Shire of Denmark

Bushfire Risk Management Plan

2019-2024

Office of Bushfire Risk Management (OBRM) Bushfire Risk Management (BRM) Plan reviewed 26 September 2019

Shire of Denmark Council BRM Plan endorsement 17/12/ 2019

Contents

Document Control

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Document Endorsements

Shire of Denmark Council (The 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*[1]. Shire of Denmark 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 Shire of Denmark Council satisfies their endorsement obligations under section 2.3.1 of the *State Hazard Plan - Fire* (*interim*).

Local Government	Representative	Signature	Date
Shire of Denmark *council*	*Shire President*		

Amendment List

Version	Date	Author	Section
1.0	June 2019	M Haymont	All
2.0	September 2019	M Haymont	All

Publication Information

[1] https://www.dfes.wa.gov.au/waemergencyandriskmanagement/obrm/Documents/OBRM-Guidelines-for-Preparing-a-Bushfire-Risk-Management.pdf

1. Introduction

1.1 Background

Under the *State Hazard Plan - Fire* (*Formerly Wesplan fire)* (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 Denmark in accordance with the requirements of the *State Hazard Plan – Fire* and the *Guidelines for Preparing a Bushfire Risk Management Plan* (the Guidelines). 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 the Policies of the State Emergency Management Committee, specifically the *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.

The BRM Plan consists of the following components:

- Bushfire Risk Management Plan Document including Shire context, asset identification, risk assessment and acceptance;
- Communications Strategy (Appendix 1);
- Local Government Wide Controls Table (Appendix 3);

The asset, risk and treatment data recorded in the Bushfire Risk Management System (BRMS) a summary of asset and risk data within the Shire is provided in Tables 16,17 & 18

The Treatment Schedule supports the implementation of the plan. The Shire have developed some treatments and will continue to build on this and aim to complete it within 6 months of endorsement of the BRM Plan. The Shire of Denmark or delegate, including Bushfire Risk Management Planning Coordinator (BRPC), will be responsible for this work with support from the Bushfire risk Management Officer (BRMO).

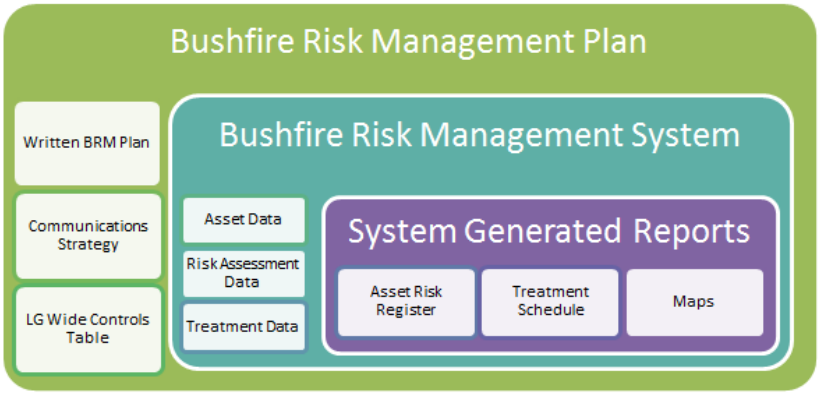


Figure 1 - Components of the bushfire Risk Management Plan[2]

[2] Bushfire Risk Management Handbook, Department of Fire and Emergency Services,2017

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 Denmark.

The objective of the BRM Plan is to effectively manage bushfire risk within the Shire of Denmark 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, 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* (cth)
- *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*

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 (OEM)
- State Emergency Management Prevention Procedure 1 – Emergency Risk Management Planning (OEM)

- State Emergency Management Preparedness Procedure 7 – Local Emergency Management Committee (LEMC)
- State Emergency Management Preparedness Procedure 8 – Local Emergency Management Arrangements (OEM)
- State Hazard Plan Fire (Formerly Wesplan Fire) (OEM)
- 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 (2017)
- Western Australian Emergency Risk Management Guidelines (Emergency Management WA 2005)
- 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)
- Code of Practice for Timber Plantations in Western Australia – Forest Industries Federation (WA) inc. Australian Forest Growers (AFG) Forest Products Commission, The Government of Western Australia.

1.3.3 Shire of Denmark Documents and References

- The Shire of Denmark Strategic Community Plan (SCP) – Denmark 2027
- The Shire of Denmark Corporate Business Plan 2018/19-2021/22
- Shire of Denmark Local Planning Strategy – (2011)
- Wilson Inlet Foreshore Management Plan (2008)
- Shire of Denmark Coastal Reserves Management Strategy and Action Plan 2010-2020
- Denmark Fire Prevention Report (2001)
- Mt Hallowell Fire Management Plan (2008)
- Shire of Denmark Local Planning Strategy V 5.0
- Municipal Heritage Inventory (2011)
- Town Planning Scheme 3
- Town Planning Policy 1 Dieback management
- Town Planning Policy 10 Parkland clearing outside building envelopes
- Town Planning Policy 19.5 Property management Plan
- Town Planning Policy 28 Settlement strategy
- Bushfire Brigades Local Law
- Aboriginal Cultural Heritage Management Plan -Kwoorabup Beelia(Denmark River) (July 2011)
- Roadside Vegetation and Conservation Values in the Shire of Denmark (2011)
- Coastal Reserves Management Strategy and Action Plan 2010-2020
- Local Emergency Management Arrangements (2018)
- Community Engagement Policy and Framework - Adopted 05 May 2015
- Delegations Register
- Shire of Denmark Risk Management Governance Framework

1.3.4 Other Related Documents

- National Strategy for Disaster Resilience
- National Statement of Capability for Fire and Emergency Services (AFAC 2015)
- Public Service Circular No. 88 Use of Herbicides in Water Catchment Areas (Dept. of Health 2007)
- 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 2** below.

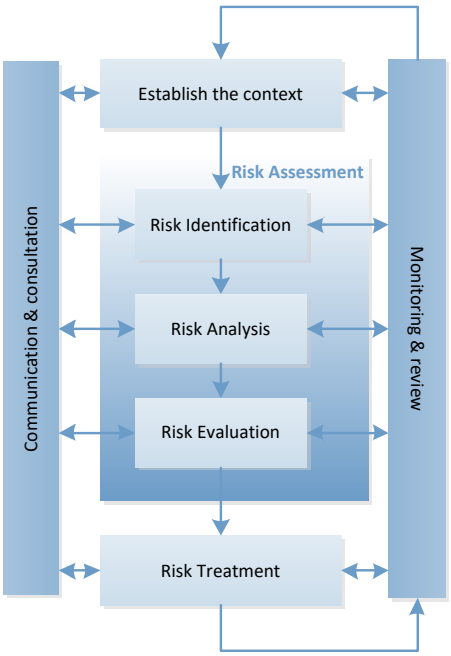


Figure 2 - An overview of the risk management process[3]

2.1 Roles and Responsibilities

Table 1 – Roles and Responsibilities

Stakeholder Name*	Roles and Responsibilities
Shire of Denmark	▪ As custodian of the BRM Plan, coordination of the development and ongoing review of the integrated BRM Plan. ▪ Negotiation of commitment from land owners to treat risks identified in the BRM Plan. ▪ As treatment manager, implementation of treatment strategies. ▪ Integrating Bushfire risk management as part of the corporate framework within the Shire of Denmark.

[3] Source: AS/NZS ISO 31000:2009, Figure 3, reproduced under SAI Global copyright Licence 1411-c083.

Stakeholder Name*	Roles and Responsibilities
	▪ 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. ▪ As part of the approval process, submission of the final BRM Plan to Council for their endorsement and adoption.
Department of Fire and Emergency Services (DFES)	▪ Participation in and contribution to the development and implementation of BRM Plans, as per their agency responsibilities as the Hazard Management Agency for fire. ▪ Support to local government through expert knowledge and advice in relation to the identification, prevention and treatment of bushfire risk. ▪ Facilitation of local government engagement with State and Federal government agencies in the local planning process. ▪ Undertake treatment strategies, including prescribed burning on behalf of Department of Lands for Unmanaged Reserves and Unallocated Crown Land within gazetted town site boundaries. ▪ In accordance with Memorandums of Understanding and other Agreements, implementation of treatment strategies for other landholders.
Office of Bushfire Risk Management (OBRM)	▪ 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. ▪ Review BRM Plans for consistency with the Guidelines prior to final endorsement by Council.
Department of Biodiversity, Conservation and Attractions - Parks and Wildlife Service (PWS)	▪ Participation in and contribution to the development and implementation of BRM Plans. ▪ Providing advice for the identification of environmental assets that are vulnerable to fire and planning appropriate treatment strategies for their protection. ▪ As treatment manager, implementation of treatment strategies on Department managed land and for Unmanaged Reserves and Unallocated Crown Land outside gazetted town site boundaries. ▪ In accordance with Memorandums of Understanding and other agreements, implementation of treatment strategies for other landholders.
Other State and Federal Government Agencies	▪ Assist the local government by providing information about their assets and current risk treatment programs. ▪ Participation in and contribution to the development and implementation of BRM Plans. ▪ As land owner/manager, identification and implementation of treatment strategies.
Public Utilities	▪ Assist the local government by providing information about their assets and current risk treatment programs. ▪ Participation in and contribution to the development and implementation of BRM Plans. ▪ As land owner/manager, identification and implementation of treatment strategies., also interact with and facilitate the access for the implementation of treatment strategies in the vicinity of their assets to protect their assets
Corporations and Private Land Owners	▪ Assist the local government by providing information about their assets and current risk treatment programs.

Stakeholder Name*	Roles and Responsibilities
	▪ Participation in and contribution to the development and implementation of BRM Plans. ▪ As land owner/manager, identification and implementation of treatment strategies.
Other Stakeholders and Interested Parties[4] •	▪ Participation in and contribution to the development and implementation of BRM Plans and treatment schedules. ▪ Providing technical advice and local knowledge to assist in the identification of assets that are vulnerable to fire and planning of appropriate treatment strategies for asset protection.

2.2 Communication & Consultation

As indicated in **Figure 2** communication and consultation throughout the risk management process is fundamental to the preparation of an effective BRM Plan. To ensure appropriate and effective communication has occurred and is ongoing with relevant stakeholders in the development of the BRM Plan, a *Communication Strategy* has been prepared. The strategy is provided at **Appendix 1**.

3. Establishing the Context

3.1 Description of the Local Government and Community Context

3.1.1 Strategic and Corporate Framework

The Shire of Denmark's strategic and corporate framework is outlined in the *The Shire of Denmark Strategic Community Plan (SCP) – Denmark 2027*.

The BRM Plan aims to support the Shire achieve its strategic vision of *'A happy, healthy and eclectic community that embraces creativity, celebrates the natural environment and is invested in a strong local economy'* through the key strategic themes:

- **E1.0 - Our Economy:** *We are an attractive location to live, invest, study, visit and work.*
- **N2.0 - Our Natural Environment:** *Our natural environment is highly valued and carefully managed to meet needs of our community, now and in the future.*
- **B3.0 - Our Built Environment:** *We have a functional built environment that reflects our rural and village character and supports a connected, creative and active community.*
- **C4.0 - Our Community**: *We live in a happy, healthy, diverse and safe community with services that support a vibrant lifestyle and foster community spirit.*
- **L5.0 - Our Local Government:** *The Shire of Denmark is recognised as a transparent, well governed and effectively managed Local Government.* [5]

Under strategic theme C4.0 – Our Community, the Shire of Demark has committed to *undertake a "tenure blind" approach to bushfire risk management planning* and lists a number of existing and new strategies that relate to, or support bushfire risk management within the Shire. The BRM Plan forms part of this work and will facilitate delivery of a tenure blind approach to bushfire risk management and

[4] This group includes stakeholders who can provide technical advice and local knowledge in relation to the BRM Plan, including the Chief Bushfire Control Officer (CBFCO), Bushfire Advisory Group (BFAC), District Operations Advisory Group (DOAG), Local Emergency Management Committee (LEMC), Volunteer Bushfire Brigades (BFBs) and other emergency services volunteers, Landcare, Denmark Environmental Centre inc. and Denmark Weed Action Group (DWAG).

[5] Strategic Community Plan _Denmark 2017

encourage collaboration with key partners and the community to effectively manage unacceptable bushfire risks.

The corporate Business Plan activates the priorities in the SCP and aligns purpose specific strategy projects and actions to each year of delivery. Resources, finances and assets are considered over a four-year period and aligned to ensure each team within the organisation is working, in an integrated way, towards the aspirations and priorities contained within the SCP.

The BRM Plan will help guide the Shires effective and efficient allocation of resources to address priority bushfire risks and schedule mitigation treatment to best address the risks.

The Shire of Denmark recognises the importance of leadership and coordination in emergency management and has an established Local Emergency Management Committee (LEMC) with multi-agency membership. The Committee provides an important multiagency forum for seeking stakeholder input into the BRM Plan, and for collaboration with partner agencies during implementation of the plan. It will also play an important role in the escalation and resolution of issues highlighted during the planning processes.

The Shire of Denmark Bushfire Advisory Committee (BFAC) has played an integral role in the development of the BRM Plan, in particular the identification of assets and existing controls, assessment of risk and the development of treatment options.

The LEMC and the BFAC will continue to have involvement in the implementation and review of the BRM Plan as outlined in **Appendix 1** – Communication Strategy

The Shire of Denmark has a complex community which is highly invested in the amenity and ecological values contained within the natural and built environment. The community values extensive consultation on a variety of matters pertaining to the community, both the physical and conceptual. This will be the case for issues addressed within the Bushfire Risk Management Plan, and the community as a whole is a key stakeholder in the development and successful implementation of the BRM Plan. As depicted in Figure 3, the Shire of Denmark supports community driven decision making in all aspects of its business.

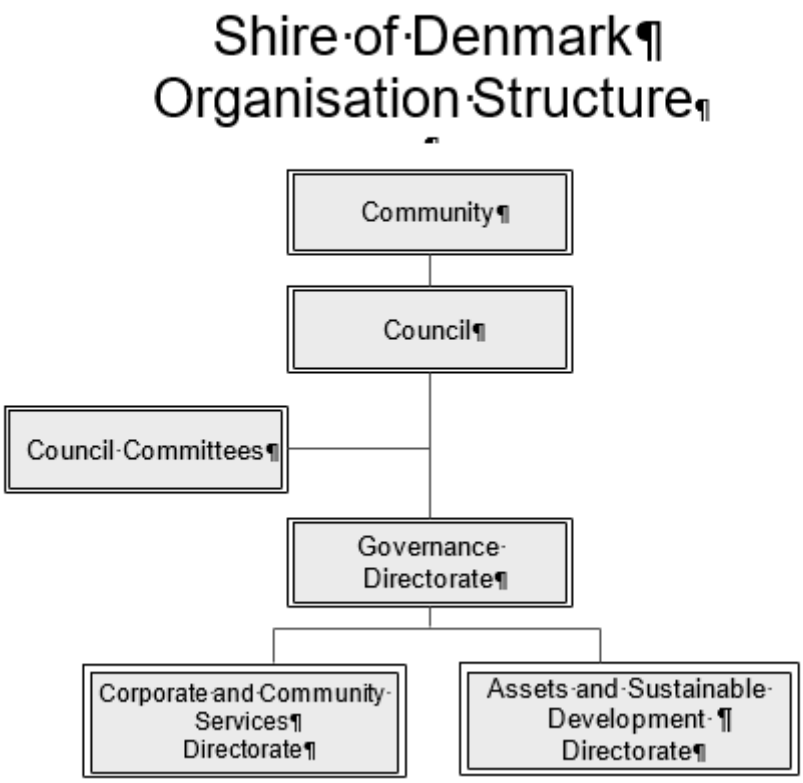


Figure 3 - Organisational structure Shire of Denmark

Several years ago, council adopted its environmental policy which states the following:

" A healthy environment is fundamental to our social, physical and economic wellbeing. Only for the past two decades however, has there been broad recognition that development must be scaled to the environments capacity to assimilate it, if we are to maintain an acceptable standard of living into the future

The Natural environment is the principal reason most people live in or visit Denmark. In an increasingly populous and fast-moving world, the attractions of tall forests, clean air, pristine oceans, unspoiled landscapes, a closer relationship with nature, and a relaxed pace of life are in growing demand.

Council is responsible for making decisions which directly affect the local environment -and thus indirectly other environments. It therefore has an explicit duty to balance the needs of growing population against their impacts upon the natural world.

Council supports the ethic of ecologically sustainable development. It will endeavour in all its activities to apply the principles associated with conserving natural resources, integrate environmental accounting procedures into its management decisions, and favour development which clearly demonstrates sympathy with the environment-to preserve Denmark's unique appeal and sense of place in the interests of present and future generations ''

This Policy demonstrates the Council's commitment to protecting the environmental values contained within in the Shire of Denmark, for multiple outcomes. Significant consideration of the policy's intent,

and the community's aspirations, will need to be given when developing appropriate bushfire risk treatment strategies for the Shire. The Shire's Community Engagement Policy and Framework, along with the Communication Strategy (**Appendix 1**) developed as a part of the BRM Plan provide guidance for engagement and consultation with the community and key stakeholders in relation to complex or sensitive issues arising from development and implementation of the BRM Plan. There are a number of key issues that have been identified as priorities for the Denmark community to be addressed through the BRM Planning process. They include:

- Management and Planning
  - Education and engagement around private property bushfire preparation techniques;
  - Review of access and egress for Peaceful Bay, Nornalup and the town site of Denmark vulnerable subdivisions;
  - Evacuation planning and communication;
  - Reserves management plan;
  - Support for the enforcement of the Firebreak notice by the Denmark Council, BFAC and the executive group
  - Access to vegetated areas for fire control and mitigation activities.

- Infrastructure
  - **Bridges.** There is one main bridge on the Eastern entry to the Denmark town site. This poses a significant risk to the community's evacuation capacity if this bridge was to be impacted *(a study carried out By GHD in July 2018 indicated the existing bridge on the South coast Hwy is the most efficient means by which to evacuate residents[6]);
  - **Communications.** Communications towers are critical to effective and timely provision of information to the community during emergencies. Sites are predominantly located on top of hills and in high fuel areas, which increase their vulnerability to being impacted by a bushfire event. Protection of critical infrastructure located at these sites is a priority of the BRM Plan;
  - **Water.** The main water storage facility for the townsite sits in a heavily vegetated area amidst Department of Biodiversity Conservation and Attractions (DBCA) and Shire of Denmark reserves; and
  - **Roads.** Road reserves within the Shire have been reviewed to identify the conservation values within existing vegetation. Careful consideration will need to be given when planning treatment strategies in road reserves areas with high conservation values, as some are also primary evacuation routes.

From an emergency management perspective, bushire remains the highest natural hazard risk to the community followed by flood. The Shire is faced with an increased bushfire risk to people and property

[6] **"By iteratively running the AIMSUN models under different traffic loading conditions, it is estimated that: Using the existing South Coast Highway bridge, all inhabitants could be orderly evacuated (free of unforeseen chaotic incidents) west-to-east within approximately 1.5 hours; and Using the existing Churchill Road bridge, all inhabitant could be orderly evacuated (free of unforeseen chaotic incidents) west-to-east within approximately 2 hours.Under the Churchill Road bridge scenario, most vehicles need to utilise the Scotsdale Road / Horsley Road roundabout and the heavy northbound traffic would block vehicles arriving from other approaches. By comparison, the South Coast Highway is better at coping with heavier traffic as all intersections are unsignalised, rather than roundabouts"* – Source: Denmark Traffic and evacuation Management Study Final Report 17 July 2018

due to a drying climate, development in high fuel load areas (Rural Urban Interface), a significant annual tourist population, and increasing pressure on fire brigade volunteers to support bushfire preparedness and response requirements, which is further compromised by declining volunteerism and an ageing volunteer demographic.

The following, Table 2, outlines the various organisational groups within the Shire that are involved in the development, implementation and review of the BRM Plan and associated treatment schedule.

Table 2 - Organisational Groups within the Shire of Denmark and their Role in the BRM Plan Process

Group	Roles
Community	▪ Participate in and contribute to reasonable, open and transparent communication with the Council on matters relating to bushfire risk management planning and treatment implementation. ▪ Seek to be informed of their bushfire risk and take action to adequately prepare for bushfire events. ▪ As landowners, comply with the requirements of legislation, notices and and policy relating to the prevention of bushfires and the responsible management of their land.
Council	▪ Build knowledge and understanding of fire management practices within the community ▪ As representative of the community, participate on the Bushfire Advisory Committee (BFAC), Local Emergency Management Committee (LEMC) and support other bushfire related meetings and committees ▪ Endorse and adopt the BRM Plan ▪ Support directorates in matters relating to BRM Planning
Council Committees	▪ Contribute to treatment planning ▪ Liaise with stakeholders and community groups on matters relating to the BRM Plan ▪ Remain informed of the status of the BRM Plan and associated treatment schedule, and aware of key issues related to their development and implementation.
Governance Directorate	▪ Contribute to treatment planning ▪ Liaise with key stakeholders and community groups on matters relating to the BRM Plan ▪ Remain informed of the status of the BRM Plan and associated treatment schedule, and aware of key issues related to their development and implementation. ▪
Corporate and Community Services	▪ Oversight of the implementation, monitoring and review of the Bushfire Risk Management Plan, including the implementation of agreed treatments ▪ Contribute to treatment planning ▪ Consult and negotiate with stakeholders to develop and implement appropriate treatment strategies ▪ Source and approve funding and expenditure related to bushfire risk management activities, including seeking opportunities for grant funding or interagency partnerships

	▪ Liaise with key stakeholders and community groups on matters relating to the BRM Plan ▪ Participate on the Local Emergency Management Committee (LEMC) and Bushfire Advisory Committee (BFAC) ▪ Ensure adequate and appropriate information is made available to the community in reference to the BRM Plan and related activities, including managing publication of the BRM Plan and related data ▪ Build knowledge and understanding of bushfire risk and bushfire management practices within the community ▪ In consultation with stakeholders, plan an annual schedule of works ▪ Develop sustainable practices for fire management on LG, UCL and UMR land ▪ Oversee burning programs and support local brigades to undertake mitigation activities and deliver engagement programs ▪ Undertake an annual education, inspection and enforcement program to ensure maximum compliance with the Shire's Fire Management Notice
Assets and Sustainable Development	▪ Ensure new development adheres to building codes and planning schemes, including the provisions of State Planning Policy 3.7 Planning in Bushfire Prone Areas and the associated Guidelines ▪ Review and update Bushfire Prone Area mapping for the Shire ▪ Contribute to treatment planning, particularly in relation to Shire assets and land ▪ In consultation, plan and undertake an annual schedule of works ▪

3.1.2 Location, Boundaries and Tenure

The Shire of Denmark is located on the South coast of Western Australia. The Shire is bordered by the Southern Ocean and shares boundaries with the Shire of Manjimup to the West, the Shire of Plantagenet to the North and the City of Albany to the East. The Shire is approximately 400kms South of Perth and has an area of 1,860sq kms (186,007 ha). Of this total area, 70% is comprised of public land managed by DBCA and Unallocated Crown Land, with the remaining 30% being Freehold land, which contains large tracts of remnant vegetation.

The Shire of Denmark is recognised for its natural beauty and significant environmental values. This is reflected in the thirty-five protected areas located within the Shire; including six National Parks, which equate to a total area of 99,711 ha, and 11 Nature Reserves totalling 7,148 ha.

Over 70% of the land within the Shire remains uncleared. The northern part of the Shire is dominated by uncleared land, largely managed by DBCA. The southern part of the Shire is dominated by private land (30%). While large areas of this is cleared for agricultural purposes, significant areas of vegetation remain and large areas of uncleared vegetation occur along the coastline in the form of reserves and National Parks. See table 3

The significant amount of remnant vegetation on private property is a major factor contributing the increased bushfire risk faced by all townsites within the Shire of Denmark. Large properties outside of the residential areas present significant challenges to enforcement of the Shire's Fire Management Notice. Other significant challenges include the complex local vegetation types that exist within the Shire, the limited availability of favourable conditions for burning and a lack of suitably skilled and experienced staff and volunteers to plan, supervise and carry out the volume of prescribed burning required to effectively mitigate risk.

