Jerramungup and Bremer Bay Townsite Bushfire Prone Vegetation Mapping and BAL Contour Plan 2023 Review

BIO DIVERSE SOLUTIONS

Shire of Jerramungup

Final V1

29/04/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

Site Details					
Address:	Jerramungup and Bremer Bay Townsites				
Suburb:	Jerramungup and Bremer Bay	**State:**	W.A.	**Postcode**	6337 - 6338
Local Government Area:	Shire of Jerramungup				
Description of Building Works:	Shire of Jerramungup: Jerramungup and Bremer Bay Townsite Bushfire Prone Vegetation Mapping and BAL Contour 2023 Review				

Report Details			
Report / Job Number:	JER005-007	**Report Version:**	Draft
Assessment Date Start:	23 October 2023	**Assessment Date End:**	23 October 2023
Report Date:	29 April 2024		
BPAD Practitioner	Melanie Haymont (Level 1)	**Accreditation No.**	BPAD-58389
BPAD Practitioner	Bob McGonnell (Level 1)	**Accreditation No.**	BPAD-58381
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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, 2020 and 2022) for the townsites of Jerramungup and Bremer Bay. The townsites 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 require a BAL assessment to support a building application as they have been identified as 'bushfire prone' in the current state-wide Map of Bush Fire Prone Areas

This project aims to reassess the previously mapped bushfire prone vegetation of the townsites to Australian Standard (AS) 3959-2018 and the OBRM mapping standards. This vegetation dataset assists in mapping the extent of bushfire risks to the townsites and critical assets and future planning. The BAL Contour Plans have been generated to guide the Shire's decision making on bushfire mitigation priorities, planning and development applications. These are not to be used for BAL assessments unless a detailed site/building plan is certified by a BAL Assessor.

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 (Local Planning Scheme) Regulations 2015*
- State Planning Policy 3.7 Planning in Bushfire Prone Areas
- Guidelines for Planning in Bushfire Prone Areas v1.4 (WAPC, 2021)
- *Building Act 2011*
- *Building Regulations 2012*
- Building Code of Australia (National Construction Code)
- *Fire and Emergency Services Act 1998*
- AS3959-2018 "Construction of Buildings in Bushfire Prone Areas" current and endorsed standards
- *Bushfires Act 1954*
- 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
- Diploma of public safety (Emergency Management)

Melanie Haymont is an accredited Level 1 Bushfire Practitioner (Accreditation No: BPAD-58389) and has been an accredited Bushfire Consultant for the last 2 years. Melanie is a suitably qualified Bushfire Practitioner to prepare this document.

Mapping contained within this document has been prepared by Bob McGonnell who has three years of experience working in the bushfire and environmental field and has the following qualifications:

- B.Sc. Environmental Management and Sustainability.

Bob is an accredited Level 1 Bushfire Practitioner (BPAD-58381) with extensive experience in ArcGIS mapping software.

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 (BPAD-37893) and has been an accredited Bushfire Consultant for 9 years. Jason is a suitably qualified Bushfire Practitioner to review this Document.

Bio Diverse Solutions are Silver Corporate Members of the Fire Protection Australia Association.

1.3. Consultation

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

2. Aims of this Project

The aims of the project are:

