Bushfire Risk Management Plan

2020– 2025

Office of Bushfire Risk Management (OBRM) Bushfire Risk Management (BRM) Plan reviewed 26th June 2020

Shire of Narrogin BRM Plan endorsement 25th August 2020 Month 2020

Contents

Document Control

Document Name	Bushfire Risk Management Plan	**Current Version**	*V1*
Document Owner	Shire of Narrogin CEO	**Issue Date**	*25/08/2020*
Document Location	Shire Office	**Next Review Date**	*25/08/2025*

Document Endorsements

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

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

The endorsement of the BRM Plan by the Shire satisfies their endorsement obligations under section 2.2.8 of the *State Hazard Plan for Fire (Nov 2019).*

Local Government	Representative	Signature	Date
Shire of Narrogin	CEO		26 August 2020

Disclaimer

In approving this BRM Plan, the Shire of Narrogin is acknowledging the assets that have been identified and the risk ratings and treatment priorities assigned. Endorsement of the plan is a commitment by the Shire to work with land owners and managers to address unacceptable risk within the community. Endorsement of this plan is not committing the Shire to a program of treatment works to be implemented by others, or an acceptance of responsibility for risk occurring on land that is not owned or managed by the Shire. [1]

Amendment List

Version	Date	Author	Section

[1] *Guidelines for Preparing a Bushfire Risk Management Plan, November 2015, Page 79*

Publication Information

1. Introduction

1.1 Background

Under the *State Hazard Plan – Fire,* an integrated Bushfire Risk Management Plan (BRM Plan) is to be developed for local governments identified as having a significant bushfire risk. This BRM Plan has been prepared for the Shire of Narrogin in accordance with the requirements of the *Guidelines for Preparing a Bushfire Risk Management Plan.*

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.

This BRM Plan is a strategic document that identifies assets at risk from bushfire and their priority for treatment. The resulting '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. Treatments will be guided by risk priority, not land tenure, and will not be limited to local government managed lands.

This BRM Plan, as reflected in *Figure 1* below, consists of:

- Bushfire Risk Management Plan
- Communications Strategy (***Appendix 1***)
- Local Government Wide Controls & Multi Agency Work Plan *(**Appendix 2**)*
- Asset Risk Register *(refer to section 4.2.4)*
- Treatment Schedule (to be completed within 6 months of endorsement of the BRM Plan)

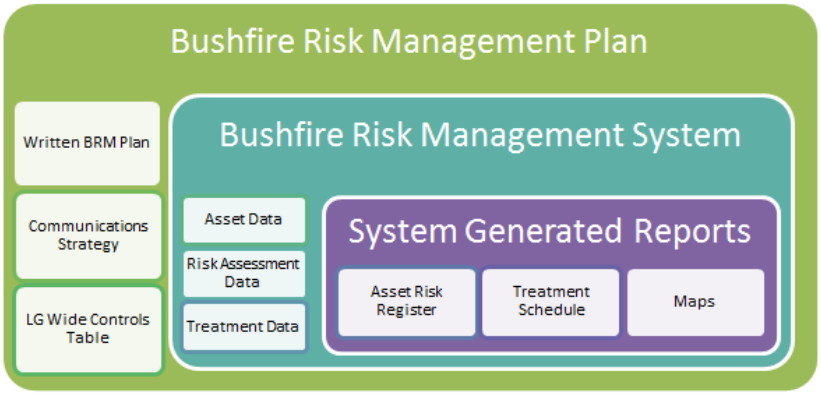


Figure 1: Components of the Bushfire Risk Management Plan [2]

Assets, risk assessments and treatment data is stored and maintained in an electronic database – the Bushfire Risk Management System (BRMS). Shire personnel will have access to the Shire's data and are able to produce reports including the *Asset Risk Register* and *Treatment Schedule* as well as maps.

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 Narrogin.

[2] *Source: Bushfire Risk Management Handbook, Department of Fire and Emergency Services, 2017.*

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

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

1.3 Legislation, Policy and Standards

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

1.3.1 Legislation

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

1.3.2 Policies, Guidelines and Standards

- AS 3959-2009 Construction of buildings in bushfire-prone areas
- AS/NZS ISO 31000:2009 - Risk Management – Principles and Guidelines
- Building Protection Zone Standards (DFES)
- Bushfire Risk Management Planning – Guidelines for preparing a Bushfire Risk Management Plan (2015)
- Firebreak Location, Construction and Maintenance Guidelines (DFES)
- Guidelines for Planning in Bushfire Prone Areas (2015)
- Guidelines for Plantation Fire Protection (DFES 2011)
- National Emergency Risk Assessment Guidelines (NERAG) (Second Edition 2015)
- State Emergency Management Policy 2.5 – Local Arrangements
- State Emergency Management Policy 3.2 – Emergency Risk Management Planning
- State Emergency Management Preparedness Procedure 7 – Local Emergency Management Committee (LEMC)

- State Emergency Management Preparedness Procedure 8 – Local Emergency Management Arrangements
- State Emergency Management Prevention Procedure 1 – Emergency Risk Management Planning
- State Hazard Plan for Fire (2019)
- State Planning Policy 3.4: Natural Hazards and Disasters
- State Planning Policy 3.7: Planning in Bushfire Prone Areas
- Western Australian Emergency Risk Management Guide 2015

1.3.3 Shire of Narrogin References

- Shire of Narrogin Strategic Community Plan 2017 – 2027
- Shire of Narrogin Local Emergency Management Arrangements 2016
- Shire of Narrogin - Annual Fire Control order
- Shire of Narrogin – Corporate Business Plan 2019-2023
- Roadside vegetation and Conservation values in the Shire of Narrogin (2009)
- Shire of Narrogin - Bushfire Prone Area Map
- Narrogin Bridge Inventory (Main Roads Sept 2017)
- Local Recovery management Plan 2017
- The Shire of Narrogin Business Prospectus
- Native Vegetation Handbook for the Shire of Narrogin
- Hillman and Narrogin Zones (Blackwood zones 8and 9): rapid catchment appraisal 2006

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)
- Code of Practice for Timber Plantations in Western Australia (Forest Products Commission 2014)

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.

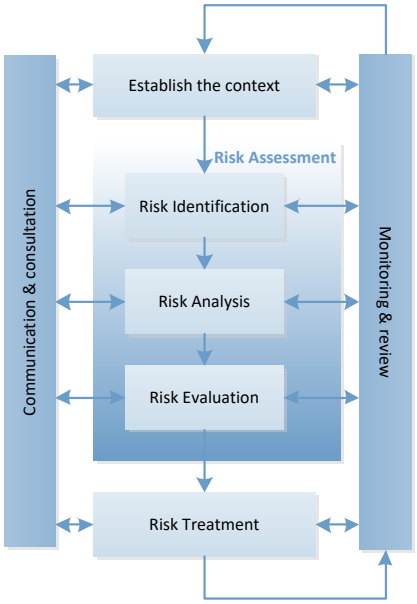


Figure 2 - An overview of the risk management process [3]

2.1 Roles and Responsibilities

The roles and responsibilities of the key stakeholders involved in the development of the BRM Plan are outlined in *Table 1*.

Table 1 – Roles and Responsibilities

Stakeholder Name	Roles and Responsibilities
Local Government	▪ 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. ▪ 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.

[3] *Source: AS/NZS ISO 31000:2009, Figure 2, reproduced under SAI Global copyright Licence 1411-c083.*

Stakeholder Name	Roles and Responsibilities
	▪ Facilitation of local government engagement with state and federal government agencies in the local planning process. ▪ Undertake treatment strategies, including planned 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. ▪ Ensure bushfire risk is managed in accordance with AS/NZS ISO 31000 and reporting on the state of bushfire risk across Western Australia (OBRM). ▪ Review BRM Plans for consistency with the Guidelines prior to final endorsement by Council (OBRM).
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 treatment manager (where applicable), 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 treatment manager, implementation of treatment strategies.
Corporations and Private Land Owners	▪ Assist the local government by providing information about their assets and current risk treatment programs. ▪ As land owner/treatment manager, identification and implementation of treatment strategies.
Other Stakeholders	▪ Providing advice for the identification of assets that are vulnerable to fire. ▪ Providing advice on 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 occurred with relevant stakeholders in the development of the BRM Plan, a *Communication Strategy* was prepared. This 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 Narrogin Strategic Community Plan (2017 – 2027) outlines the Shire's commitment to community safety, risk management and effective management of the environment and natural resources. This is reflected in the Shire's values and mission:

> ***Our Vision: "A leading regional economic driver and a socially interactive and inclusive community"***[4]

Our Mission; Provide leadership, direction and opportunities for the community.
Key Principals: In achieving the Vision and Mission, we will set achievable goals and work with the community to maintain a reputation of openness, honesty and accountability.
In doing so, we will:

- respect the points of view of individuals and groups;
- build on existing community involvement;
- encourage community leadership;
- promote self-reliance and initiative;
- recognise and celebrate achievement;
- support the principles of social justice; and
- acknowledge the value of staff and volunteers.[5]

The Shire's commitment to these values are reflected throughout this document and are contextualised against each of the key result areas discussed below. On review of the Strategic Community Plan, the following key result areas, activities and objectives are identified as having direct relevance to the objectives of this BRM Plan:

Key Strategic Objectives

Objective 1: Economic: - Support growth and progress, locally and regionally

- Outcome 1.3: An effective well-maintained transport network
    - Maintain and improve road network in line with resource capacity

The Shire of Narrogin is committed to ensuring land and infrastructure developments reflect best practice to reduce bushfire risks.

[4] *Shire of Narrogin Strategic Community Plan 2017 - 2027*
[5] *Shire of Narrogin Strategic Community Plan 2017 - 2027*

Objective 2: Social - To provide community facilities and promote social interaction

- Outcome 2.3: Existing strong community spirit and pride is fostered, promoted and encouraged
    - Engage and support community groups and volunteers

The Shire recognises and values the efforts and dedication of the members of the local volunteer emergency services brigades and is committed to providing the necessary support and resources to enable them to respond to bushfires.

Objective 3: Environment - Conserve, protect and enhance our natural and built environment

- Outcome 3.1: A preserved natural environment
    - Conserve, enhance, promote and rehabilitate the natural environment

- Outcome 3.4: A well maintained built environment
    - Improved and maintain built environment

The Shire of Narrogin is committed to addressing bushfire risks and working with stakeholders to reduce this risk and will do so in a way with minimal impact to the environment.

Objective 4: Civic Leadership - Continually enhance the Shire's organisational capacity to service the needs of a growing community.[6]

- Outcome 4.1 an efficient and effective organisation
    - Continue to enhance communication and transparency[7]

The Shire of Narrogin is committed to engaging with the community and stakeholders on matters related to bushfire risk management and maintaining compliance with bushfire related legislation including the responsible expenditure of any mitigation grant funding.

The size of the Shire's structure and available funding at this time, does not support a role specifically allocated to Emergency Management. It has therefore been determined that this responsibility will be delegated by the Chief Executive Officer as appropriate. Tasks may be delegated to the Chief Bush Fire Control Officer (CBFCO), which is a volunteer position appointed by the Shire in accordance with the Bush Fires Act 1954. The following *table 2*, reflects the functions and positions within the Shire of Narrogin critical to the successful achievement of the objectives of this BRM Plan.

Table 2 – Functions/positions within Shire of Narrogin critical to this Bushfire Risk Management Plan

Function	Roles
Shire Leadership Team	▪ Oversight of the implementation, monitoring and review of the Bushfire Risk Management Plan ▪ Sourcing and approving funding and expenditure ▪ Monitoring the implementation of agreed treatments ▪ Liaison with key stakeholders ▪ Participation on Local Emergency Management Committee (LEMC) ▪ Management of the release of BRM Plan and BRMS data

[6] *Shire of Narrogin Strategic Community Plan 2017 - 2027*
[7] *Shire of Narrogin Strategic Community Plan 2017 - 2027*

Person/s Tasked with Emergency Management within the Shire Administration Team	▪ Develop practices for fire management on LG, UCL and UMR land ▪ In consultation, planning annual schedule of works ▪ Build knowledge and understanding of fire management practices within the community ▪ Participation on Bushfire Advisory Committee (BFAC) ▪ Support bushfire meetings and committees ▪ Oversee burning programs and support from local brigades ▪ Contributing to treatment planning ▪ Negotiating with stakeholders
Chief Bushfire Control Officer	▪ Oversee burning programs and support from local brigades ▪ Contributing to treatment planning ▪ Negotiating with stakeholders ▪ Fire breaks inspection and enforcement
Works Department	▪ Contributing to treatment planning ▪ Undertake planned works
Town Planning	▪ Ensure adherence to building codes and planning scheme ▪ Bushfire prone mapping
Finance	▪ Accessing and managing grants and funding

NOTE: Some functions outlined above may be fulfilled through the employment of contract personnel

The Shire's Local Emergency Management Committee (LEMC) and Bushfire Advisory Committee (BFAC) are identified as key stakeholders in the development, implementation and review of the BRM Plan. Their input and advice are critical to the bushfire risk management process and will provide an important forum for consultation, joint-agency partnerships and the resolution of local issues affecting bushfire risk management.

The BRM Plan will assist in improving the community's awareness of bushfire risk and treatment activities planned in their area. Identification of treatment priorities will inform the Shire's forward planning and budgeting for treatment activities within the BRM Plan area.

The Shire has a scheduled annual works program and proactively addresses risks identified on Shire owned and managed land, within their budgetary constraints. The Bushfire Risk Management Plan can be used as a useful tool to help prioritise the work on their managed lands. The following challenges have been identified for the Shire, all of which have the potential to impact the objectives of this BRM Plan, consequently special consideration should be given to these matters during the life of this plan:

- Changes to agricultural practices
- Aging population
- Attraction and retention of residents impacting succession planning within the emergency services volunteer brigades
- Vulnerable groups, such as the elderly recreational visitors
- The volume of traffic moving through the Shire along known ignition routes

The challenges outlined above, and the priority areas detailed below, together with the actions being undertaken by the Shire in relation to these challenges and priorities, are referenced further in this document.

The Shire has identified a number of priority areas that need to be considered in the bushfire risk planning processes both in the context of this BRM Plan and beyond. These include:

- The risk of fire travelling along waterways in and around the more populated areas of the shire;
- Limitations of water access and long delays in turnaround times when refilling during firefighting operations;
- Bridges within the Shire are predominantly timber construction. These have been identified as a significant risk due to their cost of replacement and the potential economic impact if transport routes are interrupted for extended periods;
- Management of Unallocated Crown Land (UCL) and Unmanaged Reserves (UMR) both within and outside town boundaries;
- Management of reserves around the town boundary; and
- Vegetation in and around telecommunications and public utility infrastructure, such as the communications towers, water pipeline, pumping station and the railway.

These priority areas have been identified from matters raised through corporate governance processes such as Council, Local Emergency Management Committee, Bushfire Advisory Committee and local knowledge. The location of assets in relation to vegetation and their importance for the Shire's response and recovery activities have driven identification of these risks.

3.1.2 Location, Boundaries and Tenure

The Shire of Narrogin is in the south-west interior of Western Australia within the Wheatbelt Region as depicted in *Figure 3*. The Shire is situated in undulating broad acre farming country. The Shire is located 200km southeast from Perth and the Shire covers an area of 1619km2.

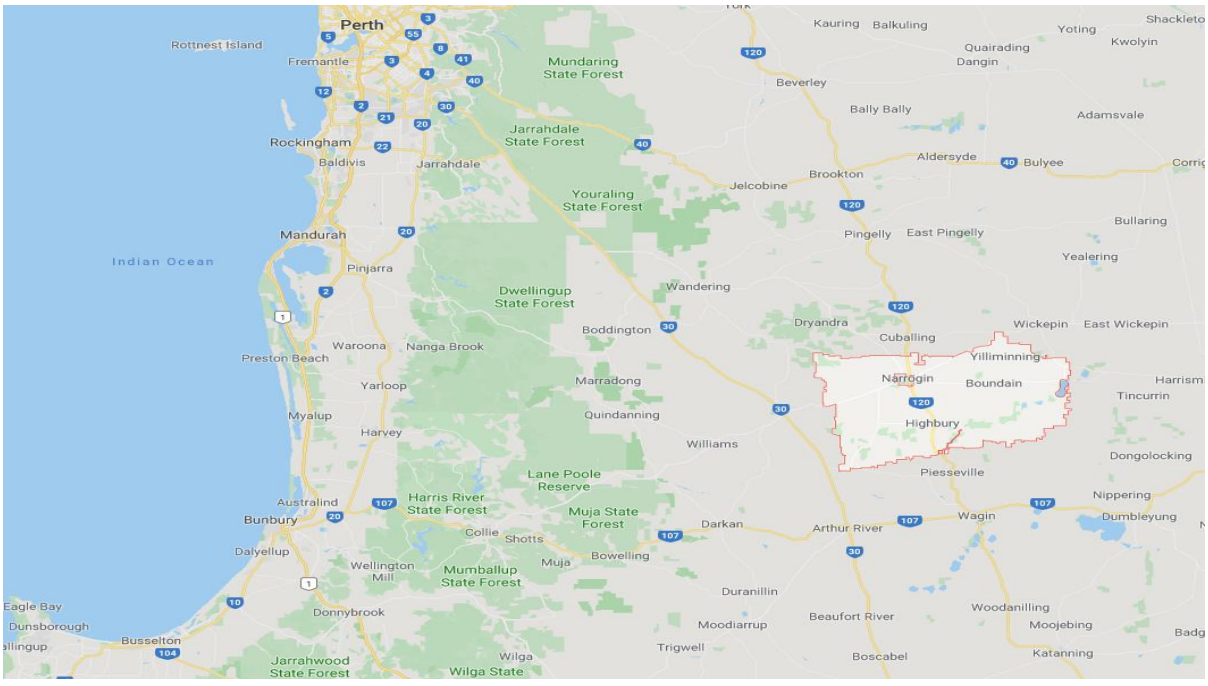


Figure 3: The location of the Shire Narrogin within the State of WA [8]

[8] *Source: Map data Google 2019*

Adjoining local government authorities include the Shires of Cuballing, Wickepin, West Arthur, Wagin and Williams.