Table 3– Overview of Land Tenure and Management within the BRM Plan Area

Land Manager/Agency*	% of Plan Area
Local Government	3
Private	26
Parks and Wildlife Service	70
Other	1
Total	100

There are 121 Reserves vested with the Shire of Denmark. 41 reserves are for community-oriented services such as drainage, emergency services sites and communications. The remaining 80 reserves have some degree of natural resource management (NRM) input required in order to maintain biodiversity and environmental values. The associated land use and protection values of these 80 reserves range from Conservation, Public Recreation and Parkland Management, to resource extraction (gravel and sand). Of these, 13 are A Class Reserves (Figure 4 and 5). The A Class classification is used solely to protect areas of high conservation or community value. Classification as an A Class reserve affords the greatest degree of protection for reserve lands; requiring approval from parliament to amend the reserve's purpose or area, or to cancel the reservation.

The total area of reserves vested with the Shire of Denmark equates to 25,068 ha. The management responsibilities associated with these areas place substantial pressure on local government and its rate payers. Funding and capacity to adequately maintain strategic bushfire mitigation strategies and undertake other land management activities to protect and maintain the reserves and their associated values must be sourced internally, without the provision of additional resources.

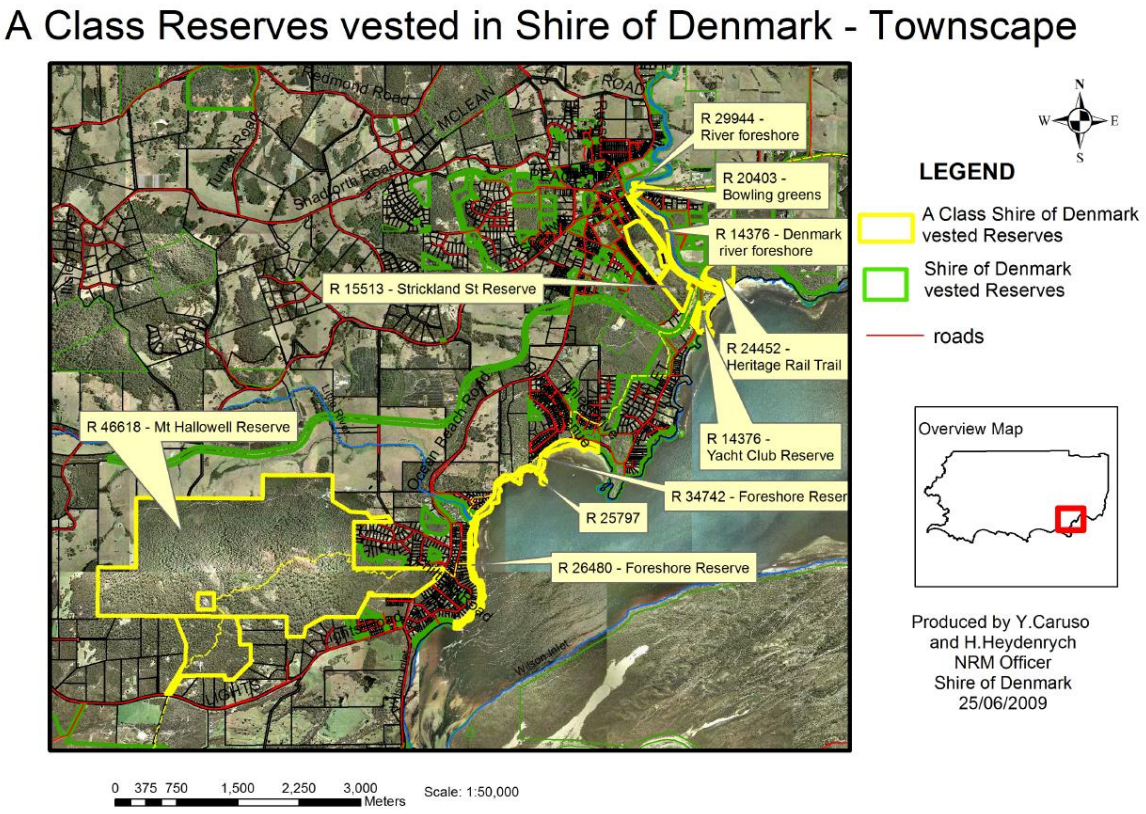


Figure 4 - A class reserves vested in the Shire of Denmark - Town

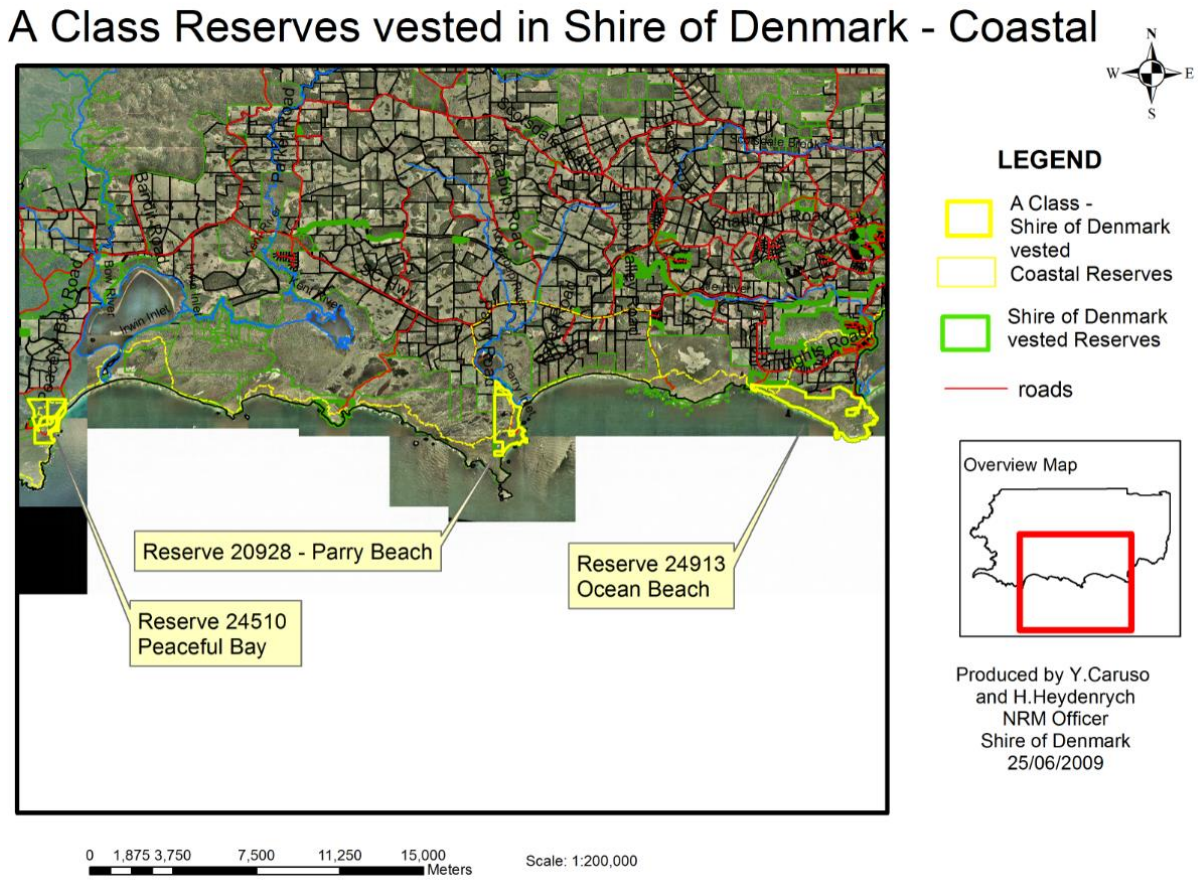


Figure 5 - A class reserves vested in the Shire of Denmark - Coastal

3.1.3 Population and Demographics

Majority of the Shire's population is concentrated around three main townsites, being Denmark, Peaceful Bay, and Nornalup, and the locality of Bow Bridge. The remainder of the population are dispersed throughout the Shire, living on small farms or semi-rural subdivisions.

The most recent census data from 2016 shows the total population as 5,964.[7]

Population growth for Denmark is estimated to be 2.2% per annum in the long term (2006-2016) population statistics from the Australian Bureau of Statistics (ABS)[8]. This coincides with the high range estimate of growth from the Western Australian Planning commission.[9]

Based on a review of all adopted structure plans, subdivision approvals and local planning strategy data (including assumed future land development), the assumed high-level population distribution for Denmark is shown below in figure 6[10]

Figure 6 - Geographical population distribution

The Denmark townsite is the Shire's main service and administration centre, with other population centres being the smaller gazetted townsites of Nornalup, Peaceful Bay and the locality of Bow Bridge. The remainder of the population (20%), live on agricultural properties or semi-rural subdivisions.

[7] ABS 2016 Census QuickStats
[8] ABS (July 2017), 3218.0 Regional Population Growth, Australia
[9] WAPC (August 2015), Western Australia Tomorrow: Population report No.10.
[10] Denmark Traffic and evacuation Management Study Final Report 17 July 2018-

Figure 7- Shire of Denmark boundaries[11]

Nornalup town site is located on the east bank of the Frankland River and comprises approximately 77 private properties, many of which are owned by absentee landowners. The permanent population of Nornalup is 66 people. This can swell significantly over the summer period in line with the rest of the great southern. The area is steep and heavily wooded. The Nornalup River Chalets are located between the South Coast Highway and Riverside Drive. Adjacent to this is a café/restaurant, which is the only other commercial building in town. The Civic Centre which includes the Bush Fire Brigade is located on the banks of the river opposite the chalets. The land opposite the main town site is predominantly Walpole Nornalup National Park, however there is also a small collection of residential dwellings on private land.

Management strategies for heavy fuel loads surrounding the town site contained in the Walpole-Nornalup National Park, are an ongoing source of tension between some members of the community, conservationists and DBCA, due to differing views regarding the appropriate management of old growth Karri and Tingle forest for bushfire mitigation and biodiversity protection. This has led to some of the fuels loads in this area being up to 80 years old, which is an extreme concern for some residents as to how to protect their properties in the event of a fire threat from the North West. Prescribed burning in these forests is predominantly carried out by DBCA to achieve a number of outcomes, for both conservation and community protection. At times, theses outcomes may have conflicting objectives. This can create challenges in the execution of some strategic burns.

Nornalup has one Bush Fire Brigade which has a Light Tanker and a 2.4 Urban Truck to service the Nornalup community. Membership is steady in the Nornalup Brigade as it is primarily serviced by the farming community and does not rely solely on the residents of the Nornalup townsite.

[11] https://www.google.com/maps

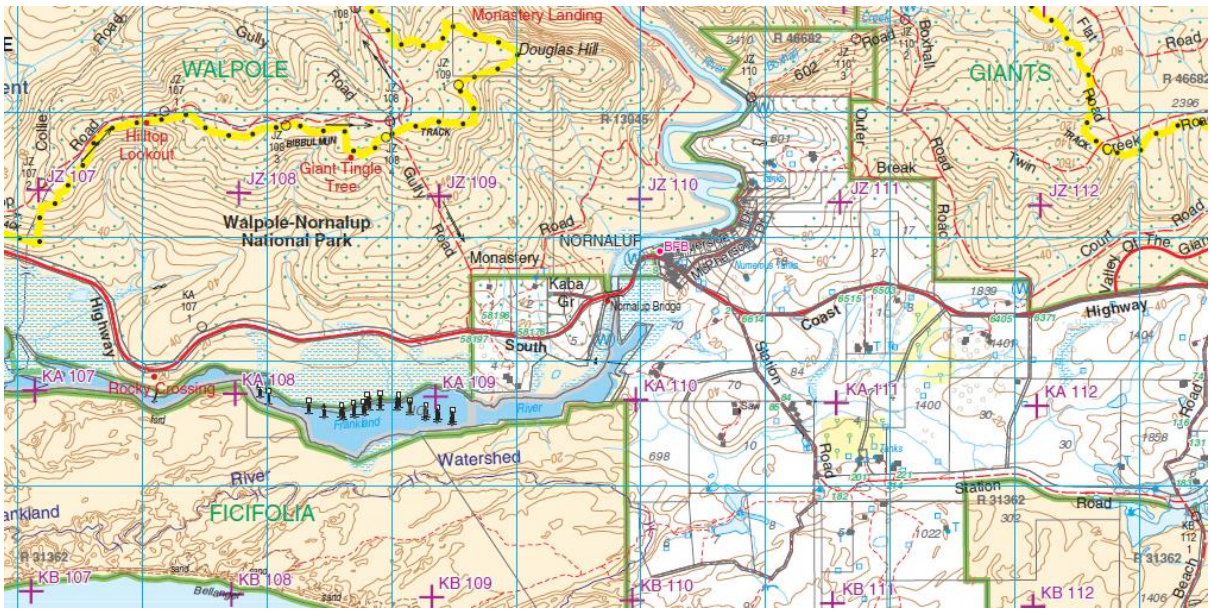


Figure 8 -Nornalup Townsite [12]

Peaceful Bay is located 51 kilometres west of Denmark and 33 kilometres east of Walpole. There are approximately 258 dwellings, primarily constructed from timber or steel frame with fibro cladding. Peaceful Bay is essentially a subdivision cut in two halves, by tenure, with a combination of 203 leasehold lots, 130 caravan sites, a camping area to the East and 49 freehold lots to the West. The majority of holiday type housing is concentrated within the leasehold area on Reserve 24510. This Reserve has been vested with the Shire of Denmark for a term of 21 years, the lease was extended from July 2010 to 2031. This leasehold area is bounded by Peaceful Bay Road loop and a smaller sub-division of permanent housing to the West, bounded by Rame Head Road and Peppermint Way.

Peaceful Bay is a location that has a permanent population of 69 people. The population is estimated to grow to 2500-3500 people during peak periods such as Christmas and Easter. This influx of visitors presents significant challenges for evacuation planning and coordination for this community in the event of a bushfire.

The community is serviced by a single access road, and is surrounded on the North, West and South by bush areas managed by DBCA and the Shire of Denmark. There is also substantial old growth remnant vegetation on two private lots to the West of the town.

Peaceful Bay has one Bush Fire Brigade with a 3.4 appliance and a light tanker, membership is low due to the demographics of the Peaceful Bay community being predominately retired and absentee landowners.

All of these factors lead to Peaceful Bay having a high bushfire risk.

[12] Great Southern Emergency Directory

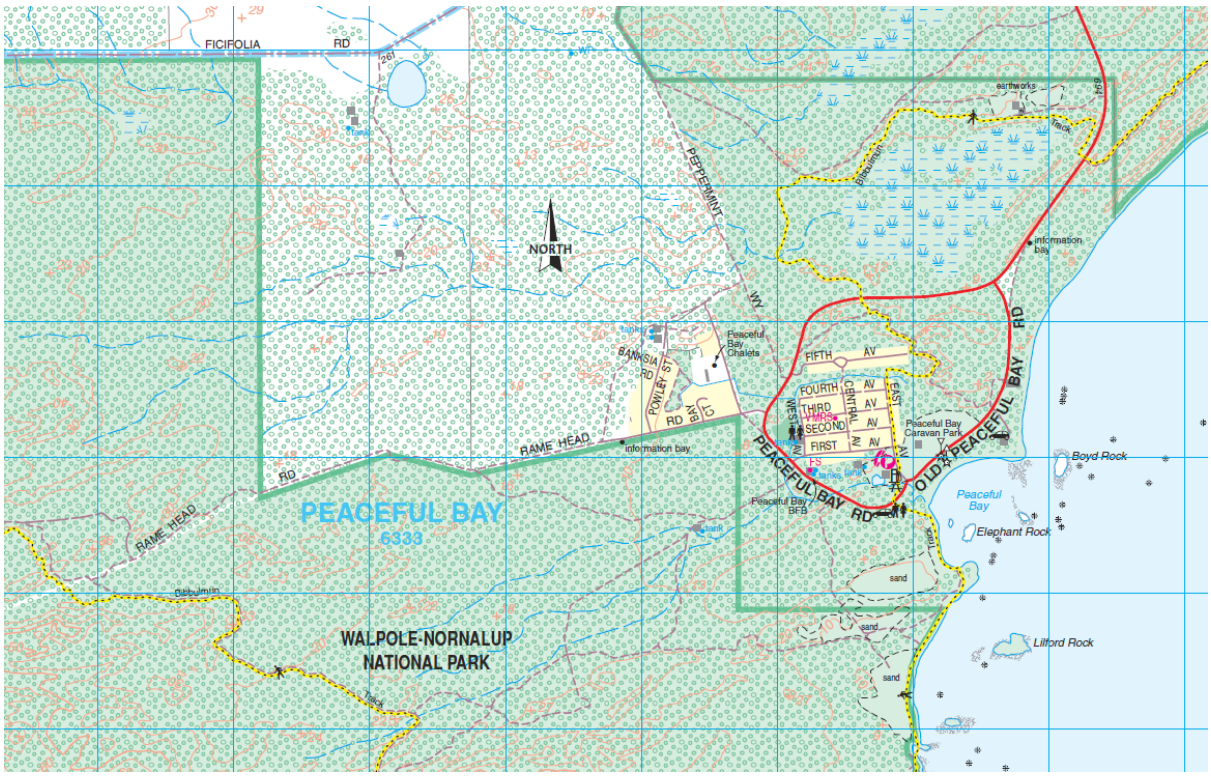


Figure 9- Peaceful Bay town site [13]

Bow Bridge is located approximately 45km West of Denmark on the junction of the Valley of the Giants Road and South Coast Hwy. The community comprises of predominantly rural, special rural and limited residential development. There are 73 permanent residents and 51 private dwellings. There is extensive remnant Karri forest on both private property, national parks and nature reserves surrounding the community. The nearest Bush fire brigade is 8km away in Nornalup.

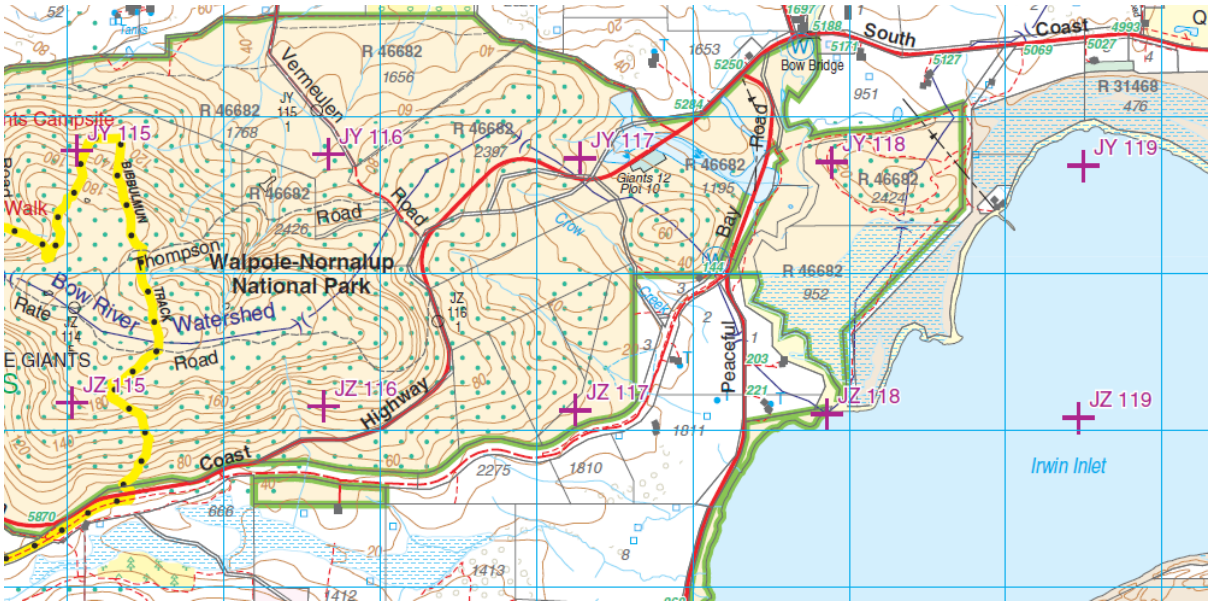


Figure 10- Bow bridge [14]

[13] Great Southern Emergency Directory
[14] Great Southern Emergency Directory

The Shire's population has an ageing demographic, with an increase in the Shire of older couples without children and an increase in the need for assistance for core activities. The older couples without children demographic represents 16% of the local population compared with 9% average in WA[15]. The percentage of couples with children is 22%, whereas across WA the average is 31%. A high percentage of the population live and work in the area and there is also a high percentage of absentee landowners. The high percentage of absentee landowners and high percentage of older couples without children aligns with the areas reputation as a lifestyle (retirement) and holiday destination. The predicted annual growth rate for Denmark is 2.4% [16] which is .4% above the WA average of 2% between now and 2026.

The majority (86.3 Percent) of the Shire's residents live in the locality of Denmark and surrounding localities of Hay, Ocean Beach, Scotsdale and Shadforth, according to the 2016 census [17] (Figure 11). These areas of higher population density are set within heavily vegitated areas with high fuel loads. This provides challenges for the Shire's mitigation program, due to the desire of the majority of the residents to maintain the amenity of the area and the proximity of reserves and reminant vegetation to residential areas.

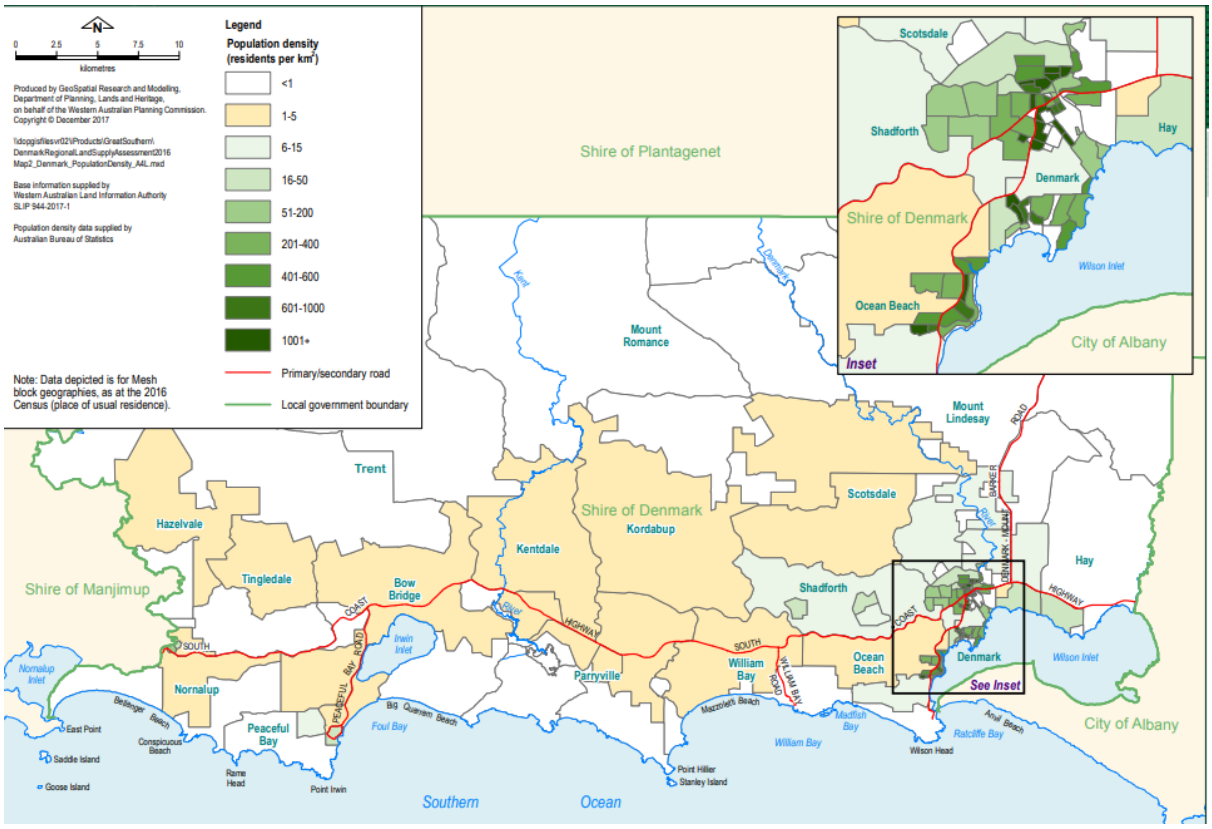


Figure 11- Population densities –Denmark -2016 Census[18]

[15] ABS 2016 Census QuickStats

[16] *WA Department of Planning, Western Australia Tomorrow Population Report No 7 2006 – 2026, Feb 2012*

[17] Great southern Denmark Regional Land supply assessment December 2017

[18] Great southern Denmark Regional Land supply assessment December 2017

The Shire recorded an occupancy rate in 2016 of 70.8 %, with the locality of Peaceful Bay recording 13.3 %. This is low compared with the average for the State of 86.7 %.[19] This reflects the high level of absentee landholders and transient members of the community which presents challenges for the local government in disseminating consistent bushfire preparedness information, adherence to the Fire Control Notice and general engagement with the community regarding bushfire risk.