- Prepare a revised Vegetation Classes Map for the townsites to determine current classifiable vegetation to AS3959-2018;
- 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 Post Works 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 allocated boundary and within 150m of the 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
- To align with 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. Review of the previous 2022 townsite mapping.
2. Preparation of pre-field GIS maps with a pre-determined boundary.
3. Overlay in GIS software the boundary .shp files and generate a 150m assessment boundary (150m buffer from the allocated boundary) for field assessment, preparation of field maps and digitisation of datasets for each townsite.
4. Detailed site assessment and review of all classifiable vegetation to AS3959-2018 within 150m of the subject site boundary.
5. 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.
6. Field measurement of Effective Slope (ES) as per Section 2.2.5 AS3959-2018 was undertaken using a Nikon Forestry Pro with a minimum of 2 slopes measured for each plot. ES are shown on the mapping as a representation of the field capture.
7. Field assessment included assessment of "low fuel and non-vegetated areas" to AS3959-2018 Clauses (e) and (f) Section 2.2.3.2 with GPS capture and photographic evidence.
8. GIS mapping using ArcMap software of all classifiable vegetation to AS3959-2018 within the 150m setback of the boundary as per the recommended methodology by WAPC Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC, 2021).
9. Input of data (population of fields) to GIS .shp/.lyr .
10. Undertake BAL Contour GIS mapping from the bushfire risks to WAPC Guidelines (WAPC, 2021) methodology.
11. Quality assurance checks of all data fields in .shp/.lyr files.
12. Preparation of Metadata documentation and files associated with the .shp/lyr files for the Shire.
13. Preparation of a report outlining the aims, methodology, GIS mapping outcomes and brief bushfire mitigation strategies for each townsite.
14. Preparation of Works Program GIS mapping in conjunction with the Shire to establish area future and current mitigation works around the townsite(s).
15. Undertake preparation of Post Works BAL Contour GIS mapping to show the positive impacts mitigation work has on the 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 Map of Bushfire Prone Areas 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

History of the 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.

2023 – On the 23rd of October 2023 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. It was again noted that mitigation works have been ongoing and are continuing to make progress. Post Works BAL Contour Plans have been included this year to show the effect on what the implementation of proposed treatments may have on the radiant heat impacts across both townsites. Mechanical Works APZ Standards has been renamed to Mechanical Works Parkland Clearing. Report template has also been updated.

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 AS3959-2018 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

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

- Review of previous 2022 bushfire prone vegetation classifications to AS3959-2018
- Vegetation Classes (GIS) Map
- Discussion on potential bushfire impacts and hazards
- BAL Contour Plan(s)
- Brief recommendations and Works Program Map(s) and Treatment Plans
- Post Treatment BAL Contour Plan(s)
- 2023 Plot Data (Appendix A).

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 2 (Jerramungup Townsite) and Section 3 (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 Jerramungup

Vegetation verification/re-assessment occurred on the 23rd October 2023 by Melanie Haymont (BPAD-58389) and Bob McGonnell (BPAD-58381) with all vegetation within 150m of the boundary classified/verified in accordance with the previous assessments and Section 2.2.3 of AS3959-2018. Vegetation was assessed in accordance with AS3959-2018 with the potential to determine the Bushfire Attack Level is identified below and shown on the Vegetation Classes Maps (Figure 1 and 2). Refer to Appendix A for vegetation classification plot data photographs.

Table 1: Summary of Plot Data (Jerramungup)

Plot Number	Vegetation Type	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	Scrub Type D	Upslope/flat
8	Scrub Type D	Downslope >0-5 degrees
9	Grassland Type G	Upslope/flat

Note: An additional plot (Plot 6 Woodland Type B Downslope >0-5 degrees) has been added due to lack of management within an existing plot previously classified as Exclusion 2.2.3.2 (f) adjacent to the Jerramungup Caravan Park in the northwest.

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	Scrub Type D	Upslope/flat
8	Scrub Type D	Downslope >0-5 degrees
9	Grassland Type G	Upslope/flat