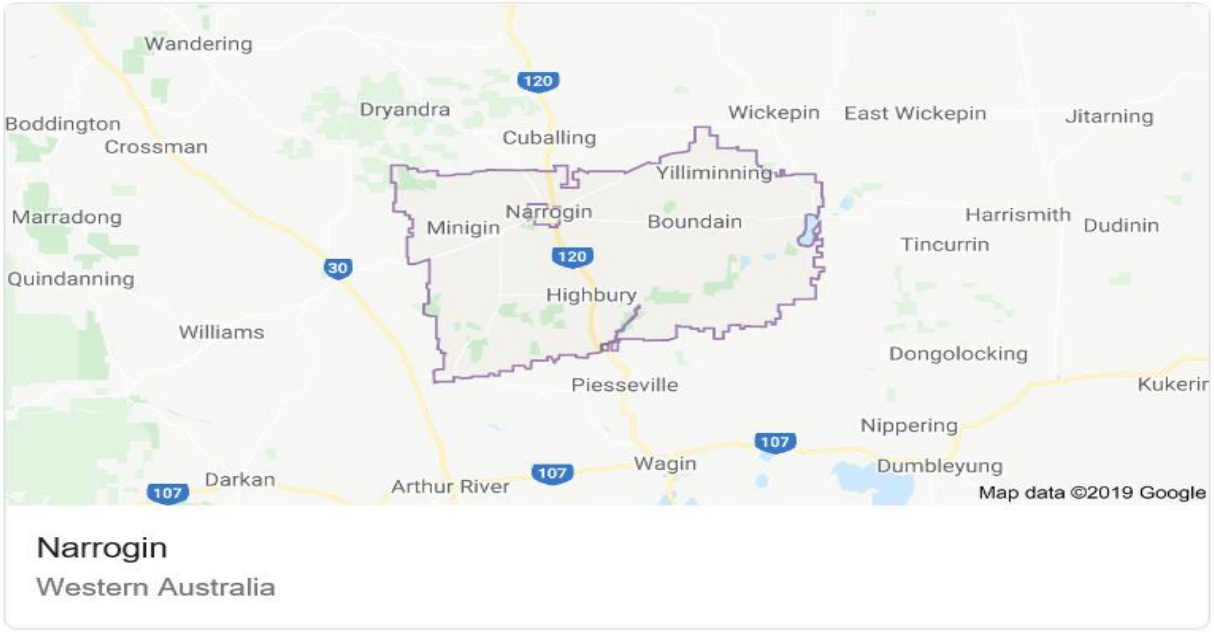


Figure 4: Map reflecting the Shires adjoining the Shire of Narrogin [9]

The Shire's main townsite is Narrogin, with smaller settlements in Highbury, Yilliminning and Nomans Lake.

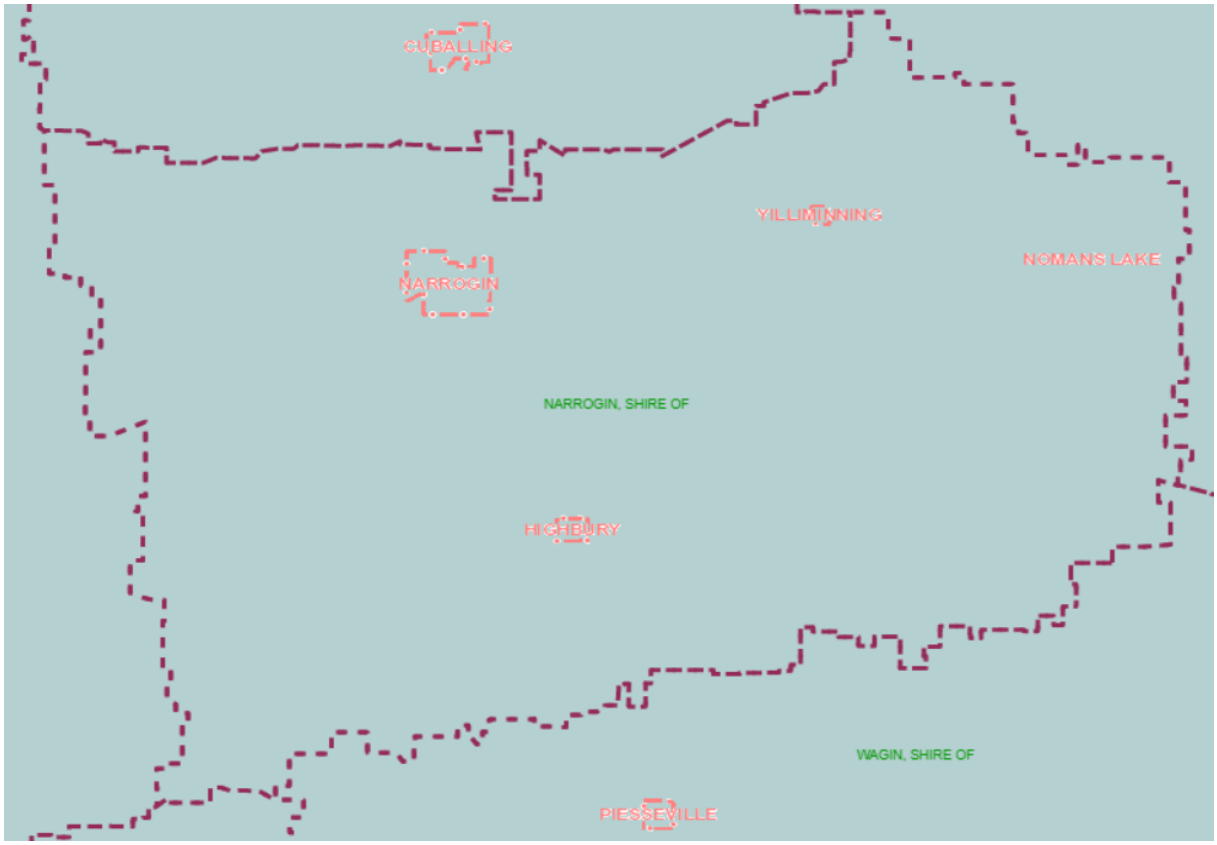


Figure 5: – Map showing the locality of the townsites within the Shire of Narrogin [10]

[9] *Source: Map data Google 2019*
[10] *Source: DFES Bushfire Risk Management System*

The Shire includes the localities of Yilliminning, Hillside, Boundain, Nomans Lake, Narrogin Valley, Highbury, Minigin, Dumberning and Narrogin.

An overview of the Shire's land tenure and management is shown in *Table 3*. The Shire is made up of a mosaic of land tenures. Fires can spread quickly across the landscape, moving between multiple tenures and areas of various land use. As shown in *Table 3*, 90.1% of land tenure within the Shire is private ownership, with the majority of this land used for agricultural purposes, predominantly broad acre farming. Approximately 69% of the Shire of Narrogin is arable land. [11] Some of the challenges related to this include:

- If one landowner does not comply with the Shire's local laws this can increase the risk to other landowners, particularly those on adjoining properties;
- Fire impacting significantly on one farm can have substantial economic and social implications for the Shire; and
- There needs to be consideration given to balancing the impacts of mitigation and risk reduction in the context of productivity and associated costs.

This results in a challenge where the Shire needs to balance the benefits of risk reduction and the impacts of mitigation activities on the productivity of the area and the associated costs of works to be carried by the land owner. This is something the Shire will continue to review, in consultation with land owners and fire management agencies.

Table 3 – Overview of Land Tenure and Management within the Shire of Narrogin [12]

Land Manager	% of Plan Area
Shire of Narrogin (Vested)	0.85%
Department of Planning, Lands and Heritage and other government agencies	0.05%
Department of Biodiversity, Conservation and Attractions	9.00%
Private *(predominantly agricultural holdings)*	90.10%
Total	100.00%

Unallocated Crown Land (UCL) and Unmanaged Reserves (UMR) constitute less than 0.1% of the total land tenure within the Shire. UCL/UMR located within the townsites are managed by the Department of Fire and Emergency Services with UCL/UMR located outside of the townsites managed by the Department of Biodiversity, Conservation and Attractions (DBCA). These management arrangements result from a memorandum of understanding (MOU) with the Department of Planning, Lands and Heritage.

Effective UCL/UMR Management within the Shire of Narrogin is necessary as UCL/UMR forms the rural-urban interface (RUI) and the vegetation on UCL/UMR is a significant driver of the Shires bushfire risk. A strong relationship has already been developed between the Shire, DFES and DBCA in recognition of the bushfire risk posed by UCL/UMR and the ongoing requirement for management programs delivered by each agency to align with, and address, key priorities identified within the BRM Plan.

Figure 6 reflects the location of UCL/UMR across the Shire, whereas *Figures 7, 8, 9* and *10* show the location of the UCL/UMR within the townsites of Narrogin, Highbury, Nomans Lake and Yilliminning respectively.

[11] *Department of Primary Industry and Regional Development*
[12] *Source: Department of Fire and Emergency - Services Geographical Information Systems Section using SLIP data*

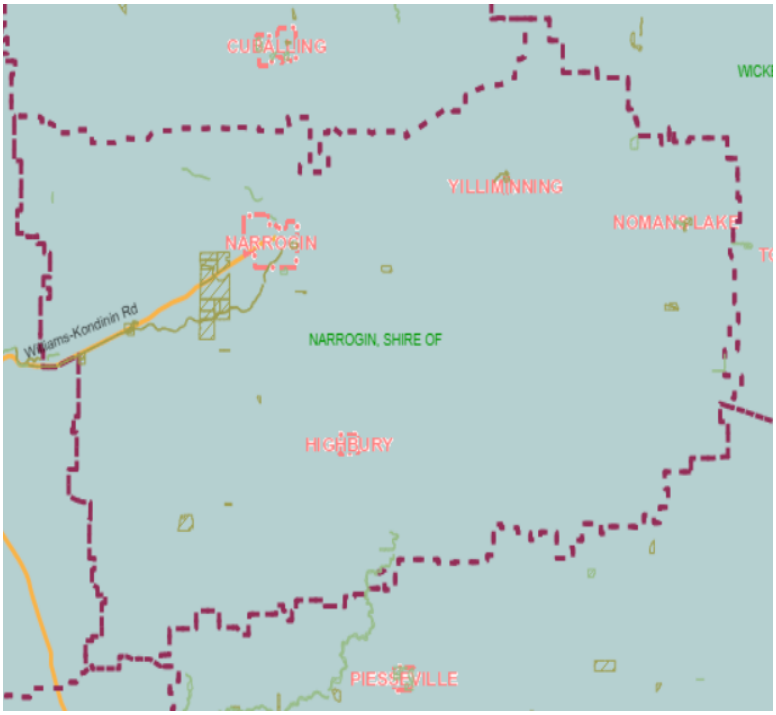


Figure 6: –The location of UCL/UMR within the Shire of Narrogin [13]

Note: UCL is land within townsites (Pink). UMR is located outside the townsite.

Figure 7: –The location of UCL/UMR within the Townsite of Narrogin [14]

[13] *Source: DFES Bushfire Risk Management System*
[14] *Source: DFES Bushfire Risk Management System*

Figure 8: –The location of UCL/UMR within the Townsite of Highbury [15]

Figure 9: –The location of UCL/UMR within the Townsite of Nomans Lake [16]

Figure 10: –The location of UCL/UMR within the Townsite of Yilliminning [17]

[15] *Source: DFES Bushfire Risk Management System*
[16] *Source: DFES Bushfire Risk Management System*
[17] *Source: DFES Bushfire Risk Management System*

3.1.3 Population and Demographics

In the 2016 Census, there were 5,162 people in the Shire of Narrogin. The ancestry is predominantly Australian and English with 72.9% of residents listing Australia as their country of birth. The median age of people in Narrogin was 39 years.[18]

Table 4 reflects that the majority of the Shire's residents are Australian born (73.3%) with 4.3% emigrating from England, 1.8% from New Zealand and 1.7% from the Philippines ,1% from South Africa and less than 1% from India.

Table 4: Population within the Shire of Narrogin by Country of Birth[19]

Country of birth	Narrogin (S)	%	Western Australia	%	Australia	%
Australia	3,770	73.3	1,492,842	60.3	15,614,835	66.7
Other top responses						
England	219	4.3	194,163	7.8	907,570	3.9
New Zealand	95	1.8	79,221	3.2	518,466	2.2
Philippines	89	1.7	30,835	1.2	232,386	1.0
South Africa	53	1.0	41,008	1.7	162,449	0.7
India	30	0.6	49,385	2.0	455,389	1.9

In Narrogin (S) (Local Government Areas), 73.3% of people were born in Australia. The most common countries of birth were England 4.3%, New Zealand 1.8%, Philippines 1.7%, South Africa 1.0% and India 0.6%.

The statistics show 53 percent of the population are aged between 20 – 64-years-old, which is the key age group for recruitment and retention of emergency services volunteers. The low population numbers overall means that there is a limited availability of bushfire brigade volunteers, with pressure further increased when considering the broad competing priorities associated with smaller rural communities. This is a key consideration for the Shire. However, as seen in many wheatbelt and farming communities, the shire has a strong turnout of spontaneous volunteers during fire events, with many local residents stepping forward to support their community. There may be an opportunity, through the BRM Plan, to engage with this sector of the community to potentially:

- increase the registration of volunteers or farmer response units prior to an event;
- deliver training or education programs;
- identify volunteer organisations that spontaneous volunteers could be referred to during an emergency.

The continued trend of an aging population is likely to impact the capability and availability of volunteers to respond to bushfires. The Shire will need to reconsider current methods for the attraction and retention of volunteers, with a particular focus on encouraging younger members of the community to volunteer with brigades, as well as ways to retain aging volunteers through the promotion of other roles or volunteer organisations that are more suitable to their skills and capabilities.

The statistics show lower number of residents than the state average in the 15 - 24 age bracket, which is most likely the result of children leaving town for further education and/or employment. These residents often return to the community, or similar communities, when they have young families of their own, seeking a similar early life experience to what they enjoyed.

The demographics of the Shire of Narrogin present a range of challenges for fire management. Forty percent (40%) of the population are in vulnerable groups (under 14 or over 65) which require special consideration when planning around prevention, preparedness, response and recovery.

[18] *Source: Shire of Narrogin Strategic Community Plan 2017 - 2027*
[19] *Source: ABS Data 2016*

The number of residents within the 0 – 14 age group indicates that delivery of a school based program may be of benefit for early engagement and increasing understanding of home bushfire awareness. Children can influence behaviour changes within families and increasing awareness within the school environment via DFES' current school-aged education programs could result in increased awareness throughout the community. There are many other established community networks and groups that could be identified and engaged in targeted bushfire risk and preparedness education programs, using for example, DFES' 5-minute Fire Chat resource.

The over 65 age group accounts for 19% of the population. Elderly people are considered a vulnerable demographic in bushfire management, as they may have less capacity to prepare and defend property or protect themselves during a fire event and may have additional or special needs during evacuation and relocation. Because of this, there is need for increased planning for this group to ensure that they are adequately considered in bushfire management planning, communications during fire events, community education delivery and consultation when planning mitigation works. Narrogin has an aged care facility that offers a wide range of care for the community. There is a need to ensure that there is tailored advice provided to this group during pre-fire season preparation, as well as during bushfire events.

Table 5: Population by Age, Shire of Narrogin[20]

Age	Narrogin	%	Western Australia	%	Australia	%
Median age	39	--	36	--	38	--
0-4 years	271	6.3	161,727	6.5	1,464,779	6.3
5-9 years	319	7.5	164,153	6.6	1,502,646	6.4
10-14 years	311	7.3	150,806	6.1	1,397,183	6.0
15-19 years	301	7.0	149,997	6.1	1,421,595	6.1
20-24 years	245	5.7	160,332	6.5	1,566,793	6.7
25-29 years	239	5.6	184,908	7.5	1,664,602	7.1
30-34 years	246	5.8	194,267	7.9	1,703,847	7.3
35-39 years	209	4.9	173,041	7.0	1,561,679	6.7
40-44 years	234	5.5	171,996	7.0	1,583,257	6.8
45-49 years	268	6.3	172,520	7.0	1,581,455	6.8
50-54 years	242	5.7	162,438	6.6	1,523,551	6.5
55-59 years	303	7.1	149,899	6.1	1,454,332	6.2
60-64 years	274	6.4	132,145	5.3	1,299,397	5.6
65-69 years	248	5.8	116,755	4.7	1,188,999	5.1
70-74 years	173	4.0	82,911	3.4	887,716	3.8
75-79 years	144	3.4	61,509	2.5	652,657	2.8
80-84 years	117	2.7	42,590	1.7	460,549	2.0
85 years and over	128	3.0	42,420	1.7	486,842	2.1

Table 6: Occupation, Shire of Narrogin[21]

Occupation *Employed people aged 15 years and over*	Narrogin (S)	%	Western Australia	%	Australia	%
Professionals	352	16.7	237,230	20.5	2,370,966	22.2
Technicians and Trades Workers	344	16.3	187,396	16.2	1,447,414	13.5
Managers	309	14.7	139,350	12.0	1,390,047	13.0
Labourers	272	12.9	112,599	9.7	1,011,520	9.5
Community and Personal Service Workers	257	12.2	122,889	10.6	1,157,003	10.8
Clerical and Administrative Workers	216	10.3	150,408	13.0	1,449,681	13.6
Sales Workers	171	8.1	102,337	8.8	1,000,955	9.4
Machinery Operators and Drivers	149	7.1	86,392	7.5	670,106	6.3

The most common occupations in Narrogin (S) (Local Government Areas) included Professionals 16.7%, Technicians and Trades Workers 16.3%, Managers 14.7%, Labourers 12.9%, and Community and Personal Service Workers 12.2%.

