Shire of Jerramungup

BIO DIVERSE SOLUTIONS

Jerramungup and Bremer Bay Townsite Bushfire Prone Vegetation Mapping & BAL Contour Plan Review 2022

Draft v. 1

25/01/2023

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

Site Details					
Address:	Jerramungup and Bremer Bay Townsites				
Suburb:	N/A	**State:**	W.A.	**Postcode**	6337
Local Government Area:	Shire of Jerramungup				
Description of Building Works:	N/A				
Stage of WAPC Planning	N/A				

BAL Contour Plan Details			
Report / Job Number:	SOJ005	**Report Version:**	Draft
Assessment Date:	10 October 2022	**Report Date:**	25 January 2023
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BPAD Bushfire Planning & Design Accredited Practitioner Level 2

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1. Introduction and Background

The Shire of Jerramungup ("the Shire") commissioned Bio Diverse Solutions (Bushfire Practitioners) to review the previous Vegetation Assessment and update the BAL Contour Plans (BDS 2016, 2017, 2018, 2019 and 2020) for the townsites of Jerramungup and Bremer Bay. The townsite(s) of Bremer Bay and Jerramungup are located in Bushfire Prone Areas according to the State Bushfire Prone Area Mapping (OBRM, 2021).

The Bushfire Prone Vegetation Mapping and the WAPC Bushfire Planning framework have increased the level of complexity when lodging development applications in the Shire and the information from this bushfire assessment assists in planning applications and assessment. Additionally, the townsites are remote to bushfire professional services, and any service usually comes with considerable travel costs added. Large areas of the townsites are required to prepare a BAL Assessment, being identified as 'bushfire prone' by the current state-wide Bushfire Prone mapping.

This project aims to re-assess the previously mapped bushfire prone vegetation of the townsites to Australian Standard (AS) 3959-2018 and the OBRM mapping standards. The dataset assists with mapping the extent of bushfire risks to the towns and critical assets, assist in any future planning within the townsites, and give brief comments for bushfire risk mitigation. The BAL Contour plans have been generated to guide the Shire's decision making on bushfire mitigation priorities, planning and development applications.

This report and mapping will be reviewed annually as required by Local Planning Policy 22 (LPP22), with this report forming an Appendix to LPP22.

1.1. Statutory Conditions

This document is aligned to the following policy and guidelines:

- *Planning and Development Act 2005;*
- *Planning and Development Regulations 2009*;
- *Planning and Development (Local Planning Scheme) Regulations 2015;*
- State Planning Policy 3.7 Planning in Bushfire Prone Areas 2015;
- Guidelines for Planning in Bushfire Prone Areas 2021;
- *Building Act 2011;*
- *Building Regulations 2012;*
- Building code of Australia (National Construction Code);
- *Fire and Emergency Services Act 1998*;
- AS 3959-2018 "Construction of Buildings in Bushfire Prone Areas" current and endorsed standards;
- *Bushfires Act 1954*; and
- Shire of Jerramungup Annual Fire Control Information.

1.2. Suitably Qualified Bushfire Consultant

This document has been prepared by Melanie Haymont who has 6 years' experience working with Local Governments on the State Bushfire Mitigation Planning Program (between 2016-2021) and has the following accreditation in bushfire management:

- Advanced Fire Fighting
- Bushfire fighting;
- Fire Control Officer;
- Prescribed Burning Operations;
- Aurora bushfire modelling;
- Structural Modules – Introduction to Structural Fires and:
- Diploma of public safety (Emergency Management)

Melanie Haymont is an accredited Level 1 Bushfire Practitioner (Accreditation No: BPAD58389) and has been an accredited Bushfire Consultant the last 12 months. Bio Diverse Solutions are Silver Corporate Members of the Fire Protection Australia Association. Melanie is a suitably qualified Bushfire Practitioner to prepare this document.

This document has been reviewed by Jason Benson who has 8 years operational fire experience with the (formerly) DEC (between 2002-2012) and has the following accreditation in bushfire management:

- Heavy Duty Fire Appliance Operator;
- Wildfire Suppression 1 & 2;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Jason Benson is an accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD37893) and has been an accredited Bushfire Consultant for 7 years. Bio Diverse Solutions are Silver Corporate Members of the Fire Protection Australia Association. Jason is a suitably qualified Bushfire Practitioner to review this Document.

1.3. Consultation

Consultation has occurred with the Shire during the field assessment, preparation of the report and review of the report.

2. Aims of this Project

The aims of the project are:

- Prepare a revised Vegetation Classes Map for the townsites to determine current bushfire prone vegetation;
- Assess the extent of bushfire risks to the townsites and critical assets;
- To guide the townsite's site works and priorities contained within their "Bushfire Risk Mitigation Plans";
- Provide brief bushfire mitigation strategies to the Shire to assist with ongoing fire mitigation works in the townsite(s);
- Provide updated BAL Contour Plans over the townsite to guide the Shire's decision making on planning and development applications; and
- Provide a BAL Contour Plan to show the effectiveness of proposed bushfire mitigation treatments (MAF applications).

2.1. Objectives

The objectives of this report are:

- Understand and document the extent of the bushfire risk and hazards to the townsite;
- Review of the bushfire prone vegetation applicable to the townsite boundary and within 150m of the townsite boundary;
- Prepare brief observations on bushfire mitigation and management measures of all land within the subject site (s) with due regard to people, property, infrastructure and the environment; and
- Align findings to the recommended assessment procedure of AS3959-2018 Method 1 BAL Assessment procedure and WAPC Guidelines for Planning in Bushfire Prone Areas Ver 1.4 (WAPC, 2021).

2.2. Methodology

The Bushfire Attack Level (BAL) for each townsite was determined by using the *"Simplified procedure described in Clause 2.2 (AS3959-2018) (Method 1)*. The following methodology (scope of works) was undertaken by Bio Diverse Solutions in preparing the vegetation classifications and BAL Contour Plans for the townsite(s):

1. Preparation of pre-field GIS maps with a pre-determined townsite boundary.
2. Generation of 150m setback boundary from the townsite boundary for field assessment using ArcGIS, preparation of field maps, and ArcGIS Mapper dataset for each townsite.
3. Detailed site assessment/review of all classifiable vegetation to AS3959-2018 within the townsite boundary and within 150m of the townsite boundary.
4. Field capture included classification of vegetation types to AS3959-2018 Section 2.2.3 to either a Forest Type A, Woodland Type B, Shrubland Type C, Scrub Type D, or Grassland Type G. All classifiable vegetation was GPS referenced (as a plot reference) in the field using Field maps ArcGIS mapping application, field capture sheets (manual entry) and hand mapped on hard copy field maps.
5. Field measurement of the Effective Slope (ES) as per Section 2.2.5 AS3959-2018 was conducted using Nikon Forestry Pro with a minimum of 2 slopes measured for each plot. ES is shown on the mapping as a representation of the field capture.
6. Field assessment included assessment of "Low fuel and non-vegetated areas" to AS3959-2018 Clauses (a)-(f) Section 2.2.3.2 of AS3959-2018 and GPS capture of these.
7. GIS mapping using ArcMap software of all classifiable vegetation to AS3959-2018 within the 150m setback of the townsite boundary as per the recommended methodology by WAPC Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC, 2021).
8. Input of data (population of fields) to ArcGIS .shp/.lyr .
9. Undertake BAL Contour GIS mapping from the bushfire risks to WAPC Guidelines (WAPC, 2021) methodology;
10. Quality assurance checks of all data fields in ArcGIS (.shp/.lyr files).
11. Preparation of Metadata documentation and files associated with AcrGIS (.shp/lyr files) for the Shire.
12. Preparation of a report outlining the aims, methodology, GIS mapping outcomes and brief bushfire mitigation strategies for each townsite.

Notes on methodology:

- In assessing the vegetation classification to AS3959-2018 consideration was given to *Table B2 AS3959-2018 (Appendix B) – 6* which referenced information from L. McCaw regarding mallee/mulga fire behaviour predictions associated with the AS3959 model.
- Each vegetation classification to AS3959-2018 Table 2.3 was described/pictorially in plots in 2016/2017, with examples of differing plot photos/vegetative structure for each plot.
- For the purpose of the BAL Contour Plans each vegetation classification to AS3959-2018 Table 2.3 was described/pictorially represented with examples of differing plot photos/vegetative structures given in the report. The detailed field capture sheets and the .shp file have corresponding field capture plot numbers/identification.
- The WA State Bushfire Prone Area Mapping was not used to guide any field assessment or verification of boundaries.
- Construction requirements/advice for AS3959 BAL FZ- BAL12.5 was not within the scope of this project.
- Certification to AS3959 for building approval is not within the scope of this project.

2.3. Previous bushfire assessment and notable changes

The documented history of the SoJ Townsite BAL contour Mapping project includes:

2016 - The original site assessment of the townsites occurred in 2016 with site assessment and field verification undertaken by Bio Diverse Solutions Accredited BAL Assessors. A report was prepared for the Shire (April 2017) which documented the vegetation classifications and BAL Contours over the site. Areas of risk were identified and mitigation measures were implemented by the Shire through their bushfire mitigation program.

2018- The assessment boundary was extended and a full reassessment occurred in 2018 to 150m from the townsite boundary which is consistent with the updated WAPC guidelines methodology (WAPC, 2021).

2019- On the 13th November 2019 a site re-assessment occurred, the vegetation was assessed as per AS3959-2018 with some modifications made to the original dataset, mainly in relation to the changes of Woodland Type B to Forest Type A based on the recently updated AS3959-2018.

2020 - On the 7th of December 2020 the site was re-assessed to document vegetation modification that had taken place in the previous year and any changes in the previously classified vegetation. The changes to vegetation were mainly clearing works that had been completed and the plot numbers simplified, there is now only one plot number for each vegetation type/slope range. It was also established that the section that was missing from previous years assessments (central south) should be included in the subject area. The vegetation within this area has now been included in the updated mapping. To review previous vegetation and BAL contour plan refer to previous report.

2021 – Updated report issued to Shire.

2022 – On the 10th and 11th of October 2022 both the Jerramungup and the Bremer Bay townsite were reassessed. This assessment documented changes to vegetation plots with respect to structure and proximity to assets within the townsites. A substantial fire occurred within the Jerramungup townsite in February 2022 which has seen the western, southern and part of the eastern vegetation severely modified. It is noted the Mitigation works have been ongoing and are continuing to make progress in reducing the radiant heat impacts to assets within both townsites. An additional area to the northwest of the Bremer Bay townsite has been included this year to take into account the expanding subdivision to the west.

2.4. AS3959-2018 disclaimer

The survivability of buildings is also dependant on a combination of measures such as landscaping, water supplies, access, building design and maintenance. Care should also be exercised when siting and designing for these measures when constructing a building under this Standard.

This Standard is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself. (AS3959-2018)

2.5. Structure of this report

This report has been prepared in two sections relating to each townsite. Each townsite (section) of this report details the following:

- Review of original bushfire prone vegetation classifications (additional 2022 Plot data) to AS3959-2018, revise plot data and town boundary;
- Revised Vegetation Classes (GIS) Map;
- Discussion on potential bushfire impacts/hazards;
- Revised BAL Contour Plan(s);
- Brief recommendations and Works Program Map(s); and

It should be noted that the original vegetation datasets undertaken in 2016/2017 and classifications still reflect the vegetation type. Where change has occurred through bushfire mitigation works or other site works then an updated Vegetation Plot data is outlined in Section 3 (Jerramungup townsite) and Section 4 (Bremer Bay Townsite) of this report. To review previous vegetation and BAL contour plans refer to previous report (s).

3. Jerramungup Townsite

3.1. Vegetation Classification

Vegetation verification/re-assessment occurred on the 10th of October 2022 by Melanie Haymont (BPAD 58389) and Bob McGonnell (BPAD 58381) with all vegetation within 150m of the townsite boundary classified/verified in accordance with the original 2016/17 Vegetation Assessment and Section 2.2.3 of AS 3959-2018. Additional and revised plot data to the 2022 assessment with the potential to determine the Bushfire Attack Level is identified below in Table 1 and shown on the Vegetation Classes Map, (Figure 1). All plots of the same vegetation type and slope range have the same plot number. To review previous vegetation and BAL Contour plans refer to the previous years' report. A summary of the plot data is shown in Table 1. Note: some plots have been removed from the original 2016 assessment due to works program/reassessment.

Table 1: Summary of the plot data (Jerramungup)

Plot number	Vegetation Type (Table 2.3)	Slope (Table 2.4.3)
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Scrub Type D	Upslope/flat
7	Scrub Type D	Downslope >0-5 degrees
8	Grassland Type G	Upslope/flat

3.2. Reclassified Plots and Plot Changes (2022 Assessment)

This section outlines the reclassified plots either from the Shire's 2022 bushfire mitigation works or modification from private property owners.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: Central to the subject site adjacent to the shire building.

Description: Maintained gardens and parkland cleared vegetation to the rear of the industrial area. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

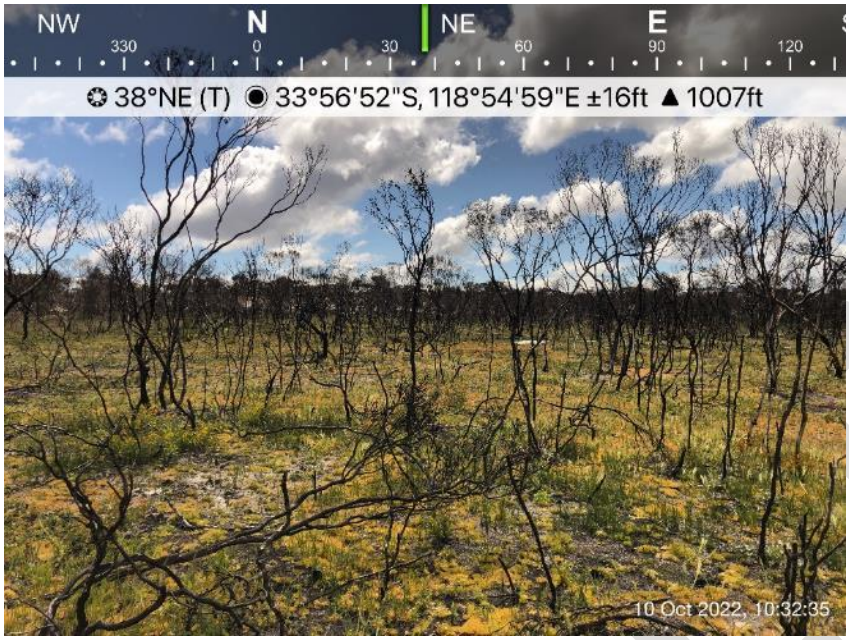
Available fuel loading: <2 t/ha.