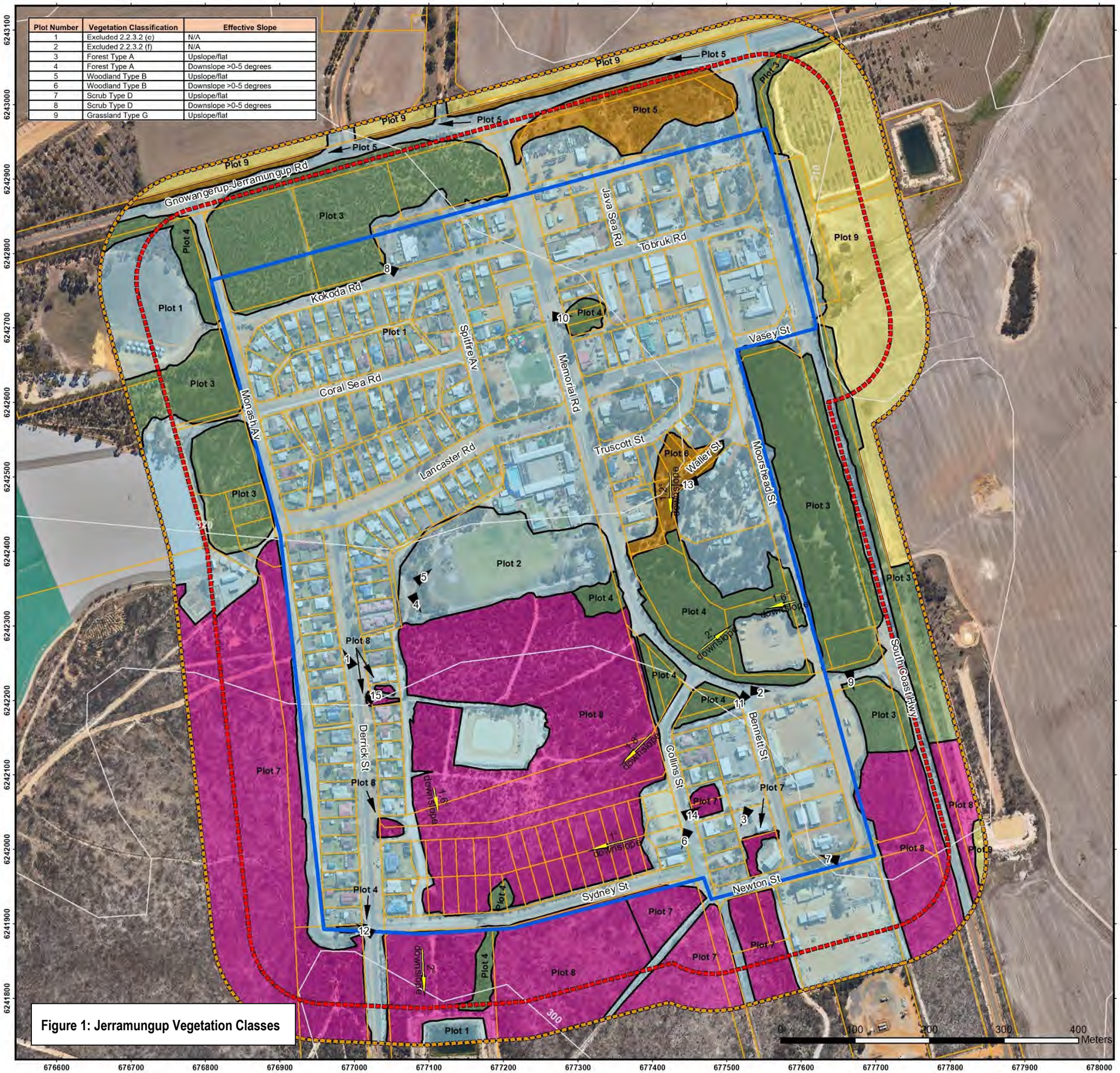

Figure 1: Jerramungup Vegetation Classes

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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
- Excluded 2.2.3.2

Scale
1:5,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Jerramungup Vegetation Classes

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

3.2. Identification of Bushfire Impacts Jerramungup

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.
- 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 north (central) and south of the townsite.
- In 2022, the Caravan Park was showing signs of unmanaged vegetation to the south. Further signs of unmanaged vegetation have been noted this year to the north and east, south of Truscott Street.

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:

- 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 and now north and east would impact this site. BAL-FZ does prevail over some sites in the Caravan Park.

3.3. 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 emanate BAL-FZ to some residential buildings and infrastructure. Continuous vegetation from the Caravan Park site, to lots and to the Shire building still create a “wick” into the townsite. Refer Figure 2 BAL Contour Plan over the page.