[20] *Source: ABS Data 2016*
[21] *Source: ABS Data 2016*

Community Engagement

The Shire is proactive in sharing emergency prevention, preparation, response and recovery related information using the Shire's Facebook page and website. This is one way that the Shire of Narrogin is addressing the challenges of providing information to recreational visitors. This provide unique challenges for community education and often have limited information about local conditions and general bushfire awareness. There has been past targeting of community education focused on these groups through:

- Radio broadcasts about volunteering, being prepared for a fire, upcoming community events;
- Information stands at local community events;
- Back to school events (all emergency services);
- Provide bushfire information in Visitor Centres;
- Roadside signage advising the current fire conditions; and
- Variable message boards on major roads advising of fire conditions.

3.1.4 Economic Activities and Industry

Agriculture is the dominant industry in the region, including within the Shire of Narrogin. Due to its location, Narrogin is a key transport hub for the wider area and its population base means it also has more shopping options, facilities and services. Its close proximity to Perth makes it a very attractive location for new business and industry as well.

Cropping rotations in the Shire of Narrogin consist mainly of wheat, barley and oats (for grain or hay). Wheat is concentrated in the eastern parts, on paddocks less prone to frosts. Canola is also included in the rotation (depending on price fluctuation) in favourable seasons.[22]

There has been a move to explore alternative crops throughout the broader wheatbelt region. Some crops (i.e. canola or rapeseed) burn at a higher temperature, which can be harder to extinguish than native pastures.[23] The recent fire in the Shire of Katanning (February 2020) highlighted the potential for a similar event to occur in Narrogin due to the close proximity of agricultural land and vegetated reserves to the townsite boundary. Fires occurring on productive agricultural land can result in impacts such as the loss of top soil, which can reduce the soil condition and may take years for the soil quality to return to the pre-fire condition. This in turn can impact the quality of future crops and lead to increased operational costs.

Potentially, even the loss of an individual farm may have a significant long term economic and social cost to the Shire. In addition to the direct economic loss, the flow on impacts are great, for example families may leave the shire, which in turn can impact local businesses through loss of their customer base, as well as reduce the number of people available to undertake or participate in volunteering.

Key transport links within the Shire of Narrogin include the tier 2 railway line and Great Southern Highway, which run north-south through the centre of the Shire. The Shire has been identified as a Grain Freight Route, linking grain growing areas to the east with the Great Southern Highway, through to delivery centres in Brookton. Transport links, both rail and road, are critical for agricultural industries, with even minor disruptions to the network likely to cause economic losses. The Australian Rail Corporation (ARC), through their own internal bushfire risk management project, undertake a program of work along their rail corridor to protect their infrastructure. The Shire will continue to identify treatment priorities and work with ARC infrastructure through the BRM planning process.

---

[22] *Hillman and Narrogin Zones (Blackwood zones 8 and 9): rapid catchment appraisal 2006*
[23] *Department of Primary Industries and Regional Development* www.agric.wa.gov.au

The Shire has an established hazard reduction maintenance program, which includes roadside spraying of vegetation, tree trimming and grading of fire access tracks on Shire managed road reserves. The Shire liaises with Main Roads to ensure areas identified as higher risk are addressed in a timely manner.

By endorsing the BRM plan the Shire can continue their hazard reduction programs by using the plan and working on the high risks identified.

The tourism market is another area which has growth potential, particularly in attracting international visitors or day trippers. Old buildings in Narrogin are a major local tourist attraction.[24] Also within a short distance of the town is the Dryandra Woodland nature reserve, which is a key natural attraction due to its rich diversity of fauna and flora species, and it being a rare remnant of the open woodlands that covered much of the wheatbelt, prior to agricultural clearing. There are many accommodation (overnight and short-stay) options within the Shire, which support a growing tourism sector.

Hospitals and Education account for high proportion of the employment in the Shire. The Shire provides these services to the wider region with a regional hospital and boarding schools located within the Shire. The role as a service hub is a critical economic and social element of the Shire.

Table 7: Industry of employment Shire of Narrogin[25]

Industry of employment, top responses *Employed people aged 15 years and over*	Narrogin (S)	%	Western Australia	%	Australia	%
Hospitals (except Psychiatric Hospitals)	108	5.3	41,706	3.6	411,808	3.9
Secondary Education	102	5.0	20,488	1.8	177,487	1.7
Primary Education	95	4.7	29,683	2.6	231,198	2.2
Aged Care Residential Services	79	3.9	21,177	1.8	211,621	2.0
Grain-Sheep or Grain-Beef Cattle Farming	67	3.3	4,107	0.4	15,056	0.1

Of the employed people in Narrogin (S) (Local Government Areas), 5.3% worked in Hospitals (except Psychiatric Hospitals). Other major industries of employment included Secondary Education 5.0%, Primary Education 4.7%, Aged Care Residential Services 3.9% and Grain-Sheep or Grain-Beef Cattle Farming 3.3%.

3.2 Description of the Environment and Bushfire Context

3.2.1 Topography and Landscape Features

The agricultural areas of Western Australia are very diverse, with a wide range of landscapes, soils and landscape features. The Shire Narrogin's landscape features are detailed in the Department of Agriculture and Food (WA) series *'Landscape and soils of the Narrogin District'* 2010'.

The geology of southern Western Australia, including the Shire of Narrogin, is dominated by the Yilgarn Craton, an ancient plateau composed mainly of granite, with intrusions of dolerite and capped with laterite. The north-west alignment of major rock bands of the Yilgarn Craton reflects its formation over many hundreds of million years as 'rafts' of land on tectonic plates collided to form bands of gneiss that were intruded by granites. Gneiss is a metamorphic rock with a banded or foliated structure, typically coarse-grained and consisting mainly of feldspar, quartz, and mica. Extensive faulting and uplifts on the south and west of the Yilgarn craton caused marked changes to slope and drainage patterns. Stresses associated with these events caused cracking and intrusion of the dolerite dykes that occur throughout the craton. These dykes can be a locally significant as soil materials are frequently associated with mafic lateritic ridges. Bands of greenstone were formed when intra-plate rifts were alternately filled by sediments and volcanic rocks, and then also became extensively metamorphosed by ongoing plate collision. Igneous rocks include granite, dolerite, gabbro, quartz and metamorphic rocks such as gneiss, that are parent materials for wind and waterborne deposits, laterites and a range of soils. Outcrops are relatively common in dissected (rejuvenated) areas.[26]

[24] *Source: Shire of Narrogin Business Prospectus*
[25] *Source: ABS Data 2016*
[26] *Source: Landscape and soils of the Narrogin District, Dept of Agriculture and Food WA, 2010, Bulletin 4807*

Figure 11 shows an example of a rocky landscape with mafic breakaway on the ridge and soils formed from granite (foreground) and dolerite dykes on the slope common in the west of the Shire.

Topography can significantly impact potential bushfire behaviour, impeding access for suppression resources and limiting suitable options for mitigation, which makes it a significant factor in bushfire risk and management. The impact of topography is greater in the west of the Shire, where the rock outcrops can restrict and, in some cases, prevent access by fire appliances. In areas where the rocky formations prevent ground based firefighting, direct attack of a fire is limited to aerial response or waiting until the fire reaches an area of suitable topography for ground crews to access. This may greatly increase the time taken for fire to be suppressed, which can allow fires to grow, resulting larger, more destructive fires often with higher intensities and rates of spread. While these land formations can present challenges when installing firebreaks, the issue highlights the need for fuels to be broken up across the landscape using a range of suitable and sustainable strategies that provide low fuel buffers and firebreaks for use in fire suppression and mitigation.

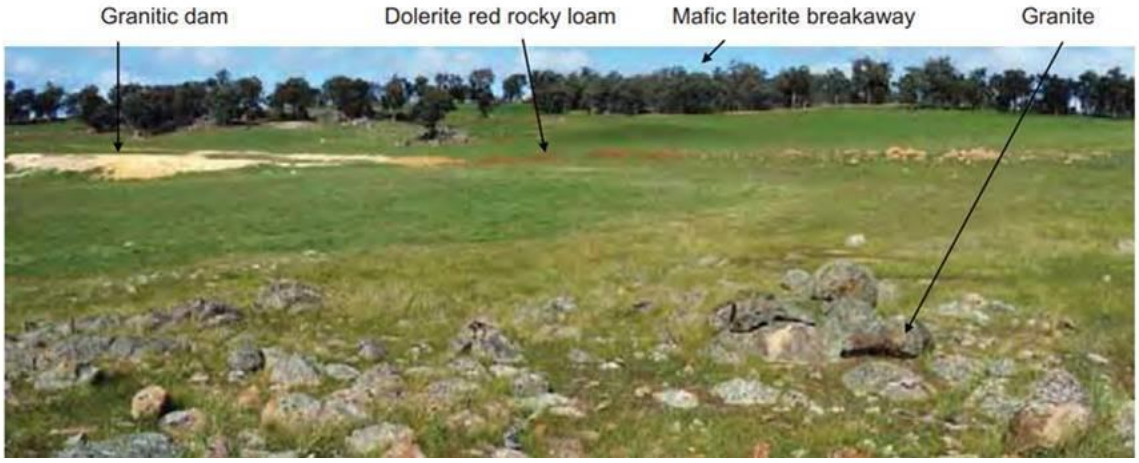


Figure 11: Mafic Landscape Views[27]

A major challenge for the Shire is accessing and crossing landscape features during fire events. Rivers, valleys, pipelines and the rail network all present challenges for firefighting vehicles and equipment when responding to a bushfire. Infrastructure, such as rail lines and the above ground Water Corporation pipeline dissecting the Shire and present a barrier, with access often limited to crossover points. These barriers are a significant consideration and limitation when responding to fires, but also when planning bushfire mitigation activities.

The western portion of the district is located on the Darling Plateau and the eastern section contains flat floored valleys. The district's landscape is dominated by a system of valleys and this formation results in slopes that can exceed 20 degrees. Slope has a major influence on potential fire behaviour. The rate of spread of a bushfire will double for each 10 degrees of slope, meaning a fire going up a 20 degree slope will move four times faster than on flat ground. Fires occurring in these valley formations will often move very fast and can be difficult to stop.

The waterways in the Shire are often corridors of riparian vegetation that create avenues for fires to travel and present challenges for access and crossing. Fires often spot across the watercourses, where firefighters cannot easily cross and may have to travel some distance to be able to get to the other

[27] *Source: Landscape and soils of the Narrogin Districts, Dept of Agriculture and Food WA.2010 Bulletin 4807*

side. This can often result in a significant delay in firefighting response allowing fires to be able to grow quickly with limited suppression under the influence of significant slopes.

Given the prevalence of waterways it is not surprising that there are 10 bridges throughout the Shire. These are critical features in the landscape, particularly for bushfire risk management. They are traffic routes critical to tourism as well as the movement of agricultural produce and therefore the local and regional economy can be adversely affected if bridges are damaged/destroyed by fire. For bushfire risk management they are vital for the evacuation of communities and the movement of firefighting response vehicles as well. The BRM planning process has identified the bridges, particularly timber bridges, as a significant risk for the Shire and they will be a priority for risk treatment.

A major challenge for the Shire is access and crossing landscape features during fire events, water way valleys, pipelines and the rail network all pose challenges to fire fighting vehicles moving through areas of the landscape. There is an above ground Water Corporation pipeline running north-south, as well as east-west dissecting the Shire. This supplies water to the Shire of Narrogin as well as other surrounding Shires. This can restrict movement with limited crossovers accessible. This is a significant consideration and limitation when responding to fires but also when planning bushfire mitigation activities particularly in the context of risk management.

3.2.2 Climate and Bushfire Season

The climate of the Shire is is described as semi-arid, with a warm, dry, Mediterranean climate. It has seven to eight dry months each year with an annual average rainfall of about 500 millimetres (20 in). Seasonal changes in temperature, rainfall and wind direction are marked and more extreme than coastal areas of the south-west. [28]

The following weather statistics were obtained from the Bureau of Meteorology (BOM) Narrogin Station ID 010614.

Bushfire threat is typically associated with very hot (above average temperatures), dry (less than 20% humidity) and windy (above 12 – 15 Km per hour) conditions. *Table 8* shows that the Shire of Narrogin can experience these conditions throughout the year, particularly during October to March inclusive (as highlighted). The wettest months are May through September when about 70% of the annual rainfall occurs. Weather is the primary influencer on fire activity[29] and therefore needs to be a significant consideration when planning both mitigation and response activities.

Month	Min temp °C	Max temp °C	Avg temp °C	Min RH %	Min avg RH %	Max avg RH %	Max RH %	Rain mm	Wind AvgSpeed @3m	Wind MaxSpeed @3m	Wind MaxCompass Point @3m	High wind days
Dec-19	8.6	41.9	24.5	5.4	15.9	73.7	95.7	1.8	12	60	NNW	21
Nov-19	1.8	40.9	19.2	7.9	20.5	84.1	97.8	12.6	13	60	SW	14
Oct-19	0.5	34	15.4	9.4	31.4	93	100	12.4	10	75	W	8
Sep-19	-1.4	28.7	13	16.1	43.3	97.4	100	17.2	8	50	NW	7
Aug-19	0.1	24.1	10.8	26.1	53.5	95.4	100	80.8	8	58	W	9
Jul-19	1.8	19.5	10.5	32.2	60.4	99	100	54.2	7	57	WSW	4
Jun-19	-0.6	23.2	11.2	12.3	52.3	91.2	100	120.6	9	66	N	11
May-19	-1.5	27.4	11.8	14.1	37.1	92.7	99.3	14.2	7	45	WSW	5
Apr-19	0.6	33.7	16.4	16.2	34.1	87.2	97.2	17	10	56	WSW	11
Mar-19	6.1	36.2	20.6	15.2	33.1	85.3	97.9	11.8	12	53	SE	10
Feb-19	9.2	40.2	22.6	9.9	21.5	81.3	93.1	0	14	60	SE	15
Jan-19	5.4	42.2	22.2	5.9	20.4	81.7	93.6	1.4	13	66	WNW	17

Table 8: 2018 Climatic Conditions for the Shire of Narrogin[30]

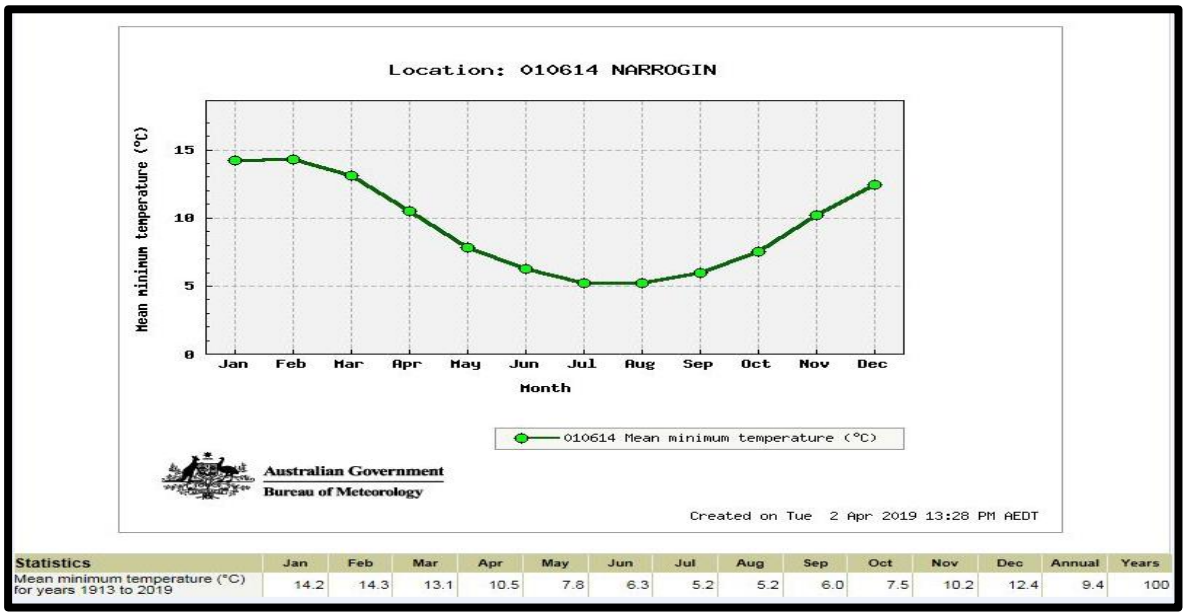
Figures 12 and *13* reflect high summer temperatures, with both the mean minimum and mean maximum temperatures the highest from December through to March. *Figure 14* shows the mean maximum temperature by month during 2019 reflected against the mean maximum temperature and

[28] *Source: Bureau of Meteorology*

[29] *The Burning Issue: Climate Change and the Australian Bushfire Threat* www.climatecouncil.org.au

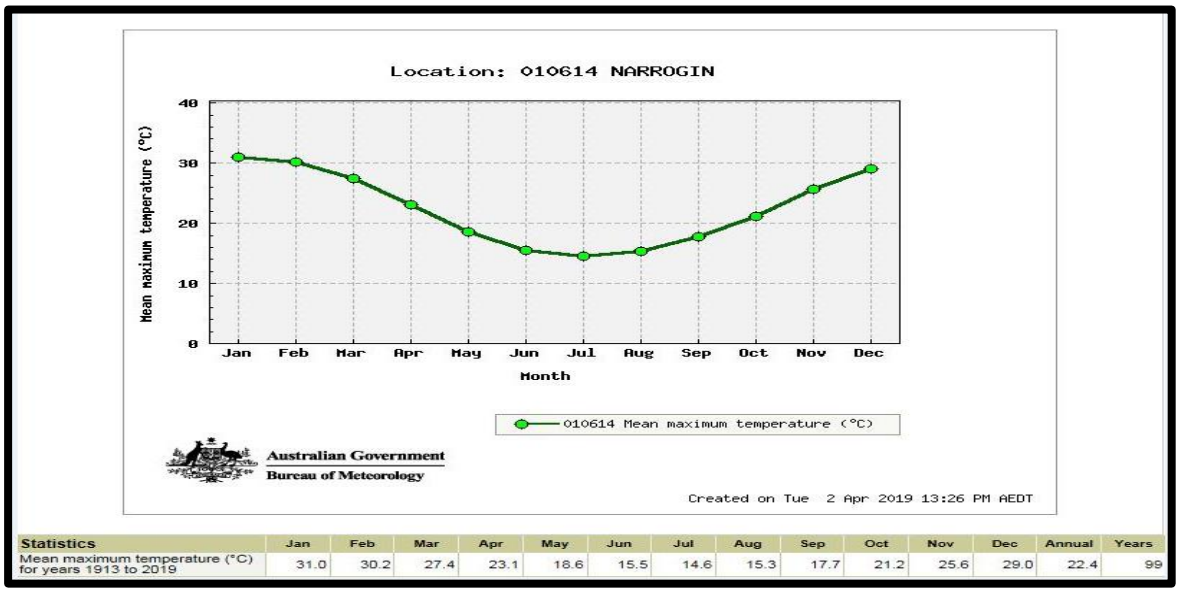
[30] *Department of Agriculture and Food*

the highest and lowest mean maximum temperatures for all years. *Figure 15* reflects the mean rainfall over the years 1891 to 2019. Relative Humidity (RH) plays a big part in firefighting as the lower the relative humidity the more vigorously fuels can burn. *Figures 16* and *17* show the lowest RHs are recorded from December through to February. *Figures 12 through to 17* confirm the higher fire danger period in the Shire of Narrogin is between December through to February.



