west of the Shire.

The Northern Jarrah Forrest Bioregion is characterised by tall, open jarrah-marri forests on laterite gravels over clayey soils with bullich and blackbutt in the valleys, and grades into wandoo woodlands in the east with powder bark on breakaways. There are extensive but localised sand sheets with Banksia low woodlands. Heath (including species such as grevillea, hakeas, rock she-oak and Darling Range Ghost Gum) is found on granite rocks and as a common understorey of forests and woodlands in the north and east.<sup>11</sup>

The Swan Coastal Plan Bioregion includes urban developments associated with the city of Perth, and is dominated by woodlands of Banksia and tuart on sandy soils, she-oak on outwash plains and paperbark in swampy areas.

<sup>10</sup> Shire of Serpentine Jarrahdale Urban and Rural Forest Strategy

<sup>11</sup> (Department of Conservation and Land Management, 2002)

Since 1996, the Shire has had a Conservation Zone within its Local Planning Scheme which protects high conservation natural areas from inappropriate development in return for ongoing rate discounts to the landowners. Landowners rezone their land voluntarily.

As recommended by the *Biodiversity Strategy*<sup>12</sup>, it is proposed that the Conservation Zone be retained in the Local Planning Scheme, renamed 'Environmental Conservation' to comply with the *Regulations*. There is potential for the zone to be expanded to protect the following additional areas:

- Bush Forever sites;
- Natural areas within 'conservation orientated subdivisions';
- Natural areas protected as a result of application of the Local Planning Policy; and
- Other natural areas where landowners voluntarily enter rezone their property without a development bonus or subdivision.

The *Biodiversity Strategy* includes goals and targets, for which consideration needs to be given in this local planning strategy. The challenge is that the figures in the *Biodiversity Strategy* relating to areas of remaining vegetation type were valid in 2006 but are likely to have changed since then.

**Goal 1** is to retain all local natural areas remaining in the Shire.

The targets established under this goal (1A to 1C) are:

**1** Retain an estimated 4,000 hectares (of 4,522 ha) of local natural areas in the Shire, and only allow clearing in exceptional circumstances.

This includes retention of:

**1A** All verified natural areas and parkland-treed areas that support a) Carnaby's Cockatoo, b) *Eucalyptus lane-poolei*, or c) *Eucalyptus laelex*.

**1B** All verified natural areas and other native vegetation that occurs within Regional Ecological Linkages. These are to provide ecological stepping stones throughout the Shire.

**1C** All riparian vegetation in the Shire (ie: associated with rivers, creeks and other waterways).

**Goal 2** is to protect and manage a portion of each basic type of vegetation and ecosystem typical of the Shire. Approximately 1,690 hectares of Local Natural Area would be protected to meet this goal.

Targets for this goal are protection of a minimum area of each of the vegetation types found in the Shire. These targets are designed to protect a given percentage of each of the basic types of ecological communities found in the Shire. The Shire proposes to retain all of the remaining coastal plain and foothills vegetation and protect 675 ha of this vegetation.

These targets can increase the likelihood and consequence of bushfires, however periodic fuel reduction activities (including weed reduction and prescribed burning) will mitigate this increase in risk. For new developments, the Shire and the Western Australian Planning

<sup>12</sup> (Ironbark Environmental, 2008)

Commission will also ensure that bushfire risk is managed in accordance with *State Planning Policy 3.7: Planning in Bushfire prone Areas (2015)*.

**Table 6: Current retention and protection levels and proposed protection targets for Shire's vegetation**

<b>Target</b>	<b>Vegetation complex</b>	<b>Original extent in Shire before clearing (ha)</b>	<b>Current extent in Shire 2006 ha (%)</b>	<b>Extent currently protected – (ha) and as (%) of original Shire extent</b>	<b>Representational Target (Shire's proposed protection target) (ha)</b>
<b>Swan Coastal Plain</b>					
<b>2A</b>	Bassendean Central and South Complex	9,854	2,707 (27%)	1,666 (17%)	266
<b>2B</b>	Beermullah Complex	3,691	40 (1%)	14 (< 1%)	20
<b>2C</b>	Dardanup Complex	1,113	148 (13%)	135 (12%)	12
<b>2D</b>	Guildford Complex	13,244	611 (5%)	347 (3%)	96
<b>2E</b>	Serpentine River Complex	783	51 (7%)	17 (2%)	8
<b>2F</b>	Southern River Complex	7,653	680 (9%)	107 (1%)	172
<b>Foothills</b>					
<b>2G</b>	Forrestfield	4,128	266 (6%)	145 (4%)	101
<b>Darling Scarp</b>					
<b>2H</b>	Darling Scarp Complex	4,175	2,100 (50%)	812 (21%)	583
	Darling Plateau				
<b>2I</b>	Cooke Complex	914	900 (99%)	0 (0%)	0

<b>Target</b>	<b>Vegetation complex</b>	<b>Original extent in Shire before clearing (ha)</b>	<b>Current extent in Shire 2006 ha (%)</b>	<b>Extent currently protected – (ha) and as (%) of original Shire extent</b>	<b>Representational Target (Shire's proposed protection target) (ha)</b>
	Dwellingup Complex 1	11,030	10,536 (96%)	1,420 (13%)	47
	Dwellingup Complex 2	11,398	10,676 (94%)	1,226 (11%)	122
	Goonaping Complex	304	283 (93%)	0 (0%)	16
	Helena Complex 1	599	592 (99%)	591 (99%)	1
	Murray Complex 1	8,530	6,996 (82%)	1,150 (13%)	133
	Swamp Complex	1,797	1,670 (93%)	0 (0%)	15
	Yarragil Complex 1	4,734	4,224 (89%)	576 (12%)	66
	Yarragil Complex 2	6,030	5,694 (94%)	0 (0%)	32
<b>Total</b>		<b>89,977</b>			<b>1,690</b>

Table source: *Serpentine-Jarrahdale Shire Final Local Biodiversity Strategy*

### 3.2.4.2 Biodiversity and Bushfire Risk

The majority of the Shire of Serpentine-Jarrahdale has been declared as bushfire prone by the Fire and Emergency Services Commissioner and SPP 3.7 provides essential guidance on how the Shire can best protect its community and infrastructure from this natural hazard.

Integration of bushfire mitigation and protection measures into the Shire's planning instruments is required. At the same time, this SPP introduces challenges in relation to other priorities such as conservation of bushland and providing high amenity urban areas and public open space, which includes the provision of vegetation and shade for visual and microclimatic purposes. The BRM Plan will assist in managing this challenge through actively communicating risk and associated appropriate treatments across all tenures. Where biodiversity is an identified issue and a community concern, increased community pressure has influenced fuel reduction treatments (through increasing weed reduction and reducing prescribed burning frequency) that accommodate local biodiversity concerns.

### 3.2.5 Bushfire Frequency and Causes of Ignition

The Shire of Serpentine Jarrahdale has a demonstrated history of bushfires with over 1,092<sup>13</sup> fires reported by DFES over the past 10 years.