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	Scrub Type D	Upslope/flat
8	Scrub Type D	Downslope >0-5 degrees
9	Grassland Type G	Upslope/flat

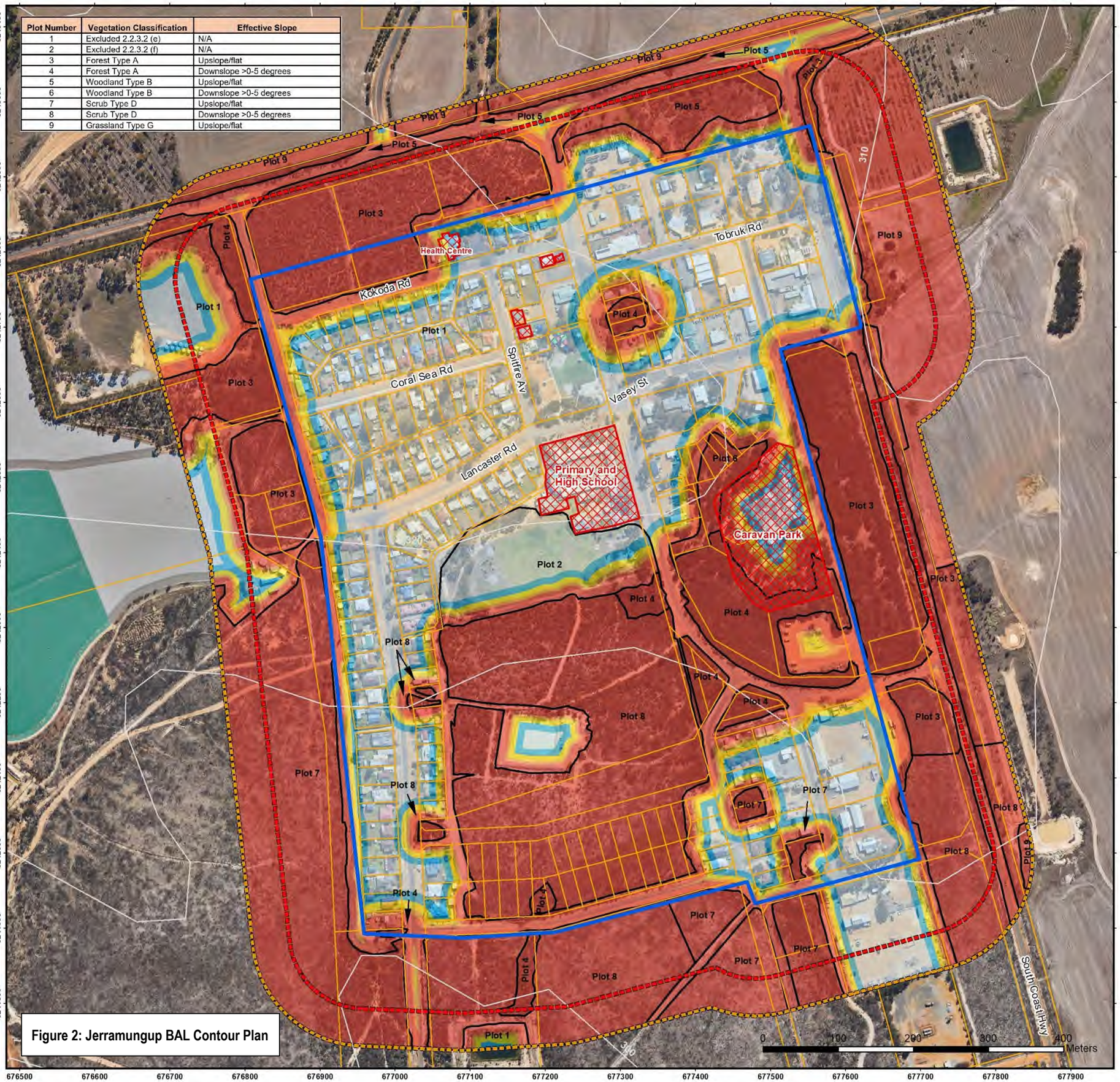

Figure 2: Jerramungup BAL Contour Plan

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BPAD Bushfire Planning & Design

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Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Assets and 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 a Bushfire Consultant

Scale
1:5,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Jerramungup BAL Contour Plan