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean minimum temperature (°C) for years 1913 to 2019	14.2	14.3	13.1	10.5	7.8	6.3	5.2	5.2	6.0	7.5	10.2	12.4	9.4	100

Figure 12: Graph depicting the mean minimum monthly temperate over the period 1913 – 2019. [31]



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean maximum temperature (°C) for years 1913 to 2019	31.0	30.2	27.4	23.1	18.6	15.5	14.6	15.3	17.7	21.2	25.6	29.0	22.4	99

Figure 13: Graph depicting the mean maximum monthly temperate over the period 1913 – 2019. [32]

[31] *Bureau of Meteorology*

[32] *Bureau of Meteorology*

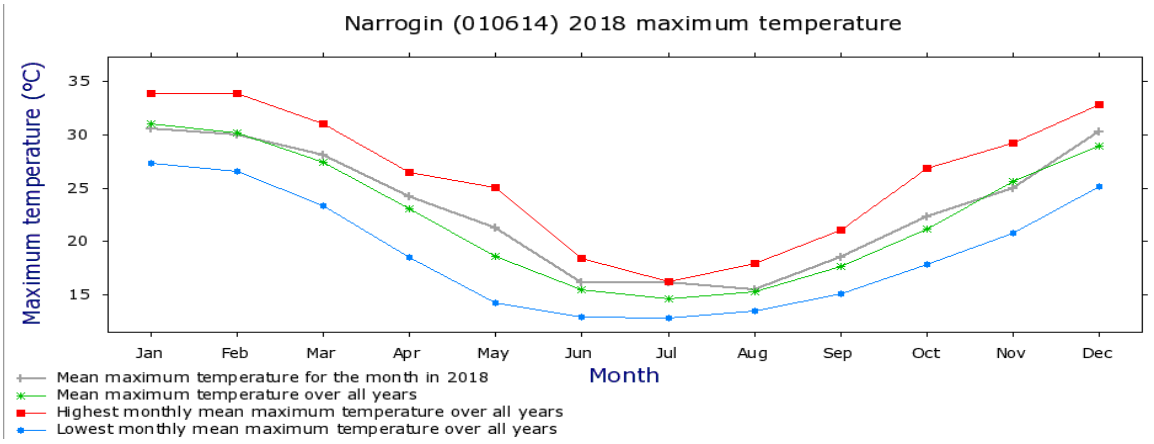
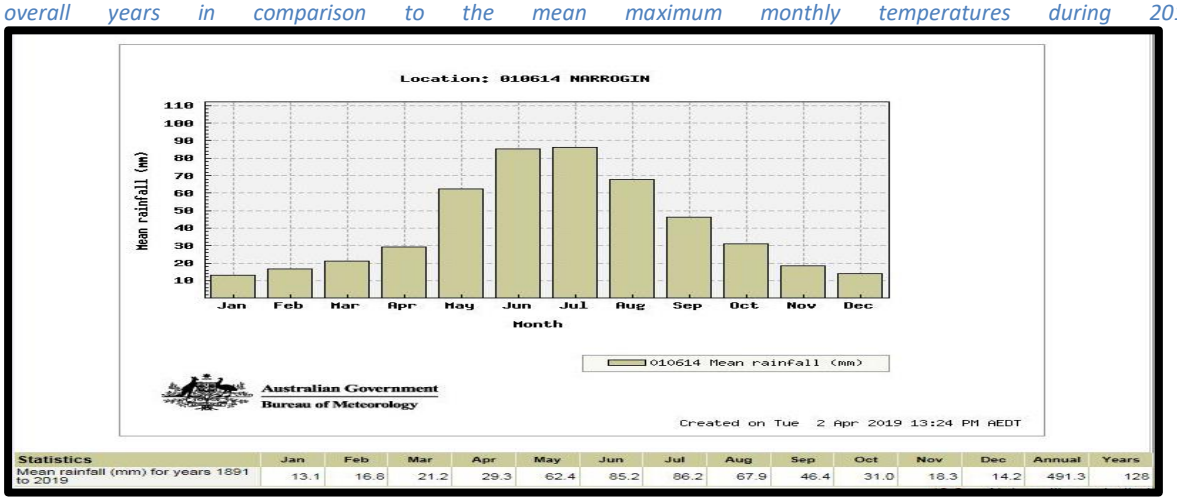
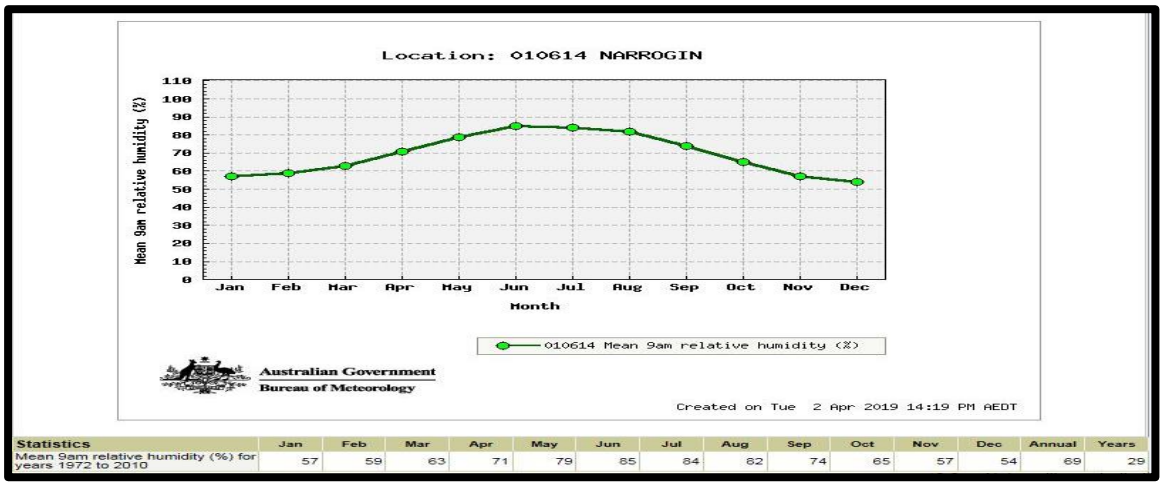


Figure 14: Graph depicting the mean maximum monthly temperate and the highest and lowest mean monthly temperature overall years in comparison to the mean maximum monthly temperatures during 2018[33]



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean rainfall (mm) for years 1891 to 2019	13.1	16.8	21.2	29.3	62.4	85.2	86.2	67.9	46.4	31.0	18.3	14.2	491.3	128

Figure 15: Graph depicting the mean rainfall between 1891 to 2019 [34]



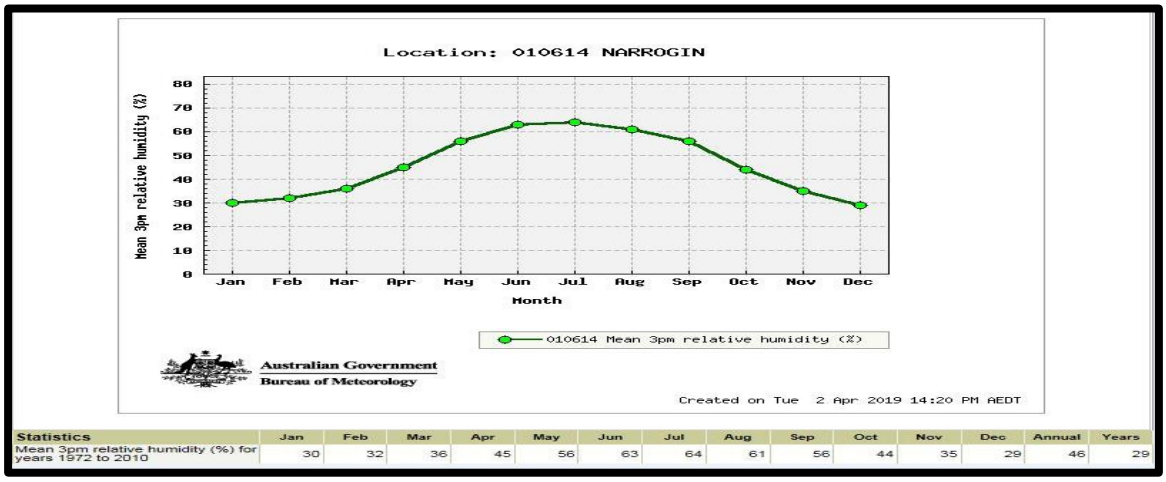
Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean 9am relative humidity (%) for years 1972 to 2010	57	59	63	71	79	85	84	82	74	65	57	54	69	29

Figure 16: Graph depicting the 9am relative humidity for year 1972 to 2010 [35]

[33] *Bureau of Meteorology*

[34] *Bureau of Meteorology*

[35] *Bureau of Meteorology*



Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Mean 3pm relative humidity (%) for years 1972 to 2010	30	32	36	45	56	63	64	61	56	44	35	29	46	29

Figure 17: Graph depicting the 3pm Relative Humidity between 1972 to 2010 [36]

Wind Direction and Speed

The following diagram (*Figure 18*) is a wind rose covering a twelve (12) year period 2007 – 2019 reflecting the prevailing winds for the Shire of Narrogin. Figure 19 reflects a series of wind roses covering the years 2016 – 2019 individually. Both diagrams show prevailing winds predominantly from the West (W), West South West (WSW), South East (SE) and East South East (ESE).

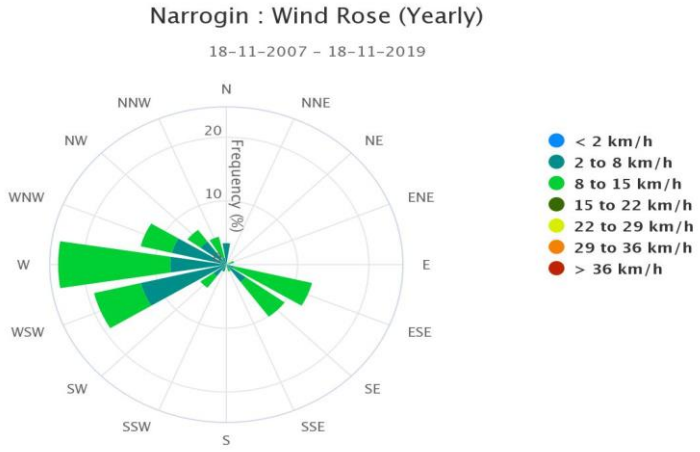


Figure 18: Wind rose reflecting predominant winds and wind speeds over the period 18 Nov 2007 – 18 Nov 2019 taken from the Dept of Agricultural Weather Station NA001 [37]

[36] *Bureau of Meteorology*

[37] *Department of Agriculture and Food Weather Station Narrogin (NA001)*

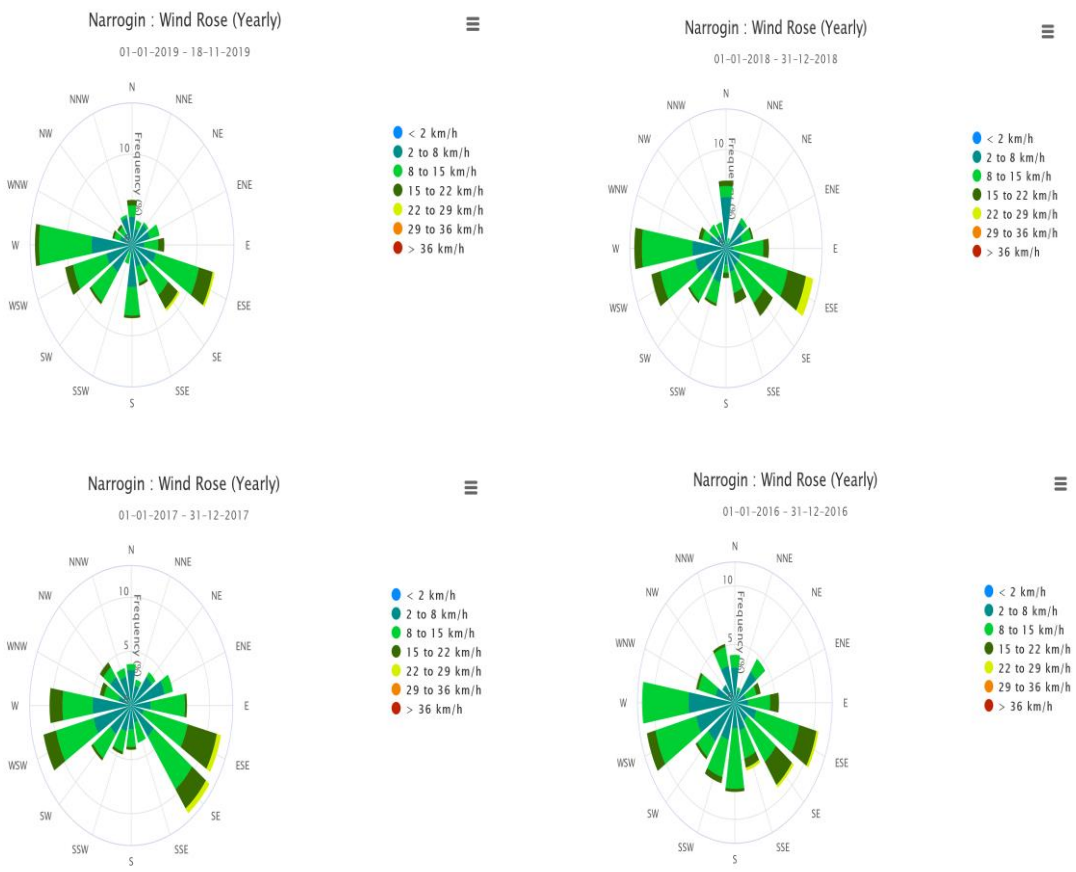
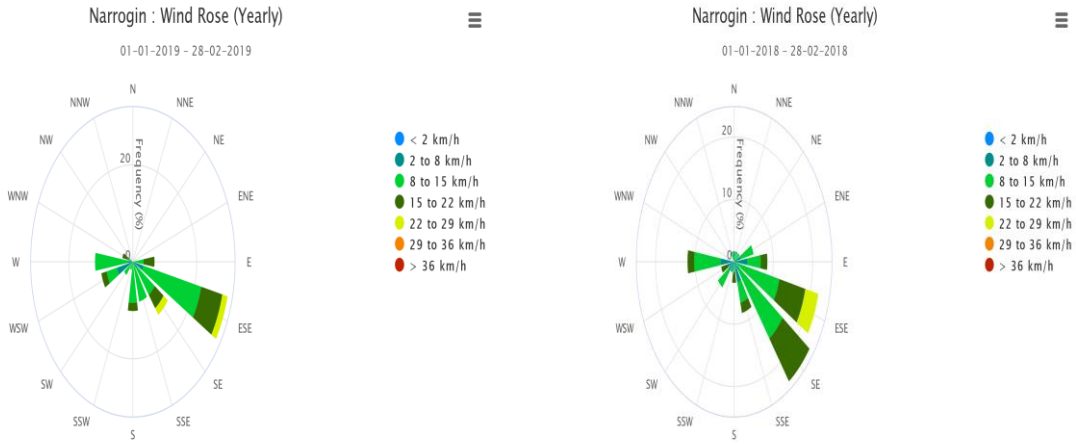


Figure 19: Wind roses reflecting the annual predominant winds and wind speeds for the years 2016 to Nov 2019 taken from the Dept of Agriculture Weather Station NA001. [38]

The following diagrams look at prevailing winds in the context of the hotter months corresponding with the peak of the fire season – December through February. These wind roses also indicate winds predominantly from the South-East. The prevailing winds within the Shire of Narrogin is known as the 'Albany Doctor' which comes from the South-East in the mid-afternoon. This is well known by the fire response personnel and subsequently fire management strategies are developed with this in mind.



[38] *Department of Agriculture and Food Weather Station Narrogin (NA001)*

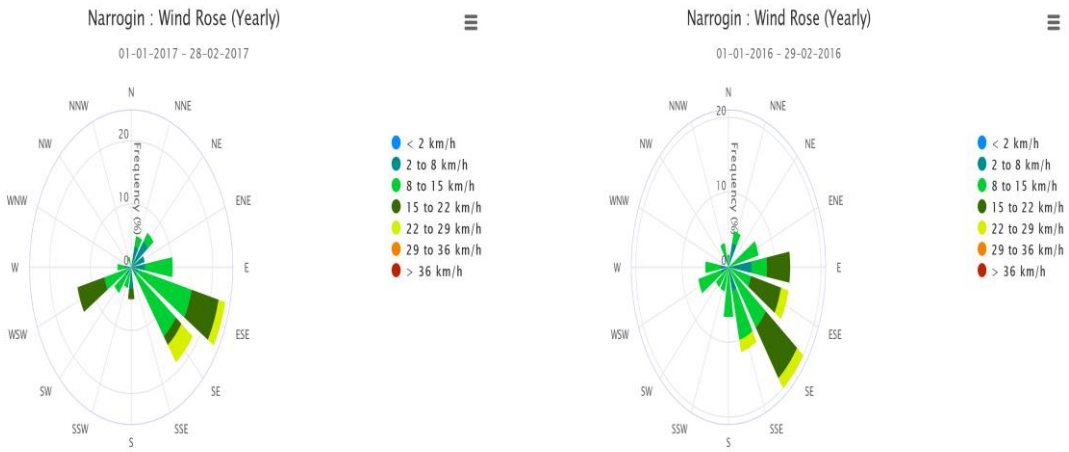


Figure 20: Graph depicting wind direction during the summer months (December to February) for the years 2015 to 2018 taken from the Dept of Agriculture Weather Station NAR001. [39]

The impact of wind speed and direction cannot be underestimated when it comes to any fire, however grassland fires can be particularly susceptible to the effects of wind changes. Prevailing winds are a significant consideration in relation to both operational response, as well as determining effective mitigation treatments.