At the 2016 census the median age for the shire's population was 49 years, which is significantly older than the median age for Western Australia (36 Years) and Australia (38 years). There is a significant under representation of persons aged 20-29 years in the Shire (at 5 %) compared to Western Australia (14 %). This is becoming a common trend in many regional areas as young adults leave the area to move to larger population centres for tertiary education or employment.[20] This trend is reflected in the increasing average age of firefighting volunteers in the shire. It is a challenge for the Shire to develop effective strategies to engage with the limited younger age groups within the community to maintain the volunteer numbers required to manage both bushfire response and the large program of prescribed burning within the Shire, whilst maintaining and transferring the vast knowledge base currently residing within the older volunteers.

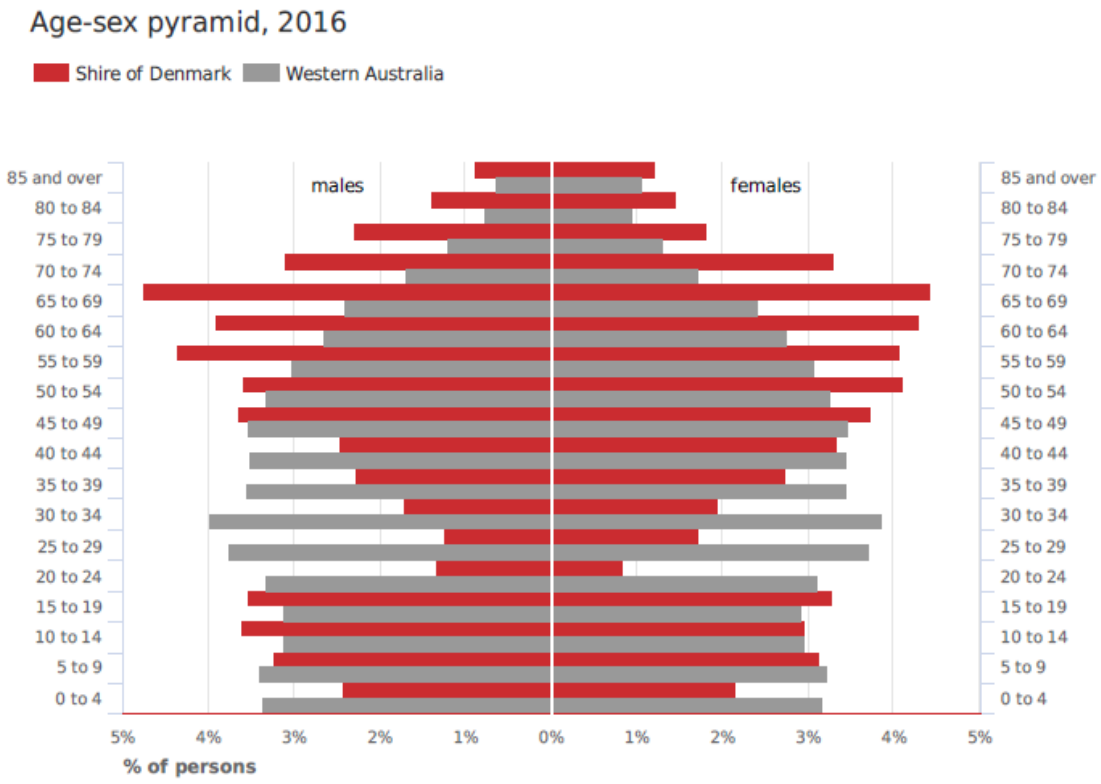


Figure 12- Age sex pyramid 2016 [21]

3.1.4 Economic Activities and Industry

The Shire of Denmark Strategic Community Plan (SCP) identifies the Economy as one of five strategic themes, within this is captured the aspiration *'We are an attractive location to live, invest, study, visit and work'*[22]. The key objectives within this include *'To have a locally supported resilient, stable and*

[19] Great southern Denmark Regional Land supply assessment December 2017

[20] Great southern Denmark Regional Land supply assessment December 2017

[21] Denmark 2027, Strategic Community Plan, December 2017

[22] Denmark 2027, Strategic Community Plan, December 2017 (pp. 5)

innovative business community that embraces creativity, resourcefulness and originality', 'to be a vibrant tourist destination, that celebrates our natural and historical assets', 'to recognise the importance of agriculture in our local economy and protect prime agricultural land'.

The Shire of Denmark's Gross Regional Product is estimated at $280,000,000 which represents 0.1% of the Gross State Product[23]

Major industry sectors in the Shire of Denmark by employment are:

- Education
- Retail Trade
- Tourism (including Holiday accommodation, cafes and restaurants)
- Agriculture/ forestry/ fishing
- Health
- Construction

The Tourism, Agriculture and Forestry industries are the most vulnerable to impacts from bushfire, due to the nature and location of their activities, and their reliance on the road network for both inputs and outputs.

3.1.4.1 Agriculture/Horticulture/Forestry

Viticulture is a major industry within the Shire of Denmark, and its impact on the economy is two-fold, as a primary production industry and as a major attraction for tourism in the area. The presence of a viticulture industry is a significant challenge for the Shire and other land managers when executing prescribed burning programs due to the potential for smoke to impact on grape harvesting.

Conversely, many of the viticulture properties are located in the outer rural sections of the Shire, bordering National Park, Shire reserves or private stands of remnant vegetation. Often tracts of vegetation that pose substantial risk to the community or businesses are precluded from treatment (prescribed burning) due to the potential negative impacts to adjacent viticulture.

Traditional agricultural industry within the Shire of Denmark is mostly beef cattle and dairy oriented. These industries can contribute to bushfire risk during late spring when harvesting for summer hay production occurs, increasing the risk of ignitions. A combination of drying vegetation, grasses and working machinery provide an ideal opportunity for fire ignitions, and many volunteers, particularly farmer response units, can be busy with harvesting operations, reducing their availability for response and prescribed burning activities. This is not a common cause for fire ignitions in the Denmark Shire, only accounting for 5% of the total number of fires in the last 9 years.

The impacts of severe bushfire would have a crippling impact on these industries, through the destruction of feed sources and the disruption to transport corridors within the Shire, to move stock and produce out of the area.

While the forestry industry is declining within the shire, there are still some plantations and some limited harvesting of standing reserves. The decline in harvesting of natural timber resources in the area is leading to the disrepair of access tracks through the more heavily forested areas of the Shire, and an increase in the density of these unmanaged stands, which over time is leading to increased fuel loads over a set period of time until the vegetation reaches a plateau. This issue of

[23] economy.id.com.au/Denmark

increasing/declining/plateau of fuel loads in the Karri/Tingle stands of the South West and Great Southern is an ongoing issue for debate amongst the scientific community.

There are still a number of plantations in the Denmark Shire; these are predominantly Blue Gum (*Eucalyptus Globulus*). The private plantation managers of WA have formed a fire management co-operative, where all members commit to assist each other to attend and suppress bushfires on, or threatening, any member's plantation. This fire co-operative has been co-ordinated through the Forest Industries Federation of WA (FIFWA) and has been in operation since 2007. Each year the group updates each member's estate and develops an atlas of all participating privately managed plantations across the SW and Great Southern regions. The estates of each participating member are colour coded in the atlas, with fireline contact details provided in the directory. This atlas is made available annually to Shires, DBCA district offices and DFES regional offices via either a hard copy A3 map book or digitally.

3.1.4.2 Tourism

The mild climate, rugged coastline, pristine beaches, inlets, rivers, national parks, and towering Karri forests offer visitors unforgettable scenery and plenty of activities. Over 75% of the Denmark Shire is covered by nature reserves, with most of the Shire falling within the Walpole Wilderness Area.

The Denmark region is deemed to be a desirable place to visit based on the wide range of tourist activities that are available in the area. Most of these activities are at their peak during the summer period, which coincides with the southern bushfire season, when bushfire risk is at its highest.

Average annual visitor numbers for the Denmark Shire over the 2015/16/17 years are a total of 147,400 with 91% of those visitors of domestic origin and 9% international [24]

Caravan parks or camping is the predominant accommodation choice for these visitors (31%), which provides challenges in the management of potential evacuation/accommodation of these tourists in the event of a bushfire impacting the Denmark Shire. During peak periods, this type of accommodation attracts large numbers of visitors to remote places, where they are often highly exposed to bushfire risk, with limited options for vehicle access/egress and reduced telecommunications capability. Due to its location, evacuation of the town of Denmark presents some significant challenges. Evacuation to the east is impeded by the river, with a single bridge being the only crossing point for most traffic evacuating the town. To the west, traffic would evacuate via the South Coast Highway, which leads into heavily forests areas, and several smaller towns. The townships of Peaceful Bay and Nornalup also have limited options available for safe and efficient evacuation.

As in many areas of the State, visitors are more frequently choosing private accommodation options through organisations such as Airbnb (14%). Many of these rentals are not appropriately registered with the shire, and as such don't have the same management plans and safety precautions in place as traditional accommodation venues. This poses challenges for the Shire and fire agencies, as these holiday rentals situate 'at risk' people into the more vulnerable locations of the landscape (often the most forested and visually appealing locations). In these areas evacuation is likely to be difficult, particular if visitors are unfamiliar with what to do during a bushfire and do not know the local area. Risks may also be more difficult to mitigate in and around these areas. The Shire attempts to reduce the risk to these visitors through a holiday accommodation policy[25], which places a number of conditions on owners applying to use their property for short-term accommodation. Conditions include having a

[24] www.tourism.wa.gov.au/
[25] Shire of Denmark TPS Policy no 19.5: Holiday homes

property management plan[26] in place, providing appropriate evacuation information to visitors, and adequately maintaining the property in accordance with the annual Fire Management Notice.

The Bibbulmun track is approximately 1000km, starting in Mundaring and traversing through the Denmark shire to its destination to Albany. The Bibbulmun Track is a premier walking trail in WA and hosts a great number of walkers each year. The track is maintained by the Department of Biodiversity, Conservation and Attractions (DBCA) and the active Friends of the Bibbulmun Track.

The Munda Biddi trail is an off-road cycling track which provides a trail from Mundaring through to Albany.

Eco/adventure tourism centred around the Bibbulmun track and cycling the Munda Bidi trail are increasing in popularity, driving a need for agencies to balance the impacts of bushfire mitigation and the potential impacts of bushfires on these significant tourism drawcards.

Each tourist is estimated to spend $316 dollars per visit; this is an injection of $47 million into the Denmark economy annually. The balance between maintaining amenity and therefore the appeal to tourists, without compromising community safety is a challenge for the BRM Planning process.

Table 4 - Employment by industry in the Shire of Denmark [27]

Industry of Employment	Total Employed
Agriculture, Forestry and Fishing	216
Mining	14
Manufacturing	122
Electricity, Gas, Water and Waste Services	8
Construction	156
Wholesale Trade	14
Retail Trade	222
Accommodation and Food Services	225
Transport, Postal and Warehousing	48
Information Media and Telecommunications	5
Financial and Insurance Services	20
Rental, Hiring and Real Estate Services	31
Professional, Scientific and Technical Services	86
Administrative and Support Services	29
Public Administration and Safety	106
Education and Training	241
Health Care and Social Assistance	173
Arts and Recreation Services	38
Other Services	50
Inadequately described/Not stated	92
Total	**1,901**

[26] https://www.denmark.wa.gov.au/documents/361/policy-no-195-property-management-plan
[27] http://quickstats.censusdata.abs.gov.au

3.1.5 Cultural Considerations

The Denmark Shire lies in the Bibbulmun cultural area, which is part of the wider Noongar country region. The area just west of the Hay River is typically an area of overlap where, prior to European settlement, both Bibbulmun and Minang groups met for ceremonial and economic purposes for around 40,000 years[28]

Minang-Bibblmun people gathered on the shores of the Nullaki for thousands of years, utilising the inlets natural resources and caring for cultural sites. Fish traps, artefacts, grinding sites and rock shelters are the predominate sites of significance found in this area[29]. There are 18 State Registered Aboriginal Heritage sites across the Denmark Shire, 10 of which are associated with river and estuarine systems.

The Denmark, Hay and Franklin rivers are the three culturally significant waterways in the Shire of Denmark. The flammability of the vegetation associated with wetlands and river systems and difficulties with suppression activities in areas associated with acid sulphate soils results in an added vulnerability to these culturally significant sites. Bushfire risk assessments have been carried out for heritage sites located within the Shire

As there was such close interaction between both the Minang and Bibbulmun people, Noongar Elders consider it appropriate to consult representatives from both groups on matters of cultural heritage and natural resource management activities. As part of the BRM risk assessment phase and treatment planning process, local Elders will be consulted to ensue these sites are afforded due protection.

Any reference to these sites of significance in the BRM Plan and treatment strategy will be of a general nature so as not to compromise the integrity of the sites. To allow for protection of the sensitive heritage value of these sites, the information relating to the nature or location will not be made publicly available.

The Shire holds a comprehensive municipal heritage register which covers both Aboriginal and European heritage. There are 141 places listed as having significant historical value, of which 3 are listed as state heritage places. These places are also assessed for their vulnerability to fire and an appropriate treatment strategy assigned, where necessary. State heritage places within the Shire of Denmark include:

- Peace Pine Tree
- Denmark District Hospital
- Methodist Church (former), Denmark (Denmark Red cross building, Red cross centre and Church)

3.1.6 Community Values

The Denmark community is highly invested in the amenity and nature of the Town, as shown in figure 13. These sentiments reflect a comprehensive community engagement program undertaken to inform the development of the Community Strategic Plan, which involved surveys, community forums and discussion groups. Community concerns for the environment and the high value placed on preservation of local vegetation in its current state has led to tension within the community between conservation groups and those who believe the environment requires management for fire safety. This has led to less fuel reduction being carried out in some areas. This BRM Plan will attempt to identify treatment

[28] Municipal heritage inventory 2014
[29] Wilson inlet Foreshore Reserves Management plan

strategies that address areas posing a risk to the community and reach a consensus on how to manage the environment and maintain a safer community. This will contribute to one of the aspirations in our Community Strategic Plan, under the theme of Our community "We live in a happy, healthy diverse and safe community with services that support a vibrant lifestyle and foster community spirit."

Figure 13-Community values

3.1.7 Current Bushfire Mitigation management Activities

The Shire's Rangers reported that from 2014-2017 an average of 90% of properties inspected 30 met the requirements of the Fire Break and Fuel Hazard Reduction Notice. This indicates that the majority of landholders inspected undertake bushfire risk mitigation activities to comply with the minimum requirements of the Notice. Since 2014, Shire Rangers have issued fewer warnings In the 2016-17 period and overall the number of infringements issued has decreased. (as shown in Figure 14)

Data for 2018 is more difficult to interpret due to the introduction of a low fuel boundary access requirement, aimed at enabling emergency response personnel to have improved access on rural land. A new inspection strategy was employed by rangers to focus on properties affected by the new requirement. The new measures contained within the current Fire Management Notice (the Notice)

[30] On average 60% of all properties in the Shire of Denmark were inspected in this period

have resulted in a mixed response from the community. Concerns have been raised that compliance with the requirement may result in substantial clearing on some properties and as such, will be reviewed in 2019/20.

Current data is showing a reduction in the number of inspections completed annually. This may be attributed to the length of time it takes to inspect a property and the need for increased consultation with landowners to assist them to interpret and comply with the new requirements. An increase in non compliance due to the application and clarification of this condition until the community assimilates how to translate these changes as they apply to their own landholding.

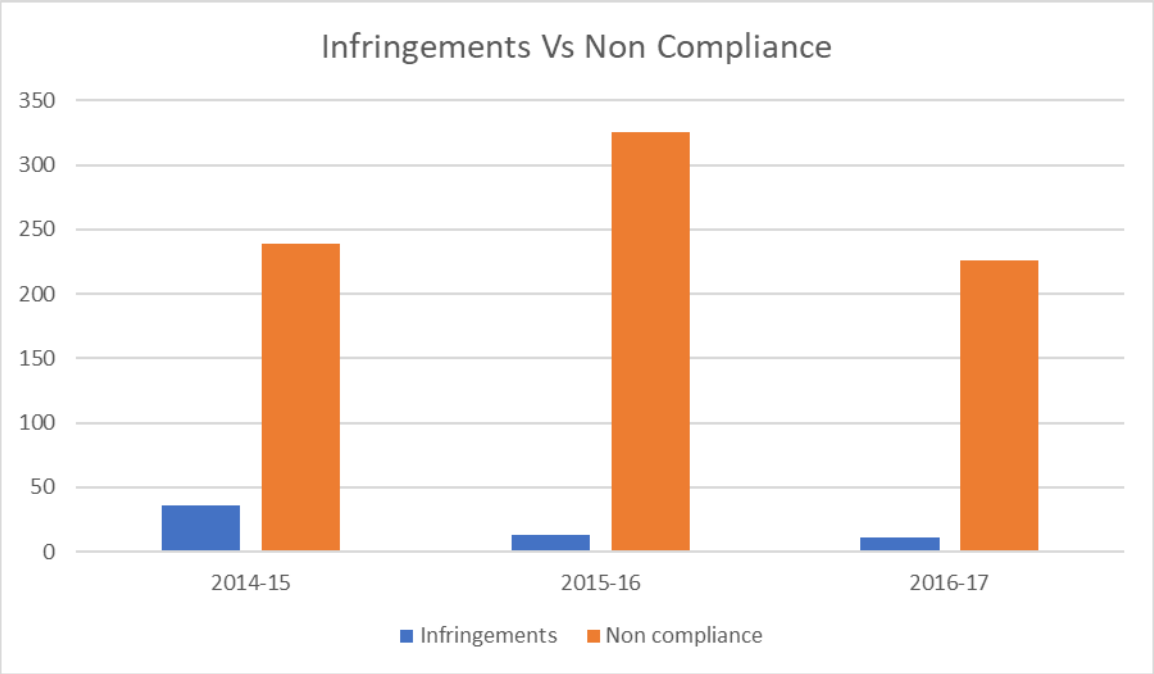


Figure 14 - Shire of Denmark Ranger issued infringements vs non-compliance

3.1.7.1 Bushfire Prone Areas

The intent of the WA Government's *Bushfire Prone Planning 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.[31] The *State Planning Policy 3.7 – Planning for Bushfire Prone Areas* ensures bushfire risk is given due consideration in all future planning and development decisions. As the Policy does not apply retrospectively, the BRM Plan focuses on identifying existing bushfire risk and establishing an effective treatment plan to manage unacceptable community risks.

The Bushfire Prone Areas are shown in 'pink' on the map in Figure 15. The map identifies areas that are designated as subject to, or likely to be subject to, bushfire attack. Where a Bushfire Prone Area cuts across a portion of a parcel of land, the entire parcel is considered to be bushfire prone. The map acts as a trigger to determine whether bushfire protection planning and building requirements may apply to new developments within these areas. Bushfire Prone Areas were first designated in the Shire of

[31] *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* www.planning.wa.gov.au

Denmark in 2015. There is minimal area within the shire of Denmark that is not designated bushfire prone.

A policy requiring construction standards within the shire of Denmark ''Building Design for Fire Safety in Specified Areas'' was adopted by Council on 27th of July 2004. This required all buildings within areas deemed to be of heightened risk from bushfire to be constructed to the standards detailed in AS3959 – Construction of Buildings in Bushfire Prone Areas (AS3959). This policy has since been superseded by State Planning Policy 3.7. This early adoption of a heightened building code for areas deemed bushfire prone means that there are a substantial number of houses built within the Shire to the AS3959 standard.

As at May 2016, the Bushfire Prone Area mapping for Denmark was reflected as presented in Figure 15.

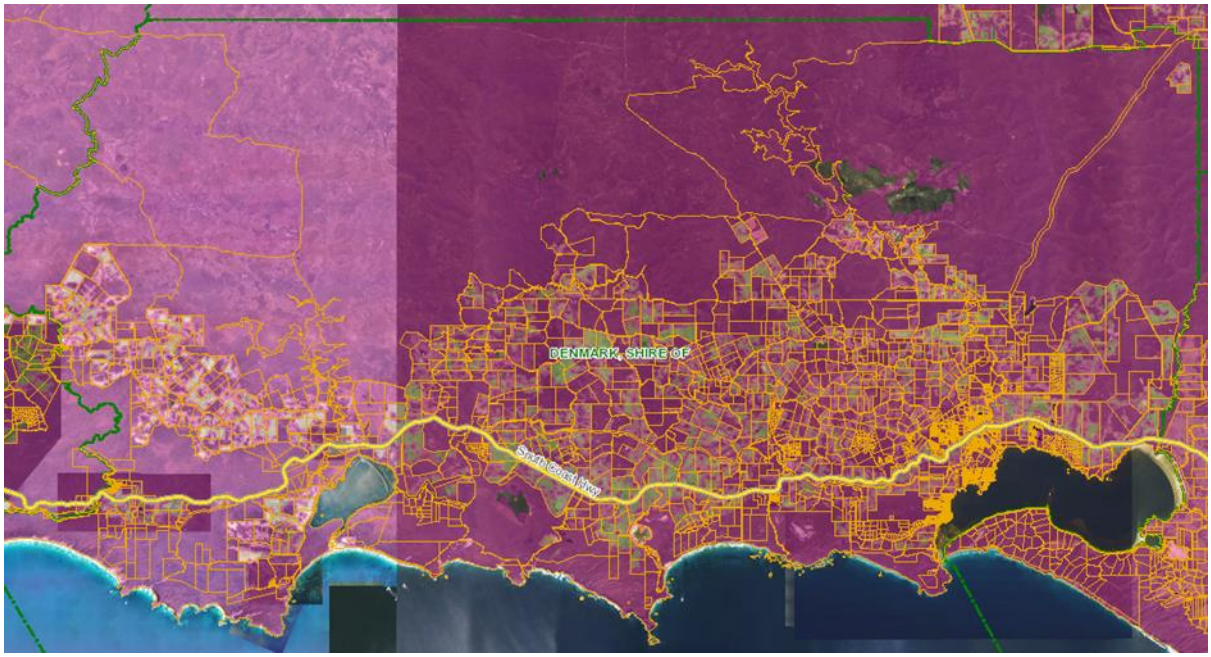


Figure 15- Bushfire Prone Area mapping for the Shire of Denmark [32]

3.2 Description of the Environment and Bushfire Context

3.2.1 Topography and Landscape Features

Generally, the terrain within the Denmark Shire is undulating. However, steep gradients, particularly in the northern region of the Shire, numerous rivers and heavily forested areas can severely restrict access to personnel responding to bushfire ignitions in these areas. Early intervention is critical to response effectiveness, as delays in access allow bushfires to build in intensity, making them more difficult to suppress.