Note: Previously classified as Forest Type A, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).

Photo Id 1: View facing south-southeast towards recently modified vegetation, located central within the subject site, adjacent to an industrial area on Memorial Road.

Plot	4	Classification or Exclusion Clause	Forest Type A
			**Location:** Central to the subject site to the south of shire building. **Dominant species & description:** Eucalypt trees with dense canopy cover, limited understorey of sedges and grass (100-200mm), some multilayering present. Classified as forest based on the overstorey using the precautionary principle. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** >0 - 5 degrees downslope. **Note:** Vegetation classification has not changed for this plot, the boundary of the plot was realigned to reflect vegetation management.
Photo Id 2: View facing north towards forest vegetation, located centrally within the subject site.			
Plot	**2**	**Classification or Exclusion Clause**	**Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)**
			**Location:** Central to the subject site. **Description:** Maintained gardens and parkland cleared vegetation to the rear of the industrial area. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading**: <2 t/ha. **Note:** Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).
Photo Id 3: View facing west-southwest towards recently modified vegetation, located central east within the subject site.			

Plot	7	Classification or Exclusion Clause	Scrub Type D



Location: Southwest to the subject site.

Dominant species & description: Scrub vegetation consisting of low Eucalyptus and Acacia trees, understorey of sedges, grasses and some low shrubs (100-400mm).

Average vegetation height: Scrubs 2-4m. Occasional eucalypt at 5m.

Vegetation Coverage: >30% foliage cover.

Available fuel loading: 25t/ha.

Effective Slope: Downslope >0-5 degrees.

Note: Vegetation burnt through uncontrolled fire in Feb 2022, vegetation still remains as originally classified as no permanent control mechanism, but will not pose a significant bushfire risk to the townsite in this state.

Photo Id 4: View facing northeast through the burnt vegetation, located to the north of Sydney Street in the southwest corner of the subject site.

Plot	7	Classification or Exclusion Clause	Scrub Type D

Location: Central to the subject site.

Dominant species & description: Scrub vegetation consisting of low Eucalyptus and Acacia trees, understorey of sedges, grasses and some low shrubs (100-400mm).

Average vegetation height: Scrubs 2-4m. Occasional eucalypt at 5m.

Vegetation Coverage: >30% foliage cover.

Available fuel loading: 25t/ha.

Effective Slope: Downslope >0-5 degrees.

Note: Vegetation classification has changed from F (managed)to Scrub D due to lack of management, the size of the plot has been increased.

Photo Id 5: View facing east towards scrub vegetation, located central west within the subject site.

Plot	7	Classification or Exclusion Clause	Scrub Type D
			**Location:** Central to the subject site. **Dominant species & description:** Scrub vegetation consisting of low Eucalyptus and Acacia trees, understorey of sedges, grasses and some low shrubs (100-400mm). **Average vegetation height:** Scrubs 2-4m. Occasional eucalypt at 5m. **Vegetation Coverage:** >30% foliage cover. **Available fuel loading:** 25t/ha. **Effective Slope:** Downslope >0-5 degrees. **Note:** Vegetation classification has not changed for this plot, the boundary of the plot was realigned more accurately.
Photo Id 6: View facing east toward scrub vegetation, located central within the subject site to the to the south of the school.			
Plot	**6**	**Classification or Exclusion Clause**	**Scrub Type D**
			**Location:** Central to the subject site. **Dominant species & description:** Scrub vegetation consisting of low Eucalyptus and Acacia trees, understorey of sedges, grasses and some low shrubs (100-400mm). **Average vegetation height:** Scrubs 2-4m. Occasional eucalypt at 5m. **Vegetation Coverage:** >30% foliage cover. **Effective Slope:** Upslope/flat. **Note:** Vegetation classification has not changed for this plot, the boundary of the plot was realigned more accurately.
Photo Id 7: View facing east-southeast toward scrub vegetation, located southeast within the subject site to the to the east of Collins Street.			

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Scrub Type D	Upslope/flat
7	Scrub Type D	Downslope >0-5 degrees
8	Grassland Type G	Upslope/flat

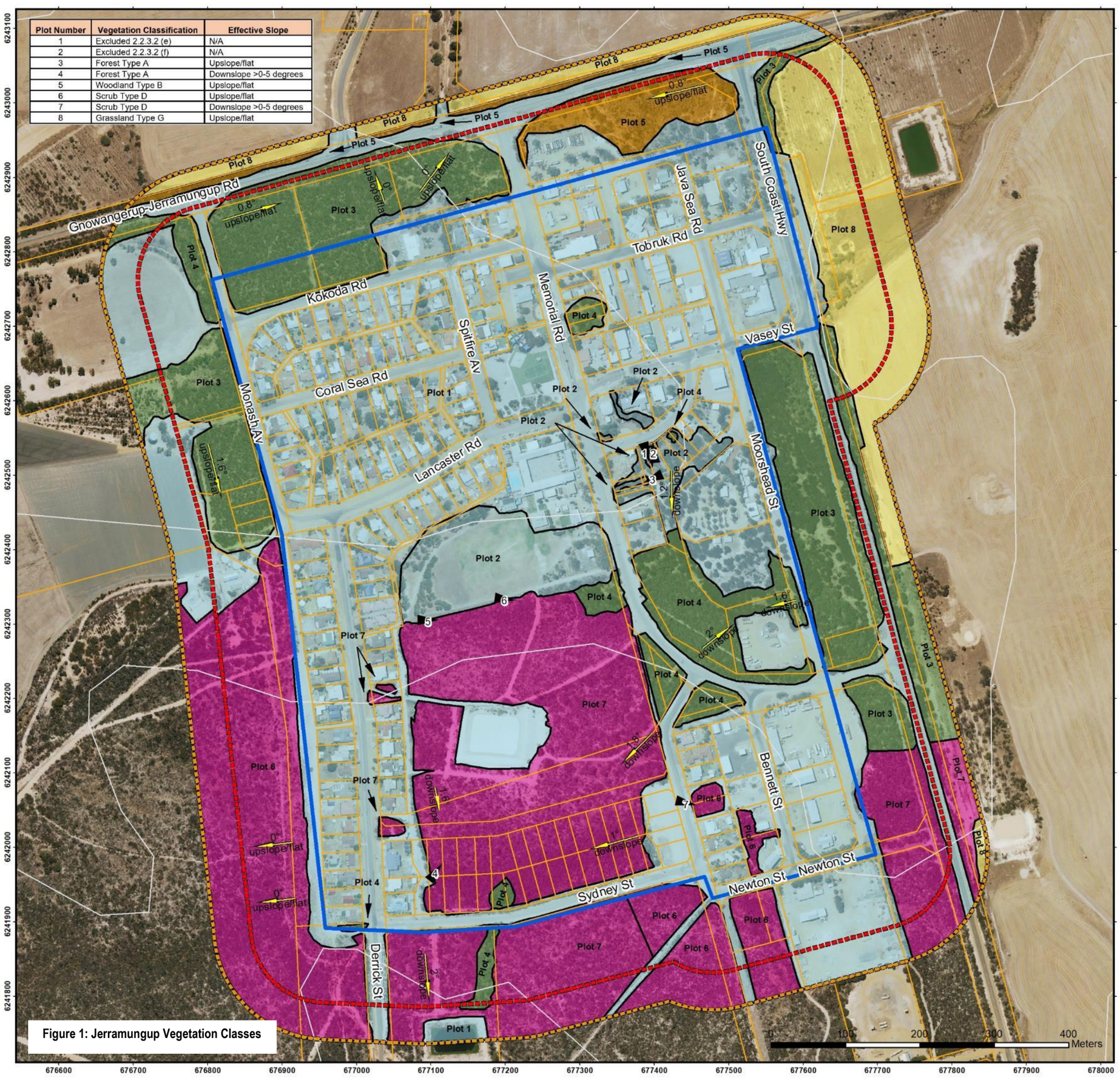


Figure 1: Jerramungup Vegetation Classes

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29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
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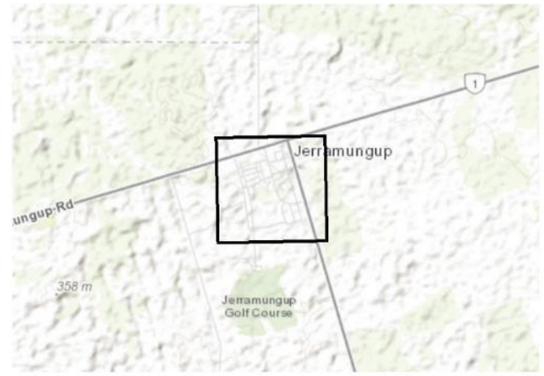

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Slopes Degrees
- Photo Point
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:5,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Jerramungup Vegetation Classes

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	BMT	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-006	1/12/2022

3.3. Identification of Bushfire Impacts

The bushfire threats associated with the townsite include:

- The vegetated areas from the remnant UCL/crown land reserves adjacent to the town site to the north, south, east and the west. These still present dominant extreme bushfire risks. It is noted that the February bushfires have significantly reduced bushfire fuels to the northwest, west, southwest, south and southeast of the townsite.
- Paddock areas are dominant in the northwest, north of Gnowangerup-Jerramungup Road and east of the South Coast Highway, these present as moderate bushfire risks.
- Small areas of remnant/overgrown vegetation in private property lots to the south and north (central) of the townsite.
- The recent fire provides an opportunity to upgrade access through the burnt vegetation.
- The Caravan Park is showing signs of unmanaged vegetation to the south, increasing the bushfire risk to this site.

These remnant vegetation (bushfire prone vegetation) areas can carry bushfire from the west and south into the town site. The town centre and eastern entry points are generally low fuel in nature and present limited risk of bushfire along the highway entry/exit points.

A summary of the bushfire issues pertinent to Jerramungup townsite is provided below:

- It is understandable that mitigation work within the townsite has been kept to a minimum as the recent bushfire impacts on the townsite vegetation is evident. Emergent weeds and grasses within the burnt areas could pose a grass fire risk to already burnt country if not adequately controlled.
- Strategic firebreaks to the south, west, north and north west are designed to protect the townsite at large from bushfire. These fuel breaks seemed to have been adequate in assisting responding agencies in defending the townsite from the February bushfire.
- Risk of bushfire attack over the townsite are from the north, south, southeast and southwest have been reduced due to the uncontrolled bushfire in Feb 2022. There are still unburnt pockets remaining within the townsite. Potentially these would be the subject of localised fire but should be readily suppressed with available resources until fuel loads build again.
- The northeast and east of town is still exposed to moderate bushfire risk from remnant vegetation in the road reserve on the highway leading into the caravan park.
- The caravan park (vulnerable land use) still has areas of classifiable vegetation within 100m of the existing buildings and infrastructure. Bushfire attack from the south would impact this site, BAL FZ does prevail over some sites in the caravan park.

3.4. BAL Contour Plan

The Bushfire Attack Level (BAL) was assigned from each distinctive vegetation plot according to AS3959 and shown as a series of BAL Contours (Figure 2). The broad scale of the presented map is for diagrammatic purposes only. The detailed GIS mapping dataset provided to the Shire should be consulted for any planning and development considerations.

It is noted that the majority of the existing dwellings achieve BAL-29 or less from external bushfire risks. Internal to the townsite there are bushfire hazards emanating from private lots, crown land and Water Corporation managed lands. These areas create BAL- FZ to some residential buildings and infrastructure. Continuous vegetation from the caravan park site, to lots and to the Shire building create a “wick” into the townsite. Refer Figure 2 BAL Contour Plan over the page.

Note: Utilising these BAL Contour Maps Jerramungup and Bremer Bay townsite building and planning approvals must be done in consultation with an accredited bushfire consultant.

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Scrub Type D	Upslope/flat
7	Scrub Type D	Downslope >0-5 degrees
8	Grassland Type G	Upslope/flat