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-007	29/04/2024

3.4. Recommendations for Bushfire Management / Mitigation Jerramungup

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, south and now north and east. A build-up of dead material and undergrowth was noted to the north, east and south of the site (see Photo 13, Appendix A). 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 Appendix B. A Bushfire Emergency Evacuation Plan (BEEP) for the caravan park should be considered to assist the evacuation of occupants in the event of an emergency.
- Vegetated reserves adjacent to private dwellings/lodgings should be fuel reduced to a minimum of 20m to provide Asset Protection Zones to the townsite dwellings and further protect life and property from bushfire events. The properties at the northern end of Derrick Street adjacent to the school oval need fuel management to the rear in Education Department land.
- 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).
- Burnt areas are still 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 (see Photo 9, Appendix A).
- It is recommended that land owners of vacant land are enforced as per the annual Fire Control Information (FCI) notice to maintain urban lands to low fuel standards. Provision of this through the gazetted annual FCI 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 will be given to the ranger team to assist with priorities for the application of the FCI.

A "Works Program" has been developed (refer to 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_PC – defined as Mechanical Works Parkland Clearing 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 20m APZ is implemented around the building.

Note: Post Treatment BAL Contour Maps are indicative only and should not to be used for Development or Building Approval.

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Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- MW_PC - Mechanical Works Parkland Clearing
- PB - Prescribed Burn (Nominal Cells)
- FCI - Fire Control Information to Apply
- Weed Management
- Assets and Vulnerable Land Use
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:5,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Jerramungup Works Program

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

Figure 3: Jerramungup Works Program

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	Scrub Type D	Upslope/flat
8	Scrub Type D	Downslope >0-5 degrees
9	Grassland Type G	Upslope/flat