The last significant bushfire in the Shire of Serpentine Jarrahdale occurred in 2002/2003 in Selkirk Road, Serpentine. The fire burnt over 1600 hectares, damaged two houses, six sheds and fencing. The cause of the fire was not determined.

#### Bushfires by Town/Suburb

	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	Total
BYFORD	34	23	30	39	30	17	20	8	19	17	237
OAKFORD	17	14	11	18	24	12	8	14	22	22	162
SERPENTINE	14	13	10	8	8	35	14	9	16	17	144
MUNDIJONG	18	9	17	12	6	8	6	4	4	8	92
JARRAHDAL	4	9	10	11	8	8	7	3	9	9	78
HILBERT	0	0	15	4	3	10	2	17	6	2	59
OLDBURY	4	1	6	6	10	10	4	5	5	6	57
DARLING DOWNS	8	6	9	6	9	3	2	3	5	4	55
CARDUP	4	3	2	8	5	7	5	2	5	4	45
MARDELLA	4	1	3	6	6	5	2	3	6	7	43
KARRAKUP	2	2	6	0	6	1	7	2	5	7	38
HOPELAND	2	0	6	5	4	3	2	4	5	3	34
KEYSBROOK	0	4	3	6	4	3	2	1	3	2	28
WHITBY	4	1	2	1	2	1	2	3	3	1	20
Total	115	86	130	130	125	123	83	78	113	109	1,092

<sup>13</sup> The report only identifies landscape fires that are out of control requiring emergency assistance  
Shire of Serpentine Jarrahdale Bushfire Risk Management Plan 2018 - 2023  
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## Suspected Causes of Bushfires

	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	Total
Unreported	107	44	61	107	104	44	17	13	25	8	530
Suspicious/Deliberate	1	23	18	3	3	31	23	20	28	34	184
Burn off fires	0	3	7	0	4	11	13	6	18	11	73
Undetermined	2	1	9	0	6	8	6	7	5	2	46
Cigarette	1	5	13	7	1	2	3	5	6	0	43
Reignition of previous fire	1	0	3	1	1	7	2	6	8	12	41
Other open flames or fire	1	1	2	5	2	7	3	2	3	7	33
Weather Conditions - Lightning	0	0	1	0	0	5	1	7	3	12	29
Vehicles (incl. Farming Equipment/Activities)	0	5	4	3	0	2	3	1	3	5	26
Power lines	0	0	0	1	4	1	3	3	5	4	21
Campfires/bonfires/outdoor cooking	0	1	2	0	0	0	3	1	4	1	12
Equipment - Mechanical or electrical fault	1	2	2	1	0	1	1	2	1	1	12
Hot works (grinding, cutting, drilling etc.)	0	1	1	0	0	0	1	3	1	2	9
Children misadventure	0	0	3	0	0	2	0	1	0	2	8
Weather Conditions (High winds, natural combustion etc. Excludes Lightning)	1	0	1	0	0	2	0	0	1	1	6
Electrical distribution (excl. power lines)	0	0	2	0	0	0	2	0	0	0	4
Equipment - Operational deficiency	0	0	0	0	0	0	1	0	2	1	4
Human Error (Left on, knock over, unattended etc.)	0	0	0	1	0	0	0	0	0	2	3
Improper Fuelling/Cleaning/Storage/Use of material ignited	0	0	0	0	0	0	0	1	0	1	2
Sleeping/Alcohol/Drugs/Physical -Mental impairment	0	0	0	0	0	0	0	0	0	2	2
Yard maintenance, hand held equipment	0	0	0	0	0	0	1	0	0	1	2
Fireworks/flares	0	0	0	1	0	0	0	0	0	0	1
Service, Maintenance Equipment - cause unknown	0	0	1	0	0	0	0	0	0	0	1
<b>Total</b>	<b>115</b>	<b>86</b>	<b>130</b>	<b>130</b>	<b>125</b>	<b>123</b>	<b>83</b>	<b>78</b>	<b>113</b>	<b>109</b>	<b>1,092</b>

## 4 Asset Identification and Risk Assessment

### 4.1 Planning Areas

The Shire of Serpentine Jarrahdale has been divided into six (6) planning areas. Attached at Appendix B is a map showing the boundaries of those planning areas identified within the Shire of Serpentine Jarrahdale.

#### 4.1.1 Priorities for Asset Identification and Assessment

The *Planning Area Assessment Tool* was applied to each planning area to determine the priorities for asset identification and assessment. Using the tool, each planning area was rated against six risk factors, with the highest scoring planning area being the first priority for asset identification and risk assessment.

Assets were identified and assessed in each planning area, based on the results of the planning area assessment outlined in the following table.

Table 7 – Planning Area Assessment Summary

Risk Factor	Byford	Oakford	Mundijong	Jarrahdale	Serpentine	Keysbrook
1. % of LG Population in Planning Area	80	20	20	20	20	20
2. Fuel Structures	60	40	40	80	60	80
3. Assets	100	60	60	100	100	60
4. Rural Urban Interface	60	60	60	80	80	80
5. Suppression response times	20	20	20	20	20	20
6. Suppression strategies	40	40	40	40	40	40
<b>TOTAL</b>	360	240	240	340	320	300
<b>PRIORITY</b>	1	6	5	2	3	4

### 4.2 Asset Identification

Asset identification and risk assessment has been conducted at the local level using the methodology described in the Guidelines. Identified assets have been mapped, recorded and assessed in the Bushfire Risk Management System (BRMS). Identified assets are categorised into the following subcategories:

Table 8 – Asset Categories and Subcategories

Asset Category	Asset Subcategories
<b>Human Settlement</b>	<ul style="list-style-type: none"> <li>• <b>Residential areas</b> Rural urban interface areas and rural properties.</li> <li>• <b>Places of temporary occupation</b> Commercial, mining and industrial areas located away from towns and population centres (that is, not adjoining residential areas).</li> <li>• <b>Special risk and critical facilities</b> Hospitals, nursing homes, schools and childcare facilities, tourist accommodation and facilities, prison and detention centres,</li> </ul>