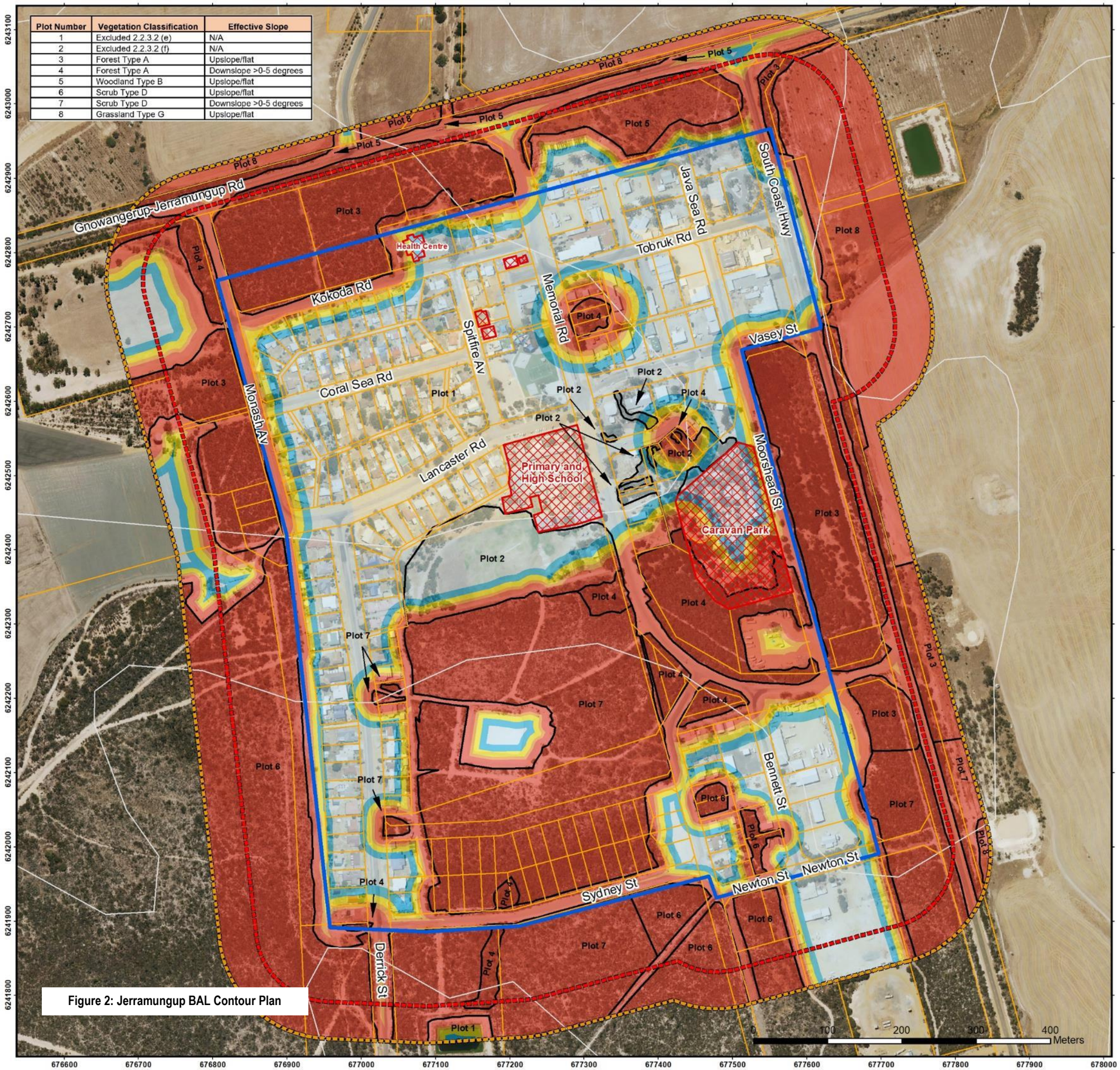

Figure 2: Jerramungup BAL Contour Plan

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29 Hercules Crescent
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Denmark Office:
7/40 South Coast Highway
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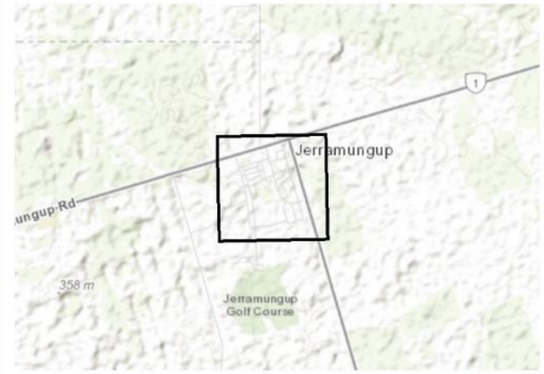


Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Assets / Vulnerable Land Use
- Vegetation/Plot Boundary

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

Not for Development or Building Approval unless approved/certified by an accredited Bushfire Consultant

Scale
1:5,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Jerramungup BAL Contour Plan

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	KPK	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-006	1/12/2022

3.5. Recommendations for bushfire management/mitigation

The vegetation assessment of Jerramungup townsite has determined the following recommendations for bushfire mitigation, also refer to Figure 3 "Works Program":

- The Vulnerable land use of the Jerramungup Caravan Park should have fuel reduction strategies deployed internal to the site, to the southwest, southeast and south. A build-up of dead material and undergrowth was noted to the south of the site. A minimum of 20m APZ area to any structures is recommended. Fuel reduction standards (*note this is not broad scale clearing*) are to be as per the WAPC APZ recommended standards, refer to Section 5.0 of this report and Appendix A. Consider a Bushfire Emergency Evacuation Plan (BEEP) for the park as per the policy requirements of SPP 3.7 (Photo 4, Mitigation treatment table).
- Vegetated reserves adjacent to private dwellings/lodgings should be fuel reduced to a minimum of 20m to assist in Asset Protection Zones to the townsites dwellings and further protection of life and property from bushfire events. The properties to the top end of Derrick Street adjacent to the school oval need fuel management to the rear in Education Department land (see Photo 5 & 6 in Plot changes table).
- Access tracks should be maintained to a 4m trafficable surface with 1m low fuel either side and a 4.5m vertical trim (see appendix C) (Photo 6, Mitigation treatments table)
- Burnt areas are showing evidence of weed encroachment, this will need to be managed each year until the regrowth establishes to prevent the potential for grassland fire and manage the colonisation of weedy species in recovering vegetation. (Photo 2, Mitigation Treatments).
- Previously slashed areas need to be retreated to maintain low fuel status (see health centre Photo 1 Mitigation treatment areas).
- It is recommended that land owners of vacant land are enforced as per the annual Fire Control Information notice to maintain urban lands to low fuel standards. Provision of this through the gazetted annual Fire Control Information notice pursuant to Section 33 of the *Bushfires Act 1953*.
- It is recommended the Shire implements APZ standards to their maintenance of street verges, parks and gardens adjacent to or within mapped areas of bushfire prone areas (classifiable vegetation) to ensure these maintained areas are not linking into the townsites as "wicks" or encourage ember establishment in bushfire conditions. Refer to further information Section 5.0 of this document.
- A copy of the Works program mapping be given to the ranger team to assist with priorities for the application of the FMN.

A "Works Program" has been developed (Figure 3) to help assist for townsite bushfire mitigation works. The key/legend to the Works Program Mapping is consistent with DFES BRMS database, being "MW" - Mechanical Works and "PB"- Prescribed Burning. This has been further applied by Bio Diverse Solutions as:

- MW-APZ: defined as Mechanical Works to WAPC APZ standards (distance specified).
- MW -SB – defined as Mechanical Works to DFES Strategic Break standards (distance specified), no trees in zone, traversable for bushfire attack and prescribed burning operations.
- PB – Prescribed burning to reduce fuel loads, asset identified.

Although outside of the townsite assessment area, it was noted that the recreation centre to the south of town would be classified as BAL FZ as there is vegetation within 10m of the building. As a "refuge" or a designated evacuation centre it is recommended that a minimum of 20m APZ prevails over the building.

3.6. Mitigation treatment areas 2022

Examples of the bushfire mitigation treatments is outlined in the following pages. Also refer to the "Works Program" (Figure 3) and Shire provided GIS files. Refer to Appendix C for the Bushfire Mitigation Terminology and Guidelines.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: Northwest internal to the subject site.

Description: Maintained gardens and parkland cleared vegetation to the west of the health centre. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha**.**

Note: Vegetation needs to be slashed as emergent eucalypts becoming more prevalent.

Photo Id 1: View facing north-northwest towards regrowth of Eucalypt species, located to the west of the health centre.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: West internally of the subject site adjacent to the rear of houses on Derrick Street.

Description: Maintained gardens and parkland cleared vegetation to the rear of houses on Derrick Street. "Excluded" as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: emergent grasses and weeds growing up through burnt areas, slashing/weed management required.

Photo Id 2: View facing north-northwest towards emergent grasses, located to the west of houses of Derrick Street.

Plot	3	Classification or Exclusion Clause	Forest Type A
			**Location:** Southeast of the subject site, adjacent to the industrial area. **Dominant species & description:** Eucalypt trees with dense canopy cover, limited understorey of sedges and grass (100-200mm), some multilayering present. Classified as forest based on the overstorey using the precautionary principle. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Upslope/flat. Note: emergent grasses and weeds growing up through burnt areas, slashing/weed management required.
Photo Id 3: View facing southeast towards emergent grasses and weeds in a recently burnt area, located to the southeast of the subject site			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central to the subject site adjacent west to the Caravan Park. **Description:** Maintained gardens and parkland cleared vegetation to the rear of the Caravan Park. "Excluded" as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Accumulating dead material was noted in several areas around the Caravan Park Site this if left to accumulate further will be difficult to manage and provide for a greater risk from bushfire.
Photo Id 4: View facing north-northwest towards dead accumulating material, located west of the caravan park.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central to the subject site adjacent to the shire building. **Description:** Maintained gardens and parkland cleared vegetation to the rear of the industrial area. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).
Photo Id 5: View facing west-southwest along access track to the rear (east) of houses of Derrick Street.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** southeast to the subject site adjacent to the west of shire depot. **Description:** Maintained gardens, parkland cleared vegetation and managed tracks. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Access track needs some vegetation management as per standards in Appendix B
Photo Id 6: View facing north-northwest along access track adjacent to the Shire Depot to the west, located southeast of the subject site.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Southeast to the subject site adjacent to House on Colins Street. **Description:** Maintained gardens and parkland cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Access track and vegetation adjacent to the fence needs some vegetation management as per standards in Appendix C.
Photo Id 7: View facing east-southeast along access track and low fuel area to the north of houses on Collins Street, located internally to the southeast of the subject site towards recently modified vegetation central to the subject site.			

Figure 3: Jerramungup Works Program

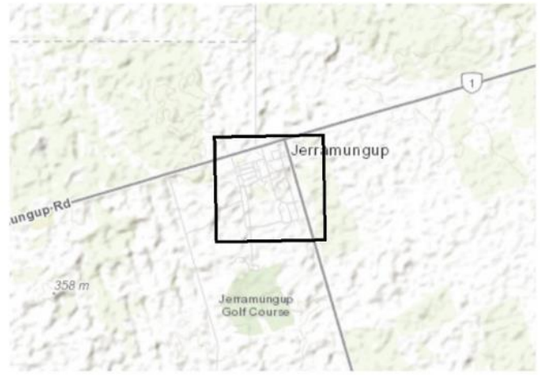
Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS



Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- Photo Point
- Vegetation/Plot Boundary
- Jerramungup Fire Shape
- Fire Control Notice to Apply
- PB - Prescribed Burn (Nominal Cells)
- MW_APZ - Mechanical Works APZ Standards
- Weed Management
- Assets / Vulnerable Land Use

Vegetation

- Forest Type A
- Woodland Type B
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:5,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Jerramungup Works Program

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-006	1/12/2022

4. Bremer Bay Townsite

4.1. Vegetation Classification

The Bremer Bay townsite Vegetation verification/re-assessment occurred on the 10th and 11th Of October 2022 by Melanie Haymont (BPAD 58389) and Bob McGonnell (BPAD 58381) with all vegetation within the townsite boundary and 150m of its boundary classified/verified in accordance with the original 2016, 17, 18, 19 and 20 Vegetation Assessment and Section 2.2.3 of AS 3959-2018. The subject site boundary has been extended to the west to include an expansion to Freeman Estate, west of Goorie Way. Additional plot data and revision of the 2016, 2018 and 2021 assessment with the potential to determine the Bushfire Attack Level is identified below and shown on the revised Vegetation Classes Maps Figures 4, 5 and 6. A summary of the plot data is shown in Table 2.

Table 2: Summary of plot data (Bremer Bay)

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Woodland Type B	Downslope >0-5 degrees
7	Woodland Type B	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat
9	Shrubland Type C	Downslope >0-5 degrees
10	Scrub Type D	Upslope/flat
11	Scrub Type D	Downslope >0-5 degrees
12	Grassland Type G	Upslope/flat
13	Grassland Type G	Downslope >0-5 degrees
New Plot		
14	Forest Type A	Downslope >5-10 degrees

4.2. Reclassified Plots and Plot Changes (2022 Assessment)

This section outlines the reclassified plots either from the Shire's 2022 bushfire mitigation works or modification from private property owners.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** On the mid-western boundary of the subject site. **Description:** Parkland cleared vegetation and recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Forest Type A (plot 9) However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).
Photo Id 1: View facing north-northeast towards cleared area, located to the southern end of Gunn Place central west of the subject site.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: On the mid- western boundary adjacent to the subject site boundary.

Description: Parkland cleared vegetation and recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as Scrub Type D (Plot 11). However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 2: View south towards recently mulched area, located within reserve on the western side of the subject site boundary, at the southern end of Gunn Place.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: To the north of Buck Street on the central west within the subject site.

Description: Parkland cleared vegetation and recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as Scrub Type D (Plot 10). However, recent construction has reduced the classification to exclusion clause 2.2.3.2 (f).

Photo Id 3: View facing north-northwest towards newly constructed residence, located within lot on the northern side of Buck Street.

Plot	11	Classification or Exclusion Clause	Scrub Type D
			**Location:** Northern boundary of the subject site. **Dominant species & description:** Closed scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm). **Average vegetation height:** Scrubs 2-4m. Occasional eucalypt at 5m. **Vegetation Coverage:** >30% foliage cover. **Available fuel loading:** 25t/ha. **Effective Slope:** Downslope >0-5 degrees. Note: Classified as Scrub Type D (Plot 11). However, recent vegetation modification has led to the realignment of the vegetation boundary.
Photo Id 4: View facing south-southwest towards recently modified scrub vegetation, located in the north of the subject site.			
Plot	**13**	**Classification or Exclusion Clause**	**Grassland Type G**
			**Location:** North-eastern of the subject site. **Dominant species & description:** Predominantly unmanaged grasses within paddock area. **Average vegetation height:** 100 – 300mm. **Vegetation Coverage:** <10% tree and scrub cover. **Available fuel loading:** 4.5t/ha. **Effective Slope:** Downslope >0-5 degrees. Note: This area was not classified in the previous assessment. However, it is not managed in a low threat state and has been classified as Grassland Type G.
Photo Id 5: View facing north-northwest located in a vacant block to the northeast of the subject site.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: Central west within the subject site.

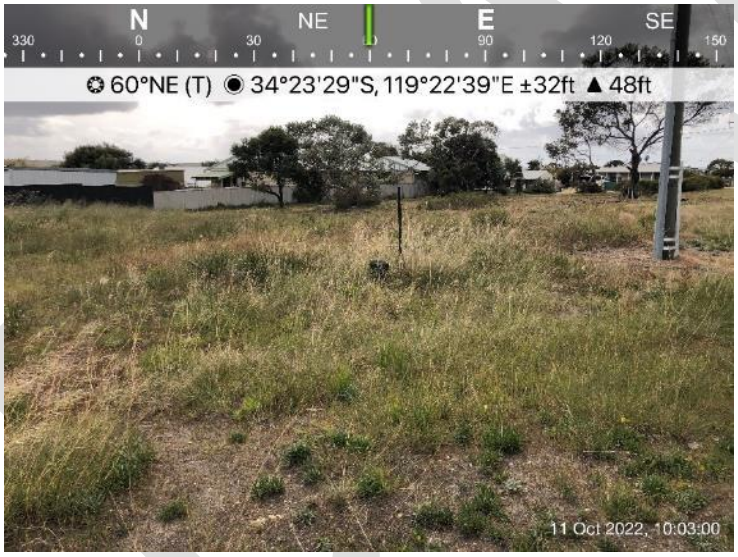
Description: Parkland cleared vegetation and managed vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as Grassland G and Scrub D. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).