3.2.3 Vegetation

The total area of native vegetation in the Shire of Narrogin has been significantly reduced through rapid and excessive clearing for agricultural purposes. Despite this, much of the native vegetation that remains in public reserves and on private land is similar to that which existed in the past, although the range of species has been significantly reduced. [40]

The Shire of Narrogin lies within the Avon Botanical District of the Southwest Botanical Province and contains three Vegetation Systems;

- Narrogin System

  The northern region and majority of the Shire is covered by the Narrogin Vegetation System. As rainfall is higher than in the eastern region of the Shire, these plateaux are covered by a mosaic of brown mallett (*Eucalyptus astringens*) and powderbark (*Eucalyptus accedens*) woodlands instead of heath. Woodlands of York gum (*Eucalyptus loxophleba*)and wandoo (*Eucalyptus wandoo*) covers the dissected country with tendency to topographic separation to the west. The understory consists of sparse open shrubs, prickly poison (*Gastrolobium spinosum*), the one-sided bottlebrush (*Calothamnus quadrifdus*) roadside teatree (*Leptospermun erubescens*) and skirted grass tree (*Xanthorrhoea reflexa*).

  Fires can be fast moving in understory with invasion of weeds and ladder fuels. This can cause high intensity patches with the potiental to cause canopy fires.

- Wagin System

  The Wagin system occupies the south-east corner of the Shire and is dominated by mixed York gum -wandoo woodland on the slopes of the undulating country. The vegetation of salt flats southeast of Highbury have been severely affected by the increase in salinity and rise of water tables following vegetation clearing.

  Within the woodlands fire can be of high intensity with lower fuel intensity within the vegetation on the salt flats.

[39] *Department of Agriculture and Food Weather Station Narrogin (NAR001)*

[40] *Source: Native Vegetation Handbook for the Shire of Narrogin*

- Dumbleyung system

  The Dumbleyung system occupies a small portion of the -east corner of the Shire and is dominated by a series of small salt lakes, York gum woodland with an understory of *Casuarina* spp., *Melaleuca* spp., and samphire species. For all intents and purposes, it can be regarded as being similar in composition to the Narrogin Vegetation System. Fires can be fast moving in understory with invasion of weeds and ladder fuels. This can cause high intensity patches within these fires.

Vegetation is one of the most significant influencers on fire risk and subsequent mitigation strategies. Further details about the indicative vegetation in the Narrogin District, is located at ***Appendix 3***.

Three (3) aspects of vegetation within the Shire of Narrogin that requires specific attention, particularly in the context of bushfire mitigation treatment options moving forward, are:

1. The ability for sheoak – e.g. Allocasuarina huegeliana to invade into other native vegetation, significantly changing the vegetation and fuel structure. This is a common concern across the region with areas being significantly affected over time and, in the shorter term, from post fire regeneration.

2. The importance of managing annual weeds in remnant vegetation and the opportunity for these weeds to become established post mitigation works. Burning small remnants in the wrong way, wrong time and wrong frequency can potentially result in higher fuel loads.

3. Waterways, particularly those in and around assets, are significant as they offer riparian vegetation corridors which produce a wick-like effect and are often associated with fire runs with marked changes in fire behaviour, intensity and spread expected in this vegetation.

Whilst agricultural holdings (grassland) may appear to be a low bushfire risk, this vegetation presents a significant bushfire hazard, especially during harvest season (November to January) when harvesting activities have the potential to ignite a fire in fully cured crops. The impact of wind on open terrain regardless of whether it is under crop, should not be underestimated. Fortunately, the landscape in much of the agricultural tenure is gently undulating with broad fields and only scattered remnant vegetation, making access for firefighting appliances easier.

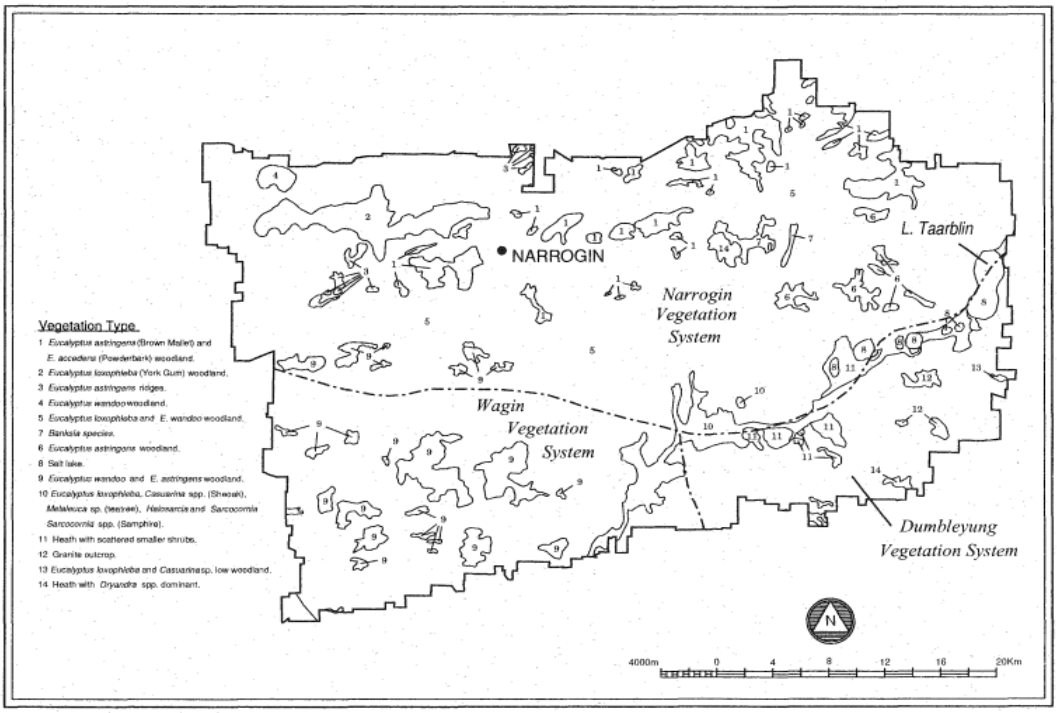


Figure 21: Vegetation Systems and major types in the Shire of Narrogin (According to Beard, 1980)[41]

Environmental Considerations – Flora and Fauna

Flora and fauna are significant assets, but also impact the treatment options available for reducing risk to other assets. For example, the breeding cycle of some mammals, such as the Numbat, will restrict the period in which prescribed burns can be undertaken due to the need to ensure nests are not disturbed during the breeding season.

All risk treatments need to consider the requirements of the flora, fauna and communities located on the site. Appropriate authorities must be consulted prior to any mitigation work commencing. The Shire will take every opportunity to remind landowners/managers of their obligation to obtain appropriate clearances and approvals, prior to commencing vegetation-based treatments. Response strategies should be environmentally sensitive within the constraints of the incident.

A further consideration in relation to both bushfire prevention and response strategies is the potential spread of weeds or diseases such as *Phytopthora Cinnamomi* (Dieback), which is easily spread through soil movement from vehicles, animals, water and feet. Other fungal-borne diseases can also be spread through these mechanisms. This risk must be considered in the context of planned prevention and response strategies and the risk minimised wherever possible.

A list of the Declared Rare Flora and Declared Rare Fauna applicable to the Shire of Narrogin is included at ***Appendix 4***.

Threatened Ecological Communities

The Shire of Narrogin is within the catchment of the Threatened Ecological Community – *Eucalypt Woodlands of the Western Australian Wheatbelt Ecological Community*, listed under the *Environment Protection and Biodiversity Conservation Act 1999.* The distribution of this community in the Shire is show in figure 23, Narrogin townsite is the blue arrow indicated on map.

[41] *Source: Native Vegetation Handbook for the Shire of Narrogin*

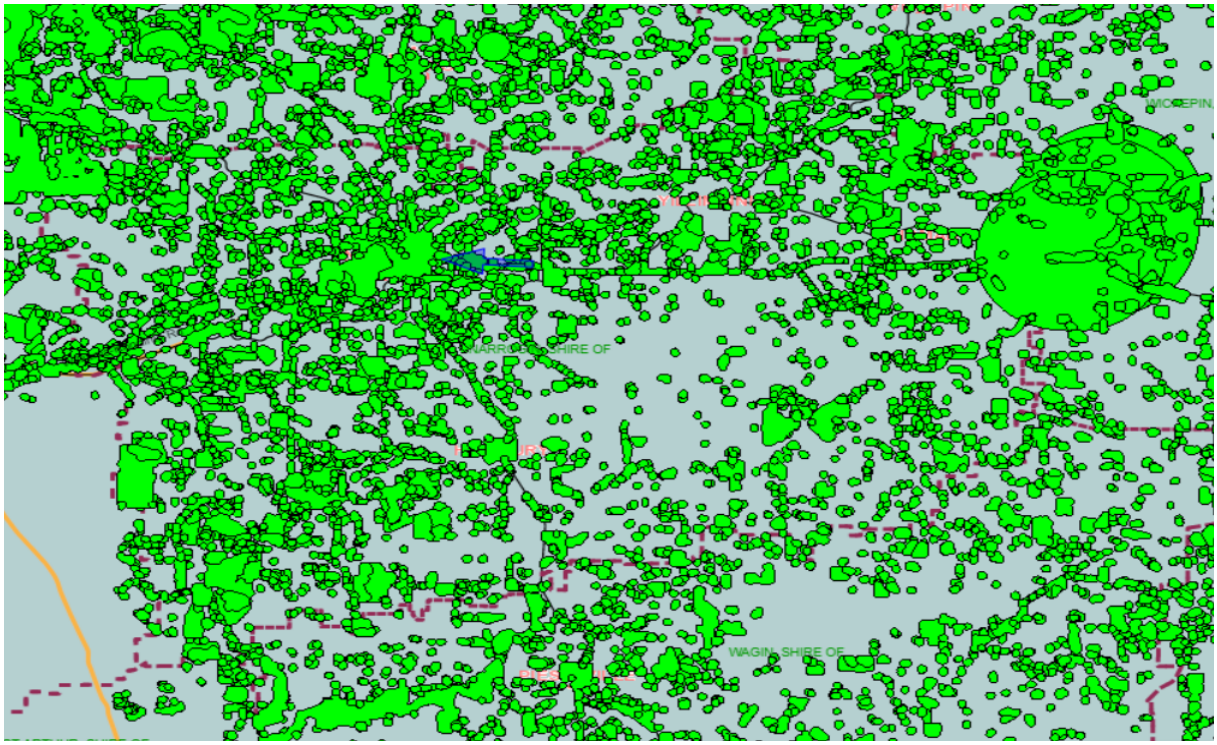


Figure 22: Map reflecting the location of the Eucalyptus Threatened Ecological Community[42]

The *Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt* notes that altered fire regimes will have a significant impact on the threatened community. An altered fire regime includes any sustained changes from the long-term pattern of fires experienced at a site, this can include changes in frequency, seasonality and/or intensity. The Conservation Advice also notes that the response of the TEC to fire is site specific, that the TEC can benefit from an appropriate fire regime and that many responses to fire disturbance can be relatively temporary and/or minor. The impacts, both negative and positive, require careful consideration and balanced when undertaking prescribed burning in this TEC.

When planning risk treatments on tenure within the TEC catchment the following should be considered:

- the extent to which the risk treatment will remove or substantially damage tall *Eucalypt* trees which are a key component of the Eucalypt Woodlands TEC;
- the extent to which the understory is likely to be impacted and/or recover from the risk treatment;
- whether there is a risk that the risk treatment will facilitate the invasion and/or spread of fast colonising weed species benefiting from the temporary reduction in vegetative competition;
- can the prescribed burn be implemented effectively to meet the burn objectives with limited risk of creating damaging fire conditions, noting that a 'hot' burn can substantially alter the vegetative structure or change the nature of the understory of the TEC; and
- whether fire sensitive eucalypts, such as gimlet or salmon gums are present.

[42] *Source: DFES Bushfire Risk Management System*

Fauna

Major populations of three nationally endangered species exist within the Shire of Narrogin, centred on the Wandoo Woodlands, Woylies (*Bettongia penicillata*), Red-Tailed Phascogales (*Phascogale calura*) and Numbats (*Myrmecobius fasciatus*). [43]

Figure 23: Picture of the nationally endangered Numbat (Myrmecobius fasciatus). [44]

Other native marsupial fauna includes Bilbies (*Macrotis lagotis*), Mala (*Lagorchestes hirsutus*), Boodies (*Bettongia lesueur*), Brown Bandicoots (*Isoden obesulus fasciventer*) and Marls (or Western Barred Bandicoot: *Perameles bougainville*).[45]

[43] *Source: Wikipedia – Dryandra Woodland*
[44] *Source: Wikipedia – Dryandra Woodland*
[45] *Source: Wikipedia – Dryandra Woodland*

3.2.4 Bushfire Frequency and Causes of Ignition

DFES records show that from 1/07/2008 – 30/06/2019, a total of 276 incidents were reported in the Shire of Narrogin.

Government of Western Australia
Department of Fire & Emergency Services

DFES
Department of Fire & Emergency Services

All Bushfires
LGA of NARROGIN (S)
from 01/07/2008 to 30/06/2019

A Bushfire is considered to be any vegetation fire (bush, grass, scrub, forest): of any size

Bushfires Summary of Ignition for NARROGIN (S)	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2018/ 2019	Total
Total Number of Bushfires:	**53**	**56**	**8**	**16**	**20**	**15**	**36**	**21**	**16**	**16**	**22**	**279**
Burn off fires	0	0	0	1	1	4	8	1	2	6	3	26
Campfires/bonfires/outdoor cooking	0	0	0	1	0	0	0	0	0	1	0	2
Children misadventure	0	0	0	0	0	0	1	2	0	0	0	3
Cigarette	0	0	0	0	0	0	0	4	0	0	1	5
Equipment - Mechanical or electrical fault	0	0	1	0	0	0	0	0	0	1	0	2
Hot works (grinding, cutting, drilling etc..)	0	0	1	0	0	0	1	0	0	0	0	2
Other open flames or fire	0	0	0	3	2	1	8	2	2	0	1	19
Power lines	0	0	0	0	0	0	0	0	0	1	2	3
Reignition of previous fire	0	2	1	0	0	0	2	2	0	0	0	7
Sleeping/Alcohol/Drugs/Physical-Mental impairment	0	0	0	2	0	0	3	2	3	0	0	10
Suspicious/Deliberate	0	1	0	0	6	1	6	7	2	4	8	35
Undetermined	0	42	4	9	7	3	1	0	1	0	0	67
Unreported	53	10	1	0	1	1	3	1	3	2	3	78
Vehicles (incl. Farming Equipment/Activities)	0	0	0	0	1	0	0	0	0	1	0	2
Weather Conditions - Lightning	0	1	0	0	2	5	3	0	0	0	3	14
Weather Conditions (High winds, natural combustion etc. Excludes Lightning)	0	0	0	0	0	0	0	0	3	0	1	4

EXTERNAL USE APPROVED

Table 9– Reported landscape fires in the Shire of Narrogin 2007 – 2018 46 Note: 'Unreported' - a known fire for which the ignition source was not provided to the incident reporting system. 'Undetermined' - Undermined ignition is where the attending officer cannot or will not make a determination on the ignition factor.

Of the 134 fires with known causes (i.e. excluding undetermined and unreported from the above table), the cause of ignition was predominantly as a result of deliberate/suspicious activities, reflecting approximately 26% of the fire occurrences, 19% of the fires were as a result of burn offs, 14% were the result of open flame sources. These fires represent 59% of reported fires and could be prevented. This is an area for the Shire for consideration.

With over 50% of recorded fires listed as 'unreported' it would be advantageous to promote, through the Bushfire Advisory Committee, the value of ensuring all fire reports are completed with the cause of ignition documented. This data has significance in emergency services resource planning and funding at the State level.