Asset Category	Asset Subcategories
	government administration centres and depots, incident control centres, designated evacuation centres, police, fire and emergency services.
<b>Economic</b>	<ul style="list-style-type: none"> <li>• <b>Agricultural</b> Pasture, grazing, livestock, crops, viticulture, horticulture and other farming infrastructure.</li> <li>• <b>Commercial and industrial</b> Major industry, waste treatment plants, mines, mills and processing and manufacturing facilities and cottage industry.</li> <li>• <b>Critical infrastructure</b> Power lines and substations, water and gas pipelines, telecommunications infrastructure, railways, bridges, port facilities and waste water treatments plants.</li> <li>• <b>Tourist and recreational</b> Tourist attractions and recreational sites that generate significant tourism and/or employment within the local area.</li> <li>• <b>Commercial forests and plantations</b></li> <li>• <b>Drinking water catchments</b></li> </ul>
<b>Environmental</b>	<ul style="list-style-type: none"> <li>• <b>Protected</b> Rare and threatened flora and fauna, ecological communities and wetlands.</li> <li>• <b>Priority</b> Fire sensitive species and ecological communities.</li> <li>• <b>Locally important</b> Nature conservation and research sites, habitats, species and communities, areas of visual amenity.</li> </ul>
<b>Cultural</b>	<ul style="list-style-type: none"> <li>• <b>Aboriginal heritage</b> Places of indigenous significance.</li> <li>• <b>Recognised heritage</b> Assets afforded legislative protection through identification by the National Trust, State Heritage List or Local Planning Scheme Heritage List.</li> <li>• <b>Local heritage</b> Assets identified in a Municipal Heritage Inventory or by the community.</li> <li>• <b>Other</b> Other assets of cultural value, for example community centres and recreation facilities.</li> </ul>

### 4.3 Assessment of Bushfire Risk

Risk assessments have been undertaken for each asset or group of assets identified using the methodology described in the Guidelines.

The percentage of assets within the local government in each asset category at the time of BRM Plan endorsement is shown in the following table.

Table 9 – Asset Category Proportions

Asset category	Proportion of identified assets
----------------	---------------------------------



<b>Human Settlement</b>	344
<b>Economic</b>	98
<b>Environmental</b>	0
<b>Cultural</b>	9

#### 4.3.1 Likelihood Assessment

Likelihood is described as the chance of a bushfire igniting, spreading and reaching an asset. The approach used to determine the likelihood rating is **the same for each asset category**: Human Settlement, Economic, Environmental and Cultural.

**There are four possible likelihood ratings: almost certain, likely, possible, and unlikely.**

Table 10 – Likelihood Ratings

Likelihood Rating	Description
<b>Almost Certain</b> (Sure to Happen)	<ul style="list-style-type: none"> <li>Is expected to occur in most circumstances;</li> <li>High level of recorded incidents and/or strong anecdotal evidence; and/or</li> <li>Strong likelihood the event will recur; and/or</li> <li>Great opportunity, reason or means to occur;</li> <li>May occur more than once in 5 years.</li> </ul>
<b>Likely</b> (Probable)	<ul style="list-style-type: none"> <li>Regular recorded incidents and strong anecdotal evidence; and /or</li> <li>Considerable opportunity, reason or means to occur;</li> <li>May occur at least once in 5 years.</li> </ul>
<b>Possible</b> (feasible but < probable)	<ul style="list-style-type: none"> <li>Should occur at some stage; and/or</li> <li>Few, infrequent, random recorded incidents or little anecdotal evidence; and/or</li> <li>Some opportunity, reason or means to occur.</li> </ul>
<b>Unlikely</b> (Improbable, not likely)	<ul style="list-style-type: none"> <li>Would only occur under exceptional circumstances.</li> </ul>

#### 4.3.2 Consequence Assessment

Consequence is described as the outcome or impact of a bushfire event. The approach used to determine the consequence rating is **different for each asset category**: Human Settlement, Economic, Environmental and Cultural.

**There are four possible consequence ratings: minor, moderate, major and catastrophic.**

Table 11 – Consequence Ratings

Consequence Rating	Descriptions
<b>Minor</b>	<ul style="list-style-type: none"> <li>No fatalities.</li> <li>Near misses or minor injuries with first aid treatment possibly required.</li> <li>No persons are displaced.</li> <li>Little or no personal support (physical, mental, emotional) required.</li> </ul>

Consequence Rating	Descriptions
	<ul style="list-style-type: none"> <li>• Inconsequential or no damage to an asset, with little or no specific recovery efforts required beyond the immediate clean-up.</li> <li>• Inconsequential or no disruption to community.</li> <li>• Inconsequential short-term failure of infrastructure or service delivery. (Repairs occur within 1 week, service outages last less than 24 hours.)</li> <li>• Inconsequential or no financial loss. Government sector losses managed within standard financial provisions. Inconsequential business disruptions.</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• Isolated cases of serious injuries, but no fatalities. Some hospitalisation required, managed within normal operating capacity of health services.</li> <li>• Isolated cases of displaced persons who return within 24 hours.</li> <li>• Personal support satisfied through local arrangements.</li> <li>• Localised damage to assets that is rectified by routine arrangements.</li> <li>• Community functioning as normal with some inconvenience.</li> <li>• Isolated cases of short to mid-term failure of infrastructure and disruption to service delivery. (Repairs occur within 1 week to 2 months, service outages last less than 1 week.)</li> <li>• Local economy impacted with additional financial support required to recover. Government sector losses require activation of reserves to cover loss. Disruptions to businesses lead to isolated cases of loss of employment or business failure.</li> <li>• Isolated cases of damage to environmental or cultural assets, one-off recovery efforts required, but with no long term effects to asset.</li> </ul>
<b>Major</b>	<ul style="list-style-type: none"> <li>• Isolated cases of fatalities.</li> <li>• Multiple cases of serious injuries. Significant hospitalisation required, leading to health services being overstretched.</li> <li>• Large number of persons displaced (more than 24 hours duration).</li> <li>• Significant resources required for personal support.</li> <li>• Significant damage to assets, with ongoing recovery efforts and external resources required.</li> <li>• Community only partially functioning. Widespread inconvenience, with some services unavailable.</li> <li>• Mid to long-term failure of significant infrastructure and service delivery affecting large parts of the community. Initial external support required. (Repairs occur within 2 to 6 months, service outages last less than a month.)</li> <li>• Local or regional economy impacted for a significant period of time with significant financial assistance required. Significant disruptions across industry sectors leading to multiple business failures or loss of employment.</li> <li>• Significant damage to environmental or cultural assets that require major rehabilitation or recovery efforts.</li> </ul>

Consequence Rating	Descriptions
	<ul style="list-style-type: none"> <li>Localised extinction of native species. This may range from loss of a single population to loss of all of the species within the BRM Plan area (for a species which occupies a greater range than just the BRM Plan area).</li> </ul>
<b>Catastrophic</b>	<ul style="list-style-type: none"> <li>Multiple cases of fatalities.</li> <li>Extensive number of severe injuries.</li> <li>Extended and large number requiring hospitalisation, leading to health services being unable to cope.</li> <li>Extensive displacement of persons for extended duration.</li> <li>Extensive resources required for personal support.</li> <li>Extensive damage to assets that will require significant ongoing recovery efforts and extensive external resources.</li> <li>Community unable to function without significant support.</li> <li>Long-term failure of significant infrastructure and service delivery affecting all parts of the community. Ongoing external support required. (Repairs will take longer than 6 months, service outages last more than 1 month.)</li> <li>Regional or State economy impacted for an extended period of time with significant financial assistance required. Significant disruptions across industry sectors leading to widespread business failures or loss of employment.</li> <li>Permanent damage to environmental or cultural assets.</li> <li>Extinction of a native species in nature. This category is most relevant to species that are restricted to the BRM Plan area, or also occur in adjoining areas and are likely to be impacted upon by the same fire event. 'In nature' means wild specimens and does not include flora or fauna bred or kept in captivity.</li> </ul>

The methodology used to determine the consequence rating for each asset category is based on the following:

- Consequence Rating - Human Settlement Assets**

The outcome or impact of a bushfire event on the asset, or a group of assets, measured by the hazard posed by the classified vegetation and the vulnerability of the asset.