Photo Id 6: View facing west-southwest towards recently mulched area, located to the north of Eucla Court.

Plot	13	Classification or Exclusion Clause	Grassland Type G



Location: Central west within the subject site.

Dominant species & description: Predominantly unmanaged grasses within paddock area.

Average vegetation height: 100 – 300mm.

Vegetation Coverage: <10% tree and scrub cover.

Available fuel loading: 4.5t/ha.

Effective Slope: Downslope >0-5 degrees.

Note: This area was not classified in the previous assessment of the area. However, it is not managed in a low threat state and has been classified as Grassland Type G.

Photo Id 7: View facing east-northeast towards Grassland vegetation located in a vacant block to the north of Emma Street.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: Northwest within the subject site adjacent to the Bremer Bay Primary School.

Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as Scrub Type D. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 8: View facing east towards recently modified vegetation located in the northwest of the subject site adjacent to the Bremer Bay Primary School.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: Northwest within the subject site.

Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 9: View facing north-northwest towards recently modified vegetation located north west of the subject site adjacent to the corner of Sea Dragon Ave and Mary Street.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: Northwest within the subject site.

Description: Parkland cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as a small plot of Scrub Type D. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 10: View facing south towards vegetation managed in a low threat state, located northwest of the subject site adjacent to the Bremer Bay Church.

Plot	4	Classification or Exclusion Clause	Forest Type A

Location: Central south to the subject site.

Dominant species & description: Open Forest consisting of Eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation.

Average vegetation height: Trees 4-8m.

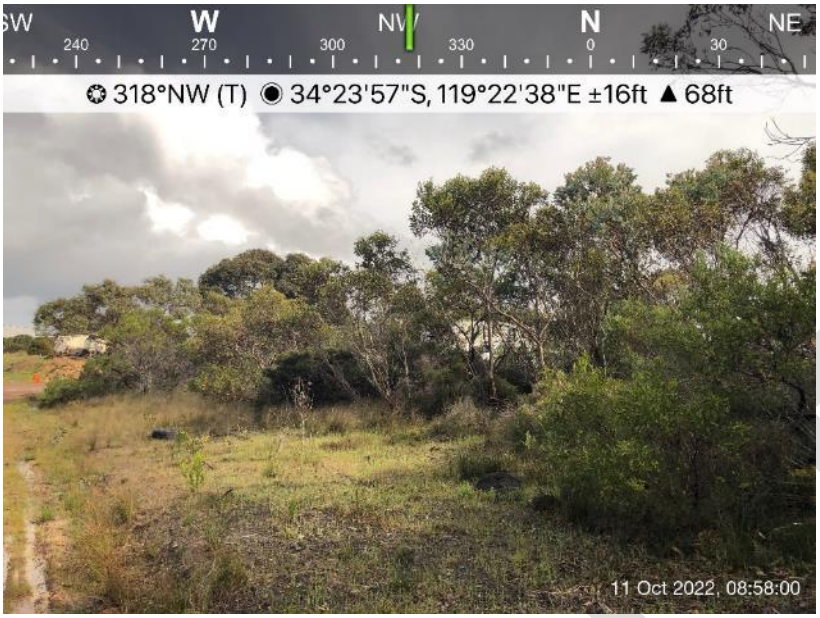
Vegetation Coverage: 30-70% foliage cover.

Available fuel loading: 25-35t/ha.

Effective Slope: Downslope >0-5 degrees.

Note: This area was not classified in the previous assessment of the area as it was maintained in a low threat state. However, it is not currently being managed and has been classified as Forest Type A. Needs to be managed. Vegetation boundary has been realigned.

Photo Id 11: View facing west towards forest vegetation, located central south of the subject site to the northwest of Yate Place.

Plot	4	Classification or Exclusion Clause	Forest Type A
			**Location:** Central south to the subject site. **Dominant species & description:** Open Forest consisting of Eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Downslope >0-5 degrees. Note: This area was classified in the previous assessment as woodland, this has now been changed to Forest Type A.
Photo Id 12: View facing Northwest towards Forest vegetation located central south of the subject site to the northwest of Yate Place.			
Plot	**10**	**Classification or Exclusion Clause**	**Scrub Type D**
			**Location:** Central south of the subject site. **Dominant species & description:** Thin strip of closed scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm). **Average vegetation height:** Scrubs 2-4m. Occasional eucalypt at 5m. **Vegetation Coverage:** >30% foliage cover. **Available fuel loading:** 25t/ha. **Effective Slope:** Upslope/flat Note: This area was previously classified low fuel (f) due to plot size, it now has sufficient coverage from Acacia and Eucalyptus Spp to be reclassified as Scrub D.
Photo Id 13: View facing northeast towards Scrub D vegetation, located to the north of Yate Place.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central southern boundary of the subject site. **Description:** Parkland cleared and recently modified vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Forest Type A. However, this area has recently been modified to a low threat state. Classification reduced to exclusion clause 2.2.3.2 (f). Vegetation Boundary has been realigned.

Photo Id 14: View facing southeast towards recently modified vegetation located central southern boundary of the subject site to the east of Wellstead Road.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central south within the subject site. **Description:** Recently modified vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Scrub Type D. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 15: View facing south towards recently modified vegetation located on the central south of the subject site to the east of Wellstead Road.

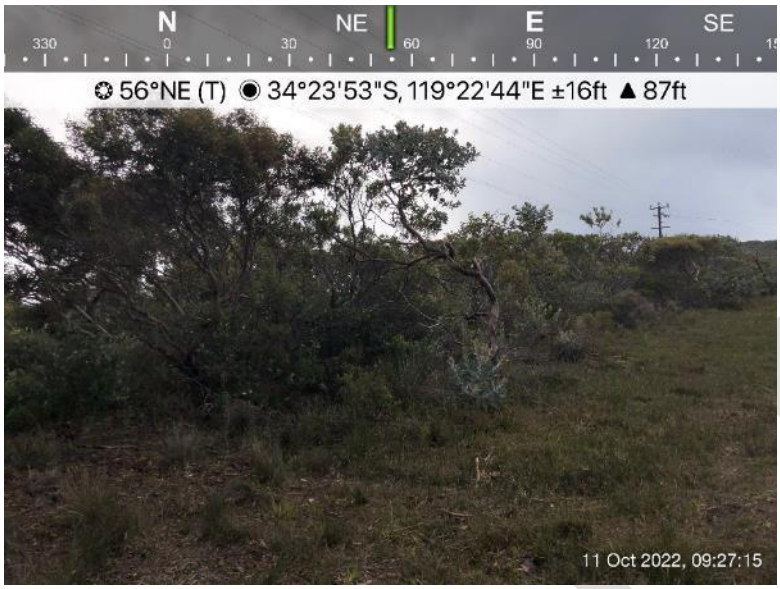
Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central south within the subject site. **Description:** Vegetation maintained in a low threat state including parkland cleared vegetation and managed lawns. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as a small patch of Scrub D. However, this area is being maintained in a low threat state. Classification reduced to exclusion clause 2.2.3.2 (f).

Photo Id 16: View facing northeast towards vegetation maintained in a low threat state located central south of the subject site to the south of Frantom Way.

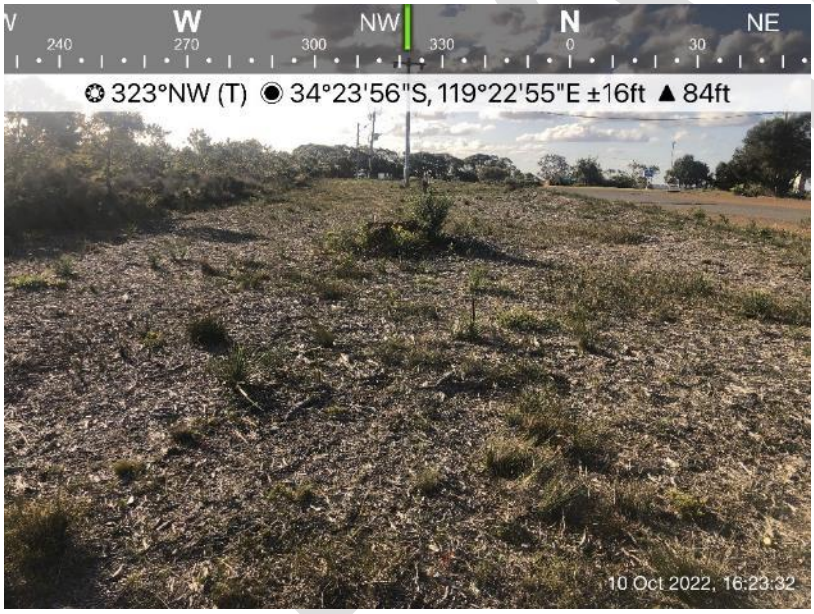
Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central south on the boundary of the subject site. **Description:** Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Scrub Type D. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 17: View facing northwest towards recently modified vegetation central south of the subject site to the south of Frantom Way.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central south of the subject site. **Description:** Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 18: View facing north-northeast towards recently modified vegetation central south of the subject site to the north of Frantom Way.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central south of the subject site. **Description:** Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Forest Type A, However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned.

Photo Id 19: View facing southeast towards recently modified vegetation central south of the subject site to the north of Frantom Way

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: Central south on the boundary of the subject site.

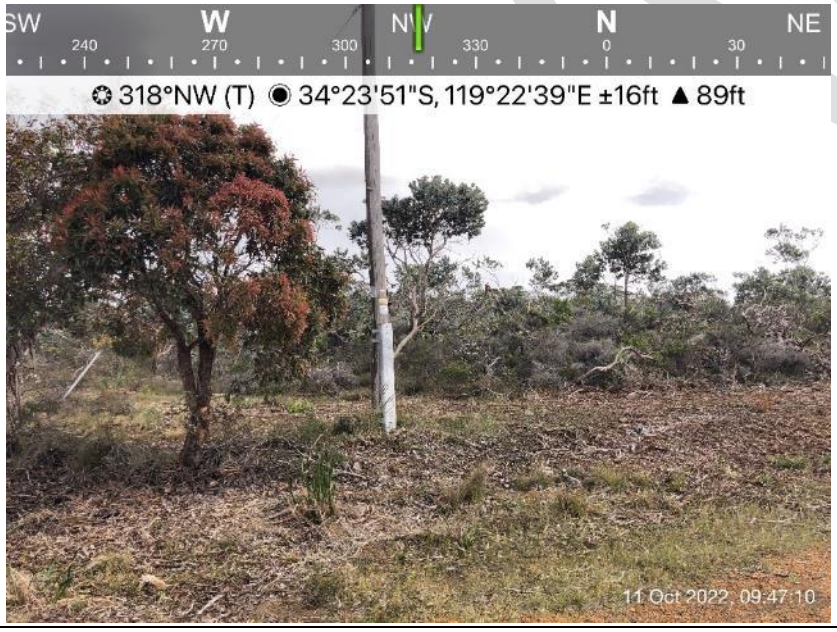
Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as Scrub Type D. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).

Photo Id 20: View facing northwest towards recently modified vegetation, located near accommodation units adjacent to the Bremer Bay Resort.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)



Location: Central south within the subject site.

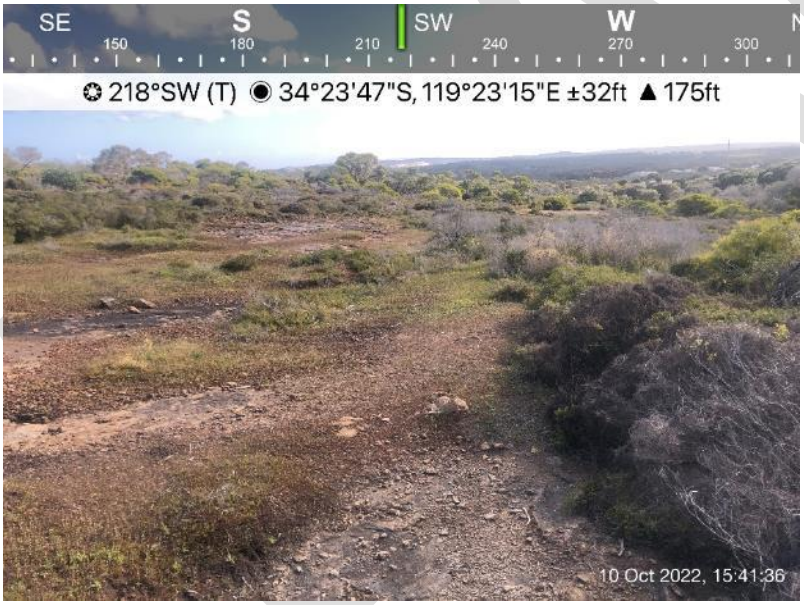
Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.

Note: Previously classified as Scrub Type D. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).

Photo Id 21: View facing northwest towards recently modified vegetation, located adjacent to the southern boundary.

Plot	11	Classification or Exclusion Clause	Scrub Type D
			**Location:** Southeast boundary of the subject site. **Dominant species & description:** Closed scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm). **Average vegetation height:** Scrubs 2-4m. Occasional eucalypt at 5m. **Vegetation Coverage:** >30% foliage cover. **Available fuel loading:** 25t/ha. **Effective Slope:** Downslope >0-5 degrees. Note: This area was previously classified Shrubland Type C due to vegetation growth, it now has been reclassified as Scrub D.
Photo Id 22: View facing south-southeast towards scrub vegetation, located adjacent to the south eastern boundary of the subject site.			

Plot	9	Classification or Exclusion Clause	Shrubland Type C
			**Location:** Southeast boundary of the subject site. **Dominant species & description:** Low sparse shrubland consisting low growing acacia, Hibbertia, Dryandra, sedges, and grasses (100-400mm). **Average vegetation height:** Scrubs 2-4m. Occasional eucalypt at 5m. **Vegetation Coverage:** >30% foliage cover. **Available fuel loading:** 15t/ha. **Effective Slope:** Downslope >0-5 degrees. Note: This area was previously classified Scrub D, it now has been reclassified as Shrubland C.
Photo Id 23: View facing southwest towards Shrubland Type C vegetation, located adjacent to the south eastern boundary of the subject site to the southwest of the water tanks.			