[46] *Source: Department of Fire and Emergency Services*

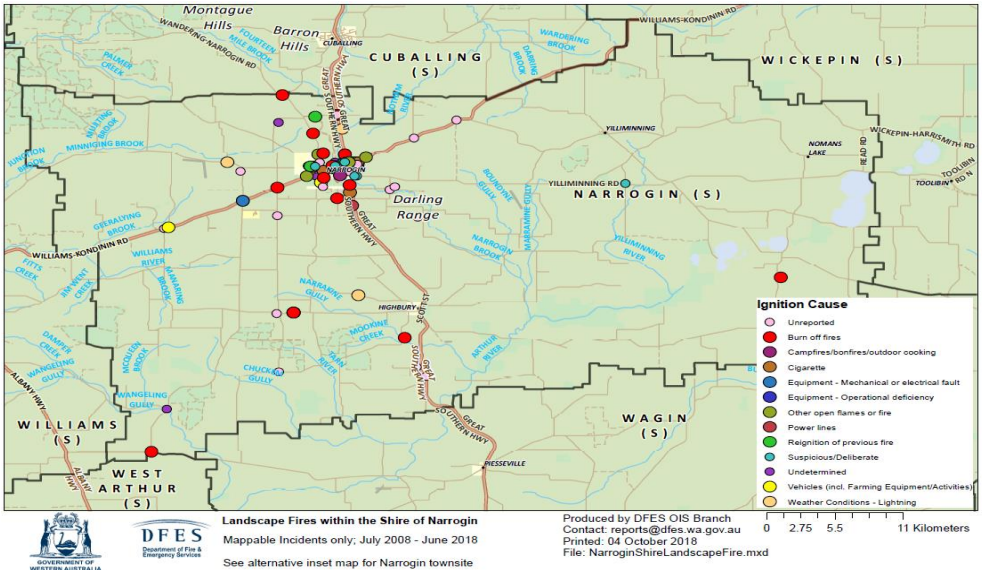


Figure 25 - Map reflecting the location of recorded fires within the Shire of Narrogin [47]

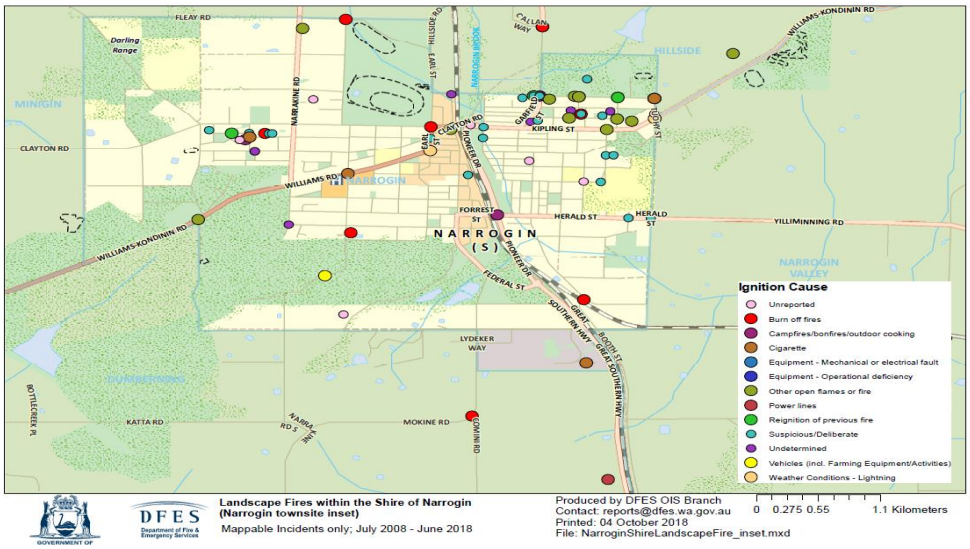


Figure 26 - Ignition type and location around the town of Narrogin[48]

3.2.5 Current Bushfire management

Narrogin has one Volunteer Fire and Rescue Service Brigade with two vehicles located in Narrogin, being a Country Pump and a Light Tanker. Narrogin Central Bush Fire Brigade and Minigin Bush Fire Brigade have a 4.4 broadacre appliance each.

There are eight other farmer response brigades being:

- Boundain Bush Fire Brigade
- Highbury East Bush Fire Brigade
- Highbury South Bush Fire Brigade
- Highbury West Bush Fire Brigade
- Narrogin South Bush Fire Brigade
- Narrogin Valley Bush Fire Brigade
- Nomans Lake Bush Fire Brigade
- Ockley Bush Fire Brigade

[47] *Source: Department of Fire and Emergency Services*

[48] *Source: Shire of Narrogin Fire Management Requirements*

The Shire had 173 registered emergency services volunteers as at March 2020.[49]

The Shire has an active Bushfire Advisory Committee (BFAC) with membership that includes leadership positions from each of the Brigades.

In the context of the four stages of emergency management – *Prevention, Preparation, Response and Recovery,* the Shire of Narrogin has a strong and very proactive approach to bushfires. As bushfire events can directly impact a farmer's livelihood, colloquially *'if the smoke goes up',* history has shown a positive response reflecting the community's values and willingness to help their neighbours. There's an all hands on-deck approach with farmer response units arriving from neighbouring farms and further afield. Many of the volunteers amass a considerable number of years of service and hold a significant level of skills and experience in rural and agricultural firefighting. The Shire and the community of Narrogin benefit greatly from the skills, knowledge, experience and commitment of their emergency services volunteers.

The emergency services volunteer figure of 173 does not reflect the additional personnel, sometimes referred to as 'spontaneous volunteers', who are not officially registered as Emergency Services (ES) Volunteers, but spring into action upon the first sight or smell of smoke. Together with the registered farmer response personnel this has inherent benefits including:

- Access to mobile fire units
- Bushfire fighting skills
- Familiarity with the terrain, tracks, landmarks, landowners etc.

Both the Bush Fire Brigades and Volunteer Fire and Rescue Service brigade respond to bushfires.

Like most local governments, the Shire of Narrogin has annually issued Fire Control order which details the requirements for residents to maintain and construct fire breaks, asset protection zones and undertake other hazard reduction activities.

Bushfire Control Activities

The *Bush Fires Act 1954*, sections 17 and 18, provides 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 Shire of Narrogin Restricted and Prohibited Burning times are as follows, subject to possible variation depending on each bushfire season:

- 1st May to 31st October: Restricted (permits required)
- 1st November to 1st March: Prohibited
- 1st May to 1st November: Firebreaks to be Maintained[50]

Bushfire Prone Mapping

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.[51] 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 and focuses on individual developments and buildings, the BRM Plan focuses on

[49] *Source: Department of Fire and Emergency Services*

[50] *Source: Department of Fire and Emergency Services*

[51] *Source: State Planning Policy 3.7 – Planning in Bushfire Prone Areas*

identifying existing bushfire risk and establishing an effective treatment plan to manage unacceptable community risks.

The Shire of Narrogin has identified some areas within the local government area as Bushfire Prone, as evidenced by the associated map. Bushfire Prone Areas are subject to increased planning and construction requirements, under the Planning and Development (Local Planning Scheme amendment) Regulations 2015.

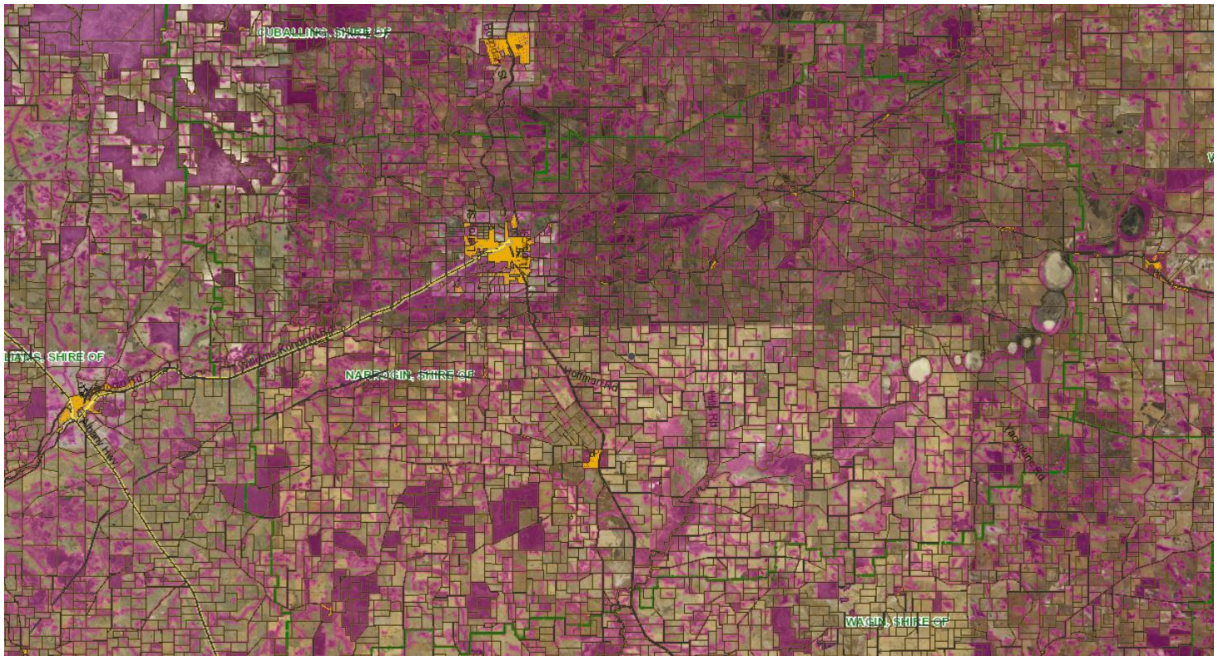


Figure 26: Shire of Narrogin Bushfire Prone Map[52]

Harvest and Vehicle Movement Bans

In recognising the significance of agricultural activities in the Shire, and to reduce the risk of crop related bushfires; the Shire has controls in place pursuant to the *Bush Fires Regulations 1954*. These controls are reviewed annually by the Bushfire Advisory Committee (BFAC). One such control is the issuing of Harvest and Vehicle Movement Bans. A Harvest and Vehicle Movement Ban is a ban that individual local governments are responsible for issuing under the *Bush Fires Regulations 1954 Section 38A, and/or Section 24C*. The Shire can issue Harvest and Vehicle Movement Bans to restrict the use of vehicles and machinery that have an increased risk of igniting a fire on days when weather conditions are considered unfavourable. Bans are generally issued as a result of the risk posed by agricultural practices during severe fire weather events.

Harvest and Vehicle Movement Bans are issued by the Shire's Chief Bush Fire Control Officer, in consultation with the Bush Fire Brigade Fire Control Officers, when the use of engines, vehicles, plant or machinery during the Prohibited or Restricted Burning Times (or both) is likely to cause a fire or contribute to the spread of a bushfire. 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.

[52] *Source: Department of Fire and Emergency Services*

Whilst detailed records have not been kept for Harvest and Vehicle Movement Bans within the Shire, it is believed that on average, 5 bans (2016 to 10/1/2020) are issued annually.[53]

4. Asset Identification and Risk Assessment

4.1 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 10 – 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** 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.

[53] *Source: Shire of Narrogin*

Asset Category	Asset Subcategories
	• **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.

4.2 Assessment of Bushfire Risk

Risk assessments have been undertaken for each asset, or group of assets, identified using the methodology described in the Guidelines. Most risk assessments were undertaken via 'desk top' assessment in the first instance. However, assets with a preliminary rating of 'very high' and 'extreme' have been validated through field assessment.

At the time of completing this Bushfire Risk Management Plan, a total of **435 assets** have undergone a bushfire risk assessment.

The percentage of assets within the local government in each asset category at the time of BRM Plan endorsement is shown in Table 11:

Table 11– Asset Category Proportions

Asset category	Proportion of identified assets
Human Settlement	86.00%
Economic	9.85%
Environmental	1.15%
Cultural	3.00 %

4.2.1 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 12 – 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 • Few, infrequent, random recorded incidents or little anecdotal evidence; and/or • Some opportunity, reason or means to occur.

Likelihood Rating	Description
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.

4.2.2 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 13 – 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 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).

Consequence Rating	Descriptions
	• 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 fatalities. • 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. • 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.

- **Consequence Rating - Economic Assets**

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

- **Consequence Rating - Environmental Assets**
  The outcome or impact of a bushfire event on the asset, or a group of assets, measured by the vulnerability of the asset and the potential impact of a bushfire or fire regime.

- **Consequence Rating - Cultural Assets**
  The outcome or impact of a bushfire event on the asset, or a group of assets, measured by the hazard posed by the classified vegetation and the vulnerability of the asset.

The methodology used to determine the consequence rating for each asset category is based on the following taken from the *Bushfire Risk Management Planning Handbook (2018)*:

Determining Bushfire Hazard

The level of bushfire hazard for human settlement, economic and cultural assets is determined using a quantified bushfire hazard assessment model.[54] 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:[55]

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 chance of controlling a fire until weather conditions improve.

The Shire of Narrogin is located with the Upper Great Southern Fire Weather District. Given the prevalence of agricultural holdings within the Shire of Narrogin, the Grass Fire Danger Index is the model applied to determine the FDI within the Shire given the prevalence of agricultural activities.

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 below, which is a scale developed to assist communities to better understand information about fire danger.[56]

- **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 hazard. 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 assets, 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.

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

- **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 are based around Bushfire Management Zones (BMZ) with a focus on hazards within the Asset Protection Zone (20 metres) and Hazard Separation Zone (80 metres).

Figure 27: Bushfire Management Zones [57]

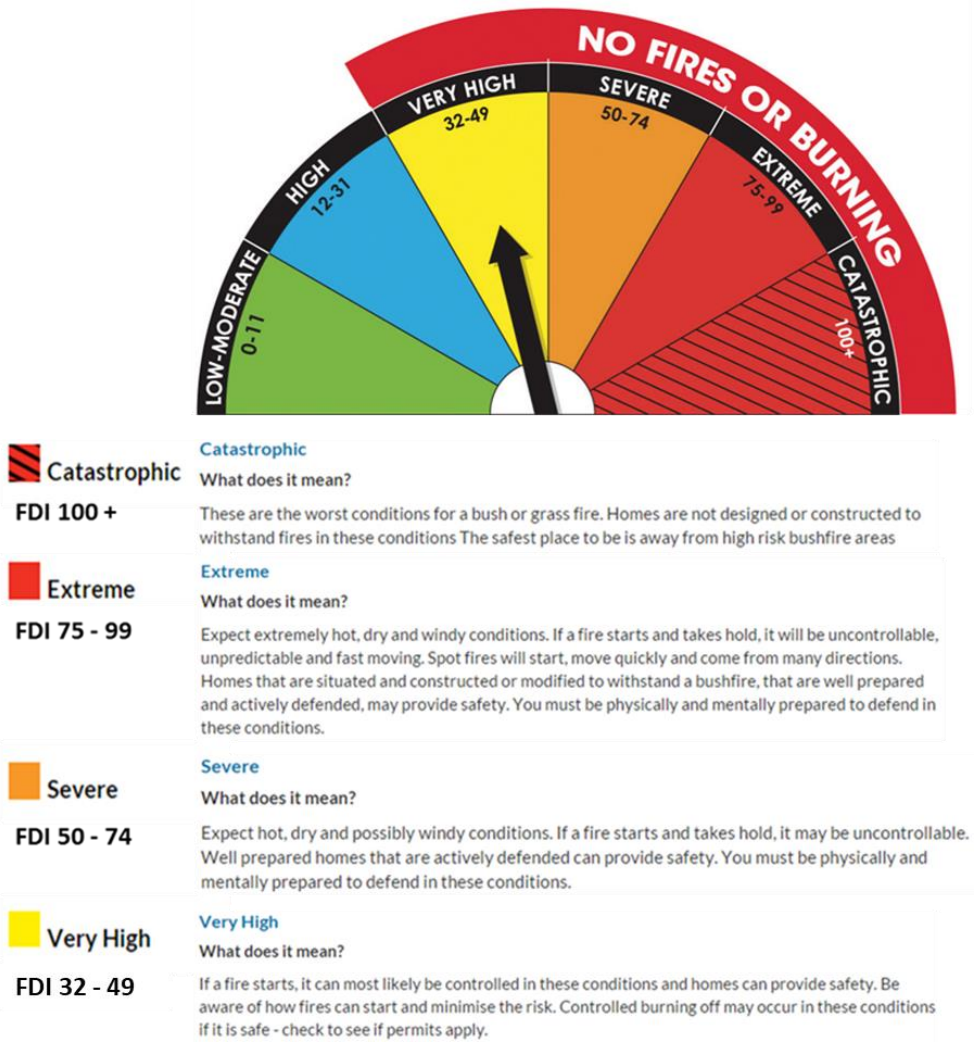


Figure 28: Fire Danger Ratings [58]

[57] *Bushfire Risk Management Planning Handbook, DFES (March 2018)*
[58] *Source: Department of Fire and Emergency Services www.dfes.wa.gov.au*

4.2.3 Assessment of Environmental Assets

Using available biological information and fire history data, environmental assets with a known minimum fire threshold were assessed to determine if they were at risk from bushfire, within the five-year life of the BRM Plan. The Department of Biodiversity, Conservation and Attractions (DBCA) Parks and Wildlife Services (PWS) assisted with the identification and assessment of Environmental assets. Environmental assets that were unlikely to 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.

4.2.4 Local Government Asset Risk Summary

A risk profile for the Shire is provided in the summary table 14 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 14 – Local Government Asset Risk Summary

Risk Rating / Asset Category	Low	Medium	High	Very High	Extreme
Human Settlement	*0.9*	*68.8%*	*11.5%*	*4.3%*	*1.8%*
Economic	*-0.3*	*4.3%*	*2.5%*	*1.9%*	*0.9%*
Environmental	-	-	*1.15%*	*0.35%*	-
Cultural	-	*2.1%*	*0.9%*	*.95%*	-

The '*Guidelines for Preparing a Bushfire Risk Management Plan'* requires that only assets considered of value and vulnerable to bushfire are to be included in this plan consequently not all assets within the Shire have been included in the assessments.

5. Risk Evaluation

5.1 Evaluating Bushfire risk

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

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

5.2 Treatment Priorities

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

Table 15 – 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

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

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

Table 16– Criteria for Acceptance of Risk and Course of Action

Risk Rating	Criteria for Acceptance of Risk	Course of Action
Extreme (Priorities 1A, 1B, 1C)	Requires asset specific treatment strategies to be applied. Treatment action is required within 2 years of the plan being endorsed. It is unlikely that Local Government Wide Controls would be adequate to manage the risk.	• Specific action(s) required in the first 2 years of the BRM Plan where resourcing and funding permits. • Assets to be included on the Shire's annual fire break inspection. • Priorities will include: ○ treatments that will have maximum benefit to multiple assets and critical infrastructure. ○ Identification of partnerships with other agencies for strategic mitigation. ○ Assets within the townsite to be included on Fire Break inspection list.
Very High (Priorities 2A, 2B, 2C)	Requires asset specific treatment strategies to be applied. Treatment action is required with 2 years of the plan being endorsed. It is unlikely that Local Government Wide Controls would be adequate to manage the risk.	• Specific action(s) required in the first 3 years of the BRM Plan where resourcing and funding permits. • Priorities will include: ○ treatments that will have maximum benefit to multiple assets and critical infrastructure. ○ Identification of partnerships with other agencies for strategic mitigation. • Assets within the townsite to be included on Fire Break inspection list. • Communication with stakeholders as per the Communications Plan.
High (Priorities 3A, 3B, 3C, 3D)	Asset specific treatment strategies will likely be required to adequately manage the risk.	• Specific action(s) required in the first 4 years of the BRM Plan where resourcing and funding permits. • Priorities will include: ○ Assets that fall adjacent to Extreme or Very High-risk assets. ○ treatments that will have maximum benefit to multiple assets and critical infrastructure.