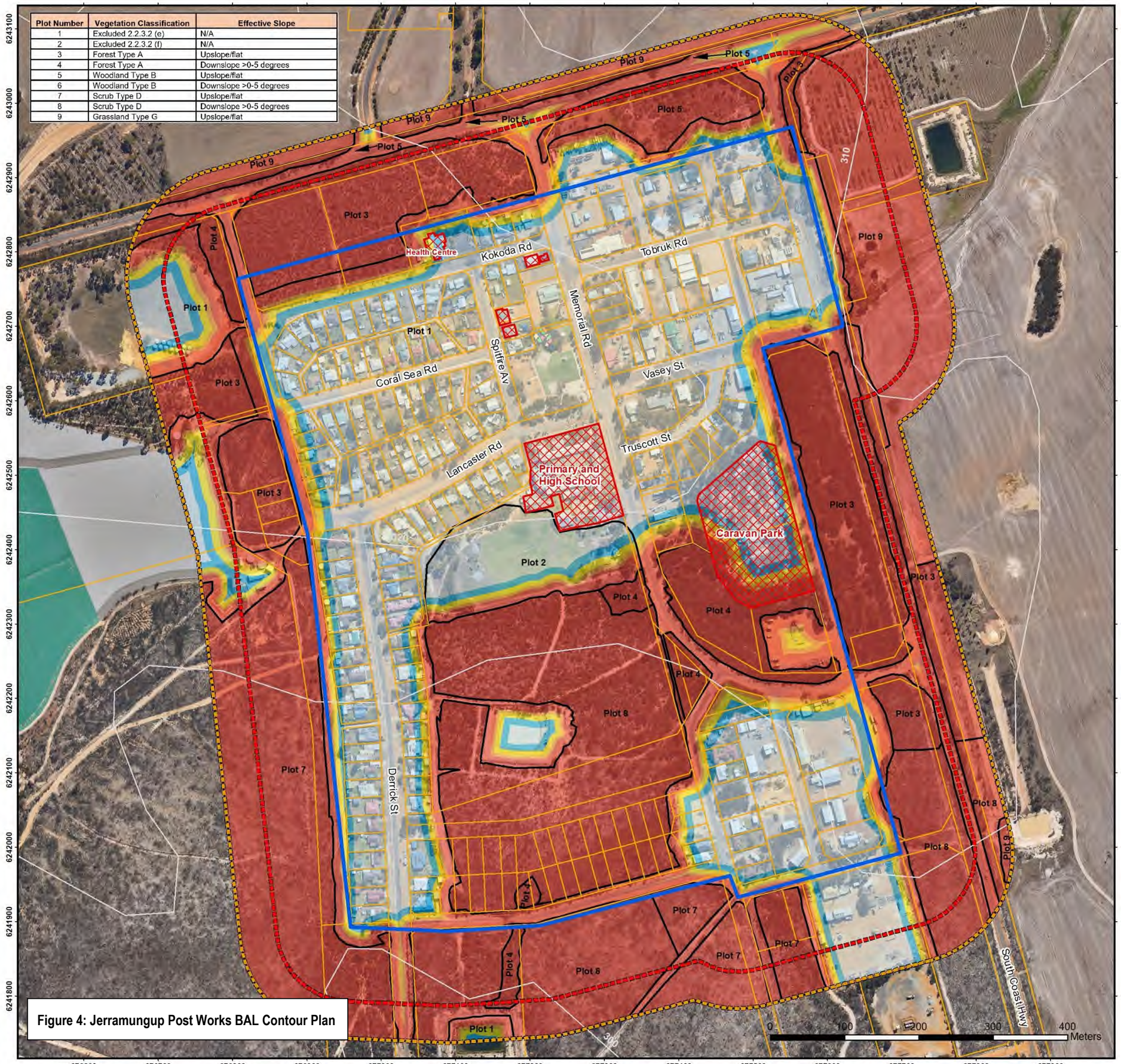

Figure 4: Jerramungup Post Works BAL Contour Plan

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BPAD Bushfire Planning & Design

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Overview Map Scale 1:100,000

Legend

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

BAL Contours

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

This BAL Contour Map is Indicative only, it has been produced to show how fuel mitigation can reduce the potential radiant heat impact on certain areas of the townsite. Not for Development or Building Approval.

Scale
1:5,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Jerramungup Post Works BAL Contour Plan

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-007	29/04/2024

4. Bremer Bay Townsite

4.1. Vegetation Classification

Vegetation verification/re-assessment occurred on the 23rd October 2023 by Melanie Haymont (BPAD-58389) and Bob McGonnell (BPAD-58381) with all vegetation within 150m of the boundary classified/verified in accordance with the previous assessments and Section 2.2.3 of AS3959-2018. Vegetation was assessed in accordance with AS3959-2018 with the potential to determine the Bushfire Attack Level is identified below and shown on the Vegetation Classes Maps (Figure 1 and 2). Refer to Appendix A for vegetation classification plot data photographs.

Table 2: Summary of Plot Data (Bremer Bay)

Plot Number	Vegetation Type	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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

Note: Plot Data has remained unchanged from the previous 2022 assessment.