Plot	3	Classification or Exclusion Clause	Forest Type A
			**Location:** North-eastern boundary of the subject site. **Dominant species & description:** Open Forest consisting of eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Upslope/Flat. Note: This area was not classified in the previous assessment of the area as it was maintained in a low threat state. However, it is not currently being managed and has been classified as Forest Type A. Needs to be managed.

Photo Id 24: View facing northeast towards forest vegetation, located in the northeast of the subject site to the south of Bremer Bay Road.

Plot	14	Classification or Exclusion Clause	Forest Type A
			**Location**: Northeast within the subject site. **Dominant species & description:** Open Forest consisting of Agonis and Eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** >5-10 degrees Downslope. Note: This area was previously classified Low fuel (f). due to plot size and vegetation growth, it now has sufficient coverage from Acacia and Eucalyptus and Melaleuca spp to be reclassified as Forest A.

Photo Id 25: View facing northeast towards forest vegetation, located northeast within the subject site to the south of Bremer Bay Road.

Plot	3	Classification or Exclusion Clause	Forest Type A
			**Location:** North eastern boundary to the subject site. **Dominant species & description:** Thin strip of open forest consisting of Agonis and eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Upslope/Flat Note: This area was not classified in the previous assessment of the area as it was maintained in a low threat state. However, it is not currently being managed and has been classified as Forest Type A. Needs to be managed. Vegetation boundary has been realigned.

Photo Id 26: View facing south-southeast towards Forest vegetation, located to the north of Bremer Bay Road.

Plot	4	Classification or Exclusion Clause	Forest Type A
			**Location:** Central east within the subject site. **Dominant species & description:** Open Forest consisting of Agonis and Eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** >0-5 degrees Downslope. Note: This area was not classified in the previous assessment of the area as it was maintained in a low threat state. However, it is not currently being managed and has been classified as Forest Type A. Needs to be managed. The vegetation boundary has been realigned.

Photo Id 27: View facing east-southeast towards Forest vegetation, located on the corner of Barbra Street and Mary Street.

Plot	3	Classification or Exclusion Clause	Forest Type A
			**Location:** Central east within the subject site. **Dominant species & description:** Open Forest consisting of Agonis and Eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Upslope/Flat. Note: This area was classified as woodland in the previous assessment of the area based on the understorey, it has been reclassified as Forest Type A based on the dense canopy cover.

Photo Id 28: View facing northeast towards forest vegetation, located central east to the subject site to the east of Barbra Street.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central east within the subject site. **Description:** Managed area. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Grassland G, management of this area, has reduced the classification to exclusion clause 2.2.3.2 (f).

Photo Id 29: View facing west-southwest towards managed vegetation, located to the west of Bennet Street.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central west within the subject site. **Description:** Managed area. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Previously classified as Scrub D, management of this area, has reduced the classification to exclusion clause 2.2.3.2 (f). The vegetation boundary has been realigned.

Photo Id 30: View facing south towards managed vegetation, located to the west of John Street.

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Woodland Type B	Downslope >0-5 degrees
7	Woodland Type B	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat
9	Shrubland Type C	Downslope >0-5 degrees
10	Scrub Type D	Upslope/flat
11	Scrub Type D	Downslope >0-5 degrees
12	Grassland Type G	Upslope/flat
13	Grassland Type G	Downslope >0-5 degrees
New Plot		
14	Forest Type A	Downslope >5-10 degrees

Figure 4: Bremer Bay Vegetation Classes - West

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Slopes Degrees
- Photo Point
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6338

Bremer Bay Vegetation Classes - West

BAL Assessor	QA Check	Drawn by
MEH & BRM	BMT	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-006	8/12/2022

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Woodland Type B	Downslope >0-5 degrees
7	Woodland Type B	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat
9	Shrubland Type C	Downslope >0-5 degrees
10	Scrub Type D	Upslope/flat
11	Scrub Type D	Downslope >0-5 degrees
12	Grassland Type G	Upslope/flat
13	Grassland Type G	Downslope >0-5 degrees
New Plot		
14	Forest Type A	Downslope >5-10 degrees

Figure 5: Bremer Bay Vegetation Classes - Central

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Slopes Degrees
- Photo Point
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6338

Bremer Bay Vegetation Classes - Central

BAL Assessor	QA Check	Drawn by
MEH & BRM	BMT	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-006	8/12/2022

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Woodland Type B	Downslope >0-5 degrees
7	Woodland Type B	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat
9	Shrubland Type C	Downslope >0-5 degrees
10	Scrub Type D	Upslope/flat
11	Scrub Type D	Downslope >0-5 degrees
12	Grassland Type G	Upslope/flat
13	Grassland Type G	Downslope >0-5 degrees
New Plot		
14	Forest Type A	Downslope >5-10 degrees

Figure 7: Bremer Bay Vegetation Classes - East

Albany Office:
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Denmark Office:
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Denmark, WA 6333
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Esperance Office:
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Esperance, WA 6450
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BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Slopes Degrees
- Photo Point
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6338

Bremer Bay Vegetation Classes - East

BAL Assessor	QA Check	Drawn by
MEH & BRM	BMT	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-006	8/12/2022

4.3. Identification of Bushfire Impacts

The bushfire threats associated with the townsite include:

- There has been significant bushfire mitigation treatment carried out within the townsite of Bremer Bay, which has greatly improved the risk of bushfire propagating into the townsite (outlined below). There still remains some targets for mitigation treatments.
- The Green Belt Reserve which runs as an east/west line of vegetation still presents a hazard to adjacent residents of particular note is the Vulnerable Land use area, Age Care Units (Roderick Street) to the eastern end of the Green Belt Reserve.
- The vegetated "wicks" which are present from the remnant reserve areas entering the townsite to the west (north of Mary Street) and the south east/south west (adjacent to remnant vegetation reserves) have been managed through prescribed burning, this will need to be maintained to prevent these reserves carrying significant fire into the townsite.
- Low fuel areas near the estuary to the north of the townsite which present little risk from bushfire radiant heat impacts, however on high Fire Danger Index (FDI) could present ember attack from the north and east.
- Central townsite reserves which were previously managed will need attention as to not become a bushfire risk to adjacent properties (corner of Mary and Barbra Street)
- Small areas of remnant/overgrown vegetation in private property lots in the central areas of the townsite. Particular of concern/priority are private property to be managed under the Fire Control Information notice adjacent to Crown reserves, as these can act as "wicks" into the town centre in bushfire events.
- Aged Care Units (Yandil Street) are at risk from the forest vegetation to the north.,

A summary of the bushfire issues pertinent to Bremer Bay townsite is provided below:

- Large strategic firebreaks along the west, south and east are designed to protect the townsite at large from bushfire. These breaks would assist in fire mitigation works however do not change the BAL allocation over the townsite.
- Recent fuel reduction in the form of prescribed burning, had had a significant impact on the bushfire risk to the townsite. Of particular note is the burn carried out to the west of the townsite (bog arm) and adjacent to George Street. Appropriately timed rotational burns should be carried out on these sites that have the potential to feed bushfire into the residential areas from the Fitzgerald National Park and adjacent farms.
- Risk of bushfire attack over the townsite are from the east and southwest where continuous bushfire vegetation exists. Specifically, from the following Plots:
    - Scrub Type D – all Plots identified.
    - Forest Type A – all Plots identified.
- The town centre areas are generally low fuel in nature and present limited risk of bushfire including from the estuary.
- Linking foreshore areas present continuous bushfire fuels but also present problems for fuel reduction as removal of vegetation will increases erosion and changes to the fragile environment. Capacity of fire run is noted to be only on east/west wind directions and limited scope for fire run from the north and south along the estuary foreshore area.
- Fuel reduction in the form of mulching & slashing has been carried out on the Green Belt to the west of Roderick Street. This has moved the classification from BAL-FZ of some fringing properties to BAL-40, 29 and 19.
- Overall, it is noted on review there has been a substantial amount of bushfire mitigation works carried out within the town site. This had led to an increase in the number of residences located within BAL-29 and below. in the event of a bushfire impacting the townsite, the defensibility of these homes has been greatly improved.
- The Vulnerable Land use assets:
    - The aged care facility along Roderick Street is noted to be in BAL- FZ and BAL- 40 which is not considered appropriate for a Vulnerable Land use. This review has seen more work carried out in the Green belt but this has had no discernible impact on the aged care units as the reserve to the immediate north is unmanaged.
    - Fire station is no longer in BAL- FZ however still has roadside vegetation to the south and west contributing to a high BAL rating on the south and western elevations of the building.
    - The health centre is predominantly BAL-19 and lower.
    - The Primary School is now predominantly BAL-12.5 which is a great achievement.
    - The caravan park has strategic 20m breaks applied to the south and south east, and west which has greatly increased protection of the site (s) it was noted these breaks were unlashed at the time of review. protection from these strategic breaks will depend greatly on annual maintenance. Internally work has been undertaken to reduce fuel (especially noted at the caravan park is removal of dead tree limbs removed throughout the site).
    - New aged care units have been constructed in BAL-FZ near Yandil Street, which is not considered appropriate for a Vulnerable Land use. There has been some clearing works completed to the north of the

aged care facility since last inspection, this has improved the BAL rating for some of the buildings but part of the facility is still within a high BAL Rating.

4.4. BAL Contour Plan

BAL was assigned from each revised distinctive vegetation plot according to AS3959 and shown as a series of BAL Contours (Figure 7, 8 and 9). The broad scale BAL map is for diagrammatic presentation purposes only. The detailed GIS mapping dataset provided to the Shire should be consulted for further detail and used for any planning and development considerations.

Note: Utilising these BAL Contour Maps for Jerramungup and Bremer Bay townsite building and planning approvals must be done in consultation with an accredited bushfire consultant.

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Woodland Type B	Downslope >0-5 degrees
7	Woodland Type B	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat
9	Shrubland Type C	Downslope >0-5 degrees
10	Scrub Type D	Upslope/flat
11	Scrub Type D	Downslope >0-5 degrees
12	Grassland Type G	Upslope/flat
13	Grassland Type G	Downslope >0-5 degrees
New Plot		
14	Forest Type A	Downslope >5-10 degrees

Figure 8: Bremer Bay BAL Contour Map - West

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design
Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Assets / Vulnerable Land Use
- Vegetation/Plot Boundary

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

Not for Development or Building Approval unless approved/certified by an accredited Bushfire Consultant

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Bremer Bay BAL Contour Plan - West

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-006	8/12/2022

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Woodland Type B	Downslope >0-5 degrees
7	Woodland Type B	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat
9	Shrubland Type C	Downslope >0-5 degrees
10	Scrub Type D	Upslope/flat
11	Scrub Type D	Downslope >0-5 degrees
12	Grassland Type G	Upslope/flat
13	Grassland Type G	Downslope >0-5 degrees
New Plot		
14	Forest Type A	Downslope >5-10 degrees

Figure 9: Bremer Bay BAL Contour Map - Central

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Assets / Vulnerable Land Use
- Vegetation/Plot Boundary

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

Not for Development or Building Approval unless approved/certified by an accredited Bushfire Consultant

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Bremer Bay BAL Contour Plan - Central

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-006	8/12/2022

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Woodland Type B	Upslope/flat
6	Woodland Type B	Downslope >0-5 degrees
7	Woodland Type B	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat
9	Shrubland Type C	Downslope >0-5 degrees
10	Scrub Type D	Upslope/flat
11	Scrub Type D	Downslope >0-5 degrees
12	Grassland Type G	Upslope/flat
13	Grassland Type G	Downslope >0-5 degrees
New Plot		
14	Forest Type A	Downslope >5-10 degrees

Figure 10: Bremer Bay BAL Contour Map - East

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Assets / Vulnerable Land Use
- Vegetation/Plot Boundary

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

Not for Development or Building Approval unless approved/certified by an accredited Bushfire Consultant

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Bremer Bay BAL Contour Plan - East

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-006	8/12/2022

5. Recommendations for bushfire management/mitigation

The assessment of Bremer Bay townsite has determined the following recommendations for bushfire mitigation, also refer to Figures 10, 11 and 12 "Works Program":

Vulnerable land uses

- Aged care facility (Roderick Street), needs vegetation management (parkland clearing) to the north.
- New units on Yandil Street require further separation from vegetation to the north.
- Primary School has had some effective fuel management to the north, however further maintenance of the break to the east would improve the hazard level of the primary school.
- Fuel reduction strategies deployed external to the site to 20m and to WAPC APZ standards at all times. Fuel reduction standards (*note this is not broad scale clearing*) are to be as per the WAPC recommended APZ standards, refer to Section 5.0.

Fire Control Information Notice

- It is recommended that land owners of vacant land are required under the SoJ Fire Control Information (FCI) to maintain private property as provided through the gazetted annual FCI pursuant to Section 33 of the *Bushfires Act 1953*.
- Priority areas for application of the FCI are adjacent to UCL/Crown reserves and internal Shire reserves where unmanaged private land can act as "wicks" into the townsite form bushfire attack.
- Consideration of the FCI implementation time being similar to other LGA districts (1 Dec-30 April), or splitting to "Zones of Implementation", e.g., Zone 1-3 Implementation dates October and Zone 4 Bremer Bay December. This is due to it being noted that grasses in Bremer Bay were complaint to the notice in October were non-compliant at time of assessment by Bio Diverse Solutions (December). The coastal areas have moister cooler climate than the northern agricultural areas, so consideration to a varied date of compliance is warranted (an example of this applying is the Shire of Manjimup Firebreak and Fuel Hazard Reduction Notice).
- Absentee owners are made aware of their obligations of the notice and to be compliant through the period (not just at the beginning or when they get down for holiday).
- Grassland to the south west of the subject site poses a threat of carrying grass fire into the townsite from the west, these blocks need to have the FCI applied. The threat will diminish over time as the block are built on and managed.
- A copy of the Works Program mapping be given to the ranger team to assist with priorities for the application of the FCI.