		○ Identification of partnerships with other agencies for strategic mitigation. • Communication with stakeholders as per the Communications Plan.
Medium (Priorities 4A, 4B, 4C)	Asset specific treatments are 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.
Low (Priorities 5A, 5B, 5C)	Asset specific treatments are 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 and/or Community Education. • Specific action is not required.

6. Risk Treatment

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

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

6.1 Local Government-Wide Controls

Local government-wide controls reflect activities that reduce the overall bushfire risk within the Shire of Narrogin. 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 Narrogin:

i. *Bush Fires Act 1954* Section 33 notices, including applicable fuel management requirements, firebreak standards and annual enforcement programs;
ii. Declaration and management of Prohibited Burn Times, Restricted Burn Times, Total Fire Bans and Harvest and Vehicle Movement Bans for the local government;
iii. Public education campaigns, including Shire community education programs, 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;
iv. State-wide arson prevention programs developed in conjunction with WA Police and DFES;
v. 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;
vi. Monitoring performance against the BRM Plan and reporting annually to the local government Council and OBRM;
vii. Shire annual works program; and
viii. 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:
    a. Department of Biodiversity, Conservation and Attractions Master Burn Program
    b. Water Corporation Bushfire Risk Management Plan
    c. Western Power annual asset inspection and vegetation management program
    d. Department of Education Memorandum of Understanding
    e. Main Roads WA Bridge Assessment and Maintenance Works Plan
    f. Shire pre-season meetings and training with Fire Control Officers and local Brigade members covering high risk areas

A ***Local Government-Wide Controls and Multi-Agency Work Plan*** is attached at ***Appendix 2***. 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;

- **Ignition management** - Treatment aims to reduce potential human and infrastructure sources of ignition in the landscape;
- **Preparedness** - Treatments aim to improve access and water supply arrangements to assist firefighting operations;
- **Planning** - Treatments focus on developing plans to improve the ability of firefighters and the community to respond to bushfire;
- **Community Engagement** - Treatments seek to build relationships, raise awareness and change the behaviour of people exposed to bushfire risk; 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.

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 profile, will require ongoing management and will likely need to be repeated periodically in order to sustain risk reduction gains post the initial treatment. The maintenance regime should be included in the treatment schedule where possible.

7. Monitoring and Review

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

7.1 Review

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

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

7.2 Monitoring

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

The Shire of Narrogin has determined that assets rated:

- ‘Extreme’ risk will be reassessed biennially and at the completion of a treatment as part of the post treatment evaluation.
- ‘Very High’ will be reassessed biennially where possible and at the completion of a treatment 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 as part of the post treatment evaluation.
- ‘Low’ and ‘Medium’ risk should be reassessed during the development of future plans.

The plan will be monitored by a member of the Shire Administration Team designated by the Chief Executive Officer.

Post-treatment Risk Assessment, using the Bushfire Risk Management System, involves completing a risk re-assessment at the completion of any scheduled treatment/s in order to confirm that the treatment objectives have been achieved. This could include evaluation of the initial treatment or ongoing treatments included in a treatment management plan, 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 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. Ideally risk re-assessment for ‘extreme’ and ‘very high’ risk assets would include a site visit.

7.3 Reporting

The Shire of Narrogin 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 Council for ratification (if required).

The reporting requirements will be managed by a member of the Shire Administration Team designated by the Chief Executive Officer.

7.3.1 Privacy Issues and Release of Information

Information captured through the Bushfire Risk Management System (BRMS) includes data considered ‘personal’ in nature including the names and addresses of landholders. There is therefore the potential for the data collected through the BRMS to be used for purposes other than bushfire risk mitigation (i.e. Insurance companies using this information to set insurance premiums).

The Chief Executive Officer is to be consulted prior to any Bushfire Risk Management data being released to the public domain.

In order to actively encourage and support the implementation, monitoring and review of agreed actions the Shire of Narrogin, as a matter of course or upon request, will provide reports to key stakeholders that detail the 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.[59]
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.[60]
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

[59] Australasian Fire and Emergency Service Authorities Council 2012, *AFAC Bushfire Glossary*, AFAC Limited, East Melbourne.
[60] 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 Westplans.
Geographic Information System (GIS)	A data base technology, linking any aspect of land-related information to its precise geographic location.[61]
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.

[61] 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.[62]
Rural Urban Interface (RUI)	The line or area where structures and other human development adjoin or overlap with undeveloped bushland.[63]
Slope	The angle of the ground's surface measured from the horizontal.
Tenure Blind	An approach where multiple land parcels are considered as a whole, regardless of individual ownership or management arrangements.
Treatment	An activity undertaken to modify risk, for example a planned 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.

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

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

Treatment Strategy	The broad approach that will be used to modify risk, for example fuel management.
Treatment Type	The specific treatment activity that will be implemented to modify risk, for example a planned burn.
Vulnerability	The susceptibility of an asset to the impacts of bushfire.

9. Common Abbreviations

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

Appendices

Shire of Narrogin

Bushfire Risk Management Planning

Communication Strategy

Document Control

Document Name	**Communications Strategy**	**Current Version**	1.1
Document Owner	Shire of Narrogin CEO	**Issue Date**	May 2019
Document Location	Shire Office	**Next Review Date**	May 2024

Related Documents

Title	Version	Date
Shire of Narrogin Bushfire Risk Management Plan	1.1	

Amendment List

Version
1.0

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 Narrogin. This Communication Strategy accompanies the BRM Plan for the Shire of Narrogin. 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 Narrogin 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.

Communication Roles and Responsibilities

The Shire of Narrogin 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:

- Shire of Narrogin CEO, 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 the release of BRMS and BRM Plan data.

- Designed Officer (as designated by the CEO), is responsible for:
    - BRM Plan monitoring, review and reporting

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 on outcomes	Level of engagement
Shire of Narrogin	Significant role in plan and treatment development, implementation and review. 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 and empower
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 and empower
Telecommunication providers	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
Department of Planning, Lands and Heritage, LandCorp & Landgate	Role in plan and treatment development, implementation and review	Medium	Inform, consult, involve, collaborate and empower
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 and empower
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 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 and empower
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

Bushfire Advisory Committee, District Operations Advisory Committee & Local Emergency Management Committee	Role in plan development, implementation and review	High	Inform, consult, involve, collaborate
Traditional Owners, Gnaala Karla Boodja Regional Corporation, 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
Narrogin Community	Role in plan implementation and review	Low	Inform and consult

Communications Plan

Timing of Communication	Stakeholder (s)	Communication Objectives *(Refer to Page 68)*	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring & Evaluation Method
Development of the BRM Plan and Treatment Schedule								
Annually or as required	Shire of Narrogin CEO, Senior Leadership Team and Council	1 – 3 & 5	• Email • Face to face meetings	• Inform and consult • Confirm accountability and responsibilities • Input into plan and treatments	BRMO & BRPC	• Resource constraints could limit their ability to participate	• Clarify misunderstandings and intentions of plan • Express value of meeting	• Stakeholder's willingness to participate • Feedback on the presentation
Annually or as required	Shire of Narrogin Building and Works	2,3 & 5	• Email • Face to face meetings • Phone	• Input into plan and treatments	CEO or Delegate	• Limited time • Conflicting priorities	• Plan meetings	• Stakeholder's willingness to participate • Contributions to treatment plan
Annually	Bushfire Advisory Committee (BFAC) and Regional Operations Advisory Committee (ROAC)	1 – 3 & 5	• Face to face meeting • Presentation	• Inform and consult • Confirm project objectives • Seek input into treatment plans • Project updates	BRMO & BRPC	• Stakeholder's willingness to participate	• Preparation • Ensure current information on the BRM Plan Project is available	• Seek feedback on the presentation and (anecdotal) community feedback
Annually and as required	Local Emergency Management Committee (LEMC)	1 – 3 & 5	• Email • Face to face meetings • Presentation	• Confirm project objectives • Seek input into treatment plans • Project updates	BRMO & BRPC	• Stakeholder's willingness to participate	• Preparation • Ensure current information on the BRM Plan Project is available	• Feedback on the presentation
Quarterly or as required	Chief Bushfire Control Officer (CBFCO), Bushfire Brigades, Brigade Captains	1 – 3 & 5	• Email • Face to face meetings	• Confirm project objectives • Seek input into treatment plans and providing project updates	BRMO & BRPC	• Time constraints • No plan, unorganised • Availability of volunteers	• Clarify misunderstandings and intentions of plan • Confirm benefits • Preparation	• Feedback • Support for BRMP process • Level of engagement

				• Identify Risk and share information			• Ensure current information on the BRM Plan Project is available	
Biannually	Dept of Biodiversity, Conservation and Attractions	1 – 3 & 5	• Face to face meetings • Email • Telephone	• Confirmation of environmental assets • Identification of DBCA burn plans • Confirming project objectives, seeking input into treatment plans and providing project updates • Development of treatment options	BRMO & BRPC	• Resource constraints could limit their ability to participate • Willingness to release 'confidential' data re environmental assets	• Clarify misunderstandings and intentions of plan • Provide undertakings re the release of confidential data • Restrict release of information and document in plan	• Level of engagement • Environmental assets in BRMS
Annually and as required	Stakeholders – Landowners / Land Managers	1 – 3 & 5	• Email • Face to face meeting • Telephone • Presentations • Community Engagement activities	• Asset identification/ confirmation • Outline BRMP process and objectives • Identify assets at risk • Identify existing controls/programs • Development of treatment options	BRMO & BRPC	• Time constraints and travel • Level of interest and engagements in process • Lack of resourcing	• Select appropriate channel of communication • Prepare materials and good planning • Communicate funding opportunities when available	• Engagement and participation levels • Feedback • Contributions to treatment strategies
Annually or as required	Stakeholders – Others	1 – 3 & 5	• Email • Face to face meeting • Telephone • Presentations • Community Engagement activities	• Asset identification/ confirmation • Inform of BRMP process • Identify assets at risk • Identify existing controls/programs • Development of treatment options	BRMO & BRPC	• Time constraints and travel • Level of interest and engagements in process	• Select appropriate channel of communication • Prepare materials • Plan communication	• Engagement and participation levels • Feedback
Annually and 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	• Stay up to date with process improvements	• Plan endorsed

						• Identified non-compliances		
Bi-annually and as required	Dept of Fire and Emergency Services (DFES) – District/Regional Office	1 – 3 & 5	• Email • Face to face meetings • Telephone	• UCL/UMR planned works • Identification of treatment strategies • Identification of other planned works • Sharing information • Identifying funding opportunities	BRMO & BRPC	• Time constraints • Conflicting priorities • Response obligations	• Plan communications • Share information	• Other planned works identified • Funding opportunities identified • UCL/UMR treatments included on BRMS

Implementation of the BRM Plan and Treatment Schedule

Timing of Communication	Stakeholder (s)	Communication Objectives *(Refer to Page 64)*	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring & Evaluation Method
Annually or as required	Shire of Narrogin CEO, Senior Leadership Team and Council	1 – 3 & 5	• Email • Face to face meetings	• Inform and consult • Confirm accountabilities and responsibilities. • Progress update • Issues identification and action planning	CEO or Delegate	• Time constraints • Availability • Lack of understanding • Budget (for LG mitigation)	• Planning and time management • Clear purpose • Targeted communication • Regular updates	• Feedback, • Questions raised • Level of support received
Annually or as required	Shire of Narrogin Building and Works	1 -3 & 5	• Email • Face to face meetings	• Reduction of fuel loads on LG managed lands • Upgrades to strategic firebreaks	CEO or Delegate	• Poor organisation, • Limited time, • Not preparing • Poor communication from stakeholders and LG on completion of works	• Clarify misunderstandings and intentions of plan • Plan communications • Regular updates	• Treatments applied • Positive feedback received on treatment supplied • Risk ratings reduced
Biannually or as required	LEMC, BFAC & ROAC, CBFCO, CAPTS	1 – 3 & 5	• Email • Face to face meetings	• Report on progress to plan • Report issues/constraints	CEO or Delegate	• Availability • Time • 'Buy in'	• Collate data and report on success to plan	• Feedback received • Level of engagement

							• Compliance to plan • Keep informed	• Issues identified and addressed
Biannually or as required	Dept of Biodiversity, Conservation and Attractions	1 – 3 & 5	• Face to face meetings • Email • Telephone	• Confirmation of environmental assets • Development of treatment options	BRMO & BRPC	• Resource constraints could limit their ability to participate • Willingness to release 'confidential' data re environmental assets	• Clarify misunderstandings and intentions of plan • Provide undertakings re the release of confidential data • Restrict release of information and document in plan	• Level of engagement • Environment-al assets in BRMS
As per Section 7.2 of this plan	Stakeholders – Landowners / Land Managers	1 – 3 & 5	• Email • Face to face meetings • Presentations • Community Engagement	• Inform and consult • Confirm accountability and responsibility • Status and progress of plan • Treatment status, gaps and issues to be addressed	CEO or Delegate	• Availability • Time • Loss of commitment • Access to treatment resources • Funding	• Planned sharing of information • Negotiations conducted • Communicate funding opportunities when available	• Feedback • Commitment to implement agreed controls • Highly engaged • Treatments being completed
As required	Stakeholders – Others	1 – 3 & 5	• Face to face • Presentations • Community Engagement • Telephone • Email	• Inform and consult • Confirm accountability and responsibility • Status and progress of plan • Treatment status • Gaps and issues to be addressed	CEO or Delegate	• Availability • Time • Loss of commitment	• Planned sharing of information • Negotiations conducted • Communicate funding opportunities when available	• Feedback • Commitment to implement agreed controls • Highly engaged • Treatments being completed
Annually or as required	OBRM, DFES District / Regional Office	1 – 3 & 5	• Face to face meetings • Email • Telephone	• UCL/UMR Management • Status and progress of plan	CEO or Delegate	• Time • Conflicting priorities	• Schedule communication opportunities	• Planned works identified

				• Treatment status, gaps and issues to be addressed • Continuous improvement • Information sharing • Identification of other planned works • Identification of funding opportunities				• Improvements identified and implemented • Issues 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	5	• Newsletter • Website • Facebook	• Continuous improvement	CEO or Delegate	• Time • Conflicting priorities	• Plan communication	• Feedback received

Review of the BRM Plan and Treatment Schedule

Timing of Communication	Stakeholder (s)	Communication Objectives *(Refer to Page 64)*	Communication Method	Key Message or Purpose	Responsibility	Identified Risks to Communication	Strategy to Manage Risks	Monitoring & Evaluation Method
Annually	Shire of **Narrogin** CEO and Elected Members	4, 5	• Email • Face to face meetings	• Governance and compliance • Review, monitoring and reporting to Council • Status update • Continuous improvement	CEO or Delegate	• Poor reporting and recording of information • Review not completed by OBRM	• BRPC & BRMO to record data and information appropriately	• Feedback received • Planned works completed • Reporting & Statistics • Risk ratings reduced
5 Yearly (Shire, DFES and OBRM)	OBRM & LG Council	4, 5	• Email • Face to face meetings • Telephone • Written report	• Governance and compliance • Review, monitoring and reporting • Future planning	CEO or Delegate	• Poor reporting and recording of information • Review not completed by OBRM	• BRPC & BRMO to record data and information appropriately • Endorsed by OBRM	• Feedback received • Planned works completed • Reporting & Statistics • Risk ratings reduced

Quarterly and as required	Shire of Narrogin – Building and Works	4, 5	• Face to face meetings	• Report on actions and status of BRM Plan • Continuous improvement	CEO or Delegate	• Time • Availability • Conflicting priorities	• Plan Communication • Discuss with Shire Leadership Team	• Feedback on work completed • Risk ratings reduced • Improvements identified and implemented
Biannually and as required	DFES Regional / District Office	4, 5	• Face to face meetings • Email • Telephone	• Report on actions and status of BRMP • Continuous improvement • UCL/UMR funding	CEO or Delegate	• Time • Availability • Conflicting priorities	• Plan communications	• Feedback on work completed • Risk ratings reduced • Improvements identified and implemented
Annually	BFAC, ROAC, LEMC, CBFCO, Captains	4, 5	• Face to face meetings • Email • Telephone • Presentations	• Report on actions and status of BRMP • Continuous improvement	CEO or Delegate	• Availability • Time • Conflicting priorities • Buy in	• Keep informed • Share the wins	• Feedback on work completed • Risk ratings reduced • Improvements identified and implemented
Every 2 years or as required	Stakeholders – Land Owners / Land Managers	4, 5	• Face to face meetings • Telephone • Presentation • Community Engagement • Survey	• Status of treatments • Success of treatments • Continuous improvement	CEO or Delegate	• Availability • Time • Conflicting priorities • Buy in • Access to resources	• Plan communication • Target communication • Planned and prepared	• Feedback on work completed • Risk ratings reduced • Improvements identified and implemented
Every 2 years or as required	Stakeholders – Other	4, 5	• Face to face meetings • Telephone • Presentations • Community Engagement • Survey	• Status of treatments • Success of treatments • Continuous improvement	CEO or Delegate	• Availability • Time • Conflicting priorities • Buy in • Access to resources	• Plan communication • Target communication • Planned and prepared	• Feedback on work completed • Risk ratings reduced • Improvements identified and implemented

Appendix 2 – Local Government-Wide Controls and Multi-Agency Work Plans

Local Government-Wide Controls

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
1.	BRM Planning Risk Analysis	• Maintain and refine BRM Plan	Shire of Narrogin	Landowners DFES	Treatment identification and planning for all very high and extreme risk assets within the Shire.
2.	Strategic Community Plan 2017 – 2032 & Corporate Plan 2019 - 2023	• As per documented actions	Shire of Narrogin		As per section 3.1.1 of the Bushfire Risk Management Plan.
3.	Shire of Narrogin Bush Fire Notice and (*Bush Fires Act 1954*)	• Review annual notice • Publish annual notice • Inspections in accordance with annual notice	Shire of Narrogin	CBFCO, FCO, Captains and the public	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 Narrogin	CBFCO, FCO's	Published Annually.
5.	Harvest and Vehicle Movement Bans	• Bans imposed when the CBFCO and FCO's are of the opinion that the use of engines, vehicles, plant or machinery is likely to cause/contribute to the spread of a bushfire.	Shire of Narrogin	CBFCO and FCO's	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.
6.	Local Emergency Management Arrangements	• Emergency Management Plan	Shire of Narrogin	SJA WAPOL DFES Dept of Child Protection Dept of Education CBFCO Gt Southern DEMC	Annual review of emergency plans and arrangements.