- Consequence Rating - Economic Assets**

The outcome or impact of a bushfire event on the asset, or a group of assets, measured by the hazard posed by the classified vegetation and the vulnerability of the asset.

- Consequence Rating - Environmental Assets**

The outcome or impact of a bushfire event on the asset, or a group of assets, measured by the vulnerability of the asset and the potential impact of a bushfire or fire regime.

#### • Consequence Rating - Cultural Assets

The outcome or impact of a bushfire event on the asset, or a group of assets, measured by the hazard posed by the classified vegetation and the vulnerability of the asset.

#### 4.3.3 Assessment of Environmental Assets

Using available biological information and fire history data, environmental assets with a known minimum fire threshold were assessed to determine if they were at risk from bushfire, within the five year life of the BRM Plan.

Environmental assets that would not be adversely impacted by bushfire within the five year period have not been included and assessed in the BRM Plan. The negative impact of a fire on these assets (within the period of this BRM Plan) was determined to be minimal, and may even be of benefit to the asset and surrounding habitat.

#### 4.3.4 Local Government Asset Risk Summary

A risk profile for the local government is provided in the summary table below. This table shows the proportion of assets at risk from bushfire in each risk category at the time the BRM Plan was endorsed.

Table 12 – Local Government Asset Risk Summary

Risk Rating \ Asset Category	Low	Medium	High	Very High	Extreme
Human Settlement			11%	14%	17%
Economic			10%	10%	10%
Environmental				10%	8%
Cultural			5%	5%	

## 5 Risk Evaluation

### 5.1 Evaluating Bushfire risk

The risk rating for each asset has been assessed against the likelihood and consequence descriptions to ensure:

- The rating for each asset reflects the relative seriousness of the bushfire risk to the asset;
- Likelihood and consequence ratings assigned to each asset are appropriate; and
- Local issues have been considered.

### 5.2 Treatment Priorities

The treatment priority for each asset has been automatically assigned by BRMS, based on the asset's risk rating. Table 15 shows how likelihood and consequence combine to give the risk rating and subsequent treatment priority for an asset.

Table 13 – Treatment Priorities

<b>Consequence</b> <b>Likelihood</b>	Minor	Moderate	Major	Catastrophic
Almost certain	3D (High)	2C (Very High)	1C (Extreme)	1A (Extreme)
Likely	4C (Medium)	3A (High)	2A (Very High)	1B (Extreme)
Possible	5A (Low)	4A (Medium)	3B (High)	2B (Very High)
Unlikely	5C (Low)	5B (Low)	4B (Medium)	3C (High)

### 5.3 Risk Acceptability

Risks below a certain level were not considered to require specific treatment during the life of this BRM Plan. They will be managed by routine local government wide controls and monitored for any significant change in risk.

In most circumstances risk acceptability and treatment will be determined by the land owner, in collaboration with local government and fire agencies. However, as a general rule, the following courses of action have been adopted for each risk rating.

Table 14 – Criteria for Acceptance of Risk and Course of Action

<b>Risk Rating</b>	<b>Criteria for Acceptance of Risk</b>	<b>Course of Action</b>
<b>Extreme</b> (Priorities 1A, 1B, 1C)	Only acceptable with excellent controls. Urgent treatment action is required.	Routine controls are not enough to adequately manage the risk. Specific action is to be prioritised and aligned to the highest risk areas.

<b>Very High</b> (Priorities 2A, 2B, 2C)	Only acceptable with excellent controls. Treatment action is required.	Routine controls are not enough to adequately manage the risk. Specific action will be required during the period covered by the BRM Plan.
<b>High</b> (Priorities 3A, 3B, 3C, 3D)	Only acceptable with adequate controls. Treatment action may be required.	Specific action may be required. Risk may be managed with routine controls and monitored annually.
<b>Medium</b> (Priorities 4A, 4B, 4C)	Acceptable with adequate controls. Treatment action is not required, but risk must be monitored regularly.	Specific action may not be required. Risk may be managed with routine controls and monitored periodically throughout the life of the BRMP.
<b>Low</b> (Priorities 5A, 5B, 5C)	Acceptable with adequate controls. Treatment action is not required, but risk must be monitored.	Need for specific action is unlikely. Risk will be managed with routine controls and monitored as required.

## 6 Risk Treatment

The purpose of risk treatment is to reduce the likelihood of a bushfire occurring and/or the potential impact of a bushfire on the community, economy and environment. This is achieved by implementing treatments that modify the characteristics of the hazard, the community or the environment.

There are many strategies available to treat bushfire risk. The treatment strategy (or combination of treatment strategies) selected will depend on the level of risk and the type of asset being treated. Not all treatment strategies will be suitable in every circumstance.

### 6.1 Local Government-Wide Controls

Local government-wide controls are activities that reduce the overall bushfire risk within the Shire of Serpentine Jarrahdale. These types of treatments are not linked to specific assets, and are applied across all or part of the local government as part of normal business or due to legislative requirements. The controls that are currently in place across the Shire of Serpentine Jarrahdale are listed in Appendix C of this Plan.

In addition to listing the controls currently in place Appendix C details work to be undertaken as a part of normal business, to improve current controls or to implement new controls to better manage bushfire risk across the local government.

### 6.2 Asset-Specific Treatment Strategies

Asset-specific treatments are implemented to protect an individual asset or group of assets, identified and assessed in the BRM Plan as being at risk from bushfire. There are six asset specific treatment strategies:

- **Fuel management** - Treatment reduces or modifies the bushfire fuel through manual, chemical and prescribed burning methods;
- **Ignition management** - Treatment aims to reduce potential human and infrastructure sources of ignition in the landscape;
- **Preparedness** - Treatments aim to improve access and water supply arrangements to assist firefighting operations;
- **Planning** - Treatments focus on developing plans to improve the ability of firefighters and the community to respond to bushfire; and
- **Community Engagement** - Treatments seek to build relationships, raise awareness and change the behaviour of people exposed to bushfire risk.
- **Other** - Local government-wide controls, such as community education campaigns and planning policies, will be used to manage the risk. Asset-specific treatment is not required or not possible in these circumstances.

### 6.3 Determining the Treatment Schedule

Efforts will be made to finalise the Treatment Schedule within six months of this BRM Plan being endorsed by council. The Treatment Schedule will be developed in broad consultation with land owners and other stakeholders.

Funding for treatments on Shire land will be sourced externally after BRM Plan is endorsed. Prioritisation is currently underway through individual risk assessments on each parcel of Shire land. Proximity to human settlements is a key determinant for prioritisation.