Shire Reserves

- Shire reserves, UCL/Crown reserves that have had a hazard reduction burn will require a weed management program to maintain the low fuel effectiveness for an extended period.
- It is acknowledged that prescribed burning to the reserves in the north western and north eastern sections of these reserves have greatly contributed to the defensibility of the Bremer Bay town site. This defensibility can be maintained by placing these cells on a rotation appropriate to the vegetation type.
- Management (mulching/slashing) of dead/fallen material is important to maintain a low fuel state on access tracks and strategic breaks.
- It is recommended the Shire implements APZ standards to their maintenance of street verges, parks and gardens adjacent to and within bushfire prone areas (classifiable vegetation) to ensure these maintained areas are not linking into the townsites as "wicks" or encourage ember establishment in bushfire conditions. Refer to further information Section 5.0 of this document.

Caravan Park

- Trimming of all trees along road boundary/edge to the north and north west to APZ standards is recommended.
- Maintenance of strategic break to the south of eastern portion of the park has not been undertaken.
- Maintenance of strategic break to the west of the park has not been undertaken.
- Spot spraying of tree emergence required in strategic breaks south of caravan park.
- Ensure all permanent vans roof spaces and under floor areas are clean of debris (leaf material).
- Consider a Bushfire Emergency Evacuation Plan (BEEP) for the park as per the policy requirements of SPP 3.7 (Vulnerable Land Use).
- Consideration to storage of gas bottles and fire wood storage to be away from buildings/vans/structures as per WAPC APZ standards. Leaf material build up noted in wood caged structures, ensure maintained free of debris to guard against ember attack.

Bremer Bay Resort

- Consider a Bushfire Emergency Evacuation Plan (BEEP) for the Tavern as per the policy requirements of SPP 3.7.
- Substantial mitigation works have been carried out around the Bremer Bay Resort; this had led to a reduction in bushfire hazard to this land use. Weed management and overall maintenance should be undertaken annually to maintain the current level of protection.

5.1. Mitigation treatment areas 2022

Examples of the bushfire mitigation treatments is outlined in the following pages. Also refer to the "Works Program" (Figure 3) and the Shire provided GIS files. Refer to Appendix C for the Bushfire Mitigation Terminology and Guidelines.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Central north internal to the subject site. **Description:** Maintained gardens and parkland cleared vegetation on the fire break on the boarder of the green belt. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading**: <2 t/ha. **Note:** Dead and fallen material needs to be removed/mulched from slashed break to prevent a bushfire hazard.
Photo Id 1: View facing north-northeast towards dead material in slashed firebreak surrounding the green belt, located to the north of Eucla Court.			
Plot	**2**	**Classification or Exclusion Clause**	**Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)**
			**Location:** northeast internally of the subject site, north of George Street. **Description:** Maintained gardens and parkland cleared vegetation north of George Street. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. **Note:** Emergent grasses, Eucalypts and weeds growing up through burnt areas, slashing/weed management required.
Photo Id 2: View facing north-northeast towards emergent Eucalypts, located to the north of George Street.			

Plot	3	Classification or Exclusion Clause	Scrub Type D
			**Location:** Northern boundary of the subject site. **Dominant species & description:** Scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm). **Average vegetation height:** Scrubs 2-4m. **Vegetation Coverage:** >30% foliage cover. **Available fuel loading:** 25t/ha. **Effective Slope:** Upslope/flat Note: This area has been prescribed burned in 2022, The reduction in fuel and therefore hazard is acknowledged but the classification will stay as scrub according to AS3959 as vegetation will return to original hazard state before next HRB
Photo Id 3: View facing north towards woody weeds, located to the north of George Street.			

Plot	2	Classification or Exclusion Clause	Scrub Type D
			**Location:** Northern boundary of the subject site. **Dominant species & description:** Scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm). **Average vegetation height:** Scrubs 2-4m. **Vegetation Coverage:** >30% foliage cover. **Available fuel loading:** 25t/ha. **Effective Slope:** Upslope/flat Note: This area has been prescribed burned in 2022, The reduction in fuel and therefore hazard is acknowledged but the classification will stay as scrub according to AS3959 as vegetation will return to original hazard state before next HRB
Photo Id 4: View facing west-southwest into recent prescribed burn, located north of George Street in the central northern boundary of the subject site.			

Plot	2	Classification or Exclusion Clause	Forest Type A
			**Location**: south east to the subject site. **Dominant species & description:** Open Forest consisting of Agonis and Eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation. **Average vegetation height:** Trees 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Upslope/Flat. Note: This area has been prescribed burned in 2022, The reduction in fuel and therefore hazard is acknowledged but the classification will stay as scrub according to AS3959 as vegetation will return to original hazard state before next HRB

Photo Id 5: View facing north-northwest through recently prescribed burnt forest vegetation, located to the southeast of the caravan park south east of the subject site.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** East of the caravan park. **Description:** Slashed break along the boundary of the caravan park. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha. Note: Emergent grasses and weeds growing up along break, slashing/weed management required to continue low fuel status.

Photo Id 6: View facing south-southwest along firebreak, located to the south of the caravan park in the south east of the subject site.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)

Location: West of the caravan park.

Description: Slashed break along the boundary of the caravan park. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).

Available fuel loading: <2 t/ha.
Note: Emergent grasses and weeds growing up along break, slashing/weed management required to maintain low fuel status within the break.

Photo Id 7: View facing south-southwest along firebreak, located to the west of the caravan park in the southeast of the subject site.

Plot	2	Classification or Exclusion Clause	Forest Type A

Location: Southeast to the subject site.

Dominant species & description: Open Forest consisting of Agonis and Eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation.

Average vegetation height: Trees 4-8m.

Vegetation Coverage: 30-70% foliage cover.

Available fuel loading: 25-35t/ha.

Effective Slope: Upslope/Flat.

Note: This area was classified as low fuel in previous reviews, as it is currently unmanaged it has been reclassified as Forest Type A. requiring canopy lifting (see Appendix C)

Photo Id 8: View facing north-northeast across reserve, located central, internally to the subject site on the corner of Barbara and Mary Street.

A “Works Program” has been developed (refer to Figures 10, 11 and 12) to help assist for townsite bushfire mitigation works. The key/legend to the Works Program Mapping is consistent with DFES BRMS database, being “MW” - Mechanical Works and “PB”- Prescribed Burning. This has been further applied by Bio Diverse Solutions as:

- MW-APZ: defined as Mechanical Works to WAPC APZ standards (distance specified).
- MW -SB – defined as Mechanical Works to DFES Strategic Break standards (distance specified), no trees in zone, traversable for bushfire attack and prescribed burning operations.
- PB – Prescribed burning to reduce fuel loads, asset identified.

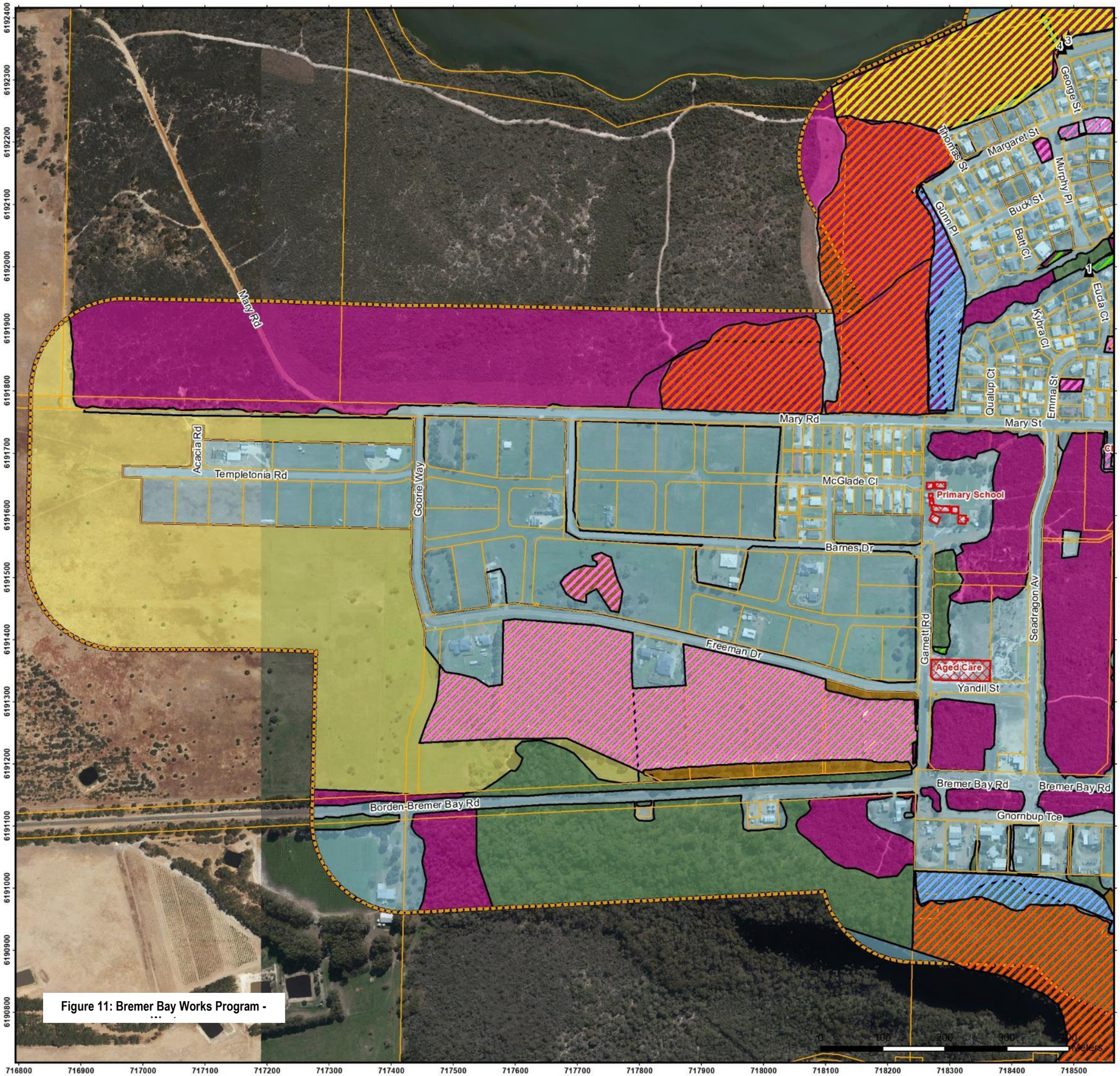


Figure 11: Bremer Bay Works Program -

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- Separation Distance
- Photo Point
- Vegetation/Plot Boundary
- MW_APZ - Mechanical Works APZ Standards
- MW_SB - Mechanical Works Strategic Break
- PB - Prescribed Burn
- Fire Control Notice to Apply
- Weed Management
- Assets / Vulnerable Land Use

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Bremer Bay Works Program - West

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-006	8/12/2022

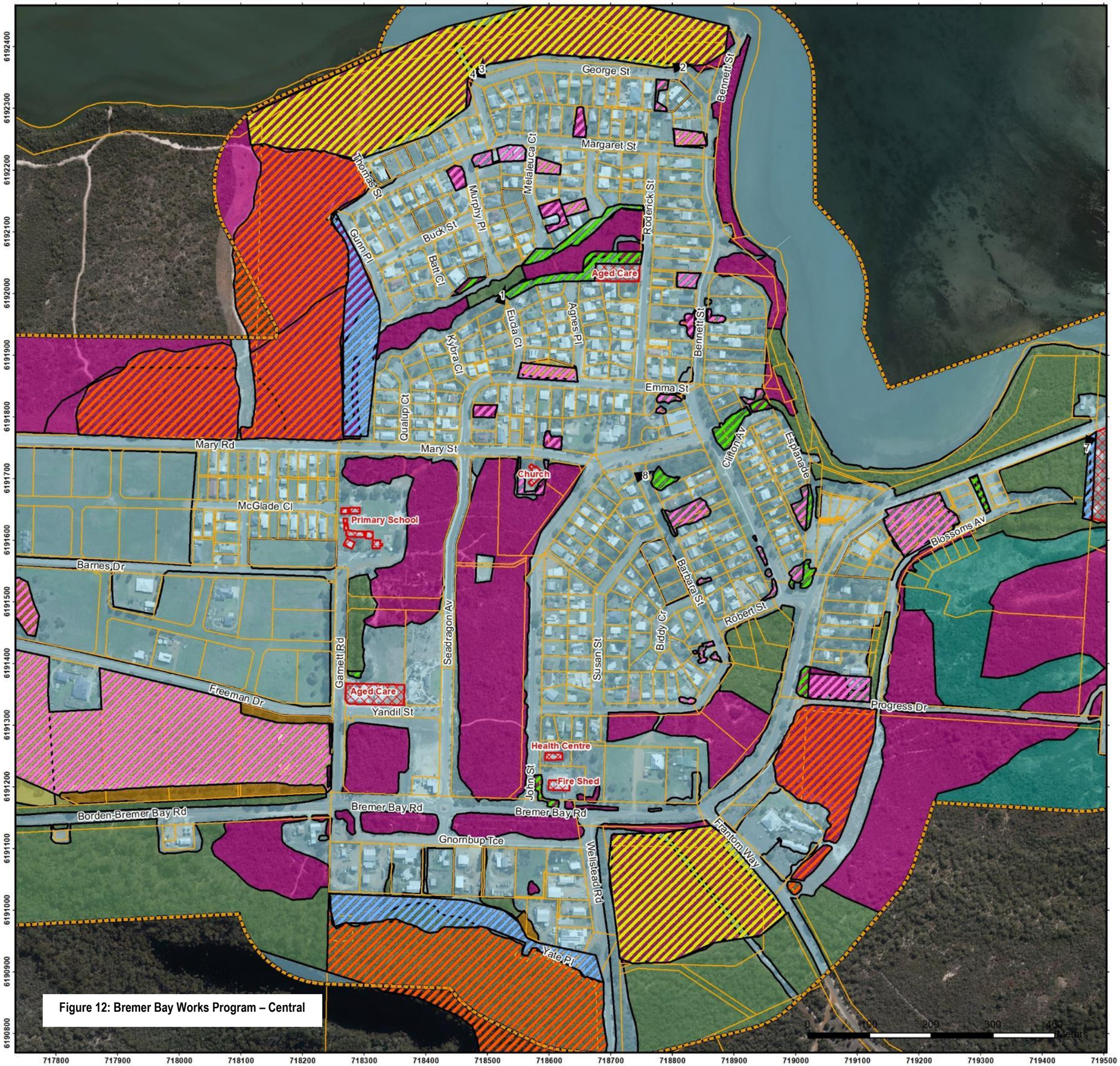


Figure 12: Bremer Bay Works Program – Central

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- Separation Distance
- Photo Point
- Vegetation/Plot Boundary
- MW_APZ - Mechanical Works APZ Standards
- MW_SB - Mechanical Works Strategic Break
- PB - Prescribed Burn
- Fire Control Notice to Apply
- Weed Management
- Assets / Vulnerable Land Use