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
				OEM	
7.	Local Planning Scheme No 2	• Requirement for new developments to complete a Fire Management Plan endorsed through the Dept of Fire and Emergency Services (if in a Bushfire Prone area)	Shire of Narrogin	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	Shire of Narrogin	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, Lands and Heritage	WA Planning Commission Shire of Narrogin	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 exist across the state for arson.	WA Police Department of Fire and Emergency Services	Shire of Narrogin	Participation as required. The Shire participates in campaigns for arson prevention.
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. The Shire of Narrogin uses a range of mediums, such as the Shires webpage, Facebook, local community newsletter, SMS's and an annual Fire Newsletter.
12.	Are you Ready Campaign	• Community Engagement	WA Government	Shire of Narrogin, Chief FCO, 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.	Australian Rail Commission(ARC)	• Mitigation plan	Australian Rail Commission	Shire of Narrogin	

	Control	Action or Activity Description	Lead Agency	Other Stakeholder(s)	Notes and Comments
14.	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	

Appendix 3 – Indicative Vegetation of the Narrogin District

The following has been taken from the publication Landscapes and soils of the Narrogin District, D.N. Sawkins, Bulletin 4807, 2010:

Indicator vegetation of the Narrogin district

Tree - single trunk, with branches that usually start more than1 meter above the ground and occupy about half of the tree's height. If the main trunk is damaged, many branches can resprout from the base or stems (epicormic growth). Examples include salmon and York gums, wandoo, marri and jarrah.

Mallet - single trunk with relatively steep angled branches and a terminal crown. Mallets are sensitive to fire and do not recover if the main trunk is lost. Examples include mallets, yates, gimlet and moort. Mallets often occur as pure or massed stands.

Mallee - multi stemmed plants usually less than 10 meters high. Several stems come from a lignotuber that can replace them when one or more are lost. Mallees that have not had to regenerate may have a single stem, but also have the basal 'mallee root'.

Salmon gum (*E. salmonophloia* left, RDZ and ADZ) and **gimlet** (*E. salubris* right, ADZ, note fluted stem) are common on clay, clay loam soils and loamy duplex soils on slopes and valleys. Salmon gums often dominate on loamy duplex and deep loam soils, and gimlets on heavier clay soils.

Buds and fruit can differentiate salmon gum from similar looking species like silver mallet.

Salmon gum | Silver mallet | Brown mallet | Blue mallet

Silver mallet (*E. argyphea*) grows on stony usually mafic gravel uplands, in the east of the district. It can be mistaken for salmon gum, but only occurs on upland gravels, has the characteristic mallet form, and distinctive buds.

Blue mallet (*E. gardneri*) often occurs with silver mallet, mainly on mafic stony uplands.

Brown mallet (*E. astringens*) is the most common mallet in this district. It is common below breakaways on poorly structured mottled zone soils ('mallet' soils), and may occur with silver and blue mallets.

Silver mallet (silver bark green shiny leaves) with blue mallet (brown bark dull blue green leaves)

Silver mallet (silver bark) with brown mallet (brown bark), both with shiny green leaves

Red morrel (*E. longicornis*) is an upright rough barked tree that occurs on the following aeolian or mafic soils

(1) Soils formed on mafic rock uplands in the RDZ and ADZ. Red brown stony and loamy gravels grading to gravelly loams with alkaline subsoils.

(2) Aeolian loamy soils usually on the west and southern sides of trunk valleys in the ADZ.

(3) Duplex soils with a brown subsoil on slopes.

York gum can be distinguished from red morrel by its generally rougher bark and more branching form. There are several species of trees and mallees with a stocking of rough bark that occur on alkaline valley soils (often aeolian loams), and red brown clay loam soils north and east of Harrismith. These include Yorrel (*E. yilgarnensis* syn Beard *E. gracilis)* , *E. myriadena* (syn Beard E. *ovularis*).

These species all have shiny leaves and rough bark, but can be differentiated from York gum by narrower leaves and smaller fruit.

DRZ = Darling Range Zone, RDZ = Rejuvenated Drainage Zone, ADZ = Ancient Drainage Zone

York Gum (*E. loxophleba*) has 3 types in the Narrogin district. They all have characteristic shiny green leaves but differ in their form and bark characteristics.

Ssp. loxophleba (tree with rough bark on whole stem) is the most common form and occurs mainly on loamy soils formed from crystalline rock (usually with jam *Acacia acuminata*).

Ssp. lissophloia is the smooth bark mallee form that occurs on lower slopes and valleys, generally on loams or loamy duplex soils often with salmon gum and gimlet east and north of Jitarning, and is common in the Merredin district.

An intergrade form that has rough bark part way up the stem is common in the Corrigin and Kukerin systems.

On the left is York gum *(E. loxophleba ssp. loxophleba)* with jam understorey.

York gum mallee *(E. loxophleba ssp. lissophloia.)*

Intergrade form

Flooded gum (*E. rudis* left) is a multi-branched tree that' occurs on winter wet soils that were originally non saline, mainly in valleys and granitic duplex slopes in the DRZ and western RDZ.

Many waterways with flooded gum have become mildly saline. These areas and fresh seepages have often been colonised by the introduced weed Spiny rush (*Dacutus spp*) below.

Wandoo (*E. wandoo subsp. wandoo)*.is widespread, ranging from gravels (in association with dryandras, jarrah and marri), to valley duplex soils. Where wandoo is the dominant vegetation it often indicates deep or grey sandy duplex and gravelly duplex soils. With other vegetation, it usually becomes more dominant when the soil becomes more duplex. Wandoo is widespread on lower slopes and sandy duplex valleys, often in association with salmon gum and rock sheoak.

Salmon gums dominate on very shallow sandy duplex, clay or calcareous duplex soils, with wandoo being more common sandy duplexes in deeper sandy duplexes, and rock sheoak on very deep sandy duplex patches.

Salmon gums with their shiny leaves and layered foliage can be readily distinguished from dull leafed wandoos with bunchy foliage.

Sandy duplex wandoo woodland

Broad valley with salmon gum flanked by two wandoos

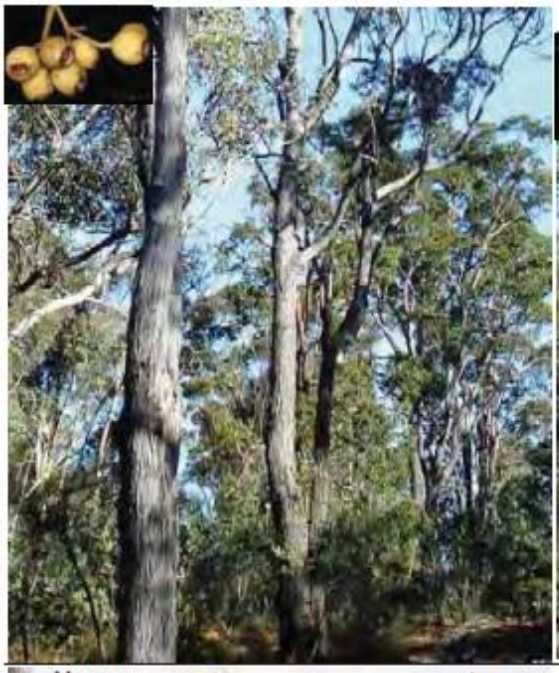
Powder-bark wandoo (*E. accedens* left) generally occurs in the west of the RDZ north of Williams on breakaways and stony ridges. It often occurs near brown mallet. Both are typical of highly water repellent soils.

Powder-bark wandoo can be distinguished from wandoo by its powdery smooth bark, and much brighter white-seasonally pink bark. Wandoo bark colour is generally steel grey-yellow

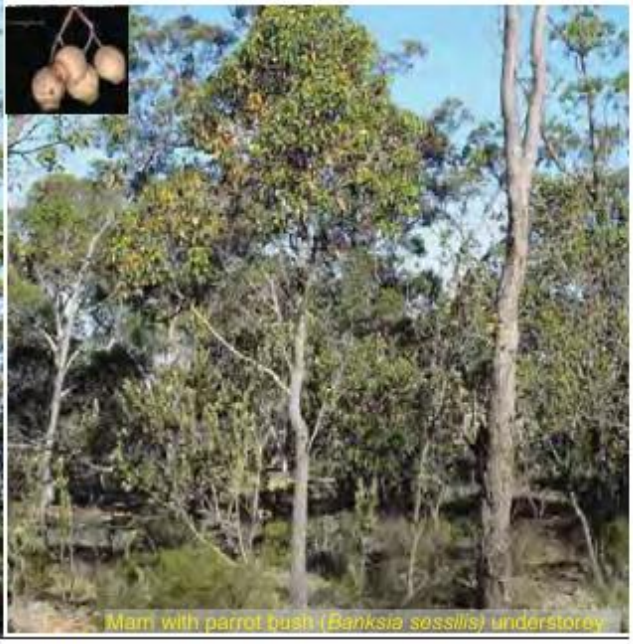
Powder-bark wandoo

Wandoo

Jarrah *(E. marginata)* (below) occurs in the gravelly uplands in the DRZ and western RDZ
It indicates very gravelly and sandy gravelly soil, often with ironstone ridges, associated with marri and dryandras, but can also occur on deep pale sands.



Marri *(Corymbia calophylla)* occurs on gravelly rises and slopes in the DRZ and western RDZ, often down-slope of jarrah or dryandra ironstone ridges. It may be intermixed with jarrah on gravelly rises or wandoo on gravelly duplex soils. It generally grows on better water holding soils than jarrah, but can occur on deep grey sand over gravel.



Jam (*Acacia acuminata*) often occurs with York gum and rock sheoak, and can dominate in shallow granitic and mafic soils, with another less common wattle (*Acacia saligna*.) Sometimes it can be scattered in lower slope sandy duplex soils in dissected landscapes.

Manna wattle (*Acacia microbotrya*) can be mistaken for jam, as they often occur together. However unlike jam, manna wattle can occur on a wide range of soils, including lateritic gravels and sands.

Plant differences are that jam has slender pointed leaves, rod shaped flowers, and flowers in spring; while manna wattle has broader sickle -shaped leaves, ball flowers and flowers in late autumn

Mallees are most common in the ADZ and eastern RDZ). The eastern edge of the district is the start of the mallee zone with widespread mallee duplex soils. Mallee scrub with melaleuca understorey usually indicates duplex or shallow soils(e.g. near breakaways, and rocky, or hard setting areas.

A few species - mottlecah (*E. macrocarpa)*, white mallee *(E. albida)*, ridge fruited mallee *(E. incrassata)*,and mallee white gum *(E. phaenophylla)* occur with sandplain and gravel heath

Apart from a few easily identifiable species like mottlecah, it is difficult to associate the many species with soil type without species identification keys. You can gain an idea of soil type by noting the type of understorey in conjunction with landscape clues like slope, rock fragments, and topsoil features.

Mottlecah (*E. macrocarpa*) is commonly found on yellow sandy soils and some pale gravelly sands in ADZ

White mallee (*E. albida*) is found in the same areas as Mottlecah on grey sandy laterites

Mallee scrub; shallow hard-setting mallee duplex soil with sparse understorey

Mallee scrub; shallow sandy duplex with dense melaleuca understorey

Melaleucas occur in all zones and many landscape positions. They are common on mallee duplex soils, or soils that can be winter wet. Where melaleucas are the dominant vegetation, they often indicate soils that are waterlogged in winter

The plants shown are from the frequently occurring *Melaleuca uncinata* group.

Sheoaks (small trees) and **Tammas** (mainly shrubs) have needle type foliage with separate male (pollen) and female ('nut') plants. Salt sheoak *(Casuarina obesa)* favours saline and wet areas, but the others are *Allocasuarina* species that indicate well drained sandy or gravelly soils.

Rock sheoak (*Allocasuarina huegeliana*) is widespread. Before agriculture, it was mainly on granitic sandy surfaced soils, sandy gravels and deep sandy duplex soils. However it has colonised many different well drained soils on roadsides.

Black tamma (*Allocasuarina acutivalvis*) occurs mainly on mafic and yellow stony and shallow gravels, in the east of the district.

Tamma, the most common tamma (*Allocasuarina campestris*) occurs with black tamma, but tends to be more common in deeper or loamier gravels and yellow earths.

Rock sheoak

Salt sheoak with samphire near a salt lake

Tamma

Black tamma

Male tamma with pollen and typical needle like foliage

Sandy soil vegetation

Roadside tea tree (*Leptospermum erubescens*) is common on well drained sandy surfaced soil. Tea trees are common on deep grey sands, but are colonising species that have spread on well drained disturbed areas.

Christmas tree (*Nuytsia floribunda* left) an indicator of deep grey sandy soils, with **sheoak** (*Allocasuarina fraseriana* right) that occurs on Darling Range sands and sandy gravels.

Sandplain cypress (*Actinostrobus arenarius*) often occurs in sandy soil, particularly yellow aeolian deep sands with Acorn banksia and woody pear

Woody Pear (*Xylomelum angustifolium*) occurs mainly on smooth slopes and crests and in dunes adjoining salt lakes and old drainage lines, mainly north and east of Pingelly.

It often occurs with banksias, sandplain cypress, roadside tea tree and sandplain heath. It indicates aeolian deep yellow sands. The image on the left shows woody pear with tamma.

Proteaceous species are major components of lateritic and sandy heaths, and as understorey species are a good guide to differentiating mallee duplex gravels from other duplexes.

Banksias are generally a good guide to sandy gravel and deep sandy soils.

Bull banksia (*Banksia grandis*) is a common tree on Darling Range gravels

Acorn banksia (*B. prionotes*) is a common tree on aeolian yellow sand

Sphere banksia (*B. sphaerocarpa*) is a shrub found in many sand and gravel heaths

Woolly banksia (*B. baueri*) is a feature of lateritic grey sandy soils to the east.

Grevilleas are also noticeable in lower rainfall sandplain heath, particularly yellow sand over gravel, but also occur on other well drained upland soils.

Flame grevillea (*G. eriostachya*) is a feature of yellow sandplain.

Hookers grevillea (*G. hookeriana*) is a feature of yelllow sand over gravel soils.

Hakeas have similar flowers to grevilleas, but have a persistent woody fruit (see below). They are very common on sandy gravel to shallow and loamy gravel soils, but can occur on a range of soils. Needle hakea (*Hakea preissii*) occurs on red clay soils)

Fan leaf hakea (*Hakea brownei*) | Marble hakea (*Hakea incrassata*) | Honeybush (*Hakea lissocarpha*)

Dryandras (now in the *Banksia* genus) with their prickly vegetation are a noticeable feature of shallow gravel and sandy gravel soils.

Parrot bush (*Banksia sessilis*) is common on Darling Range gravels. | Prickly dryandra (*Banksia armata*) is widespread on shallow gravels | Dryandra rich shallow sand over gravel vegetation near Harrismith.

Other sandplain *Proteaceae*

Stinkwood *(Jacksonia sternbergiana)* is common on deep grey sandy soils | Chittick (*Lambertia inermis*) is common on grey sand over gravel soils in the south east | Woolly bush (*Adenanthos sericea*) is also common on deep grey sandy soils.

Appendix 4 – Declared Rare Flora and Fauna in the Shire of Narrogin

The following has been taken from the Protected Matters Report produced by the Federal Department of Agriculture, Water and the Environment in March 2020. This report provides general guidance on matters of national environment significance and other matters protected by the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*.

Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area

Threatened Species		[Resource Information]
Name	Status	Type of Presence
BIRDS		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
MAMMALS		
Bettongia lesueur lesueur Burrowing Bettong (Shark Bay), Boodie [66659]	Vulnerable	Translocated population known to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Translocated population known to occur within area
Myrmecobius fasciatus Numbat [294]	Endangered	Species or species habitat known to occur within area
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat known to occur

PLANTS		
Acacia cochlocarpa subsp. cochlocarpa Spiral-fruited Wattle [23877]	Endangered	Species or species habitat may occur within area
Acacia insolita subsp. recurva Yornaning Wattle [64495]	Endangered	Species or species habitat known to occur within area
Banksia cuneata Matchstick Banksia, Quairading Banksia [9827]	Endangered	Species or species habitat known to occur within area
Banksia oligantha Wagin Banksia [20697]	Endangered	Species or species habitat likely to occur within area
Boronia capitata subsp. capitata a shrub [29156]	Endangered	Species or species habitat likely to occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat may occur within area
Darwinia carnea Mogumber Bell, Narrogin Bell [9736]	Endangered	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area
Grevillea dryandroides subsp. hirsuta Hairy Phalanx Grevillea [64577]	Endangered	Species or species habitat likely to occur within area
Grevillea scapigera Corrigin Grevillea [12195]	Endangered	Species or species habitat may occur within area
Pultenaea pauciflora Narrogin Pea [14013]	Vulnerable	Species or species habitat likely to occur within area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area
Thomasia montana Hill Thomasia [12136]	Vulnerable	Species or species habitat likely to occur within area
Verticordia fimbrilepis subsp. fimbrilepis Shy Featherflower [24631]	Endangered	Species or species habitat known to occur within area

Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area