Treatments on private land will be facilitated via personal contacts, broader public education and through existing firebreak notices. The Shire is cognisant of the importance of personal meetings with landowners and agency's to ensure objectives are met.

Land owners are ultimately responsible for treatments implemented on their own land. This includes any costs associated with the treatment and obtaining the relevant approvals, permits or licences to undertake an activity. Where agreed, another agency may manage a treatment on behalf of a land owner. However, the onus is still on the land owner to ensure treatments detailed in this BRM Plan are completed.



## 7 Monitoring and Review

Monitoring and review processes are in place to ensure that the BRM Plan remains current and valid. These processes are detailed below to ensure outcomes are achieved in accordance with the *Communication Strategy* and *Treatment Schedule*.

### 7.1 Review

A comprehensive review of this BRM Plan will be undertaken at least once every five years, from the date of council endorsement. Significant circumstances that may warrant an earlier review of the BRM Plan include:

- Changes to the BRM Plan area, organisational responsibilities or legislation;
- Changes to the bushfire risk profile of the area; or
- Following a major fire event.

### 7.2 Monitoring

BRMS will be used to monitor the risk ratings for each asset identified in the BRM Plan and record the treatments implemented. Risk ratings are reviewed on a regular basis. New assets will be added to the *Asset Risk Register* when they are identified.

### 7.3 Reporting

The Shire of Serpentine Jarrahdale will submit an annual report to OBRM each year summarising progress made towards implementation of the BRM Plan.

## 8 Glossary

<b>Asset</b>		A term used to describe anything of value that may be adversely impacted by bushfire. This may include residential houses, infrastructure, commercial, agriculture, industry, environmental, cultural and heritage sites.
<b>Asset Category</b>		There are four categories that classify the type of asset – Human Settlement, Economic, Environmental and Cultural.
<b>Asset Owner</b>		The owner, occupier or custodian of the asset itself. Note: this may differ from the owner of the land the asset is located on, for example a communication tower located on leased land or private property.
<b>Asset Register</b>		A component within the Bushfire Risk Management System used to record the details of assets identified in the Bushfire Risk Management Plan.
<b>Asset Register</b>	<b>Risk</b>	A report produced within the Bushfire Risk Management System that details the consequence, likelihood, risk rating and treatment priority for each asset identified in the Bushfire Risk Management Plan.
<b>Bushfire</b>		Unplanned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires both with and without a suppression objective. <sup>14</sup>
<b>Bushfire Management Plan</b>		A document that sets out short, medium and long term bushfire risk management strategies for the life of a development. <sup>15</sup>
<b>Bushfire management</b>	<b>risk</b>	A systematic process to coordinate, direct and control activities relating to bushfire risk with the aim of limiting the adverse effects of bushfire on the community.
<b>Bushfire Threat</b>		The threat posed by the hazard vegetation, based on the vegetation category, slope and separation distance.
<b>Consequence</b>		The outcome or impact of a bushfire event.
<b>Draft Bushfire Risk Management Plan</b>		The finalised draft Bushfire Risk Management Plan (BRM Plan) is submitted to the OBRM for review. Once the OBRM review is complete, the BRM Plan is called the 'Final BRM Plan' and can be progressed to local government council for endorsement.

<sup>14</sup> Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne.

<sup>15</sup> Western Australian Planning Commission 2015, *State Planning Policy 3.7: Planning in Bushfire Prone Areas*, WAPC, Perth.

<b>Emergency Risk Management Plan</b>	A document (developed under <i>State Emergency Management Policy 2.9</i> ) that describes how an organisation(s) intends to undertake the activities of emergency risk management based on minimising risk. These plans help inform the ongoing development of Local Emergency Management Arrangements (LEMA) and Westplans.
<b>Geographic Information System (GIS)</b>	A data base technology, linking any aspect of land-related information to its precise geographic location. <sup>16</sup>
<b>Geographic Information System (GIS) Map</b>	The mapping component of the Bushfire Risk Management System. Assets, treatments and other associated information is spatially identified, displayed and recorded within the GIS Map.
<b>Land Owner</b>	The owner of the land, as listed on the Certificate of Title; or leaser under a registered lease agreement; or other entity that has a vested responsibility to manage the land.
<b>Likelihood</b>	The chance of something occurring. In this instance, the chance of a bushfire igniting, spreading and reaching the asset.
<b>Locality</b>	The officially recognised boundaries of suburbs (in cities and larger towns) and localities (outside cities and larger towns).
<b>Planning Area</b>	A geographic area determine by the local government which is used to provide a suitable scale for risk assessment and stakeholder engagement.
<b>Priority</b>	See Treatment Priority.
<b>Recovery Cost</b>	The capacity of an asset to recover from the impacts of a bushfire.
<b>Responsible Person</b>	The person responsible for planning, coordinating, implementing, evaluating and reporting on a risk treatment.
<b>Risk acceptance</b>	The informed decision to accept a risk, based on the knowledge gained during the risk assessment process.
<b>Risk analysis</b>	The application of consequence and likelihood to an event in order to determine the level of risk.
<b>Risk assessment</b>	The systematic process of identifying, analysing and evaluating risk.
<b>Risk evaluation</b>	The process of comparing the outcomes of risk analysis to the risk criteria in order to determine whether a risk is acceptable or tolerable.

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<sup>16</sup> Landgate 2015, *Glossary of terms*, Landgate, Perth  
Shire of Serpentine Jarrahdale Bushfire Risk Management Plan 2018 - 2023  
HPRM Ref E18/6845

<b>Risk identification</b>	The process of recognising, identifying and describing risks.
<b>Risk Manager</b>	The organisation or individual responsible for managing a risk identified in the Bushfire Risk Management Plan; including review, monitoring and reporting.
<b>Risk Register</b>	A component within the Bushfire Risk Management System used to record, review and monitor risk assessments and treatments associated with assets recorded in the Bushfire Risk Management Plan.
<b>Risk treatment</b>	A process to select and implement appropriate measures undertaken to modify risk.
<b>Rural</b>	Any area where in residences and other developments are scattered and intermingled with forest, range, or farm land and native vegetation or cultivated crops. <sup>17</sup>
<b>Rural Urban Interface (RUI)</b>	The line or area where structures and other human development adjoin or overlap with undeveloped bushland. <sup>18</sup>
<b>Slope</b>	The angle of the ground's surface measured from the horizontal.
<b>Tenure Blind</b>	An approach where multiple land parcels are consider as a whole, regardless of individual ownership or management arrangements.
<b>Treatment</b>	An activity undertaken to modify risk, for example a prescribed burn.
<b>Treatment Objective</b>	The specific aim to be achieved or action to be undertaken, in order to complete the treatment. Treatment objectives should be specific and measurable.
<b>Treatment Manager</b>	The organisation, or individual, responsible for all aspects of a treatment listed in the Treatment Schedule of the Bushfire Risk Management Plan, including coordinating or undertaking work, monitoring, reviewing and reporting.
<b>Treatment Priority</b>	The order, importance or urgency for allocation of funding, resources and opportunity to treatments associated with a particular asset. The treatment priority is based on an asset's risk rating.