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Bremer Bay Works Program - Central

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-006	8/12/2022

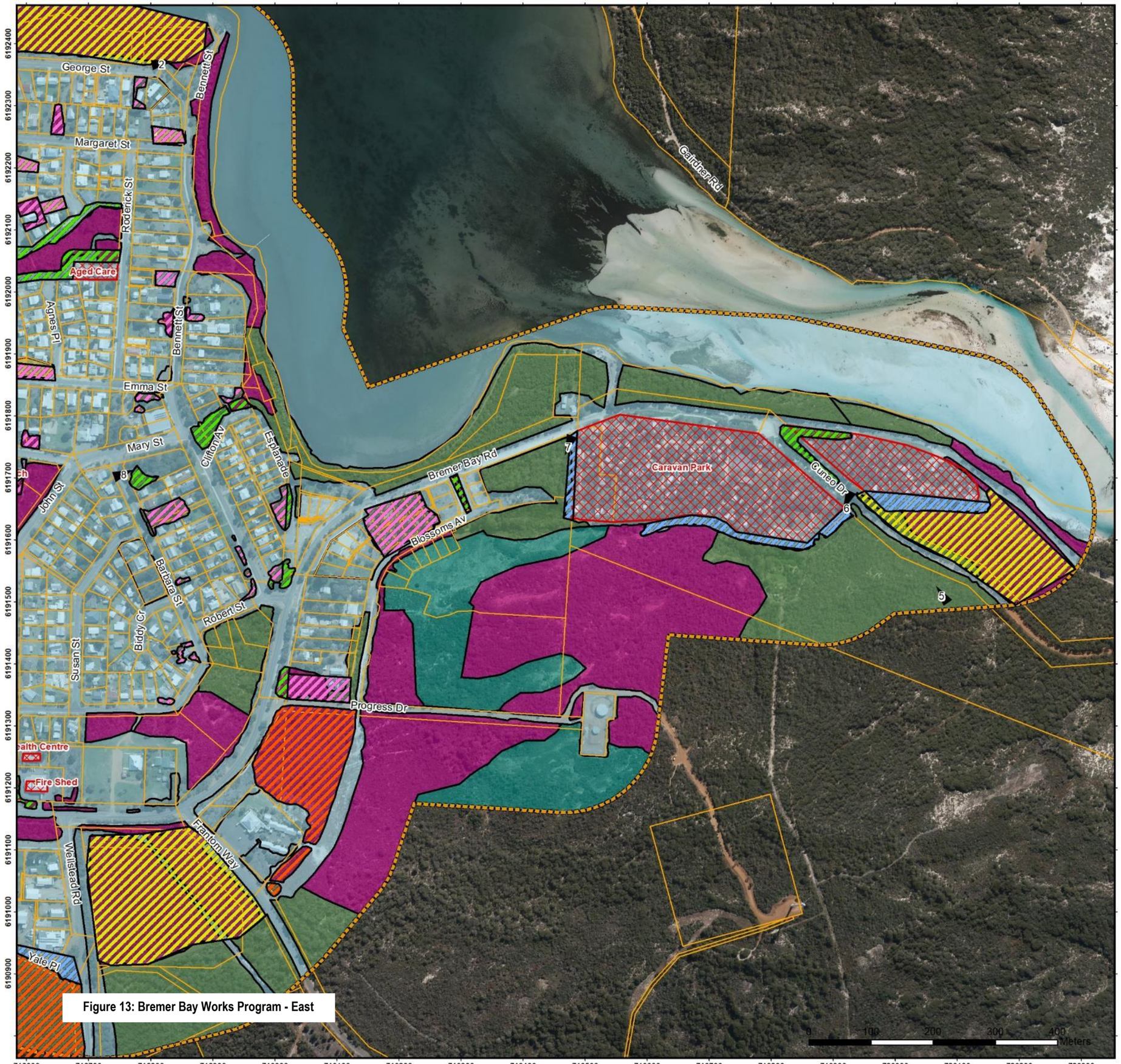


Figure 13: Bremer Bay Works Program - East

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- Separation Distance
- Photo Point
- Vegetation/Plot Boundary
- MW_APZ - Mechanical Works APZ Standards
- MW_SB - Mechanical Works Strategic Break
- PB - Prescribed Burn
- Fire Control Notice to Apply
- Weed Management
- Assets / Vulnerable Land Use

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Shire of Jerramungup
PO Box 92
Jerramungup, WA 6337

Bremer Bay Works Program - East

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-006	8/12/2022

6. Asset Protection Zones

An Asset Protection Zone (APZ) is an area surrounding a building or asset that is managed to reduce the bushfire hazard to an acceptable level (WAPC, 2017). This is also defined as a "defendable space" which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure (WAPC, 2017). Habitable buildings, sheds, water tanks and other assets should have an APZ utilising low threat or non-vegetated areas (roads, driveways, hardstand areas, maintained gardens, mowed lawns, slashing, trimming etc).

In the absence of any other DFES standards the WAPC APZ standard should be defined in the annual gazetted Fire Control Information notice to buildings. Any replanting, revegetation and landscaping in bushfire prone areas is recommended to be to an APZ standard as per WAPC Guidelines V 1.4 (WAPC, 2021). The WAPC APZ standard is provided in Appendix A.

The Shire should ensure their personnel responsible for implementing and maintaining Shire managed verges, reserves and parks are aware of the WAPC APZ standards. Design of new areas, infill planting and maintenance works adjacent to remnant (Bushfire prone) vegetation should also utilise fire retardant species. A list of fire-retardant species for the south coast region is provided in Appendix B. The CFA *"Landscaping for Bushfire – Garden Design and Plant Selection"* (CFA, 2011) is a recommended guide for landscapers and maintenance workers involved with management of public parks, verges and garden areas.

Contractors for the Shire tasked with fuel reduction in parks and gardens and street verges to APZ standards are to be aware and understand the WAPC APZ required standards (see Appendix A). It is particularly vital they understand the relevant works area is not to be devasted by broadscale clearing, trees can remain and be trimmed and fuel reduced, clumps of shrubs can remain in areas 5m^2 etc. The WAPC APZ standard can form a briefing or guide for the contractual documentation when contractors are appointed by the Shire for fuel reduction (Note for large strategic firebreak slashing this would not be required). Contractors should be briefed from project managers to ensure they understand the required works for fuel reduction.

7. References

AS 3959-2018 Australian Standard *Construction of buildings in bushfire-prone areas*, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Catchpole WR, Bradstock RA, Choate J, Fogarty LG, Gellie N, McCarthy GJ, MCaw WL, Mardsend-Smedley JB and Pearce G Co-operative Development of equations for heathland fire behaviour. In 'Proc. 3rd Int. Conf. Forest Fire Research and 14th Conf. On fire and Forest Meteorology. (ED VIEGAS DX) Luso Coimbra Portugal: 1998, 631-645pp.

Country Fire Service (CFA) Victoria (2011) Landscaping for Bushfire – Garden Design and Plant Selection. Victorian Government.

OBRM Bushfire Mapping Standard accessed from the Department of Fire and Emergency Services Website accessed January 2020:
http://www.dfes.wa.gov.au

Western Australian Planning Commission (WAPC) (2021) Guidelines for Planning in Bushfire Prone Areas Version 1.4. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

Office of Bushfire Risk management (OBRM) (2021). Map of Bushfire Prone Areas. Data retrieved from State Land Information Portal (SLIP) https://maps.slip.wa.gov.au/landgate/bushfireprone/

Shire of Jerramungup Fire Control Information 2022/2023

8. Appendices

Appendix A: APZ standards to apply

Appendix B: Forever Project Fire retardant species

Appendix C: Bushfire Mitigation Terminology and Guidelines

Appendix A

APZ standards to apply
(WAPC, 2021)

Asset Protection Zone (APZ): *Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:*

- ***Width:*** *Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29) in all circumstances.*
- ***Location:*** *The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes).*
- ***Management:*** *The APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones'.*

(WAPC, 2017)

WAPC Guidelines for an APZ (WAPC, 2021)

Fences: Within the APZ are constructed from non-combustible materials (e.g., iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: Within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e., windows and doors.

Fine Fuel load: Combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.

Trees (> 5 metres in height): Trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. See Figure 10 (WAPC Figure 16, Appendix 4) below.

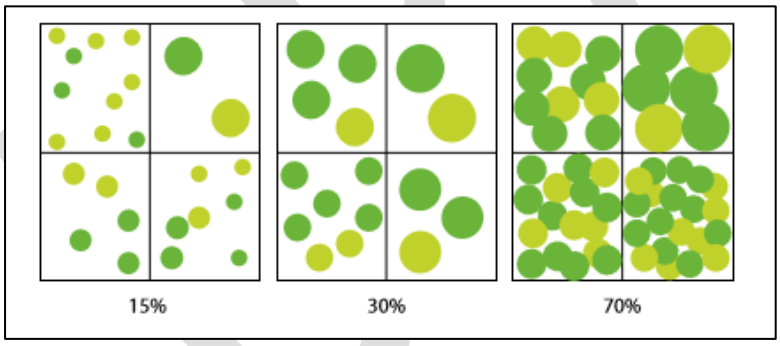


Figure 10: Tree Canopy Coverage – ranging from 15 to 70% at maturity (WAPC, 2017).

Shrubs (0.5 metres to 5 metres in height): Should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m^2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): Can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: Should be managed to maintain a height of 100 millimetres or less.

(WAPC, 2017).

Appendix B

Forever Project
Fire retardant species

The Forever Project

Fire: Recovery and Resilience

Native Fire Retardant Species

These are species that either don't burn or burn very slowly provided that they are well managed and not 'choked' in dead weeds or fallen branches!

Natives:

Trees:

Brachychiton populneus – Kurrajong *
Brachychiton x Rosea – Hybrid Flame Tree
Callitris preissii – Rottnest Island Pine
Casuarina obesa – Swamp Sheoak
Corymbia maculata – Spotted Gum *
Eucalyptus spathulata – Swamp Mallet
Grevillea robusta – Silky Oak *
Hymenosporum flavum - Native Frangipani
Lophostemon confertus - Brushbox *
Melaleuca lanceolata – Rottnest Island Tea Tree
Pittosporum phylliariodes – Native Apricot

Tall Shrubs:

Acacia cyclops – Coastal Wattle
Acacia saligna – Golden Wreath Wattle
Acmena smithii - lilly Pilly *
Hakea drupacea - Hakea

Small Shrubs:

Anigozanthos species – Kangaroo paws
Atriplex species – Salt Bushes
Correa pulchella – Salmon Correa
Crowea exalata – Small Crowea
Dianella species – Dianellas
Eremophila spp– Poverty Bush
Lomandra longifolia – Spiny headed mat rush
Maireana spp - Bluebushes
Olearia species – Coastal daisies
Orthrosanthus sp
Patersonia spp - Native flag Iris
Westringia fructosa – Coastal Rosemary

Creepers/ground covers:

Atriplex cinerea – Grey Salt Bush
Banksia blechnifolia – Creeping Banksia
Brachyscome multifida – Cut Leaf Daisy
Carbobrotus virescens – Native Pig Face
Chrysocephalum apiculatum – Common Everlasting
Correa alba – prostrate form – Dwarf White Correa
Dampiera linearis – Common Dampiera
Dichondria repens – Dichondria
Festuca glauca – Blue Fescue
Hardenbergia comptoniana – Native Wisteria
Kennedia prostrata – Running Postman
Kennedia coccinea – Coral Pea Vine
Myoporum parvifolium – Booboolia
Rhagodia spp - Berry Salt Bush
Scaevola albida – Mauve Clusters
Zygophyllium billardieri – Coast Twin Leaf

Appendix C

Bushfire Mitigation Terminology and Guidelines

Bushfire Mitigation Terminology and Guidelines

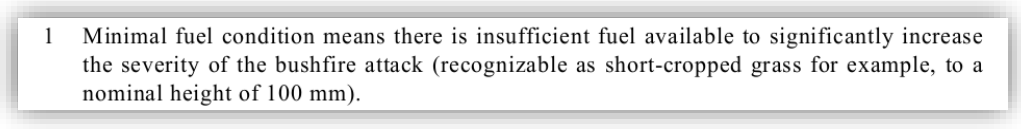
BIO DIVERSE SOLUTIONS

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

Bushfire Mitigation Terminology and standards

Fire Breaks / Fire Access Tracks

A fire-break/ fire access track is a strip of land that has been cleared of all trees, shrubs, grass and other combustible material, providing a 'fuel free' area. fire-break/ fire access track are intended to allow access for firefighting vehicles and can provide a fuel free area from which prescribed burning can be undertaken. They may slow or stop the spread of a low-intensity bushfire however they should not be relied upon to prevent the spread of a fire. fire-break/ fire access track are often constructed with a machine such as a dozer, front end loader, grader, tractor or skid-steer loader. In some situations, a suitable fuel-free area may be created by other methods such as hand tools, ploughing, herbicide treatment, grazing stock and controlled fire.