The overall terrain, concentration of wilderness vegetation, waterways and narrow roads within the Shire lead to difficulties with timely evacuation of residents in the event of a bushfire. Appropriate land use planning controls are vital in avoiding new development that proposes significant intensification of

[32] https://maps.slip.wa.gov.au/landgate/bushfireprone/

areas with a significant bushfire risk, without addressing issues relating to evacuation and bushfire risk management in general.

Denmark has a varied coastline with rocky outcrops and white sandy beaches, the majority of Denmark's coastline remains undeveloped, as a high proportion of it lies within national parks or nature reserves managed by DBCA, or is vested with the Shire of Denmark for tourism and recreational purposes.

The Shire of Denmark lies within the Proterozoic (1300-1100 Million years old) Albany-Fraser Orogen geologic province, which trend in an easterly direction along much of the south coast of Western Australia. The Shire covers the southern domain of the Albany Fraser Orogen, which consists of granitic orthogneiss, gneiss and granite of the Nornalup complex. The Nornalup complex has potential for gold and base metal mineralization.

Geologically recent limestone and lime sand deposits are restricted to a narrow coastal strip extending inland from the coast for a distance of 1-3km. Lime sand is currently being mined on the western side of Wilson Inlet and limestone has been mined at Parry Inlet.

Millions of years of weathering has produced a lateritic caprock that is commonly overlain by sand. The laterite is a source of gravel, and has potential as bauxite and clay resources.

3.2.2 Climate and Bushfire Season

The climate in Denmark can be described as Mediterranean with wet winters and warm summers. The fire season commences in November and finishes in April.

Rain in the area is caused predominantly by rain bearing cold fronts from the south and south west. Denmark townsite records an average of 1000mm per year. This rainfall makes Denmark one of the wettest locations in the State. The highest rainfall is experienced at Nornalup, which has an average rainfall of 1290mm per year. Of this, over 800mm falls during an eight-month period, with each of these months receiving more than 100mm. There is a short and mild dry season in January and February. The average number of rain days per year for Denmark is 192, compared to Albany (179 days) and Mt Barker (171 days). The advantage of a winter rainfall climate is that it is not too cold to prevent plant growth and soil wetting is far more effective due to greatly decreased evaporation. In the western high rainfall coastal zone, the growing season begins in mid-February and lasts for 10.5 months. This influences the vegetation types found within the Denmark Shire and the associated bushfire risk, which is described in Section 3.2.1.4

The Southern Ocean provides a moderating effect on temperature in the coastal areas of the Shire, providing smaller diurnal and seasonal variations and a milder climate than inland areas. Mean daily temperatures vary from around 10 degrees in August to 26 degrees in February.

Summers are dry, with December to February receiving a monthly average of less than 25mm of rain. Summers are typically very warm and cloudless, although cooling afternoon sea breezes are common. The hot dry summers and seasonal strong winds create an environment where there is a significant risk of bushfire.

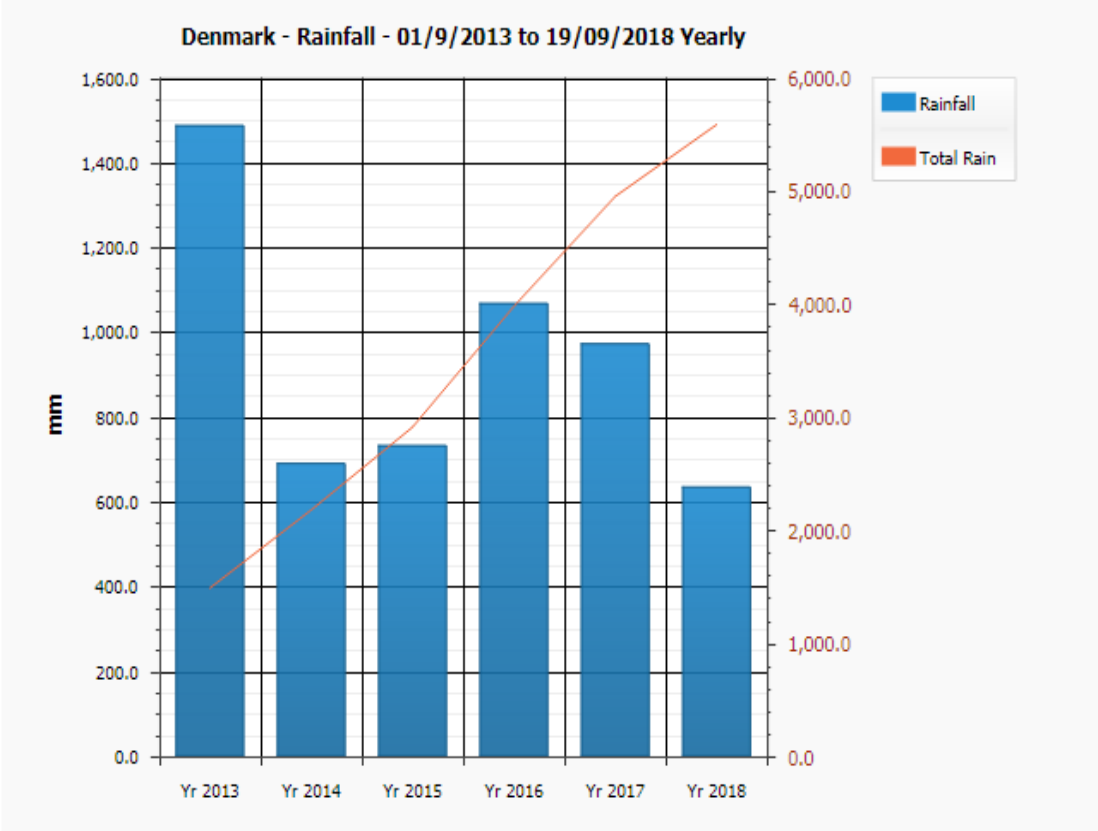


Figure 16 -Denmark annual rainfall[33]

The early to mid- summer is generally dominated by weekly weather cycles and movements of the west coast trough through the area, producing thunder storms and lightning. This is one of the primary causes of bushfire ignitions within the Shire. Destructive gale force winds and widespread bushfires have resulted from periodic incursion of decaying tropical cyclones below the 30°S latitude, most notably the fire of 1937 that burnt in excess of 100,000 ha, most significantly in the Denmark Shire[34].

The extreme fire danger period occurs between December to February (inclusive) due to higher temperatures and low relative humidity. The Great Southern fire season is heavily influenced during January – March by frequent lightning events triggered by the confluence of the of the cool moist air from the Southern Ocean and the warm inland dry air. For much of the year, prevailing winds are generally easterly and of moderate strength (20-30kmh), with southerly sea breezes extending up to 50km inland.

[33] Bureau of Meteorology

[34] N. Burrow., L. McCaw (2013) *'Prescribed burning in southwestern Australian forests',* The Ecological Society of America 11 (Online issue 1).

The high rainfall (1000mm annual average) falls mainly from April/May to October with between 28mm to 50mm in each of the other months.

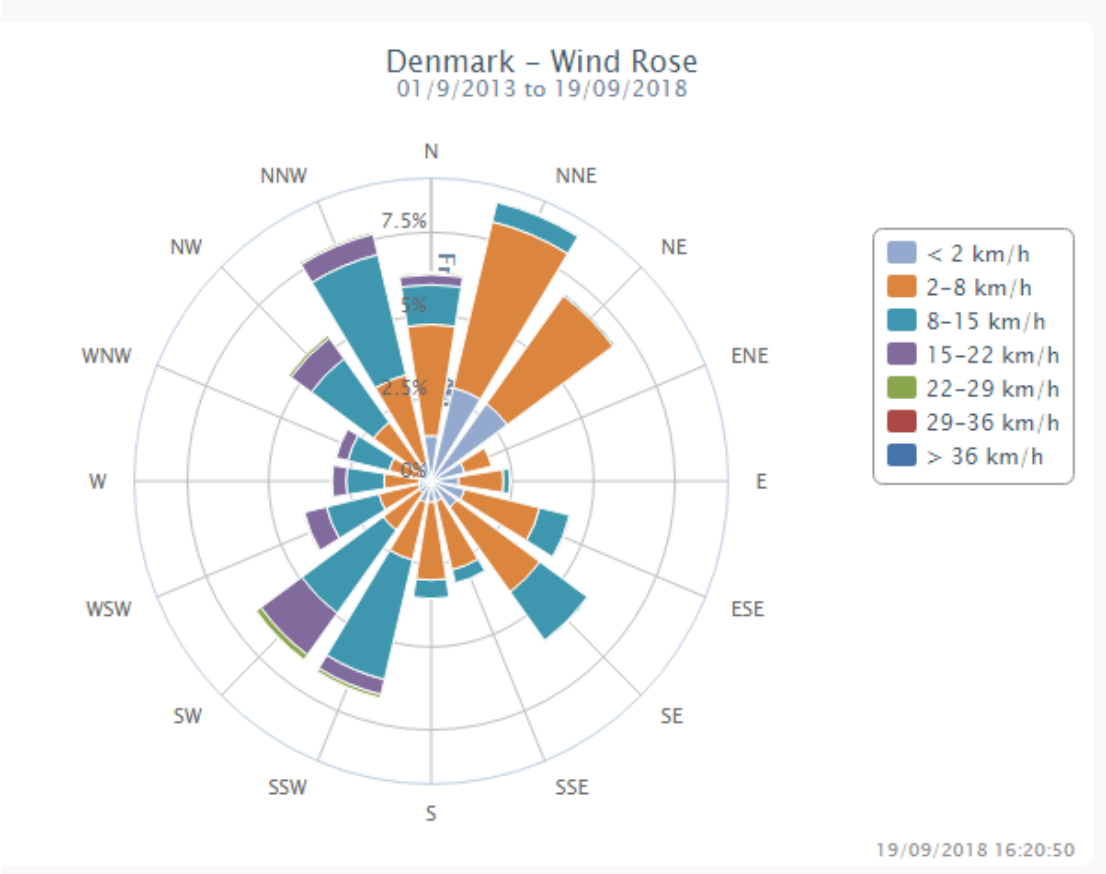


Figure 17- Denmark wind rose[35]

Prevailing winds are from the north-west and south-east, which can prove challenging for bushfire suppression because they generally strong, hot and dry (refer Figure 17 above). The north-westerly winds prevail between January and March, which is the peak bushfire period.

The Bush Fires Act 1954, sections 17 and 18, provide for the 'declaration and gazettal' of Prohibited and Restricted Burning Times, as well as the ability to adjust burning times to suit changing weather conditions.

The fire season is typically from October through to April. This is supported by the fact that the Shire of Denmark endorsed the Restricted and Prohibited Burning times for 2019/2020 as follows:

Prohibited Burning Time (PBT); 16th December to Last Day of February.

Restricted Burning Time (RBT); 1st November to 15th December—1st March to 30th April. Permits are required.

A permit is required to burn any area of standing bush from 1st October to 15th December & 1st March to 30th April.

[35] *Bureau of Meteorology*

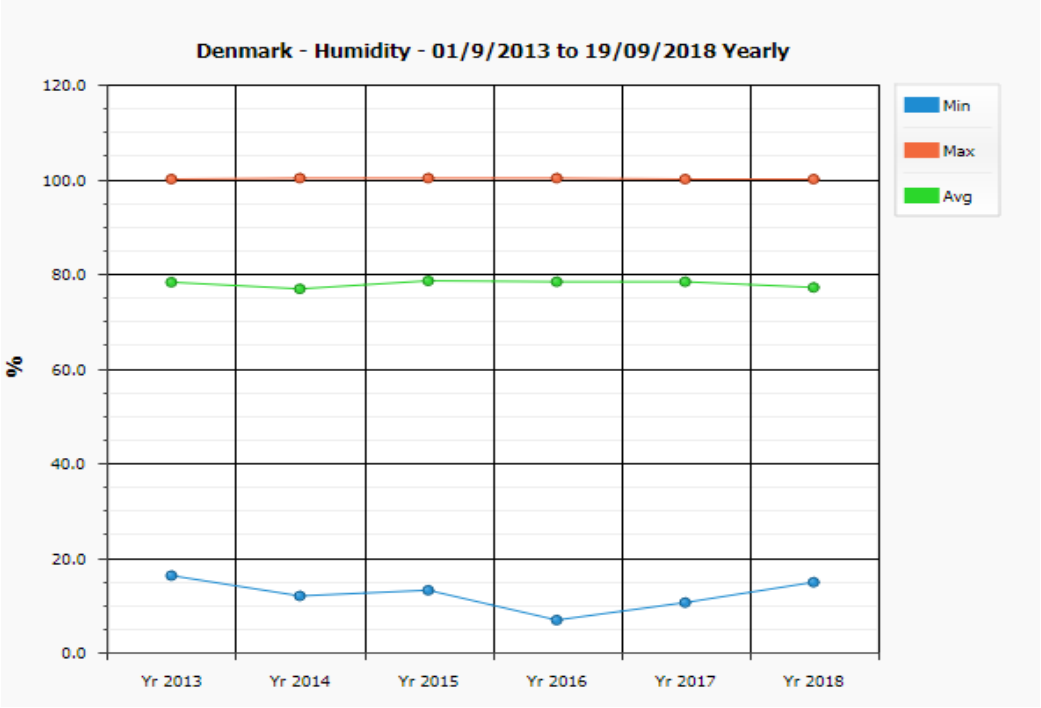


Figure 18 -Denmark Humidity

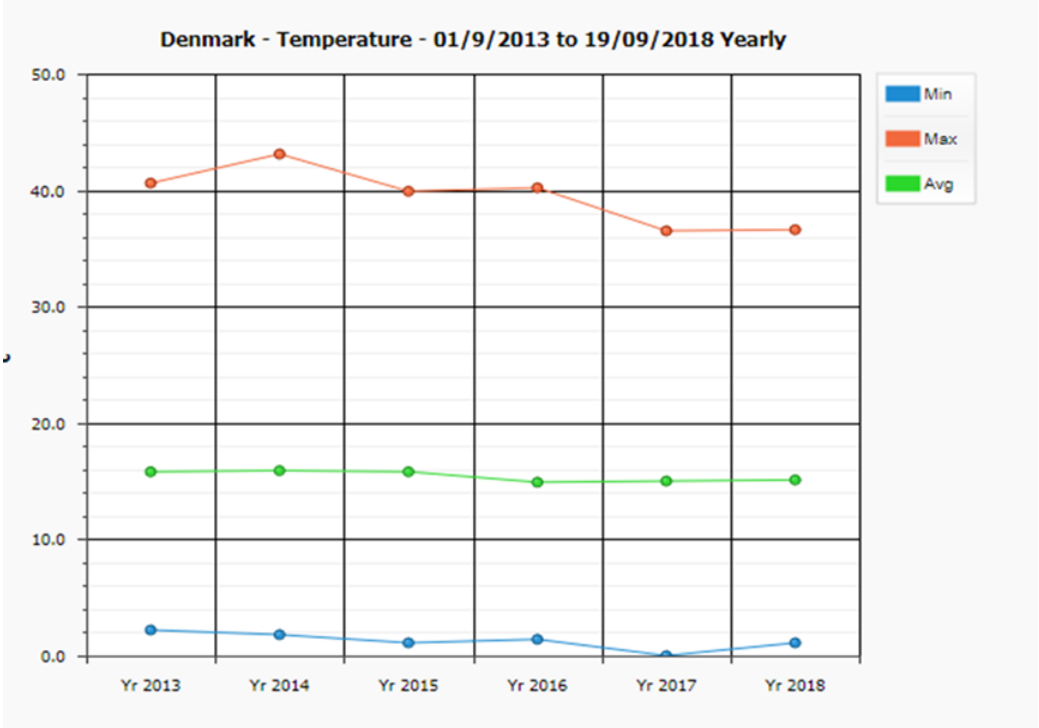


Figure19-Denmark Temperature

3.2.3Climate Change

Over the past few years, a significant amount of data has been produced worldwide to demonstrate the effects that climate change will have on the regions.

The climate of south-western Australia has been in a persistent drying phase since the mid-1970s, with annual rainfall reduced by as much as 20%, primarily due to a decline in autumn and early winter rainfall. Declining autumn rainfall has also extended the length of the high-risk bushfire period into April and occasionally to the beginning of May, with the result that opportunities for safe and effective prescribed burning in autumn may be limited to only a handful of days in some years.

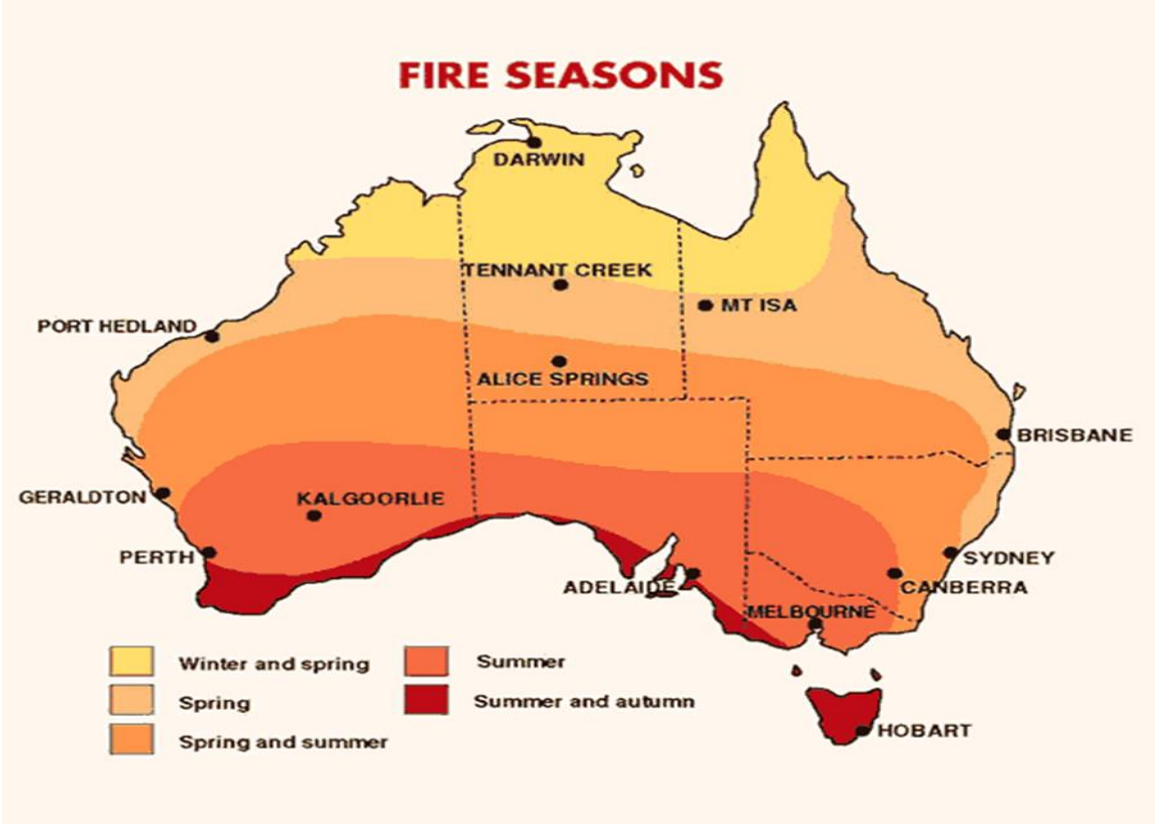


Figure 20- Fire seasons

The warming and drying climate is predicted have the most impact around wetlands, rivers, streams, rainforests and peat swamps, all of which are present in the landscape of the Denmark Shire, these ecosystems are most likely to be adversely impacted if drying leads to an increased frequency of bushfire.

In the South West and Great Southern the climate has become warmer and drier and is likely to continue to dry, with lower winter rainfall and increased average temperatures resulting in a longer 'fire season' and a greater proportion of the landscape that is sufficiently dry to burn.[36]

On average the temperature has increased by 1 degree Celsius. Rainfall has declined along the coast by 20%.[37] Declining rainfall has also extended the length of the high bushfire period into April and occasionally into the beginning of May.[38]

This may result in greater opportunities to undertake prescribed burning in the Denmark shire in spring, which is currently considered a relatively small window for burning. However, this also has implications for a longer, more severe bushfire season.

[36] www.dpaw.wa.gov.au
[37] /www.agric.wa.gov.au
[38] Prescribed burning in Southwest forests N Burrows and L McCaw

3.2.3 Vegetation

The Denmark Shire covers two biogeographic regions; Jarrah Forest and Warren. The area is characterised by Jarrah-Marri forest on the laterite gravel, Marri-Wandoo on the clay soils, *Agonis Spp* shrublands on the eluvial and alluvial deposits and *Melaleuca Spp*/sedge swamps on the leached sandy soils[39]

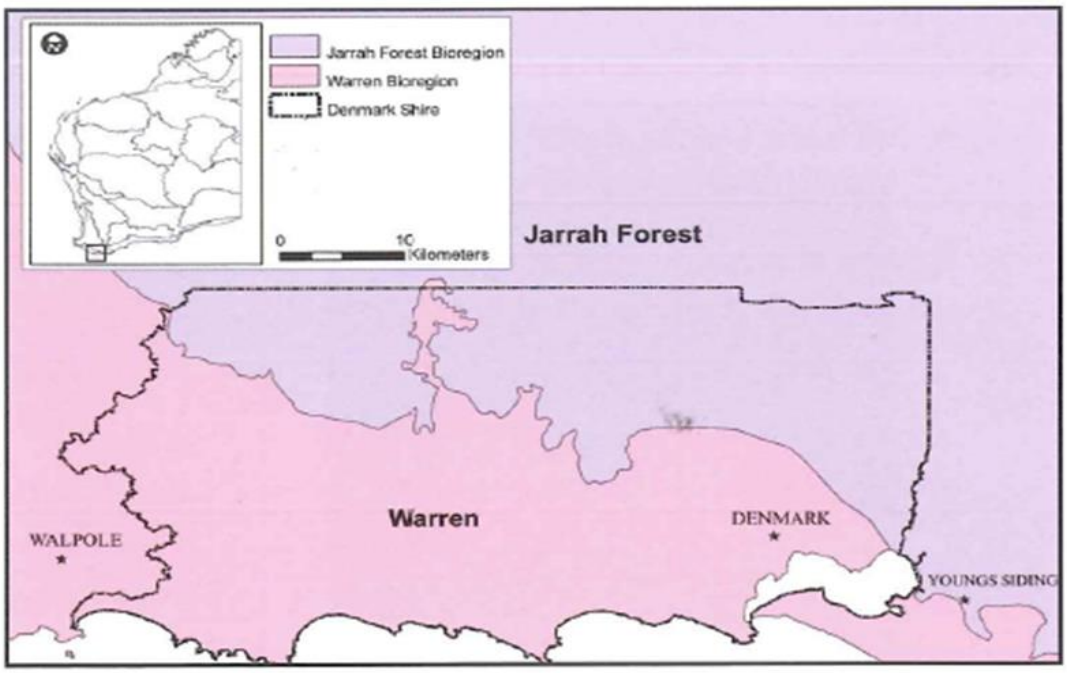


Figure 21- Vegetation regions Denmark Shire [40]

The Jarrah Forest is dominated by two eucalypt species; Jarrah (*Eucalyptus marginata) and* Marri (*Corymbia calophylla).* Other Eucalypts are present but in much lower abundance. The Southern Jarrah Forest contains extensive areas of wetland vegetation in the south–east, dominated by paperbarks, including the Swamp Paperbark (*Melaleuca rhaphiophylla*), and other eucalypts such as the Swamp Yate (*Eucalyptus occidentalis*) and the Albany Blackbutt (*Eucalyptus staeri*). The eastern forest is largely Wandoo woodland, dominated by the canopy species Wandoo (*Eucalyptus wandoo*) and, on breakaways, Powderbark (also known as powderbark wandoo (*Eucalyptus accedens*). Other eucalypts in these eastern areas include York Gum (*Eucalyptus loxophleba*). The upland areas are particularly rich in plant life, while the drier inland plateau is less so. The wetter valleys with fertile soils contain Flooded Gum (Eucalyptus rudis), Bullich *(Eucalyptus megacarpa)* and Blackbutt (*Eucalyptus patens).* Heath is a common understorey of the Jarrah forest in the north and east. See Table 5 for the breakdown of remnant vegetation classes in the Shire of Denmark.