<sup>17</sup> Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne

<sup>18</sup> Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne

<b>Treatment Schedule</b>	A report produced within the Bushfire Risk Management System that details the treatment priority of each asset identified in the Bushfire Risk Management Plan and the treatments scheduled.
<b>Treatment Strategy</b>	The broad approach that will be used to modify risk, for example fuel management.
<b>Treatment Type</b>	The specific treatment activity that will be implemented to modify risk, for example a prescribed burn.
<b>Vulnerability</b>	The susceptibility of an asset to the impacts of bushfire.

## 9 Common Abbreviations

APZ	Asset Protection Zone
BFAC	Bushfire Advisory Committee
BRMP	Bushfire Risk Management Planning
BRMS	Bushfire Risk Management System
CALD	Culturally and Linguistically Diverse
DEMC	District Emergency Management Committee
DFES	Department of Fire and Emergency Services
ERMP	Emergency Risk Management Plan
FFDI	Forest Fire Danger Index
FMP	Fire Management Plan
GFDI	Grassland Fire Danger Index
GIS	Geographic Information System
HSZ	Hazard Separation Zone
JAFFA	Juvenile and Family Fire Awareness
LEMA	Local Emergency Management Arrangements
LEMC	Local Emergency Management Committee
LG	Local Government
LMZ	Land Management Zone
OBRM	Office of Bushfire Risk Management
P&W	Parks and Wildlife (Department of)
SEMC	State Emergency Management Committee
SLIP	Shared Land Information Platform
WAPC	Western Australian Planning Commission

## Appendix A: Communications Strategy



# *Shire of Serpentine Jarrahdale*

## **Bushfire Risk Management Planning**

## **Communication Strategy**

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## Document Control

<b>Document Name</b>	Bushfire Risk Management Communication Strategy	<b>Current Version</b>	1.0
<b>Document Owner</b>	Shire of Serpentine Jarrahdale CEO	<b>Issue Date</b>	17/10/2018
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## Related Documents

Title	Version	Date
Shire of Serpentine Jarrahdale Bushfire Risk Management Plan		

### 9.1 Amendment List

Version	Date	Author	Section
DRAFT	June 2018	TB	All – Initial Draft
FINAL	October 2018	TB	All



## 9.2 Introduction

A Bushfire Risk Management Plan (BRM Plan) is a strategic document that outlines the approach to the identification, assessment and treatment of assets exposed to bushfire risk within the Shire of Serpentine Jarrahdale. This Communication Strategy accompanies the BRM Plan for Shire of Serpentine Jarrahdale. It documents the communication objectives for the BRM Plan, roles and responsibilities for communication, key stakeholders, target audiences and key messages at each project stage, communication risks and strategies for their management, and communication monitoring and evaluation procedures.

## 9.3 Communication Objectives

The communication objectives for the development, implementation and review of the BRM Plan for the Shire of Serpentine Jarrahdale are as follows:

1. Key stakeholders understand the purpose of the BRM Plan and their role in the bushfire risk management planning process.
2. Stakeholders who are essential to the bushfire risk management planning process, or can supply required information, are identified and engaged in a timely and effective manner.
3. Relevant stakeholders are involved in decisions regarding risk acceptability and treatment.
4. Key stakeholders engage in the review of the BRM Plan as per the schedule in place for the local government area.
5. The community and other stakeholders engage with the bushfire risk management planning process and as a result are better informed about bushfire risk and understand their responsibilities to address bushfire risk on their own land.

## 9.4 Communication Roles and Responsibilities

Shire of Serpentine Jarrahdale is responsible for the development, implementation and review of the Communication Strategy. Key stakeholders support local government by participating in the development and implementation of the Communications Strategy as appropriate. An overview of communication roles and responsibilities follows:

- CEO, Shire of Serpentine Jarrahdale, responsible for endorsement of the BRM Plan Communications Strategy.
- Shire of Serpentine Jarrahdale Emergency Services Team, Shire of Serpentine Jarrahdale responsible for external communication with the local government area.
- Shire of Serpentine Jarrahdale Emergency Services Team, Shire of Serpentine Jarrahdale responsible for operational-level communication between the Shire and the Department of Fire and Emergency Services.

## 9.5 Key Stakeholders for Communication

The following table identifies key stakeholders in bushfire risk management planning. These are stakeholders that are identified as having a significant role or interest in the planning process or are likely to be significantly impacted by the outcomes.

Stakeholder	Role or interest	Level of impact of outcomes	Level of engagement
Shire of Serpentine Jarrahdale	Significant role in plan and treatment development; Facilitation of BRM Plan, Land Managers	High	Consult, involve, collaborate, inform and empower
Local Governments bordering the Shire of Serpentine Jarrahdale	Significant role in plan and treatment development; Facilitation of BRM Plan, Land Managers	High	Consult, involve, collaborate, inform and empower
Dept. of Fire and Emergency Services (DFES)	Assist LG with development of BRM Plan, technical advice and expertise	High	Consult, collaborate, involve and inform
Office of Bushfire Risk Management (OBRM)	Plan governance and advice	Medium	Consult, involve and inform
Department of Biodiversity, Conservation and Attractions	Significant role in plan and treatment development; asset identification, land manager responsible for treatments	High	Consult, involve and inform
Main Roads WA	Role in plan and treatment development, asset identification; implementation and review, land manager responsible for treatments	Medium	Consult, involve, collaborate, inform and empower
Shire of Serpentine Jarrahdale Volunteer Bushfire Brigades Bushfire Advisory Committee	Major role in plan and treatment development, implementation and review	High	Consult, involve, collaborate, inform and empower
Bushfire Advisory Committee	Major role in plan and treatment schedule development, implementation and review	High	Consult, involve, collaborate, inform and empower
Shire of Serpentine Jarrahdale Local Emergency Management Committee	Major role in plan and treatment development, implementation and review	High	Consult, involve, collaborate, inform and empower
Private land owners	Role in plan and treatment development, asset identification; implementation and review, land manager responsible for treatments	High	Consult, involve, collaborate, inform and empower

Stakeholder	Role or interest	Level of impact of outcomes	Level of engagement of
Asset owners	Land Managers/impact of bushfire on business	Low	Consult inform and empower
Interest Groups	Awareness of BRM Plan, Consultation and expert advice	Low	Consult inform and empower
Telstra	Role in plan and treatment development for assets and areas surrounding assets, asset identification; implementation and review.	Medium	Consult, involve, collaborate, inform and empower
Department of Planning, lands and Heritage.	Land manager responsible for treatments; Role in plan and treatment development implementation and review	Medium	Consult, involve, collaborate, inform and empower
Landcorp	Role in plan and treatment development implementation and review	Medium	Consult, involve, collaborate, inform and empower
Department of Water and Environmental Regulation.	Role in plan and treatment development, asset identification; implementation and review, land manager responsible for treatments	Medium	Consult, involve, collaborate, inform and empower
Water Corporation	Role in plan and treatment development, asset identification; implementation and review, land manager responsible for treatments	Medium	Consult, involve, collaborate, inform and empower
Western Power	Role in plan and treatment development along powerline corridors and implementation of treatments	Medium	Consult, involve, collaborate, inform and empower
Landcare, Local Community Conservation groups	Advisory role in biodiversity/bushfire issues, fuel reduction (weeding/spraying) treatments, implementation and review	Medium	Consult, involve, collaborate, inform and empower