1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

Figure 1 :Notes on low fuel exclusion 2.2.3.2_AS3959_2018

Unless specified, fire access should have:

- 4m trafficable surface; *3.5 at a minimum, for wheel base and truck body if low fuel can be achieved either side of the access. If not, achievable tracks may be marked as unsuitable for large appliances such as 4.4/3.4 heavy-duty fire trucks ie light trucks /vehicles only
- 4.5-metre vertical clearance in total (see below).
- 1-meter low fuel either side of trafficable surface, this can be slashed or parkland cleared depending on vegetation type.
- Mineral Earth / Slashed / Mulched min 100mm / Chained / Scrub Rolled.
- Turn around or passing bay every 200m.
- Generally trafficable on one edge
- Contain Contour Banks / Water Turn Outs where required
- Windrows removed from edges to ground level
- Constructed to allow for appropriate drainage * see drain types

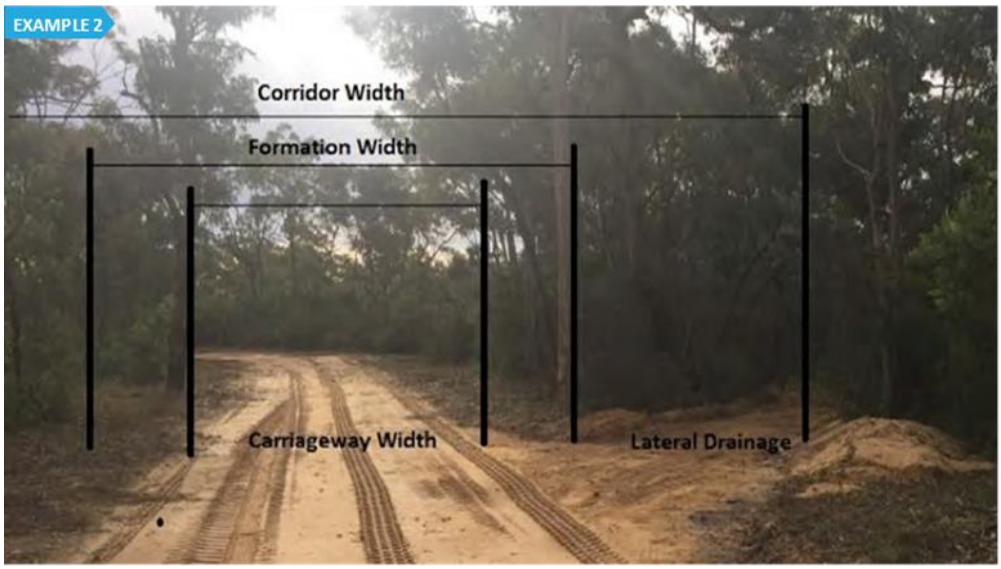
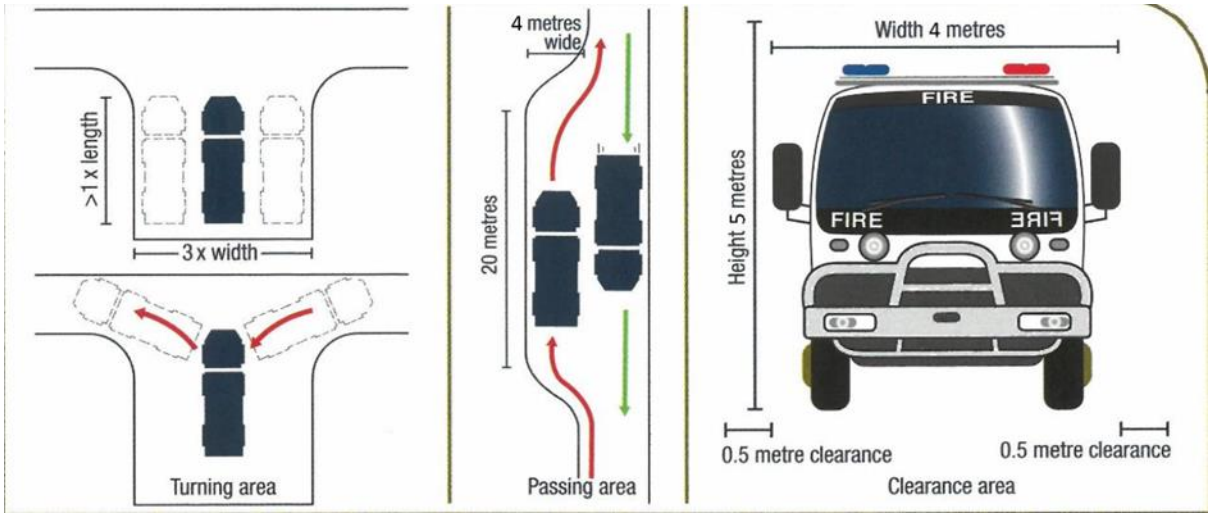


Figure 2: Example of an access track /fire break (SoD, 2018)



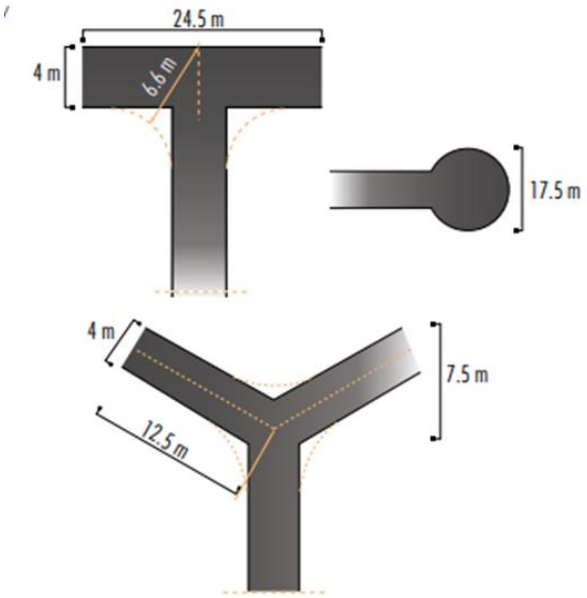


Figure 3:Turnarounds & passing Bay (WAPC, 2021)(DFES 2022)

Erosion Control:

- Minimise soil disturbance;
- incorporate appropriate erosion control measures, such as catch drains or water bars, with consideration to soil erodibility class and gradient;
- Maintain formed natural drainage lines;
- Incorporate runoff tracks;
- Avoid stream flow interference; and
- Avoid potential landslip zones.

Trafficability:

- Constructed as straight as practicable;
- Minimise cross fall;
- Minimise gradient;
- Sufficiently clear of vegetation above and on either side;
- Ensure gentle curves;
- Provide passing bays;
- Avoid no-through roads;
- Provide turnaround points;
- Where feasible, all weather 4WD construction i.e.: firm base that can handle the weight of a fire truck. Soft sands or peaty/clay material will require gravel sheeting;
- Load capacity of at least 20 tones, including for bridges and culverts;
- No cut off drains (mitre drains) to discharge or impact any private property;
- Rock rubble to be provided at crossing banks where in-situ soils are not acceptable;

Parkland Clearing

Selective clearing, parkland clearing or thinning are terms used to describe removing parts or all of the understorey and middle storey of vegetation whilst retaining the larger trees and shrubs. Selective clearing can range from minor disturbance of the natural environment to comprehensive clearing of all but the largest trees in a landscape.

Standard:

- Understory pruned to a height of 2 meters from the ground;
- All ladder fuels removed or mulched;
- Ground vegetation to be no more than 100mm in depth;
- Care to be taken not to damage large standing vegetation (ringbarking trees etc.);
- 30% canopy cover to be achieved see below (WAPC, 2021).

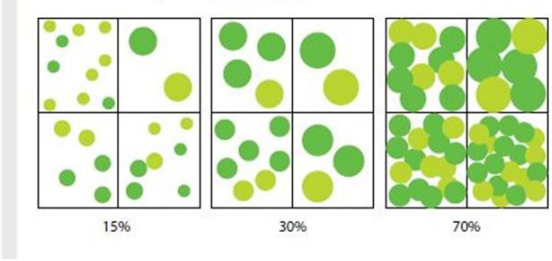


Figure 4: Canopy Cover (WAPC 2021)

Figure 5:Example of Parkland clearing

Mulching

Mulching reduces the potential for wildfires by eliminating small leafy plants, fallen or rotten trees, and other fuel sources. If left untreated, these fuel loads increase the potential for fire, increase the heat intensity, and serve as fire ladders that enable fire to elevate quickly to the tops of trees which is where a fire can spread most quickly. Mulching can also be used to create a coarse grind finish that can create a more ideal controlled burn.

Standard

- Ground Vegetation to be no more 100mm in height
- Care to be taken not to damage large standing vegetation (ringbarking trees etc.)
- Follow up spraying to maintain low fuel area

Considerations

Due to the mechanical nature of mulching care needs to be taken in hot, dry weather conditions. If mulching in rocky, granite areas there is a high risk of sparks and potential for fire.

Figure 6:Example of Mulching

Slashing

Slashing is the use of a mechanical slasher either attached to a tractor/bobcat or to a brush-cutter to remove exposed vegetation. This rarely kills the plant but allows easier access to follow up control of the inevitable regrowth. Slashing also provides a low fuel buffer zone to reduce fire intensity and flame height. The low fuel area created allows access for fire vehicles for prescribed burning activities or wildfire suppression.

Standard

- Ground Vegetation to be no more 100mm in height
- Care to be taken not to damage large standing vegetation (ringbarking trees etc.)
- Follow up spraying to maintain low fuel area

Chemical Spraying

Weed control can be achieved by the use of herbicides. Selective herbicides kill certain targets while leaving the desired vegetation relatively unharmed. Some of these acts by interfering with the growth of the weed and are often based on plant hormones.

Herbicides are generally classified as follows:

- Contact herbicides destroy only plant tissue that contacts the herbicide. Generally, these are the fastest-acting herbicides. They are ineffective on perennial plants that can re-grow from roots or tubers.
- Systemic herbicides are foliar-applied and move through the plant where they destroy a greater amount of tissue. Glyphosate is currently the most used systemic herbicide.
- Soil-borne herbicides are applied to the soil and are taken up by the roots of the target plant.
- Pre-emergent herbicides are applied to the soil and prevent germination or early growth of weed seeds.

Standard

- Approved Contractor or Ticketed Personal
- Non-Chemical options assessed
- Spray drift is not going to impact non targeted vegetation

Tree Pruning/trimming

Trees and other vegetation on roadsides and tracks can pose a hazard to vehicles, personnel responding to fires and encroach on the road asset in such a way as to contribute to its degradation. Vegetation type and growth vary so, control techniques and timing of their application vary accordingly. Control needs to be undertaken in a way that avoids unnecessary damage to vegetation.

Standard

- Ensure workers understand the aim of the particular type of vegetation control and operate only within the nominated areas;
- Prune and/or remove vegetation sufficient to meet safety requirements;
- Avoiding damage to other vegetation;
- Avoid special environmental areas;
- Identify any revegetation areas or individual plants that need to be avoided.
- Prune for a natural finish, e.g., prune entire branch, cut tree stumps close to the ground.
- Chip and mulch cleared material or replace whole where appropriate.
- Spread mulched material on bare areas for weed/erosion control, not on
- existing good quality native vegetation.
- Dispose of waste vegetative material to an appropriate site, and do not burn.

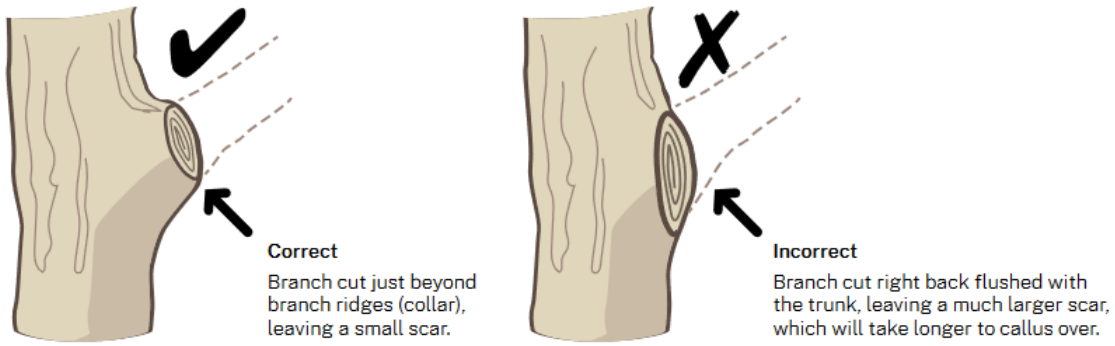


Figure 7: Correct Tree pruning Standards

There are three primary methods of tree pruning for bushfire management:

1.Crown lifting (Skirting)

Remove the lowest branches (up to 2m from the ground). Crown lifting may inhibit the transfer of fire between ground fuel and the tree canopy. May minimise the spread of fire.

2.Selective pruning

Remove branches that are specifically identified as creating a bushfire hazard (such as those over hanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

3.Thinning

Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning

Dieback

Dieback is a disease that results in the slow death of vegetation and is caused by the introduced Phytophthora fungus. This fungus is spread by the movement of spores in water, and by human activity that moves infected soil. Phytophthora is restricted to the south-western part of the State where approximately a third of native flora is susceptible to attack. Phytophthora cannot be eradicated once an area is infested, therefore it is imperative that road management activities avoid introducing and spreading it.

Standard

- Identify dieback-free and dieback-infested roadsides and sources of road-building materials.
- Plan site activity for drier months where possible.
- Apply hygiene methods where there is a risk of spreading dieback.
- Use dieback-free road building materials where required.
- Train relevant people in dieback management.

Figure 8:Mud on wheels and Dieback affected Jarrah Forest (Dieback working group)

Weeds

A weed is any plant that has a negative impact on our economy, environment, health and surroundings. Weeds are generally species which are not native to Australia. However, some native species growing outside of their native range can also become invasive. Many weeds are species which have escaped cultivation and become naturalised—that is, they have begun reproducing without human assistance. Weeds typically spread easily by producing large numbers of seeds or reproducing vegetatively. They are often excellent at surviving and reproducing in disturbed environments and are commonly the first species to colonise and dominate in these conditions. Seeds and other plant material can spread into natural and disturbed environments via wind, animals, waterways and people (including contaminated clothing, hats, footwear, tools, equipment, machinery and vehicles).

To help prevent the spread of weeds:

- Arrive clean, leave clean: ensure all clothing, hats, footwear, tools, equipment, machinery and vehicles are free of weed seeds, mud, soil and organic matter before entering and exiting bushland.
- If revegetating, select indigenous plants that occur naturally in your local area. Undertake weed control work well in advance to minimise the weed seed bank before you start planting. At the very least, slash the flower heads of weed species before they go to seed

Note: these Standards/Guidelines do not override the conditions prescribed in the relevant Local Government Fire Control Notice unless a variation to the Notice has been agreed to by both parties.