The smaller trees commonly found in Jarrah forest include Bull Banskia (*Banksia grandis*), Sheoak (*Allocasuarina fraseriana*), Snottygobble (*Persoonia longifolia*) and Woody Pear (*Xylomelum occidentale*). Rare plants within the Jarrah Forest include orchid species *Drakaea confluens* and *Caladenia bryceana*, and Baumea reed beds are unique to the forest and adjacent areas. [41]

[39] Visual Fuel Load Guide for Denmark Shire, Department of Fire and Emergency Services. 2010
[40] Bradshaw, FJ., Collins, P.M. and McNamara, P.J. (1997). *Forest mapping in the Southwest of Western Australia.* Department of Conservation and Land Management, Perth.
[41] Bradshaw, FJ., Collins, P.M. and McNamara, P.J. (1997). Forest mapping in the Southwest of Western Australia. Department of Conservation and Land Management, Perth.

The warren bio region typically has four community types, consisting of:

- Tall open forrest dominated by Eucalyptus divirsicolor (Karri) with patches of E jacksonii (Red Tingle) , open forrest dominated by Eucalyptus marginata(Jarrah), Corymbia calophylla (marri)
- Low open forest dominated by Allocasuarina fraseriana(sheoak)and Jarrah

Table 5 -Remnant vegetation in the Shire of Denmark [42]

Denmark Vegetation Association Types	% Remaining
Tall forest; karri (Eucalyptus diverscolor) (1)	55.34
Medium forest; jarrah-marri (3)	82.25
Low forest; jarrah (14)	92.45
Low woodland; Agonis flexuosa (22)	100.00
Low woodland; jarrah-banksia (23)	92.18
Low woodland; paperbark (Melaleuca sp.) (27)	84.60
Shrublands; teatree thicket (37)	77.09
Shrublands; mixed heath (49)	92.31
Sedgeland; reed swamps, occasionally with heath (51)	56.79
Bare areas; salt lakes (125)	5.24
Bare areas; freshwater lakes (126)	21.63
Bare areas; rock outcrops (128)	100.00
Bare areas; drift sand (129)	66.83
Shrublands; Acacia scrub-heath (unknown spp.) (423)	77.17
Mosaic: Medium forest; jarrah-marri / Low forest; jarrah (969)	46.25
Low forest; teatree & casuarinas (977)	78.33
Low forest: peppermint (Agonis flexuosa) (990)	80.51
Shrublands; peppermint scrub, Agonis flexuosa (1109)	98.36
Shrublands; Jacksonia horrida heath (1113)	85.69
Tall forest; karri & red tingle (Eucalyptus jacksonii) (1130)	64.32
Medium woodland; jarrah (south coast) (1134)	100.00
Tall forest; karri & yellow tingle (Eucalyptus guilfoyleii) (1139)	96.98
Tall forest; karri & Rates tingle (Eucalyptus brevostylis) (1140)	100.00
Tall forest; karri, red tingle & yellow tingle (1150)	93.12
Medium forest; jarrah & red tingle (1151)	94.37
Medium forest; jarrah & yellow tingle (1152)	97.72
Medium forest; jarrah & Rates tingle (1153)	88.34
Sedgeland; sedges with low tree savanna woodland; paperbarks over & various sedges (2051)	98.56

A key difference between the Jarrah and Karri vegetation types is the rate at which fuel accumulates. Fuels in Jarrah forests accumulates at approximately 1-2 tones/ha annually, reaching a maximum of about 20 tones/ha in 20 years. Whereas fuels in Karri Forests accumulate at 3-4 tones/ha annually, to reach a maximum of about 60 tonnes/ha in 20 Years.[43]

[42] Roadside conservation Values in the Shire of Denmark
[43] https://www.dpaw.wa.gov.au/management/fire/fire-and-the-environment/51-fuel-loads-and-fire-intensity

3.2.4.1Roadside Vegetation

Since the settlement of Western Australia by Europeans, large areas of native vegetation in the south west of the State have been cleared for agriculture, settlements, and other development. The fragmentation of the more or less continuous expanse of native vegetation communities by clearing has resulted in a mosaic of man-made biogeographical islands of small native vegetation remnants.

The flora and fauna in these areas are in jeopardy due to limited resources, increased disease risk and reduced genetic diversity caused by a diminishing gene pool. Some habitat fragments may be too small to provide the requirements for even a small population; therefore, it is essential to their survival that they have a means of dispersing throughout the landscape. The presence of native vegetation along roadsides often fulfils an important role in alleviating this isolation effect by providing connectivity between bushland remnants.

While many roadside reserves are inadequate in size to support many plant and animal communities, they are integral in providing corridors connecting larger areas of potentially more suitable remnant patches. It is therefore important that all native vegetation is protected, regardless of the apparent conservation value it contains. It is important to acknowledge that even degraded roadsides have the ability to act as corridors for the dispersal of a variety of fauna. Other important values of transport corridor remnants are that they:

- are often the only remaining example of original vegetation within extensively cleared areas;
- often contain rare and endangered plants and animals - roadside plants represent more than 20% of the known populations of threatened flora in Western Austrlia and three species are known only to exist in roadside populations (DPaW, 2014c)
- provide the basis for our important wildflower tourism industry, as roadside native vegetation in good condition is aesthetically pleasing and colorful in season, and easily accessed by travelers;
- often contain sites of Aboriginal or European historic or cultural significance;
- provide windbreaks and stock shelter areas for adjoining farmland, helping to stabilise temperature and reduce evaporation;
- assist with erosion and salinity control, in both the land adjoining the road reserve and further afield; and
- provide a valuable source of seed for regeneration projects, especially shrub species, as clearing and grazing beneath farm trees often removes this layer.

The Roadside Conservation Committee's (RCC) Flora Road Program is one avenue of ensuring roadside conservation values are maintained. There are currently 4 Flora Roads, which have been recently declared within the Shire of Denmark.
These are:

- Tindale
- Scotsdale
- Ficifolia
- Mt Lindsay [44]

A Flora Road is one which has special conservation value because of the vegetation contained within the road reserve. The managing authority may decide to declare a Flora Road based on the results of a survey of roadside conservation value, and upon recommendation of the RCC. The RCC has prepared

[44] Roadside Vegetation and conservation values in the shire of Denmark Nov 2011

Guidelines for the Nomination and Management of Flora Roads. The program seeks to raise the profile of roadsides within both the community and road management authorities.

Road reserves are a potential source of bushfire ignitions due to being areas of frequent human and transport activity, and can be a corridor for fires to carry through the landscape and into developed areas. A balance between maintaining the conservation values of these reserves and appropriate mitigation of bushfire risk within the community needs to be taken into consideration when planning and implementing bushfire treatment strategies.

3.2.4.2 Roadside Fire Management

The WA Roadside Conservation Committee's Guidelines provide the following advice on roadside fire management:

- roadside burning should not take place without the consent of the managing authority;
- local government authorities should adopt by-laws to control roadside burning;
- roadside burning should be planned as part of a total Shire / area Fire Management Plan;
- only one side of a road should be burnt in any one year; *this will ensure habitat retention for associated fauna and also retention of some of the scenic values associated with the road;*
- when designing a Fire Management Plan, the two principles which must be kept in mind are the ecological management of vegetation and the abatement of fire hazard;
- no firebreaks should be permitted within the road reserve unless the width of the roadside vegetation strip is greater than 20m;
- a firebreak on any road reserve should be permitted only when, in the opinion of the road manager, one is necessary for the protection of the roadside vegetation. The road manager shall specify the maximum width to which the break may be constructed; and
- in the case of any dispute concerning roadside fire management, the Department of Fire and Emergency Services (DFES) should be called in to arbitrate.

Before any decision is made to burn a road verge the proponent should be aware of all values present and the impact the fire will have. It is illegal to burn roadsides where threatened flora is present without written permission from the Minister for the Environment. Fire can also be particularly destructive to heritage sites of either Aboriginal or European origin.

More information about fire management in roadsides can be found in the RCC's publication, Biodiversity Conservation and Fire in Road and Rail Reserves: Management Guidelines (2011).

3.2.5 Threatened Flora and Fauna

Flora and fauna represent particular significance for the Shire as they are not only recognised environmental assets in their own right, but also impact the treatment options available for identified risks in relation to other assets.

All treatments need to be assessed in line with the requirements of the identified flora and fauna detailed below, with care given to ensure appropriate authorities are consulted prior to any mitigation work commencing. Where possible, consultation should also occur prior to implementing any response strategies. The Shire will, where possible, remind landowners/managers of their obligation to obtain appropriate clearances and approvals, prior to commencing vegetation-based treatments. This includes:

- Environmentally Sensitive Areas (ESA)
- Declared Rare Flora and Fauna (DRF)
- Threatened Ecological Communities (TEC).

Planning and implementation of bushfire mitigation and response strategies need to consider the potential for activities to contribute to the spread of weeds, invasive species, or diseases such as Phytopthora Cinnamomi (Dieback). Dieback has infected large areas of Jarrah forest across WA. It is easily spread through soil movement from vehicles, people, animals and water. Other fungal-borne diseases can also be spread through these pathways. Appropriate planning and adoption of standard practices that minimise the risk of introducing such species or diseases will assist in protecting vegetation from further degeneration.

3.2.5.1 Flora

Over 70% of the shire of Denmark remains uncleared, with heavy fuels in the forest and heathland areas. These areas are largely inaccessible wilderness zones, which can prove difficult when employing traditional strategies for bushfire suppression. This, in conjunction with dense grasses in pasture areas adjacent to heavy fuels, make the communities within Denmark very vulnerable to bushfires.

The South Coast Natural Resource Management Strategy provides the following description for the Denmark Shire:

> *''the south coastal area is within one of the few global regions featuring exceptional concentrations of species and experiencing exceptional loss of habitat. The high level of biodiversity in the region is partially due to the bio-geographic complexity of the region and the geological and climate history ''*[45]

The WA Herbarium has recorded over 1600 species of native plants within the Shire of Denmark. The most prolific genera are Proteaceae (103 Species (spp)), Orchididaceae (132 spp.), Myrtaceae (119 spp.) and Fabaceae (177 spp.). Some of the areas containing the endangered species are located within protected reserves and forest areas; however, some are located within private lands.

As of January 2011, there were 10 species of threatened flora and 99 priority species found throughout the Shire of Denmark[46]. Where these species warrant inclusion in the BRM Plan they will be recorded and assessed within BRMS and an appropriate treatment assigned.

The impact of a fire regime on vegetation is a consideration when planning mitigation activities. Human settlements are a priority for bushfire mitigation, but consideration is also given within the treatment planning phase to species that will not recover from planned or unplanned fire. See Table 6 for species recorded in the Denmark Shire and their response to fire. 59% of species recorded will survive a fire that results in 100% of the overstorey crown being scorched. This level of canopy scorch in forest environments this would normally only be seen in bushfire events.

[45] Shire of Denmark local planning strategy part 2
[46] Roadside conservation Values in the Shire of Denmark

Table 6- Species response to Fire within the shire of Denmark[47]

Regeneration response to fire with 100% canopy scorch	Number of Species recorded *	% of species recorded
Seed storage on plant	4	2
Seed storage in soil	72	33
None- killed by fire	1	.5
Soil suckers	42	19
Basal sprouts	43	20
Epicormics	8	4
Large apical bud	4	2
Killed by 100% scorch	10	4.5
Survives 100% scorch	2	1
Ferns and allies (spores)	1	.5
Geophyte (Survives 100% scorch)	29	13
Total	216	100

*Full species list in appendix **4**

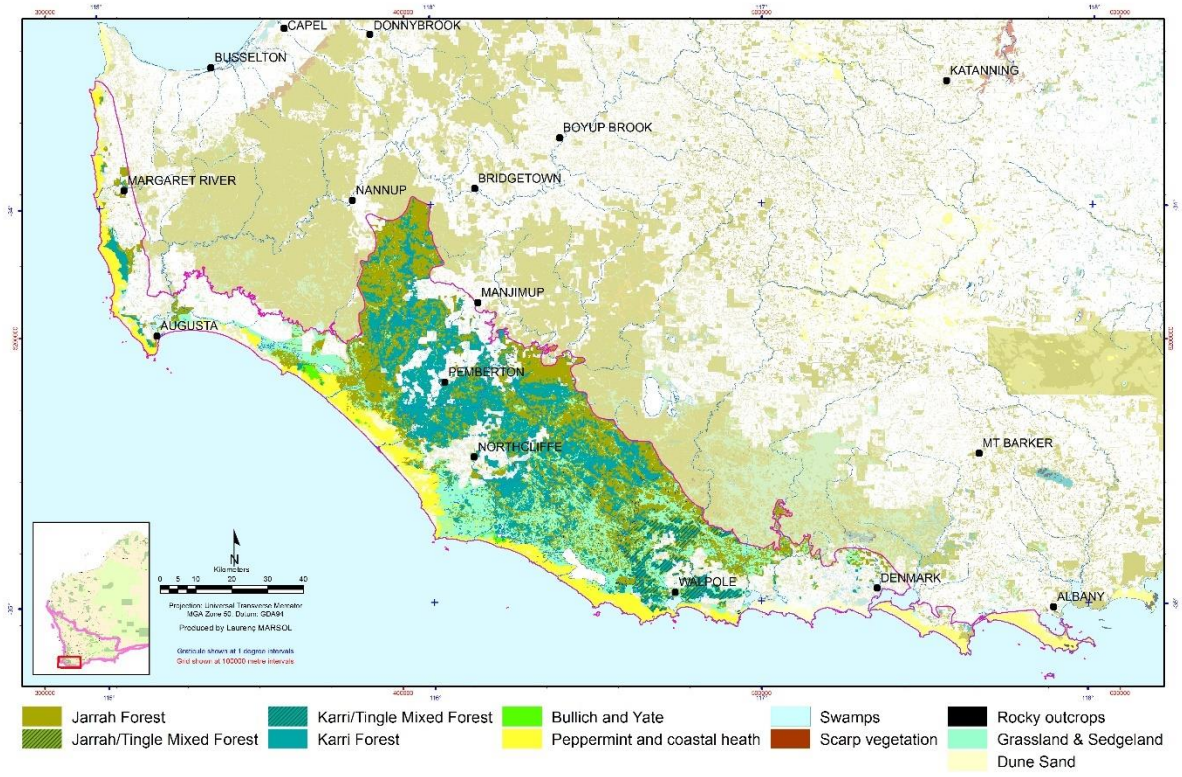


Figure 22- Warren Region Remnant vegetation [48]

[47] Nature Map

[48] https://en.wikipedia.org/wiki/Warren_(biogeographic_region)#/media/File:Warren_Ecoregion_En.jpg

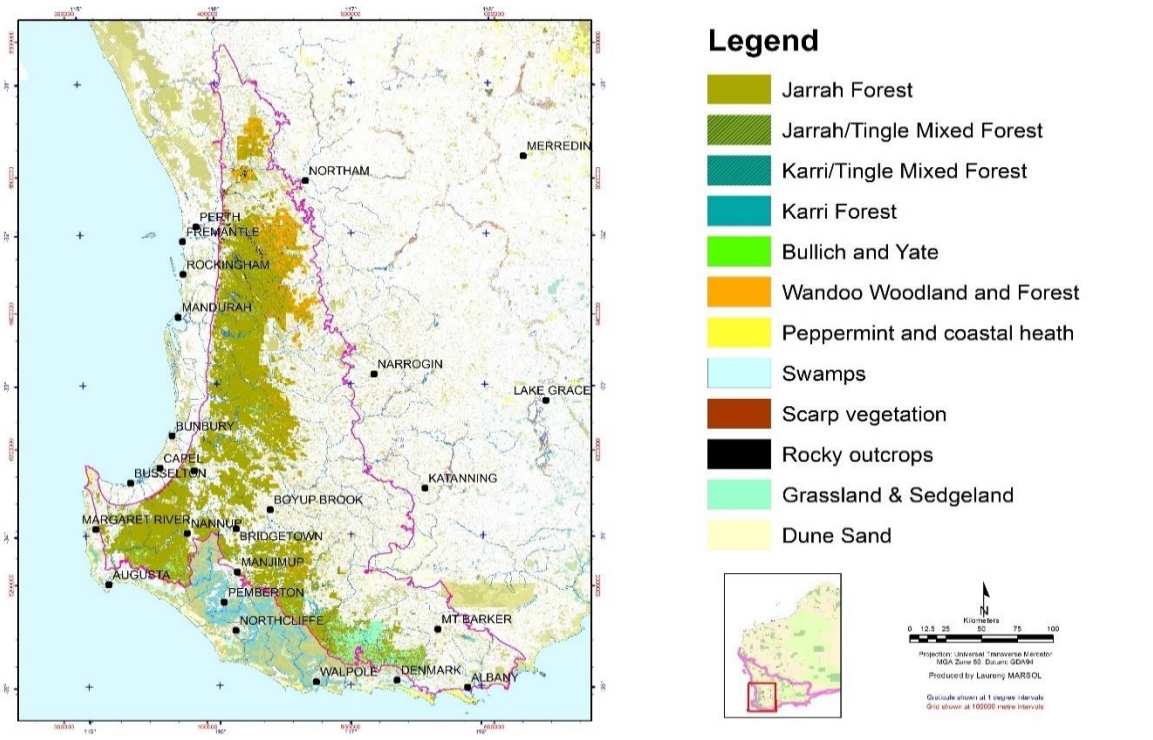


Figure 23- Jarrah forest remnant vegetation [49]

3.2.5.2 Fauna

The western Australian museum records approximately 282 species of fauna from the Denmark area.

Based on distribution data from DBCA, 46 species of threatened and priority fauna have been recorded or sighted throughout the Shire of Denmark.

An example of a fire threatened species endemic to the Denmark Shire is the Quokka. These small marsupials are known to inhabit more mesic parts of the landscape, such as swamps and creeks that can support dense vegetation. Fire plays an important role in maintaining the habitat of this threatened species. Inappropriate fire regimes, including intense wildfires can threaten their populations. In the 2015 O'Sullivan bushfires (in Shire Manjimup and Boddington) neighboring Shires to Denmark, 98,000 hectares of known Quokka habitat was affected. This was thought to have reduced the population of Quokkas in that area by up to 90%.

Fire management outcomes for Quokka conservation uses prescribed burning to either protect areas of healthy habitat and populations from bushfires, or to regenerate senescent habitat that is no longer occupied by Quokkas. Habitat protection burns are carried out in Spring when upland forest is sufficiently dry to burn and when creeks and swamps are too moist to burn.

Preventing large scale landscape fire also prevents tree hollows and larger trees from being heavily affected; which are often critical habitat components for some threatened avian species.

3.3.0 Bushfire Frequency and Causes of Ignition

The major cause of fire ignitions within the Shire of Denmark is from human activities, as is the case all-over Western Australia. Presented at Table 7 is a summary of the fire ignition causes recorded in the

[49] https://upload.wikimedia.org/wikipedia/en/0/04/Jarrah_Forest_En.jpeg

Shire between 2008 and 2017. Based on the fires recorded, 22% of ignition causes were either undetermined or unreported. The most common sources of ignition are burn offs/Re-ignitions (28%), followed by lightning/weather (14%), deliberately lit fires (12%), camp fires/human accident (7%), mechanical and equipment failure (6%), and power lines (5%).

Lightning storms provide a potential source of ignition for bushfires throughout the south western and great southern forests between October and March in most years.[50]

Table 7- Bushfires Summary of Ignition

	2008 /09	2009 /10	2010/11	2011 /12	2012 /13	2013/14	2014 /15	2015 /16	2016 /17	Total
Total Number of Bushfires:	17	18	22	39	17	22	28	16	31	210
Burn off fires	2	2	2	8	4	5	8	4	12	47
Campfires/bonfires/outdoor cooking	0	1	5	1	0	0	0	1	0	8
Cigarette	0	0		0	0	0	0	0	2	3
Electrical Equipment - Cause unknown	0	0	1	0	0	0	0	0	0	1
Equipment - Mechanical or electrical fault	1	0	0	1	0	0	0	0	0	1
Equipment - Operational deficiency	0	0	0	0	1	0	0	0	0	1
Hot works (grinding, cutting, drilling etc..)	0	0	0	1	0	1	0	1	1	3
Other open flames or fire	4	4	0	1	2	1	0	0	1	13
Power lines	0	0	0	3	1	4	0	1	1	10
Re-ignition of previous fire	1	1	1	2	0	1	2	1	2	11
Suspicious/Deliberate	3	3	3	1	1	2	7	2	2	24
Undetermined	2	2	0	2	3	1	2	0	1	13
Unreported	4	4	4	4	0	2	4	4	9	35
Vehicles (incl. Farming Equipment/Activities)	0	0	5	2	0	2	1	0	0	10
Weather Conditions - Lightning	0	0	0	13	5	2	4	3	0	27
Weather Conditions (High winds, natural combustion etc. Excludes Lightning)	0	1	0	0	0	1	0	0	0	2

[50] N. Burrow., L. McCaw (2013) 'Prescribed burning in southwestern Australian forests', The Ecological Society of America 11 (Online issue 1).