## 9.6 Communications Plan

Timing of Communication	Stakeholder (s)	Communication Objective(s)	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring and Evaluation Method
<b>9.6.1 Development of the BRM Plan<sup>19</sup></b>								
<b>Life of Plan</b>	Shire of Serpentine Jarrahdale Councillors and Executive team	All (1-5)	Emails Meetings	Informed, consulted, accountable or responsible. Review and input into Plan	Shire of Serpentine Jarrahdale Emergency Services Team	Time constraints Unclear messages	Planning and time management	Feedback, questions and level of support received
<b>Life of Plan</b>	Dept. of Fire and Emergency Services (DFES)	All (1-5)	Email, Phone Call, Face to face Meetings (Quarterly) Face to Face	Informed, consulted, accountable or responsible. Review and input into Plan	Shire of Serpentine Jarrahdale Emergency Services Team	Time constraints Unclear messages	Planning and time management	Feedback, questions and level of support received
<b>Life of Plan</b>	Parks and Wildlife	All (1-5)	Email, Phone Call, Face to face Meetings (Quarterly) Face to Face	Informed, consulted, accountable or responsible. Review and input into Plan	Shire of Serpentine Jarrahdale Emergency Services Team	Time constraints Unclear messages	Planning and time management	Feedback, questions and level of support received
<b>Life of Plan</b>	Bushfire Advisory Committee (BFAC)/LEMC	All (1-5)	Email, Phone Call, Face to face Meetings (Quarterly) Face to Face	Engaged in process of BRMP	Shire of Serpentine Jarrahdale Emergency Services Team	Time constraints Unclear messages	Planning and time management	Feedback, treatments negotiated and supported by committee

<sup>19</sup> Please note this includes development of the treatment schedule which will occur after OBRM approval of the BRMP

Timing of Communication	Stakeholder (s)	Communication Objective(s)	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring and Evaluation Method
				Treatment schedule and Risk analysis				
<b>Life of Plan</b>	Land Managers	1 and 2	Social Media Shire website Face to face meetings Community workshops and forums	Inform of the BRMP process  Identify valued assets  Identify existing controls	Shire of Serpentine Jarrahdale Emergency Services Team	Limited Resources  Stakeholder not identified  Limited engagement from Stakeholder	Time management  Widespread consultation	Engaged throughout process  Feedback received  Success of outcomes
<b>May 2018 – March 2019</b>	Asset Owners	1 and 2	Shire Website Face to face meetings Community workshops and forum	Inform of the BRMP process  Identify valued assets  Identify existing controls	Shire of Serpentine Jarrahdale Emergency Services Team	Media not reaching majority  Workshops and forums could get overtaken by other agendas	Newspaper and website details  Chair meetings with strict agenda and purpose	Engaged throughout process  Feedback received  Success of outcomes
<b>May 2018 – March 2019</b>	Service Providers		Email, Phone calls, face to face meetings	Inform of the BRMP process  Identify valued assets	Shire of Serpentine Jarrahdale Emergency Services Team	Limited Resources  Stakeholder not identified  Limited engagement	Time management  Widespread consultation	level of support received  Feedback received

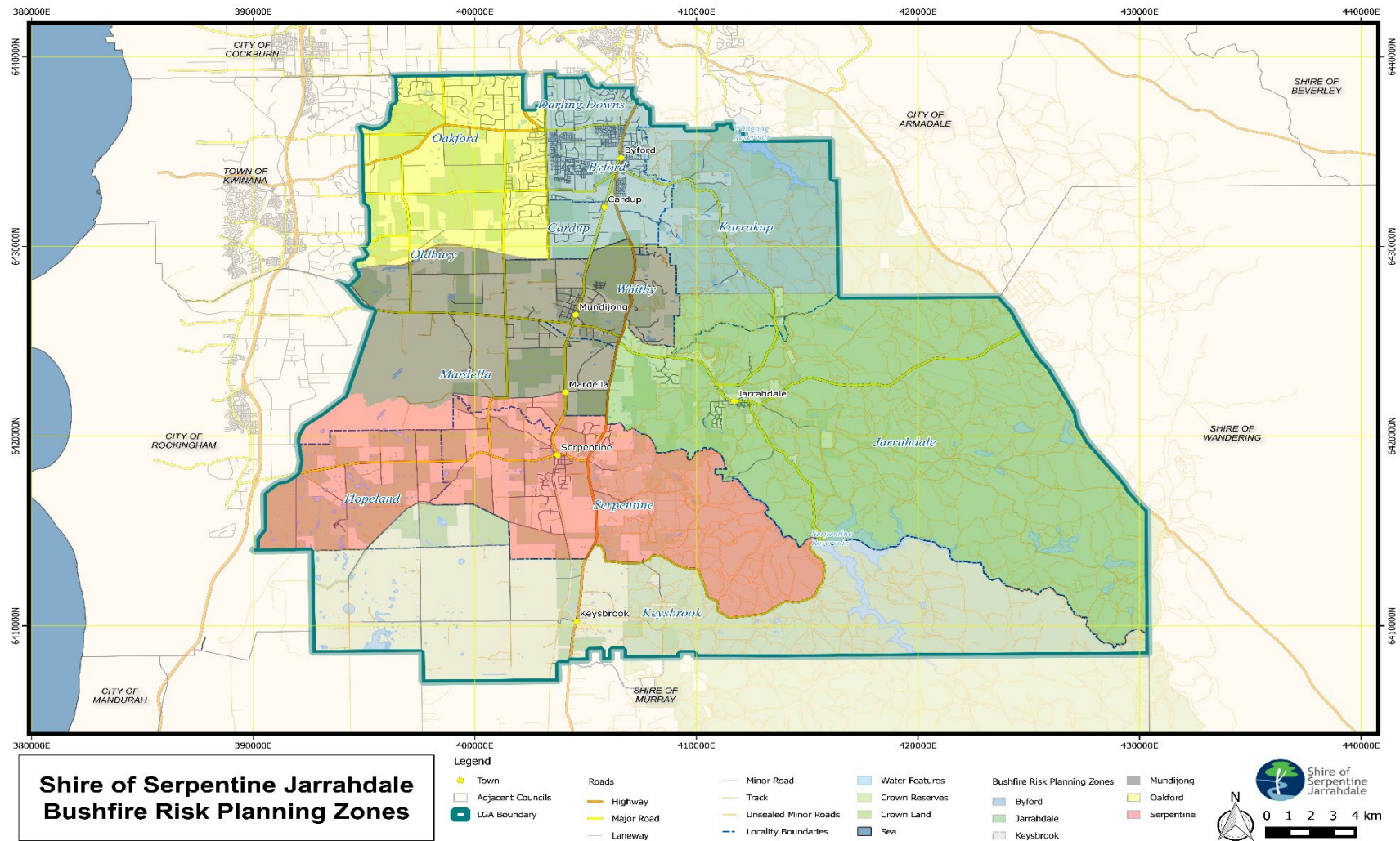
Timing of Communication	Stakeholder (s)	Communication Objective(s)	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring and Evaluation Method
				Identify existing controls		from Stakeholder		Success of outcomes
<b>9.6.2 Implementation of the BRM Plan<sup>i</sup></b>								
<b>Life of Plan</b>	Shire of Serpentine Jarrahdale Councillors and Executive team	3, 4 and 5	Face to face Email Reports	Risk Analysis and prioritised strategic treatments.	Shire of Serpentine Jarrahdale Emergency Services Team	Incorrect information  Lack of understanding	Clear communication and regular updates  Clear purpose	Feedback, questions and level of support received
<b>Life of Plan</b>	Dept. of Fire and Emergency Services (DFES)	3, 4 and 5	Email, Phone Call, Face to face Meetings (Quarterly) Face to Face	Risk Analysis and prioritised strategic treatments.	Shire of Serpentine Jarrahdale Emergency Services Team	Incorrect information  Lack of understanding	Clear communication and regular updates  Clear purpose	Feedback, questions and level of support received
<b>Life of Plan</b>	Parks and Wildlife	3, 4 and 5	Email, Phone Call, Face to face Meetings (Quarterly) Face to Face	Risk Analysis and prioritised strategic treatments.	Shire of Serpentine Jarrahdale Emergency Services Team	Incorrect information  Lack of understanding	Clear communication and regular updates  Clear purpose	Feedback, questions and level of support received
<b>Life of Plan</b>	Bushfire Advisory Committee (BFAC)/LEMC	3, 4 and 5	Email, Phone Call, Face to face Meetings (Quarterly) Face to Face	Risk Analysis and prioritised strategic treatments.	Shire of Serpentine Jarrahdale Emergency Services Team	Incorrect information  Lack of understanding	Clear communication and regular updates  Clear purpose	Good feedback received on works

Timing of Communication	Stakeholder (s)	Communication Objective(s)	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring and Evaluation Method
Life of Plan	Land Managers	3, 4 and 5	Social Media Shire Website Face to face meetings Community workshops and forums	Treatment Schedule and Risk Analysis  Negotiation of treatments	Shire of Serpentine Jarrahdale Emergency Services Team	Incorrect information  Lack of understanding  Limited engagement from stakeholder Limited resources	Well planned and executed sharing of information  Negotiations conducted	Feedback and commitment received to implement agreed controls  Highly engaged
Life of Plan	Asset Owners	3, 4 and 5	Shire Website Face to face meetings Community workshops and forums	Empowerment through Provision of risk analysis information	Shire of Serpentine Jarrahdale Emergency Services Team	Incorrect information  Lack of understanding  Limited engagement from stakeholder Limited resources	Well planned and executed sharing of information  Negotiations conducted	Feedback and commitment received to implement agreed controls  Highly engaged
Life of Plan	Service Providers	3, 4 and 5	Email, Phone Call, Face to face meetings	Provision of Risk Analysis and Prioritised strategic treatments.	Shire of Serpentine Jarrahdale Emergency Services Team	Incorrect information  Lack of understanding  Limited engagement from stakeholder	Well planned and executed sharing of information  Negotiations conducted	Feedback and commitment received to implement agreed controls

Timing of Communication	Stakeholder (s)	Communication Objective(s)	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring and Evaluation Method
						Limited resources		
<b>9.6.3 Review of the BRM Plan</b>								
<b>Annually</b>	OBRM/BFAC	All (1-5)	Report Email Meeting	Review, Monitor and Reporting  Endorse plan  Compliance	Shire of Serpentine Jarrahdale Emergency Services Team	Poor reporting and recording of information  Review not completed by due date	Shire of Serpentine Jarrahdale Emergency Services Team to record data and information appropriately  Approved by Shire of Serpentine Jarrahdale Emergency Services Team	Feedback from Council received  Work completed as a result of plan



## Appendix B: Shire of Serpentine Jarrahdale Bushfire Risk Planning Zones



## Appendix C: Local Government-Wide Controls, Multi-Agency Treatment Work Plan

Control	Action or Activity	Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
01	Legislation/regulation	Bush Fires Act 1954 section 33 Notices	Shire of Serpentine Jarrahdale	DFES P&W	Firebreak standards Fuel management requirements Annual enforcement programs Declaration and management of prohibited burn times, restricted burn times and Total Fire Bans
02	Public Education Programs	'Are You Ready' Fire Break Notices Hazard Reduction Programs	Shire of Serpentine Jarrahdale Bush Fire Advisory Committee (BFAC)	DFES P&W	"Are You Ready" State wide campaign and targeted campaigns tailored to suit local needs, including Oakford (2017) and Byford (2018).  Fire Break Notices  Hazard/fuel reduction programs
03	Arson control	Preventative and monitoring actions to mitigate arson	WA Police DFES	DFES Shire of Serpentine Jarrahdale	Shire of Serpentine Jarrahdale participates in campaigns for arson prevention
04	Planning	Planning in bushfire prone areas (i.e., State Planning Policy 3.7)	WAPC	Shire of Serpentine Jarrahdale DFES Land owners	Directs how land use should address bushfire risk. It aims to preserve life and reduce impact on property and infrastructure. The accompanying <i>Guidelines for Planning in Bushfire Prone Areas</i> provide advice on how bushfire risk is to be addressed when planning, designing or assessing a planning proposal within a designated bushfire prone area.
05	Bushfire Ready Groups	Bush Fire Advisory Committee (BFAC) Local brigades	Shire of Serpentine Jarrahdale	DFES	
06	Annual mitigation works	Fuel/Hazard reduction programs	Shire of Serpentine Jarrahdale Volunteer bushfire brigades	DFES P & W	Fuel reduction programs in reserves within the Shire of Serpentine Jarrahdale. These include weed reduction programs (slashing, spraying), vegetation thinning and removal and prescribed burning. Reserve response plans are also being developed. These plans detail fire response protocols specific to

Control	Action or Activity	Lead Agency	Other Stakeholder(s)	Notes and Comments	
				the reserve (i.e water sources, access and environmental considerations).	
07	Monitoring and Review	Recording and reviewing bushfire mitigation activities	Shire of Serpentine Jarrahdale	DFES OBRM	Annual reports to the Shire of Serpentine Jarrahdale And OBRM