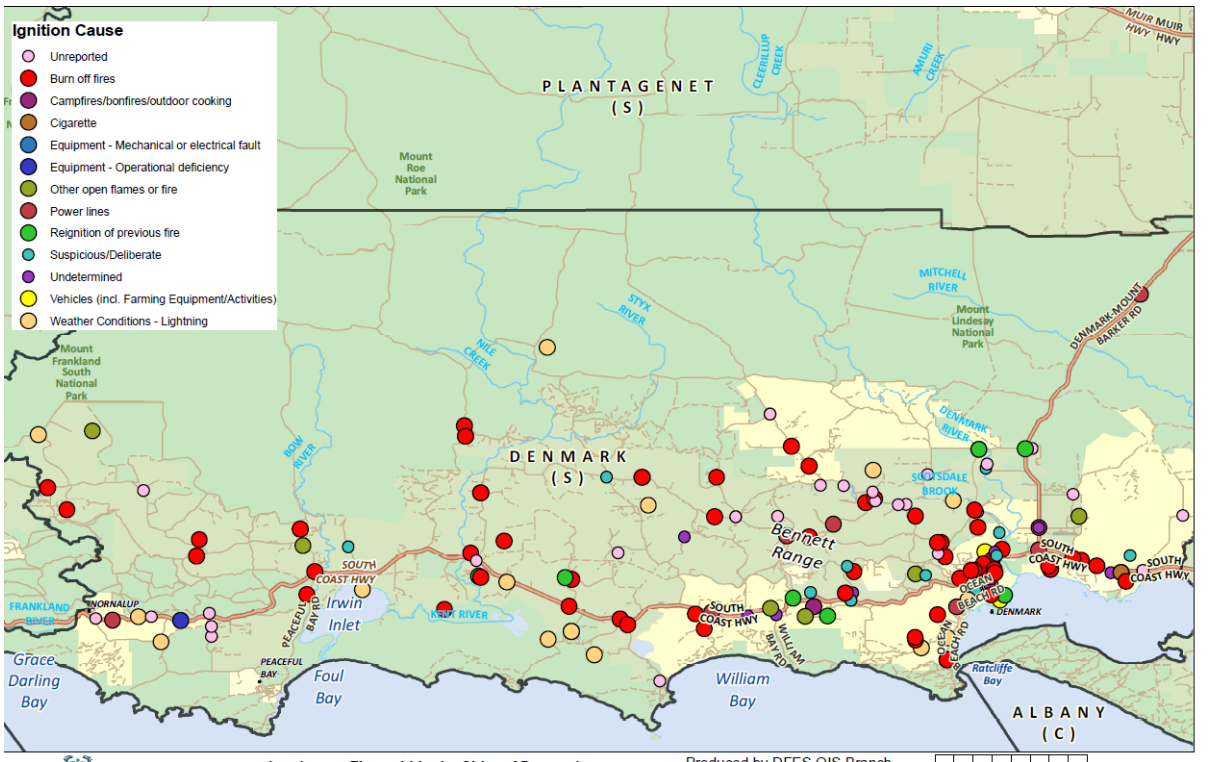
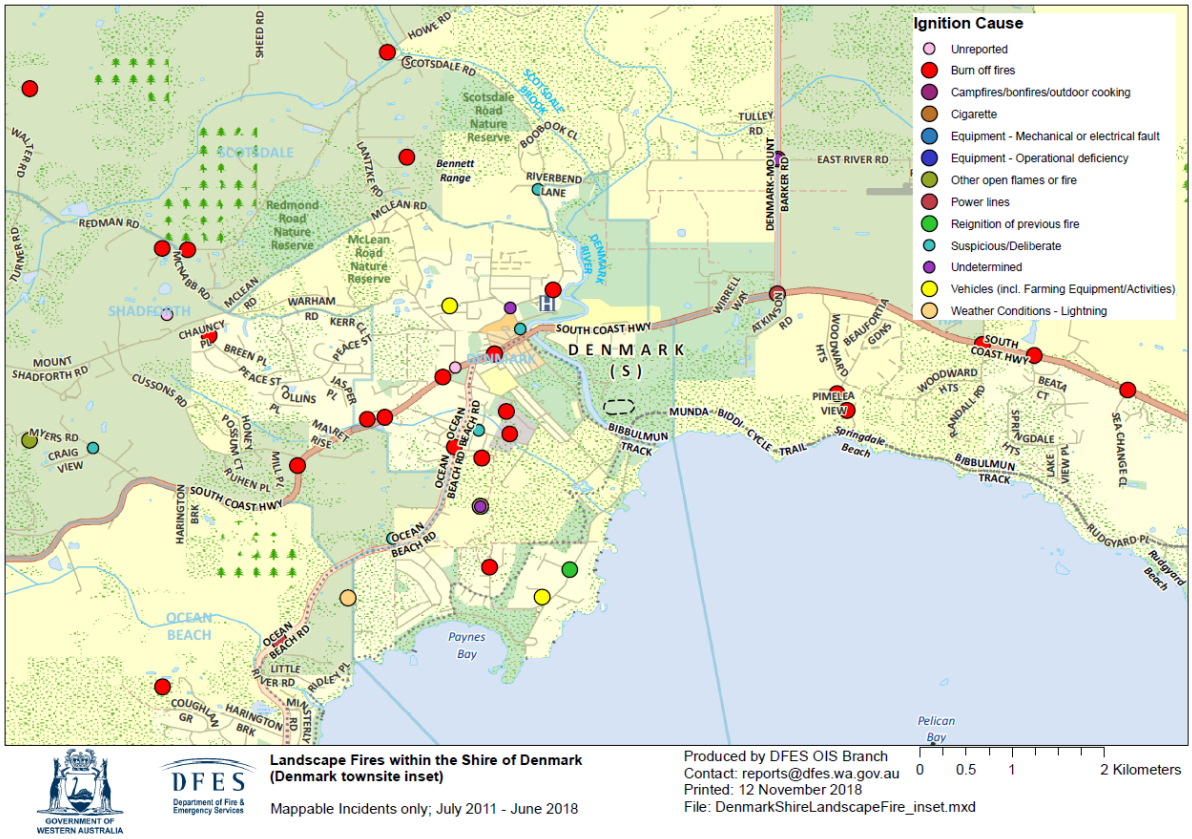


Fig 24- Landscape fires within the Shire of Denmark [51]



[51] DFES OIS Branch

Figure 25- Landscape fires within the town of Denmark (townsite inset)[52]

The previous maps (Figures 24 and 25) show the locations of unplanned ignitions occurring within the Shire between July 2011 and June 2018. Escaped burns are the most common cause of unplanned fire in the Shire. The locations of these fires are understandably distributed throughout the rural areas of the Shire. This could be a result of the large areas of remnant vegetation that are located on private property.

The Denmark Fire Control Notice requires landholders to manage fuel loads on private property, often prescribed burning is the most cost-effective way for landholders to manage fuels, but it is not the only method available. The nature of the vegetation, landscape and terrain within the Shire can add complexity to prescribed burning in some areas.

Bush Fire Brigades can be engaged to carry out burns on behalf of landholders that require assistance. However, due to the volume of requests, the current support and training for prescribed burning, and the voluntary nature of the brigades, their capacity to undertake with the work load is limited. The treatment schedule associated with the BRM Plan will be used to prioritise planned burns and build a plan for additional resources if necessary

The Shire of Denmark values community education for resilience and capacity building for residents and bushfire volunteers. Access to fuel management strategies for private property holders will be addressed through the Treatment Strategy (via community engagement based strategies) associated with the BRM Plan.

As there are generally only a small number of days each year in which the Fire Danger Index (FDI) is above 50 (Severe – Catastrophic) in the Shire of Denmark, there is some complacency within the community with respect to their perceptions of risk and the potential for large scale bushfires to impact the Shire. The nature of the Wet Sclerophyll forests surrounding the town give the impression of a benign vegetation, not susceptible to large scale bushfires. However, in the November/December 2018 fires in Queensland's Tropics more than 3.6 million hectares of Rainforest were lost. Such events indicate that our weather patterns and the general drying trend, coupled with more people moving into fire prone areas, are leading towards increased susceptibility to bushfire in these forest types.

3.3.1 Fire history within the landscape

Catastrophic fires are reasonably infrequent in the Denmark Shire, with only significant 3 events occurring over the past 80 years. These fires, when they do occur, tend to run for an extended period of time with catastrophic consequences for the environment and the community.

On the 10 February 1937, a fire burnt through Walpole and Denmark for 15 days. It is estimated that the fire burnt 100,000 hectares of Karri, Tingle, Jarrah forests and coastal vegetation. Unofficial descriptions suggest the fire may have been much larger. The Shire of Denmark was the most significantly affected. The spring and summer of 1936 were described as the driest on record. The fire weather was influenced by a cyclone that had developed in the Northwest and travelled down the coast affecting Perth and the Southwest. The associated hot dry winds continued to affect the Southwest with wind speeds recorded at Busselton at 117km/hr. Extreme fire behaviour was reported with extensive

[52] DFES OIS Branch

crown behaviour and ember attack well ahead of the fire. There were reports of losses of farm houses and outbuildings throughout the fire-affected area, in addition to livestock, fences, hay and pasture. Infrastructure losses included the bridge over the Frankland River at Nornalup.

On the 21 and 22 January 1987 a large fire burnt through Karri, Tingle and Jarrah forests and flats in the Hilltop area of Walpole-Nornalup National Park. Heavy fuels in areas unburnt for up to 27 years caused extreme fire behaviour which challenged the suppression efforts. The winds pushed the fire west and southwest to within two kilometres of the Walpole townsite. The fire was contained in the low fuel zone maintained around the town. Had the forecast wind change to the Northwest occurred, the settlement of Nornalup would have been threatened and difficult to protect. A total area of 1,600 ha of National Park was burnt. The Soil Dryness Index was 1450, considerably higher than the previous summers. The fuel was dry due to the very dry summer being experienced at the time[53].

On the 7 March 2001, following an electrical storm, an area of 2,700 ha was burnt within the Nuyts Wilderness area of the Walpole-Nornalup National Park. The seven months preceding the fire had been one of the driest periods on record. As a result, at the time the fire occurred the soil dryness index was extremely high and the surface moisture content very low. The high soil dryness index coupled with high fuel levels and the senescent state of much of the vegetation, was to produce a fire that was both difficult to control, and to have a high environmental impact. The mild weather conditions that existed throughout the period of the fire however, had a moderating influence.[54]

A significant portion of the area however, had not experienced fire for 40 years and in some cases longer. The vegetation in much of the longer unburnt areas was in various states of senescence, with dead vegetation coexisting with living plants. This was true for much of the heath-land, scrubland and the forested areas, and was to have a significant influence on the behaviour of the fire, and its resultant impact. [55]

The impact of the fire on forested areas was high. The degree and nature of the impact was determined largely by the forest structure, dominant tree species, topography, fuel accumulation and the time of day or night at which the fire passed through. Much of the area of forest that burnt downhill, and at night, suffered minimal crown scorch. Crown scorch was noticeably lower in areas that were back-burnt as opposed to those that were burnt by the head fire. The lower impact of the back-burn was particularly noticeable on the tree species that are killed outright if burnt or defoliated by scorch. Swamp banksia, *Banksia seminuda* and Warren River cedar, *Agonis juniperina*, are both fire sensitive species but many of the trees of these species suffered minimal canopy scorch and survived the lower intensity back-burn.[56]

3.3.2 Response capability

Bushfire response in the Shire of Denmark is wholly undertaken by volunteers.

There are 18 brigades within the Shire of Denmark, including 1 Volunteer Fire and Rescue Service (VFRS) brigade, which is coordinated by the Department of Fire and Emergency Services (DFES). The remaining brigades are Bush Fire Brigades coordinated by the Shire of Denmark. In conjunction with DFES, the Shire employs a Community Emergency Services Manager (CESM) to assist with the

[53] 1987. J.S. Evans, *Fire 11 Walpole – 21 January 1987, Southern Forest Region, Manjimup.* (Draft Notes)
[54] 2001 E. Middleton, *Nuyts Wilderness Wildfire Impact Report, 7-11 March 2001, Walpole, Western Australia.*
[55] 2001 E. Middleton, *Nuyts Wilderness Wildfire Impact Report, 7-11 March 2001, Walpole, Western Australia.*
[56] 2001 E. Middleton, *Nuyts Wilderness Wildfire Impact Report, 7-11 March 2001, Walpole, Western Australia.*

administration and coordination of these brigades, along with undertaking a range of other emergency management functions.

According to the 2016 Census, the level of volunteerism with in the Shire was 29.8%. This is significantly higher than the State average of 19%.[57] In line with the age demographic for the Denmark Shire there are a significant number of volunteers who are over 50. The depth of local knowledge, confidence and connection to community networks found in these volunteers is of significant benefit to the community. However, an ageing demographic can present other challenges relating to succession planning and maintaining the well-being, efficiency and suitability of brigade in relation to the needs of the community it serves. There is a great willingness to pass on experience to the next generation of volunteers; however, as with state-wide trends, there is a reduction in number of younger volunteers being attracted and retained within community organisations like the emergency services. Methods of recruiting and retaining a younger demographic, whilst retaining the wealth of experience that already exists within our volunteer community are being explored and remains a challenge for those involved in the emergency management sector of the Denmark Shire.

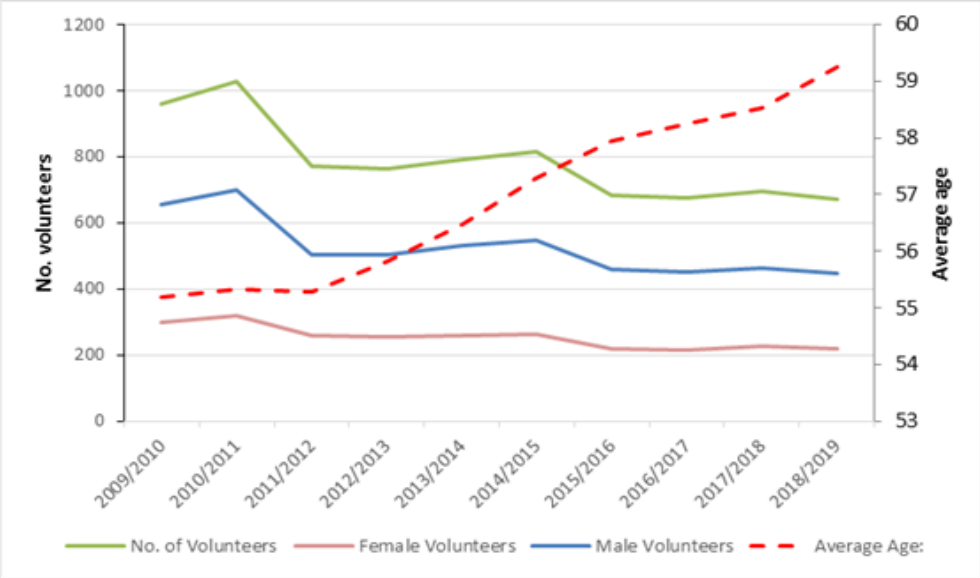


Figure 26 Decline of Volunteers Vs Ageing

In recent years there has been an increase in the use of social media as an effective tool to disseminate educational and emergency incident information to the community, which ensures people are able to prepare appropriately and respond quickly to emerging events. The Shire and local residents make use of social media applications such as 'Facebook' and the Shire website in order to keep the community informed.

The Shire of Denmark, in conjunction with DFES, has been proactive in supporting the community to implement a community-based bushfire preparedness program, Bushfire Ready. This program is gaining momentum within the Shire and is aimed at facilitating personal bushfire preparedness at a neighbourhood level and fostering a collaborative approach for communities to prepare for and respond to bushfires. This has led to implementation of an advanced warning system, with Bushfire Ready Program Coordinators being the first point of contact to disseminate accurate and timely advice to their

[57] Abs http://quickstats.censusdata.abs.gov.au

community contacts, so that the community can make informed decisions regarding their personal response plans

Table 8 Volunteer numbers and resources - Shire of Denmark as at 26 September 26, 2019 58

Brigade	Volunteers	Resources
Hazelvale /Tingledale	19	Light Tanker, 4.4B
Nornalup	21	Light Tanker, 3.4 Urban
Peaceful Bay	27	Light Tanker, 3.4 Urban
Mehniup	12	1.4 Rural
Kordabup/ Owingup	65	Light Tanker x 2, 2.4B
Somerset Hill	17	1.4 Rural
Parryville	30	Light Tanker
Harewood	45	Light Tanker ,2.4B
Carmarthen	17	2.4 Urban , 1.4 Rural
William Bay	29	2.4 Rural
Mt Lindesay	37	2.4B
Scotsdale/ Shadforth	34	Light Tanker,4.4B
Denmark East	31	2.4 Urban
Ocean Beach	41	Light Tanker, 3.4 Urban
Denmark VFRS	20	3.4 Urban , Light Tanker
Total	426	22

[58] Shire Of Denmark

4 Asset Identification and Risk Assessment

4.1 Planning Areas

The Shire of Denmark has been divided into six planning areas:

- Denmark Town
- North Denmark,
- Shadforth
- William Bay
- Peaceful Bay
- Nornalup

Attached at **Appendix 2** is a map showing the boundaries of the planning areas identified within the Denmark Shire.

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 8.

Table 8-Denmark Planning Area Assessment Summary

Risk Factor	*Denmark Town*	*North Denmark*	*Shadforth*	*William Bay*	*Peaceful Bay*	*Nornalup*
1. % of LG Population in Planning Area	Very High 50-75% **160**	Low 0-10% **20**	25-50% **80**	10-25% **40**	10-25% **40**	10-25% **40**
2. Fuel Structures	High Some large areas of mixed vegetation types, small pockets of vegetation and some low fuel areas. **60**	Extreme Heavy fuels over a large proportion of the area, heavy tall forests with a full understorey **100**	High Some large areas of mixed vegetation types, small pockets of vegetation and some low fuel areas. **60**	High Some large areas of mixed vegetation types, small pockets of vegetation and some low fuel areas. **60**	Very High Mainly large areas of continuous vegetation with some areas of low fuels **80**	Extreme Heavy fuels over a large proportion of the area, heavy tall forests with a full understorey **100**
3. Assets	Medium Local assets plus one or two Regional assets in the area **40**	Low Only local assets in the area. **20**	Medium Local assets plus one or two regional assets in the area. **40**	Medium Local assets plus one or two regional assets in the area. **40**	Medium Local assets plus one or two regional assets in the area. **40**	Medium Local assets plus one or two regional assets in the area. **40**
4. Rural Urban Interface	**Very High** A reasonable area of urban bushland interface, a large number of rural residential subdivisions with many being bush blocks **80**	**Low** Very few areas of urban bushland interface, small number of rural residential subdivisions with no bush blocks **20**	**High** Some areas of urban bushland interface, a moderate number of rural residential subdivisions with some being bush blocks. **60**	**High** Some areas of urban bushland interface, a moderate number of rural residential subdivisions with some being bush blocks. **60**	**High** Some areas of urban bushland interface, a moderate number of rural residential subdivisions with some being bush blocks. **60**	**High** Some areas of urban bushland interface, a moderate number of rural residential subdivisions with some being bush blocks. **60**
5. Suppression response times	**High** Medium response times with resources able to be at the incident within 30-60 minutes. **60**	**Very High** Poor response time with resources able to be at the incident 1-6 hours **80**	**High** Medium response times with resources able to be at the incident within 30-60 minutes. **60**	**High** Medium response times with resources able to be at the incident within 30-60 minutes. **60**	**High** Medium response times with resources able to be at the incident within 30-60 minutes. **60**	**High** Medium response times with resources able to be at the incident within 30-60 minutes. **60**

6. Suppression strategies	**Very High** Considerable restrictions on ability to employ all bushfire fighting strategies. **80**	**Extreme** Significant restrictions on ability to employ all bushfire fighting strategies. **100**	**Extreme** Significant restrictions on ability to employ all bushfire fighting strategies. **100**	**Very High** Some restrictions on ability to employ all bushfire fighting strategies. **80**	**Extreme** Significant restrictions on ability to employ all bushfire fighting strategies. **100**	**Extreme** Significant restrictions on ability to employ all bushfire fighting strategies. **100**
TOTAL	**480**	**340**	**400**	**340**	**380**	**400**
PRIORITY	**1**	**5**	**2**	**6**	**4**	**3**

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 9 – Asset Categories and Subcategories

Asset Category	Asset Subcategories
Human Settlement	• **Residential areas** Rural urban interface areas and rural properties. • **Places of temporary occupation** Commercial, mining and industrial areas located away from towns and population centres (that is, not adjoining residential areas). • **Special risk and critical facilities** Hospitals, nursing homes, schools and childcare facilities, tourist accommodation and facilities, prison and detention centres, government administration centres and depots, incident control centres, designated evacuation centres, police, fire and emergency services.
Economic	• **Agricultural** Pasture, grazing, livestock, crops, viticulture, horticulture and other farming infrastructure. • **Commercial and industrial** Major industry, waste treatment plants, mines, mills and processing and manufacturing facilities and cottage industry. • **Critical infrastructure** Power lines and substations, water and gas pipelines, telecommunications infrastructure, railways, bridges, port facilities and waste water treatments plants. • **Tourist and recreational** Tourist attractions and recreational sites that generate significant tourism and/or employment within the local area. • **Commercial forests and plantations** • **Drinking water catchments**
Environmental	• **Protected** Rare and threatened flora and fauna, ecological communities and wetlands. • **Priority** Fire sensitive species and ecological communities. • **Locally important**

Asset Category	Asset Subcategories
	Nature conservation and research sites, habitats, species and communities, areas of visual amenity.
Cultural	• **Aboriginal heritage** Places of indigenous significance. • **Recognised heritage** Assets afforded legislative protection through identification by the National Trust, State Heritage List or Local Planning Scheme Heritage List. • **Local heritage** Assets identified in a Municipal Heritage Inventory or by the community. • **Other** Other assets of cultural value, for example community centres and recreation facilities.

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 10 – Asset Category Proportions

Asset category	Proportion of identified assets
Human Settlement	*77 %*
Economic	12%
Environmental	3%
Cultural	7%

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 11 – Likelihood Ratings

Likelihood Rating	Description
Almost Certain (Sure to Happen)	• Is expected to occur in most circumstances; • High level of recorded incidents and/or strong anecdotal evidence; and/or • Strong likelihood the event will recur; and/or • Great opportunity, reason or means to occur; • May occur more than once in 5 years.
Likely (Probable)	• Regular recorded incidents and strong anecdotal evidence; and /or • Considerable opportunity, reason or means to occur; • May occur at least once in 5 years.
Possible (feasible but < probable)	• Should occur at some stage; and/or

Likelihood Rating	Description
	• Few, infrequent, random recorded incidents or little anecdotal evidence; and/or • Some opportunity, reason or means to occur.
Unlikely (Improbable, not likely)	• Would only occur under exceptional circumstances.

'Likelihood' has been assessed in the context of:

- **Separation Distance** – the distance between the asset and the hazard vegetation, and
- **Fuel Age** – the period of time elapsed since the fuel was last burnt

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 12 – Consequence Ratings

Consequence Rating	Descriptions
Minor	• No fatalities. • Near misses or minor injuries with first aid treatment possibly required. • No persons are displaced. • Little or no personal support (physical, mental, emotional) required. • Inconsequential or no damage to an asset, with little or no specific recovery efforts required beyond the immediate clean-up. • Inconsequential or no disruption to community. • Inconsequential short-term failure of infrastructure or service delivery. (Repairs occur within 1 week, service outages last less than 24 hours.) • Inconsequential or no financial loss. Government sector losses managed within standard financial provisions. Inconsequential business disruptions.
Moderate	• Isolated cases of serious injuries, but no fatalities. Some hospitalisation required, managed within normal operating capacity of health services. • Isolated cases of displaced persons who return within 24 hours. • Personal support satisfied through local arrangements. • Localised damage to assets that is rectified by routine arrangements. • Community functioning as normal with some inconvenience. • 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.) • Local economy impacted with additional financial support required to recover. Government sector losses require activation of reserves to

Consequence Rating	Descriptions
	cover loss. Disruptions to businesses lead to isolated cases of loss of employment or business failure. • Isolated cases of damage to environmental or cultural assets, one-off recovery efforts required, but with no long term effects to asset.
Major	• Isolated cases of fatalities. • Multiple cases of serious injuries. Significant hospitalisation required, leading to health services being overstretched. • Large number of persons displaced (more than 24 hours duration). • Significant resources required for personal support. • Significant damage to assets, with ongoing recovery efforts and external resources required. • Community only partially functioning. Widespread inconvenience, with some services unavailable. • 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.) • 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. • Significant damage to environmental or cultural assets that require major rehabilitation or recovery efforts. • 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).
Catastrophic	• Multiple cases of fatality. • Extensive number of severe injuries. • Extended and large number requiring hospitalisation, leading to health services being unable to cope. • Extensive displacement of persons for extended duration. • Extensive resources required for personal support. • Extensive damage to assets that will require significant ongoing recovery efforts and extensive external resources. • Community unable to function without significant support. • 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.) • 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. • Permanent damage to environmental or cultural assets.

Consequence Rating	Descriptions
	• 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.

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.

Table 13- Inputs for the consequence assessments for Human Settlement Assets

Consequence Assessment for Human Settlement Assets	
Hazard	**Vulnerability**
Hazard • vegetation category (fuel age and canopy %) • slope (between the asset and vegetation and under the vegetation) • separation distance	Vulnerability of the asset • community education • property preparedness • access • capability of occupants • water supply • construction standard

- **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.

Table 14- Inputs for the consequence assessments for Economic Assets

Consequence Assessment for Economic Assets	
Hazard	**Vulnerability**
Hazard • vegetation category (fuel age and canopy %) • slope (between the asset and vegetation and under the vegetation) • separation distance	Vulnerability of the asset • The **susceptibility of the asset** to the adverse effects of a bushfire • The **level of impact** or importance 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.

Table 15 – Inputs for the consequence assessments for Environmental Assets

Consequence Assessment for Environmental Assets	
Potential Impact of Fire	**Vulnerability**
Potential Impact of Fire • The potential impact of a bushfire event or fire regime on the asset.	Vulnerability of the asset • Conservation Status • Geographic Extent

- **Consequence Rating - Cultural Assets**

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

Table 16- Inputs for the consequence assessments for Cultural Assets

Consequence Assessment for Cultural Assets	
Hazard	**Vulnerability**
Hazard • vegetation category (fuel age and canopy %) • slope (between the asset and vegetation and under the vegetation) • separation distance	Vulnerability of the asset • The susceptibility of the asset to the adverse effects of a bushfire.

-

4.3.3 Determining Bushfire Hazard

The level of Bushfire Hazard for human settlement, economic and cultural assets is determined using a quantified Bushfire Hazard Assessment model.[59] The model is based on the methodology set out in *AS3959-2009 Construction of Buildings in Bushfire Prone Areas* that is used to undertake a Bushfire Attack Level (BAL) Assessment. The hazard assessment is used to measure the severity of an asset's potential exposure to ember attack, radiant heat and direct flame contact.

Criteria applied when undertaking the bushfire hazard assessment is as follows:[60]

- **Application of Fire Danger Index (FDI) 80**. - The fire danger index reflects the chance of a fire starting, its rate of spread, its intensity and the difficulty of its suppression, according to various combinations of air temperature, relative humidity, wind speed and both the long- and short-term drought effects. Inputs to hazard assessment calculation are reflective of FDI 80 (Grass Fire Danger Index 110) conditions, as per AS3959-2009. The higher the rating, the less the chance of controlling a fire until weather conditions improve. From the FDI, predictions can be made regarding a fire's rate of spread, intensity and the potential for various suppression tactics to succeed. The FDI is the basis for determining the Fire Danger Rating, shown at figure 28, which is a scale developed to assist communities to better understand information about fire danger.[61]

- **Classification of vegetation -** Vegetation is classified as per the vegetation categories listed in the Guidelines, and in accordance with AS3959-2009. Vegetation meeting the low hazard exclusion criteria is automatically rated as low. Where more than one vegetation type is present, the assessment is based on the vegetation type that presents the greatest hazard to the asset.

- **Separation Distance -** Is measured from the closest part of the asset/s, such as a house, to the nearest edge of the hazard vegetation. Where there is a flammable structure within 6 metres (e.g. a shed or patio next to a house), it is included as a part of the asset.

- **Slope** Two slope measurements are used in the hazard assessment calculation – the slope of the land under the hazard vegetation and the slope of the land between the asset and the hazard vegetation.

Hazard assessments focus on vegetation hazards within the Asset Protection Zone (20 metres) and Hazard Separation Zone (80 metres). Fuel load requirements and objectives for the HSZ and APZ are used to guide the development of appropriate treatment strategies for priority risks. However, it's

[59] *Guidelines for Preparing a Bushfire Risk Management Plan (2015)*
[60] *AS3959-2009 Construction of buildings in bushfire prone areas*
[61] *Source: Department of Fire and Emergency Services*

important to note that is not always possible, or practical, to achieve this in some circumstances. Any treatment strategies occurring in the land management zone would be undertaken to achieve the specific objectives of the land or broader area.

Figure 27 – Bushfire Management Zones [62]

The Fire Danger Ratings, based upon the Forest Fire Danger Index (FFDI), are explained in Figure 28:

FIRE DANGER RATING	WHAT DOES IT MEAN?	
CATASTROPHIC 100+	• These are the worst conditions for a bush or grass fire • If a fire starts and takes hold, it will be extremely difficult to control and will take significant firefighting resources and cooler conditions to bring it under control	• Spot fires will start well ahead of the main fire and cause rapid spread of the fire. Embers will come from many directions • Homes are not designed or constructed to withstand fires in these conditions • The only safe place to be is away from bushfire risk areas.
EXTREME 75-99 SEVERE 50-74	• These are very hot, dry and windy conditions for a bush or grass fire • If a fire starts and takes hold, it will be unpredictable, move very fast and difficult for firefighters to bring under control • Spot fires will start and move quickly. Embers may come from many directions	• Homes that are prepared to the highest level, have been constructed to bushfire protection levels and are actively defended may provide safety • You must be physically and mentally prepared to defend in these conditions • The only safe place to be is away from bushfire risk areas.
VERY HIGH 32-49	• These are hot, dry and possibly windy conditions for a bush or grass fire • If a fire starts and takes hold, it may be hard for firefighters to control	• Well prepared homes that are actively defended can provide safety • You must be physically and mentally prepared to defend in these conditions.
HIGH 12-31 LOW-MODERATE 0-11	• If a fire starts, it is likely to be controlled in these conditions and homes can provide safety • Be aware of how fires can start and reduce the risk	• Controlled burning may occur in these conditions if it is safe – check to see if permits apply.

Figure 28- Fire danger rating

[62] Bushfire Risk Management Planning Handbook, DFES (March 2018)

4.3.4 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. These assets were assessed in consultation with existing data from the Shire of Denmark, Department of Biodiversity Conservation and Attractions and local environmental groups. 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.

4.3.5 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 16 – Local Government Asset Risk Summary

Risk Rating / Asset Category	Low	Medium	High	Very High	Extreme
Human Settlement	64 (6%)	70 (7%)	148 (14%)	164 (16%)	349 (34%)
Economic	6 (1%)	23 (2%)	17 (2%)	36 (3%)	47 (5%)
Environmental	0 (0%)	0 (0%)	2 (<1%)	64 (6%)	10 (1%)
Cultural	4 (<1%)	7 (1%)	6 (1%)	5 (<1%)	12 (1%)

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 19 shows how likelihood and consequence combine to give the risk rating and subsequent treatment priority for an asset.

Table 17 – Treatment Priorities

Consequence / Likelihood	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

Low and Medium risks 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 18– Criteria for Acceptance of Risk and Course of Action

Risk Rating	***Criteria for Acceptance of Risk***	***Course of Action*** *(where possible / appropriate)*
Extreme **(Priorities 1A, 1B, 1C)**	Requires asset specific treatment strategies to be applied. It is unlikely that Local Government Wide Controls would be adequate to manage the risk.	• Specific treatment action is required within 1 year of the plan being endorsed for rural urban interface areas and 2 years for all others. • Ideally, a face to face meeting (on site) should be held with landowner. or alternatively a letter sent to reinforce hazard status • Treatments should include activities that modify the hazard vegetation where possible. • Risk assessment to be reviewed prior to the fire season (September) each year • Asset to be included on Fire Break Inspection List in first year post treatment and biannually after treatment compliance • Private landholders will be encouraged to join local Bush fire ready groups via letter or face to face meeting
Very High **(Priorities 2A, 2B, 2C)**	Requires asset specific treatment to be applied. It is unlikely that Local Government Wide Controls would be adequate to manage the risk.	• Specific action is required in the first 2-3 years of BRM Plan • Ideally, a face to face meeting (on site) should be held with landowner or alternatively a letter sent to reinforce hazard status • Treatments should include activities that modify the hazard vegetation where possible. • Asset to be included on Fire Break Inspection List in first year post treatment and biannually after treatment compliance • Private landholders will be encouraged to join local Bush fire ready groups via letter or face to face meeting
High **(Priorities 3A, 3B, 3C, 3D)**	Asset specific treatment strategies will likely be required to adequately manage the risk.	• Specific action required During the life of the BRM Plan • Treatment action may be required with plans to include modification of hazard vegetation where possible. • Risk assessment to be reviewed at least once within the life of the plan

		• Private landholders will be encouraged to join local Bush fire ready groups Via letter or face to face meeting
Medium **(Priorities 4A, 4B, 4C)**	Acceptable with adequate controls. Treatment action is not required, but risk should be monitored. Local government wide controls should be sufficient to manage the risk If there is a change in the landscape / environment these assets may need to be reassessed more frequently.	• Addressed through Local Government Wide Controls • Specific action is not required • Risk assessment to be reviewed at least once within the life of the plan
Low **(Priorities 5A, 5B, 5C)**	Acceptable with adequate controls. Treatment action is not required, but risk should be monitored. Local government wide controls should be sufficient to manage the risk If there is a change in the landscape / environment these assets may need to be reassessed more frequently	• Addressed through Local Government Wide Controls • Specific action is not required • Risk assessment to be reviewed as necessary

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 Denmark. 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 following controls are currently in place across the Shire of Denmark

1) *Bush Fires Act 1954* Section 33 notices, including applicable fuel management requirements, firebreak standards and annual enforcement programs;
2) Declaration and management of Prohibited Burn Times, Restricted Burn Times and Total Fire Bans for the local government;

3) Public education campaigns and the use of DBCA and DFES state-wide programs, tailored to suit local needs; including programs such as *5-Minute Fire Chat*, *Bushfire Action Month, Are You Ready Campaign* etc;
4) State-wide arson prevention programs developed in conjunction with WA Police and DFES;
5) State planning framework and local planning schemes, implementation of appropriate land subdivision and building standards in line with DFES, Department of Planning and Building Commission policies and standards;
6) Monitoring performance against the BRM Plan and reporting annually to the local government council and OBRM;
7) Regular Bushfire Advisory committee meetings to review current practices;
8) Quarterly Local Emergency Management group meetings consisting of representatives from Various emergency, essential services and infrastructure management; and
9) Other practices and programs undertaken by local government or state agencies (Multi-Agency Work Plans) that contribute to bushfire risk management within the local government, including controls in place under state government policies, agreements or memorandums of understanding. These include:
    - Department of Biodiversity, Conservation and Attractions Master Burn Program
    - Water Corporation Bushfire Risk Management Plan
    - Western Power annual asset inspection and vegetation management program
    - Department of Education Memorandum of Understanding
    - Main Roads WA Bridge Assessment and Maintenance Works Plan.

A multi-agency work plan has been developed and is attached at **Appendix 3.** The plan 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 and grazing;

- **Ignition management** - Treatment aims to reduce potential human and infrastructure sources of ignition in the landscape; such as management or power lines and restricting access, as well as arson prevention activities and fire restrictions when camping;

- **Preparedness** - Treatments aim to improve access and water supply arrangements to assist firefighting operations; such as maintaining fire access roads and firebreaks, installation of hydrants, water points and tanks, asset fire protection systems as well as training and exercising;

- **Planning** - Treatments focus on developing plans to improve the ability of firefighters and the community to respond to bushfire; such as identification of 'safer places', evacuation and relocation planning and the development of fire management plans;

- **Community Engagement** - Treatments seek to build relationships, raise awareness and change the behaviour of people exposed to bushfire risk. including 5 Minute Fire Chat Program, Bushfire Ready Groups, School Education Programs, targeted messaging and signage etc.; and

- **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

The Treatment Schedule will be developed in broad consultation with land owners and other stakeholders and efforts will be made to finalise the Treatment Schedule within six months of this BRM Plan being endorsed by council. It is expected that the Treatment Schedule will be a dynamic document and will be amended to account for changing circumstances, including changes to assets and/or risk ratings and changes in research and current methodology in fuel management for biodiversity and bushfire risk.

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.

It is important to note that some treatments, particularly those aimed at reducing the vegetation risk profile, will require ongoing management and will likely need to be repeated periodically in order to maintain the effectiveness of the initial treatment. The maintenance regime should be included in the Treatment Schedule to ensure appropriate resources are allocated and risks remain at an acceptable level.

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 (See Appendix 1 and Table 18 respectively*)

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. New assets will be added to the Asset Risk Register when they are identified.

The Shire of Denmark has determined that assets rated:

- 'Extreme' risk will be reassessed Prior to the fire season and/or at the completion of a treatment/s as part of the post treatment evaluation;
- 'Very High' will be reassessed biannually, where possible and/or at the completion of a treatment/s as part of the post treatment evaluation;
- 'High' will be reassessed at least once during the life of the plan or at the completion of a treatment/s as part of the post treatment evaluation; and
- 'Low' and 'Medium' risk should be reassessed within 5 years, where possible.

Implementation and review of the BRM Plan will be monitored by the Manager of Community Services or the appointed delegate.

A post-treatment risk assessment, using the Bushfire Risk Management System (BRMS), involves completing a risk assessment at the completion of any scheduled treatment/s in order to confirm that the treatment objectives have been achieved. This may include evaluation of the initial treatment or ongoing treatments included in the treatment schedule, noting that treatments may need to be repeated periodically in order to sustain risk reduction gains. The post-treatment risk assessment may identify that further treatments are required to reduce an asset's risk rating to an acceptable level. The post-treatment assessment uses the same methodology as the original assessment. All inputs to the assessment should be reviewed and updated to reflect any change (e.g. changes to the asset or surrounding area).

Risk re-assessment involves completing an additional assessment to determine if any factors have changed (e.g. increases in fuel age, developments) that may impact upon the asset's risk rating. Risk re-assessments may be undertaken at any time using a 'desk top' assessment to review data and spatial information in BRMS, or using validated information obtained during a site visit. Ideally risk re-assessment for 'extreme' and 'very high' risk assets would include a site visit.

7.3 Reporting

The Shire of Denmark will submit an annual report to the Office of Bushfire Risk Management summarising progress made towards implementation of the BRM Plan. This report will also be submitted to the Shire Council.

The reporting requirements will be managed by a member of the Corporate and Community Services Directorate.

Privacy Issues and Release of Information

Information captured through the Bushfire Risk Management System (BRMS) includes some sensitive data and information such as the location of culturally and environmentally significant sites, land ownership details and risk information. It has been determined, in consultation with the Denmark Shire Council, that BRMS reports produced for the public domain, are not to include information considered personal in nature.

The Chief Executive Officer is to be consulted prior to any data relating to the Bushfire Risk Management Plan or held in BRMS being released into the public domain.

In order to actively encourage and support the implementation, monitoring and review of agreed actions the Shire of Denmark, as a matter of course, will provide tailored reports and information to key stakeholders that detail the specific assets and treatments that the stakeholders (landowners) have responsibility for.

8. Glossary

Asset	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.
Asset Category	There are four categories that classify the type of asset – Human Settlement, Economic, Environmental and Cultural.
Asset Owner	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.
Asset Register	A component within the Bushfire Risk Management System used to record the details of assets identified in the Bushfire Risk Management Plan.
Asset Risk Register	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.
Bushfire	Unplanned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires both with and without a suppression objective.[63]
Bushfire Hazard	The hazard posed by the classified vegetation, based on the vegetation category, slope and separation distance.
Bushfire Management Plan	A document that sets out short, medium and long term bushfire risk management strategies for the life of a development.[64]
Bushfire risk management	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.
Consequence	The outcome or impact of a bushfire event.
Draft Bushfire Risk Management Plan	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.
Emergency Risk Management Plan	A document (developed under *State Emergency Management Policy 2.9*) that describes how an organisation(s) intends to undertake the activities of emergency risk management based on minimising risk. These plans help

[63] Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne.
[64] Western Australian Planning Commission 2015, *State Planning Policy 3.7: Planning in Bushfire Prone Areas*, WAPC, Perth.

	inform the ongoing development of Local Emergency Management Arrangements (LEMA) and State Hazard plans
Geographic Information System (GIS)	A data base technology, linking any aspect of land-related information to its precise geographic location.[65]
Geographic Information System (GIS) Map	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.
Land Owner	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.
Likelihood	The chance of something occurring. In this instance, the chance of a bushfire igniting, spreading and reaching the asset.
Locality	The officially recognised boundaries of suburbs (in cities and larger towns) and localities (outside cities and larger towns).
Planning Area	A geographic area determine by the local government which is used to provide a suitable scale for risk assessment and stakeholder engagement.
Priority	See Treatment Priority.
Recovery Cost	The capacity of an asset to recover from the impacts of a bushfire.
Responsible Person	The person responsible for planning, coordinating, implementing, evaluating and reporting on a risk treatment.
Risk Acceptance	The informed decision to accept a risk, based on the knowledge gained during the risk assessment process.
Risk Analysis	The application of consequence and likelihood to an event in order to determine the level of risk.
Risk Assessment	The systematic process of identifying, analysing and evaluating risk.
Risk Evaluation	The process of comparing the outcomes of risk analysis to the risk criteria in order to determine whether a risk is acceptable or tolerable.
Risk Identification	The process of recognising, identifying and describing risks.

[65] Landgate 2015, *Glossary of terms*, Landgate, Perth

Risk Manager	The organisation or individual responsible for managing a risk identified in the Bushfire Risk Management Plan; including review, monitoring and reporting.
Risk Register	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.
Risk Treatment	A process to select and implement appropriate measures undertaken to modify risk.
Rural	Any area where in residences and other developments are scattered and intermingled with forest, range, or farm land and native vegetation or cultivated crops.[66]
Rural Urban Interface (RUI)	The line or area where structures and other human development adjoin or overlap with undeveloped bushland.[67]
Slope	The angle of the ground's surface measured from the horizontal.
Tenure Blind	An approach where multiple land parcels are consider as a whole, regardless of individual ownership or management arrangements.
Treatment	An activity undertaken to modify risk, for example a prescribed burn.
Treatment Objective	The specific aim to be achieved or action to be undertaken, in order to complete the treatment. Treatment objectives should be specific and measurable.
Treatment Manager	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.
Treatment Priority	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.
Treatment Schedule	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.
Treatment Strategy	The broad approach that will be used to modify risk, for example fuel management.

[66] Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne

[67] Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne

Treatment Type	The specific treatment activity that will be implemented to modify risk, for example a prescribed burn.
Vulnerability	The susceptibility of an asset to the impacts of bushfire.

9. Common Abbreviations

APZ	Asset Protection Zone
BRMP	Bushfire Risk Management Planning
BRM Plan	Bushfire Risk Management Plan
BFAC	Bushfire Advisory Committee
BRMB	Bushfire Risk Management Branch
BRMO	Bushfire Risk Management Officer
BRPC	Bushfire Risk Planning Coordinator
BRMS	Bushfire Risk Management System
CALD	Culturally and Linguistically Diverse
CBFCO	Chief Bushfire Control Officer
DEMC	District Emergency Management Committee
DFES	Department of Fire and Emergency Services
DBCA	Department of Biodiversity, Conservation and Attractions
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
PWS	Parks and Wildlife Service

SEMC	State Emergency Management Committee
SLIP	Shared Land Information Platform
WAPC	Western Australian Planning Commission

Appendices

Shire of Denmark

Bushfire Risk Management Planning

Communication Strategy

Document Control

Document Name	Communications Strategy	Current Version	
Document Owner	Shire of Denmark CEO	**Issue Date**	
Document Location	Synergy records - Bushfire Risk Management planning	**Next Review Date**	

Related Documents

Title	Version	Date
Shire of Denmark **Bushfire Risk Management Plan**	1.0	

Amendment List

1 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 Denmark. This Communication Strategy accompanies the BRM Plan for the Shire of Denmark. 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.

2 COMMUNICATIONS OVERVIEW

Communication Objectives

The communication objectives for the development, implementation and review of the BRM Plan for the Shire of Denmark 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.
6. Strengthen the Shire of Denmark Strategic Community Plan

Communication Roles and Responsibilities

Shire of Denmark 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 Denmark, or nominee, is responsible for:

- endorsement of the BRM Plan Communications Strategy;
- External communication with the local government area;
- Operational-level communication between the shire and the Department of Fire and Emergency services;
- Approve release of BRM data.

Shire of Denmark Nominee is responsible for:

- BRM plan monitoring and review

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 Denmark	Land Managers/Asset Owners Input and support for plan development, implementation and Review Identify assets at risk. Responsible for treatments as a land owner/manager	High	Inform, consult, involve collaborate and empower
Department of Fire and Emergency Services	Significant role in plan and treatment development, implementation and review. Support role in treatment Implementation.	High	Inform, consult, involve and collaborate
Office of Bushfire Risk Management	Significant role in plan development, implementation and review.	Medium	Inform, consult and collaborate
Department of Biodiversity, Conservation and Attractions	Significant role in plan and treatment development, implementation and review. Responsible for treatments as a land owner/manager.	High	Inform, consult, involve, collaborate
Main Roads WA	Role in plan and treatment development, implementation and review. Responsible for treatments as a land owner/manager Critical infrastructure interest.	Medium	Inform, consult, involve, collaborate
Telstra	Role in plan and treatment development, implementation and review. Responsible for treatments as a land owner/manager Critical infrastructure interest.	Medium	Inform, consult, involve, collaborate
Department of Planning land and Heritage, LandCorp & Landgate	Role in plan and treatment development, implementation and review	Medium	Inform, consult, involve, collaborate
Water Corporation & Department of Water	Role in plan and treatment development, implementation and review. Responsible for treatments as a land owner/manager. Critical infrastructure interest.	Medium	Inform, consult, involve, collaborate
Department of Education	Role in plan and treatment development, implementation and review. Responsible for treatments as a land owner/manager. Critical infrastructure interest.	Medium	Inform, consult, involve, collaborate, empower

Department of Health	Role in plan and treatment development, implementation and review. Responsible for treatments as a land owner/manager. Critical infrastructure interest.	Medium	Inform, consult, involve, collaborate and empower
Private Land Owners	Role in plan and treatment development, implementation and review. May have responsibilities for treatments as land owners/managers	High	Inform, consult, involve, collaborate and empower
Western Power	Role in plan and treatment development, implementation and review. Responsible for treatments as a land owner/manager Critical infrastructure interest.	Medium	Inform, consult, involve, collaborate
Chief Bushfire Control Officer	Significant role in plan and treatment development, implementation and review	High	Inform, consult, involve, collaborate and empower
Bushfire Brigades and other Emergency Services Volunteers	Significant role in plan and treatment development, implementation and review	High	Inform, consult, involve, collaborate, empower
Bushfire Advisory Committee, (BFAC)District Operations Advisory Committee (DOAC)& Local Emergency Management Committee (LEMC)	Role in plan development, implementation and review	High	Inform, consult, involve, collaborate,
Landcare, Local Community Conservation Groups Denmark weed action group Denmark environmental group	Role in plan and treatment development, implementation and review	High	Inform, consult and involve, empower
Traditional Owners, Wagyl Kaip and southern Noongar Claimant group , South West Aboriginal Land and Sea Council & Department of Aboriginal Affairs	Role in plan and treatment development, implementation and review	Medium	Inform, consult and involve, empower
Denmark chamber of commerce	Role in plan and treatment development, implementation and review	Medium	Inform, consult and involve
Denmark Community	Role in plan implementation and review	High	Inform, consult, involve, collaborate and empower

Communications Plan

Timing of Communication	Stakeholder (s)	Communication Objective(s) (Refer p 3)	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring and Evaluation Method
Development of the BRM Plan								
Annually or as required	Shire of Denmark CEO & Executive, CESM	All (1-6)	Regular emails, telephone calls, Face to Face meetings Representation at bushfire stakeholder workshops	Inform & empower, strategic oversight, review and input, existing controls, identify assets, treatments	BRPC, BRMO, CESM	Time constraints, stakeholder capacity (small executive), competing issues/projects	Forward planning, achievable timeframes, strategic consultation	Feedback, 'buy-in', outcomes met, response times.
Annually or as required	Shire of Denmark engineering group	2,3&6	Email Face to face meetings	Input into treatment schedule Input into BRM plan	Director of assets and sustainable development or delegate	Time constraints Conflicting priorities	Regular planning meetings	Outcomes met Input into planning process and treatment schedule
Life of the plan (Quarterly)	Local Emergency Management Committee (LEMC)	All (1-6)	Presentation at each LEMC meetings	Understanding BRMP process, supports for project, Inc. identified assets, treatments esp. priority.	BRPC, BRMO	Attendance of members at the scheduled meeting, Time constraints, lack of buy-in	Set clear objectives, prepare succinct clear presentations,	Feedback, sign off on strategic milestones.

Life of the plan (Quarterly)	Bushfire Advisory Committee (BFAC)	All (1-6)	Presentation at each BFAC meetings	Presentation at each LEMC meetings Understanding BRMP process, supports for project, Inc. identified assets, treatments esp. priority.	BRPC, BRMO	Attendance of members at the scheduled meeting,	Set clear objectives, prepare succinct clear presentations	Feedback, sign off on strategic milestones.
Strategic milestone i.e. First Quarter 2020	ROAC DOAC	1 & 2	One of presentation, as need arising issues. Follow-up individual stakeholders as required	Understanding BRMP process, strategic support within respective agencies	BRMO, BRPC	Attendance of members at the scheduled meeting i.e. absence of key stakeholders Time constraints	Schedule follow-up with key agencies Set clear objectives, prepare succinct clear presentations, provide opportunities for follow-up	Feedback, questions, response to follow-up meetings
Life of the plan	DFES, Regional Superintendent, DO, AO, CESM	All (1-6)	Inform, consult and collaborate, Quarterly meetings with Superintendent, emails & telephone calls, Representation at bushfire stakeholder workshops	Understanding BRMP process, engagement in process i.e. identify assets, risk assessment & treatment. Accept responsibilities.	BRMO, BRPC	Staff turn-over, Travel distances, Limited buy-in to project, Treatments not negotiated.	Adapt communication to staffing, document communication outcomes, foster ownership/ empowerment in process.	Timely constructive feedback, support for/level of participation in process, negotiated treatments.

Life of the plan	Bushfire Stakeholders, CBFCO, DBFCO BFB Captains, VFRS Captains	All (1-6)	Inform, consult and collaborate, Presentations at brigade meetings Representation at bushfire stakeholder workshops ie. CBFCO or OIC/Captain	Understanding BRMP process, engagement in process i.e. identifying assets, risk assessment & treatment.	BRPC & BRMO	Time constraints Availability of Volunteers Limited buy-in	Planning for scheduled meetings Effective communication i.e. clear objectives, appropriate level of information, ensure feedback incorporated	Feedback, 'buy-in'
Life of the plan	Department of Biodiversity Conservation and Attractions (DBCA)	All (1-6)	Inform, consult and collaborate, Regular emails, telephone calls, meetings, Representation at bushfire stakeholder workshops	Understanding BRMP process, engagement in process i.e. existing controls identifies assets, risk assessment & negotiate treatments.	BRPC & BRMO & AO/DO Superintendent as required	Time constraints Limited buy-in to project, Treatments not negotiated.	Establish strategic buy-in, agree to appropriate line communication	Timely constructive feedback, support for/level of participation in process, negotiated treatments.
At strategic milestones	Govt/Critical infrastructure Service Providers	All (1-6)	Inform, consult and collaborate, Regular emails, telephone calls, meetings, to identify assets, assess risk negotiate treatments	Understanding BRMP process, engagement in process i.e. existing controls identify assets, risk assessment & negotiate treatments.	BRPC & BRMO	Time constraints Limited buy-in to project, Treatments not negotiated.	Establish strategic buy-in, agree to appropriate line communication	Timely constructive feedback, support for/level of participation in process, negotiated treatments.
At strategic project	Business/ Industry	As relevant (1-6)	Inform, consult, and collaborate,	Understanding BRMP process,	BRPC & BRMO	Time constraints	Establish strategic buy-in,	Timely constructiv

milestones during development i.e 1/10/17-2020			Regular emails, telephone calls, meetings, to identify assets, assess risk negotiate treatments	engagement in process i.e. existing controls identify assets, risk assessment & negotiate treatments.		Limited buy-in to project, Treatments not negotiated.	agree to appropriate line communication	e feedback, support for/level of participatio n in process, negotiated treatments.
At strategic project milestones during development i.e. 1/10/17-2020	Community Interest Groups	1,3, 2 & 6	Inform, consult, and collaborate, Regular emails, telephone calls, meetings, to identify assets, assess risk negotiate treatments	Understanding BRMP process, engagement in process i.e. expert knowledge, community values	BRPC & LG Exec as required BRMO & DO/AO as required	Time constraints Limited buy-in to project, Treatments not negotiated.	Establish strategic buy-in, agree to appropriate line communication	Timely constructiv e feedback, support for/level of participatio n in process, negotiated treatments.
At strategic project milestones during development i.e. 1/10/17-2020	Community/ Residents at risk	1,2 & 6	Inform, consult, empower. Letters, social media internet updates, presentations.	Understanding BRMP process, understand adjacent risk and acceptability of treatments, responsibility for own risks.	BRPC & BRMO	Time constraints Limited buy-in to project	Appropriate communication methods, opportunities for two-way communication, feedback.	Constructiv e feedback, support for/level of participatio n in project.
Annually or as required	Office of Bushfire Risk Management	1 & 2	Email Face to face meetings	Compliance and governance Plan endorsement	CEO or Delegate	Government funding Government priorities Identified non compliances	Stay up to date with process improvements	•Plan endorsed

Implementation of the BRM Plan								
Timing of Communication	**Stakeholder (s)**	**Communication Objectives *(Refer to Page 3)***	**Communication Method**	**Key Message or Purpose**	**Responsibility**	**Identified Risks to Communication**	**Strategy to Manage Risks**	**Monitoring & Evaluation Method**
Annually or as required	Shire of Denmark Elected group, executive team	All (1-6)	Email Updates, Face to Face briefings	Inform and consult, Report on Progress Issues identification and action planning	BRPC & BRMO Delegate of SOD	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	Feedback, 'buy-in', outcomes met, response times.
Annually or as required	Shire of Denmark engineering group	2,3&6	Email Face to face meetings	Input into treatment schedule Input into BRM plan	Director of assets and sustainable development or delegate	Time constraints Conflicting priorities	Regular planning meetings	Outcomes met Level of engagement and support
Annually or as required	Bushfire Stakeholder Group – CESM, DFES AO/DO, DBCA CBFCO/OIC/Captain	All (1-6)	Email updates Annual meeting	Report on progress, monitor & review against milestones/funding, bushfires, annual works plans of respective stakeholders	BRPC & BRMO Delegate of SOD	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	Feedback, 'buy-in', outcomes met, response times.
As per Section 7.2 of this plan	Land owners /Land managers	1-3 &5	Email, Face to face meetings Community engagement	Report on progress, monitor & review against milestones/funding, bushfires, annual works plans	BRPC & BRMO Delegate of SOD	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	Feedback, 'buy-in', outcomes met, response times.

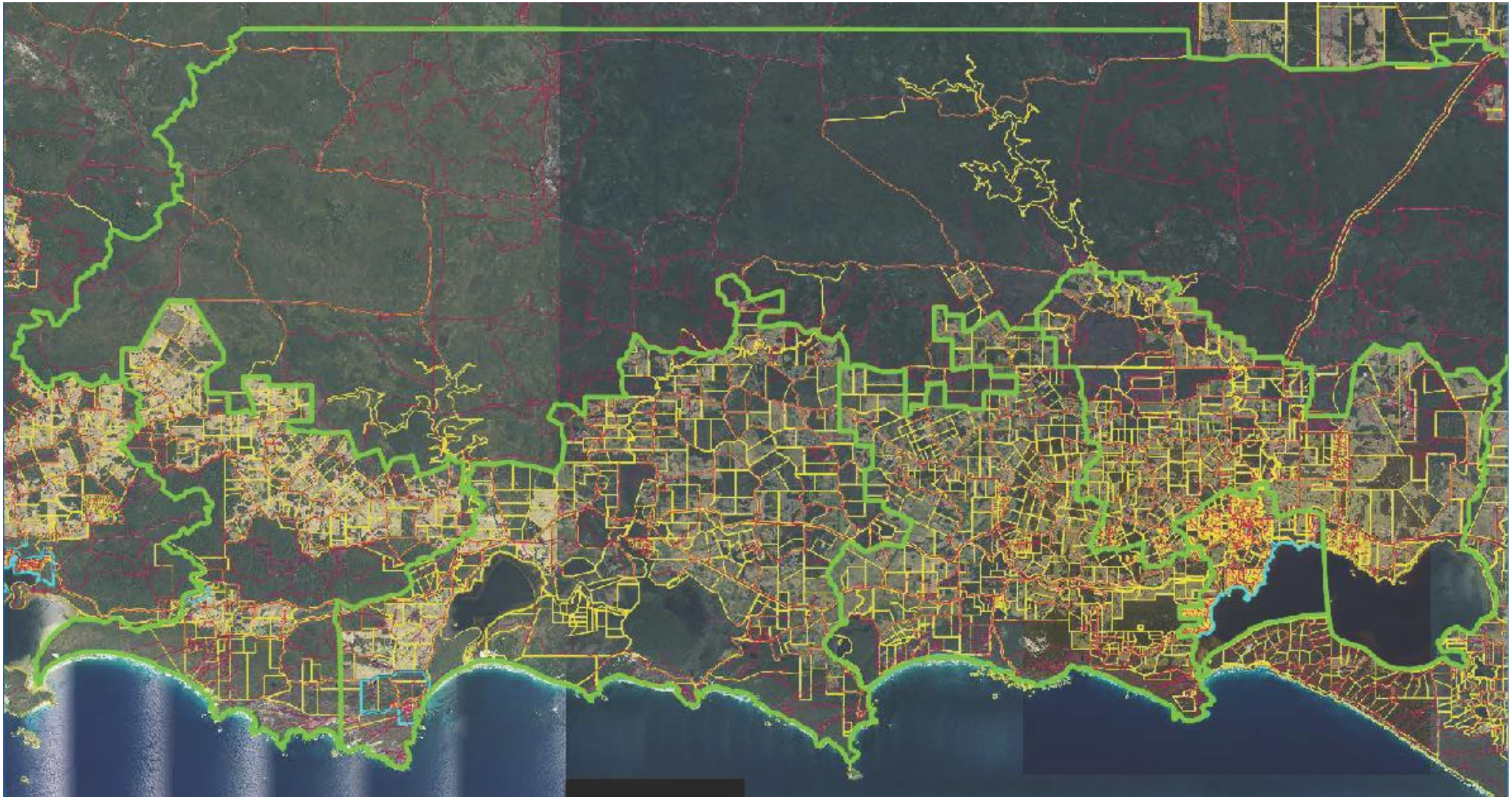
				Fire control notice effectiveness				
Annually or as required	Essential Service Providers Working Group I.e. PUNG	All (1-6)	Email updates, Face to face meetings	Report on progress, monitor & review against milestones/funding, bushfires, annual works plans of respective stakeholders	Delegate of SOD, BRPC & BRMO	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	Feedback, 'buy-in', outcomes met, response times.
Annually or as required	LEMC, BFAC & DOAC, CBFCO, CAPTS	All(1-6)	Email Updates Face to face meetings	Inform and consult, Report on Progress Issues identification and action planning	Delegate of SOD, BRPC & BRMO	Availability Time 'Buy in'	Forward planning, achievable timeframes, strategic consultation	Feedback received Level of engagement Issues identified and addressed
Annually	OBRM	1 – 3 & 5	Written report	Governance and compliance Continuous improvement	CEO or Delegate	Time Conflicting priorities	Plan communication	Compliance requirements met
Annually – ideally prior to fire season	Community/ Residents at risk	5	Newsletter Website Facebook Community engagement	Continuous improvement	CEO or Delegate	Time Conflicting priorities	Plan communication	Feedback received Buy in

Review of the BRM Plan

Timing of Communication	Stakeholder (s)	Communication Objectives *(Refer to Page 3)*	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring & Evaluation Method
Annually or as required	LEMC, BFAC & DOAC, CBFCO, CAPTS	All (1-6)	Email Updates Face to face meetings	Review monitoring reporting against milestones/funding, bushfires, annual works plans of respective stakeholders	Delegate of SOD, BRPC & BRMO	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	On-going support and positive feedback from Council
Annually or as required	Bushfire Stakeholders & key service providers i.e. Western Power, Watercorp etc.	All (1-6)	Email Updates Face to face meetings Email Updates Face to face meetings	Review monitoring reporting against milestones/funding, bushfires, annual works plans of respective stakeholders	Delegate of SOD, BRPC & BRMO	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	On-going support and positive feedback from Council
Annually or as required	Govt/Critical infrastructure Service Providers	All (1-6)	Email Updates Face to face meetings	Inform and consult, Report on Progress Issues identification and action planning	Delegate of SOD, BRPC & BRMO	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	Feedback received Level of engagement Issues identified and addressed

5 yearly	Community/ Residents at risk	5	Newsletter, Email, Face to face meetings Community engagement	Inform and consult, Report on Progress Issues identification and action planning	Delegate of SOD, BRPC & BRMO	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	Feedback received Level of engagement Issues identified and addressed
5 yearly	OBRM, DFES, Shire of Denmark	All (1-6)	Email Updates Face to face meetings	Compliance to plan and acceptance of risk	Delegate of SOD, BRPC & BRMO	LG capacity in absence of BRMO & BRPC	Forward planning, achievable timeframes, strategic consultation	On-going support and positive feedback from Council

2. Denmark Planning Areas



Bushfire Risk Management Planning – Local Government-Wide Controls, Multi-Agency Treatment Work Plan

Local Government-Wide Controls

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
1	BRMP Risk Analysis	Maintain and refine BRM Plan	Shire of Denmark	Landowners DFES irrespective of tenure	Treatment identification and planning for all very high and extreme risk assets within the Shire.
2	Strategic Community Plan, Denmark 2027 & Corporate Plan 2017/18-2021/22	As per documented actions	Shire of Denmark	Community	As per section 3.1.1 of the Bushfire Risk Management Plan.
3	Shire of Denmark Bush Fire Notice and (*Bush Fires Act 1954*)	• Review annual Fire Control Notice • Publish annual Fire Control Notice • Inspection of Fire Access Tracks • Inspection for compliance to Fire Control Notice	Shire of Denmark	CBFCO, FCO, Captains and the public, Ranger	Published Annually. Inspect local properties. 'Fire Access Track' has the same meaning as 'Fire Break', in the *Bush Fires Act 1954.*
4	Shire Prohibited and Restricted burn times and issuing of permits. (*Bush Fires Act 1954*)	Restricted and Prohibited Burn Times set the requirement that 'a permit to set fire to the bush' must be obtained.	Shire of Denmark	CBFCO, Ranger, FCO's	Published Annually.
5	Harvest and Vehicle Movement Bans *(Bush Fires act 1954 Section 38A, and or Section 24C)*	The Shire of Denmark will impose the ban when the Chief Bush Fire Control Officer and Community Emergency Services Manager is of the opinion that the use of engines, vehicles, plant or machinery during the prohibited burning times or the restricted burning times or both is likely to cause a fire or contribute to the spread of a bushfire	Shire of Denmark	CBFCO, FCO, Captains and the public	A Harvest and Vehicle Movement Ban may be imposed for any length of time but is generally imposed for the 'heat of the day' periods and may be extended or revoked by the local government should weather conditions change.

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
6	Local Emergency Management Arrangements	Emergency Management Plan (LEMA) Local emergency management Committee (LEMC)	Shire of Denmark	St John Ambulance WAPOL DFES SES Dept of Communities Education Dept CBFCO Gt Southern DEMC OEM Silver chain Dept Health Denmark Surf Lifesaving Sea Rescue Groups DBCA VFRS	Annual review of emergency plans and arrangements.
7	Local Planning Scheme No 5 (Including LPS1,2,3)	Requirement for new developments to complete a Fire Management Plan endorsed through the Dept of Fire and Emergency Services	Shire of Denmark	DFES	Where a Fire Management Plan has been endorsed by DFES and the Shire, the affected land owners will be responsible for the ongoing implementation of the "land owners' responsibilities" as specified in that Fire Management Plan.
8	Total Fire Bans	Restriction of activities that may cause or contribute to the spread of a bushfire	Department of Fire and Emergency Services	LG, CBFCO	A Total Fire Ban (TFB) is declared because of extreme weather conditions or when widespread fires are stretching firefighting resources. A TFB is declared by DFES following consultation with the LG.
9	State Planning Policy 3.7	Planning in Bushfire Prone Areas	Department of Planning	WA Planning Commission LG	Land developers are required to implement a Fire Management Plan to ensure risk is managed and other controls implemented and monitored.
10	State-wide Arson prevention Program	Education and awareness campaigns run across the state for arson	WA Police Department of Fire and Emergency Services	LG The Public	Participation as required. The Shire participates in campaigns for arson prevention. The LG assists in the promotion of Arson prevention campaigns

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
11	Bushfire Action month	Public preparedness and education campaign	Department of Fire and Emergency Services	CBFCO, FCO, Rangers and the public	During Bushfire Action Month, brigades and community groups hold a number of events across the State, to help you prepare your home and family ahead of the bushfire season. These events include street meets, property walk throughs and fire brigade open days where the community can speak to volunteer firefighters and Bushfire Ready groups about how to prepare for bushfires.
12	Are you Ready Campaign	Community Engagement	WA Government	LG, Chief FCO, Rangers and the public	The key message of this campaign is - preparing for and responding to bushfires is a team effort and everyone needs to play their part www.areyouready.wa.gov.au
13	The Principal's guide to Bushfire - Department of Education	All schools should include their plan for dealing with bushfire as a part of their governance documentation	Department of Education	DFES, LG	Private schools within the Local Government area need to be aware of their responsibilities for Bushfire Risk Management on their properties

Multi-Agency Work Plans

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
1.	UCL / UMR Land Management	Preparedness, mitigation work conducted on lands owned by DoL and managed by DFES under an MOU	Department of Fire and Emergency Services (DFES) Albany Regional	LG, P&W, Local Brigades	Annual funding is allocated to UCL/UMR land within gazetted boundary with priorities identified in consultation with stakeholders and managed through DFES Albany Regional office
2.	Water Corporation Bushfire Risk Management Plan	Great Southern Region Annual Works Plan. Water Corp assets are managed / maintained at the regional level.	Water Corporation	DFES, LG, DPAW	A plan is currently being developed. High risk areas are identified and treatments planned then completed. Treatments and risk assessments are available through Water Corp BRM department. Some high risk areas have been identified in the Shire to date. The Water

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
		Each asset has a management plan referred to as an SAP. * Watercorp has an agreement with DPAW for undertaking mitigation and land management activities on their estate. Works include fuel load management on water reserves			Corp Plan will be aligned to this BRM Plan's risk treatment schedule. *The SAPs only address very basic maintenance (inc. firebreaks as per Firebreak notice but not fuel load management etc., however any treatments from BRMS would be put through the SAP in order to raise a works order.
3.	Western Power annual asset inspection and vegetation management program	Western Power Bushfire Plan	Western Power	DFES, LG, DPAW	Annual vegetation management and asset inspections are completed to ensure risk is managed. Full asset inspections are completed every 4 years.
4.	Department of Biodiversity, Conservation and Attractions	DBCA have a 6 season burn program that is published on their website. Yearly plans are available.	Department of Biodiversity, Conservation and Attractions	LG, DFES, Local Brigades, the public	The plans can be accessed via their website, by sharing shape files (GIS) and are communicated at Local BFAC, ROAC and other various meetings.
5.	Dept of Education Memorandum of Understanding	Coordination of bushfire risk management activities	Department of Fire and Emergency Services Department of Education	Denmark District High School Denmark agricultural college	Denmark Senior High School and the agricultural college is listed on the State Bushfire Zone Register and has been assessed as 'high' risk. An inspection of the schools, in accordance with the Department of Education Bushfire Risk Strategy, is scheduled for 2019 – 2020. If hazards are identified prior to the inspection dates these can be raised with the Department of Education Bushfire Risk Management Team for early attention.
6.	Dept of Education – Bushfire Plan –	A plan designed to assist staff to prepare for a total fire ban, catastrophic fire danger rating, or a bushfire.	Department of Education	DFES, LG	This plan was developed in accordance with the Emergency and Critical Incident Management Policy

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
	Denmark Senior High School				and the Principal's Guide to Bushfire with input from local emergency management agencies.
7.	Dept of Education – Bushfire Plan – Denmark Primary School	A plan designed to assist staff to prepare for a total fire ban, catastrophic fire danger rating, or a bushfire	Department of Education	DFES, LG	This plan was developed in accordance with the Emergency and Critical Incident Management Policy and the Principal's Guide to Bushfire with input from local emergency management agencies.
8.	MRWA Bridge assessment & maintenance works plan	As per MRWA Structures Inspection and Information Management Policy (2013) Ensure that all bridges, gantries, culverts and walls on the road network are kept in a safe condition with the most efficient use of resources.	Main Roads	LG	Bridges and culverts are critical assets in the road network, and represent a major investment of community resources. Because of their strategic function, any failure or load capacity reduction may limit or severely restrict traffic over a large part of the road network, with consequent inconvenience and economic loss. Walls and gantries are minor structures that too can have an impact on the road network. It is therefore imperative that these assets are properly managed to ensure they are maintained in a safe and serviceable condition.

NatureMap

NatureMap Species Report

Created By Guest user on 23/01/2019

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Polygon'
Vertices	34° 49' 01" S,117° 05' 06" E 34° 48' 53" S,117° 20' 31" E 35° 01' 33" S,117° 19' 27" E 34° 48'
Group By	57" S,117° 05' 06" E 34° 49' 06" S,117° 05' 12" E 34° 49' 01" S,117° 05' 06" E
	Response to Fire

Response to Fire	Species	Records
01. 100% scorch kills, on plant seed storage	4	8
02. 100% scorch kills, in soil seed storage	72	189
03. 100% scorch kills, no seed storage	1	1
04. Survives 100% scorch, soil suckers	42	83
05. Survives 100% scorch, basal sprouts	43	94
06. Survives 100% scorch, epicormics	8	13
07. Survives 100% scorch, large apical bud	4	4
08. Killed by 100% scorch (any 1,2,3)	10	20
09. Survives 100% scorch (any 4,5,6,7,11)	2	3
10. Ferns and allies (spores)	1	9
11. Geophyte (Survives 100% scorch)	29	49
No data available	612	2871
TOTAL	828	3124

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
01. 100% scorch kills, on plant seed storage					
1.	2159	*Hakea falcata*			
2.	2191	*Hakea oleifolia (Dungyn)*			
3.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
4.	5841	*Kunzea recurva*			
02. 100% scorch kills, in soil seed storage					
5.	3207	*Acacia alata (Winged Wattle)*			
6.	11731	*Acacia browniana var. browniana*			
7.	3307	*Acacia divergens*			
8.	3331	*Acacia extensa (Wiry Wattle)*			
9.	3453	*Acacia myrtifolia*			
10.	15483	*Acacia pulchella var. pulchella*			
11.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
12.	6206	*Actinotus omnifertilis*			
13.	6321	*Andersonia sprengelioides*			
14.	3165	*Billardiera variifolia*			
15.	4413	*Boronia crenulata (Aniseed Boronia)*			
16.	4422	*Boronia gracilipes (Karri Boronia)*			
17.	4429	*Boronia molloyae (Tall Boronia)*			
18.	4441	*Boronia spathulata (Boronia)*			
19.	3713	*Bossiaea linophylla*			
20.	3714	*Bossiaea ornata (Broad Leaved Brown Pea)*			
21.	3723	*Bossiaea webbii (Water Bush)*			
22.	5465	*Calytrix leschenaultii*			
23.	4448	*Chorilaena quercifolia (Chorilaena)*			
24.	13107	*Chorizema reticulatum*			
25.	4552	*Comesperma confertum*			
26.	15810	*Conospermum caerulescens subsp. caerulescens*			
27.	1454	*Conostylis setigera (Bristly Cottonhead)*			
28.	7444	*Dampiera hederacea (Karri Dampiera)*			
29.	5533	*Darwinia vestita (Pom-pom Darwinia)*			
30.	3930	*Eutaxia virgata*			
31.	3948	*Gompholobium capitatum*			
32.	3950	*Gompholobium knightianum*			
33.	3953	*Gompholobium ovatum*			
34.	3954	*Gompholobium polymorphum*			
35.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
36.	3958	*Gompholobium venustum (Handsome Wedge-pea)*			