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

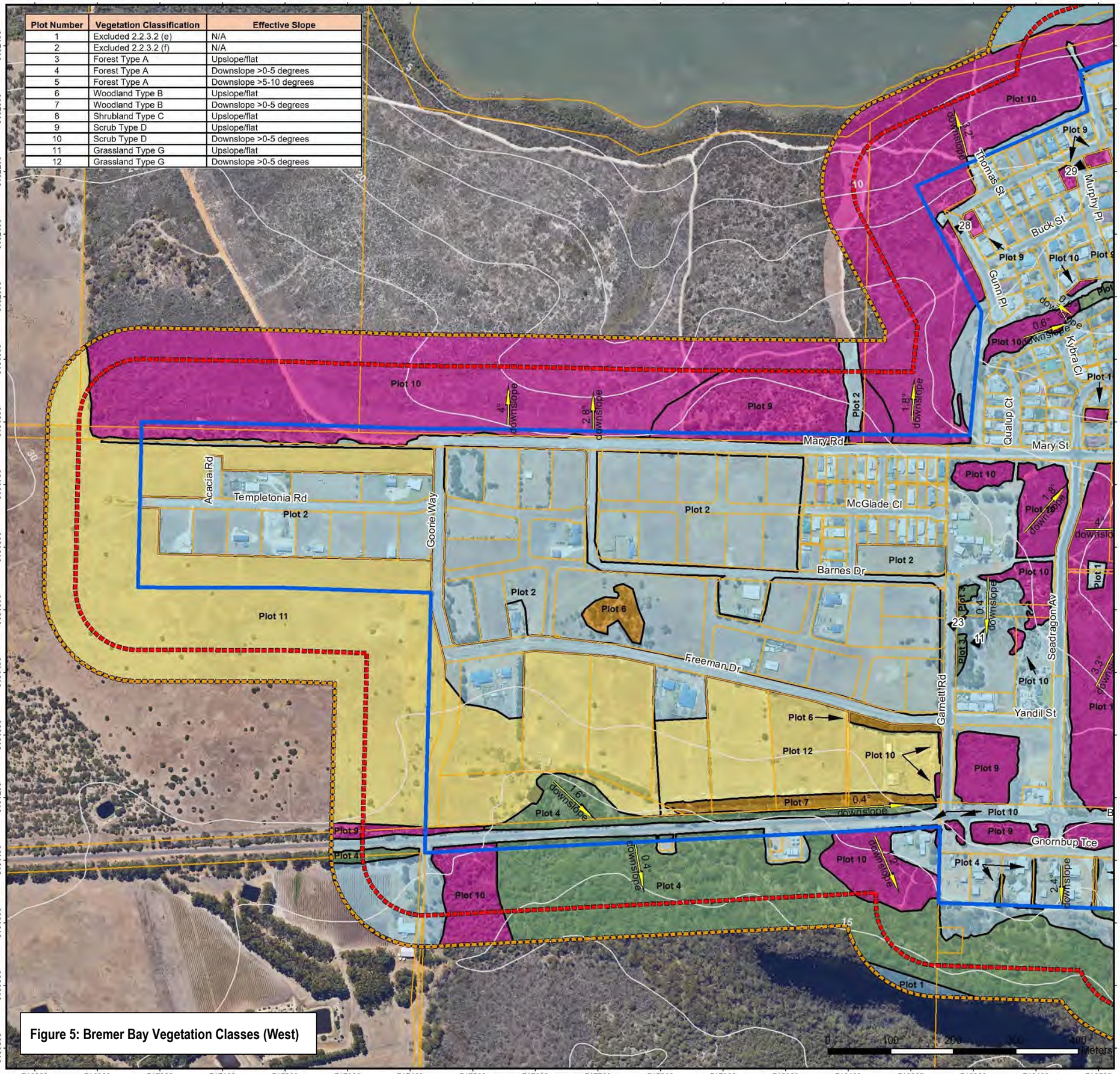

Figure 5: Bremer Bay Vegetation Classes (West)

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

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
- Excluded 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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	**JRB**	**BRM**
STATUS	*FILE*	*DATE*
FINAL	**JER005-007**	**29/04/2024**

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

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Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design

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
- Excluded 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

Figure 6: Bremer Bay Vegetation Classes (Central)

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

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BPAD Bushfire Planning & Design

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
- Excluded 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-007	29/04/2024

Figure 7: Bremer Bay Vegetation Classes (East)

4.2. Identification of Bushfire Impacts Bremer Bay

The bushfire threats associated with the townsite include:

- 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 still will need attention as to not become a bushfire risk to adjacent properties (corner of Mary and Barbara Street).
- Small areas of remnant/overgrown vegetation in private property lots in the central and northern areas of the townsite. Areas of particular concern/priority are the private properties to be managed under the FCI notice adjacent to Crown reserves, as these can act as "wicks" and carry fire through the residential area and into the town centre in the event of a bushfire.
- Aged Care Units (Yandil Street) are still at risk from 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, they do not change the BAL allocation over the townsite. Strategic Break south of Yate Place noted for 2024.
- 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.
- Overall, it is noted on review there has been a substantial amount of bushfire mitigation works carried out within the townsite. 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 Reserve but this has had no discernible impact on the aged care units as the reserve to the immediate north is unmanaged.
    - The health centre is predominantly BAL-19 and lower.
    - The primary school is predominantly BAL-12.5.
    - The caravan park has strategic 20m breaks applied to the south, southeast and west which has greatly increased protection of the site. It was noted that some areas of 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.

4.3. 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 (Figures 8, 9 and 10). 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.

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

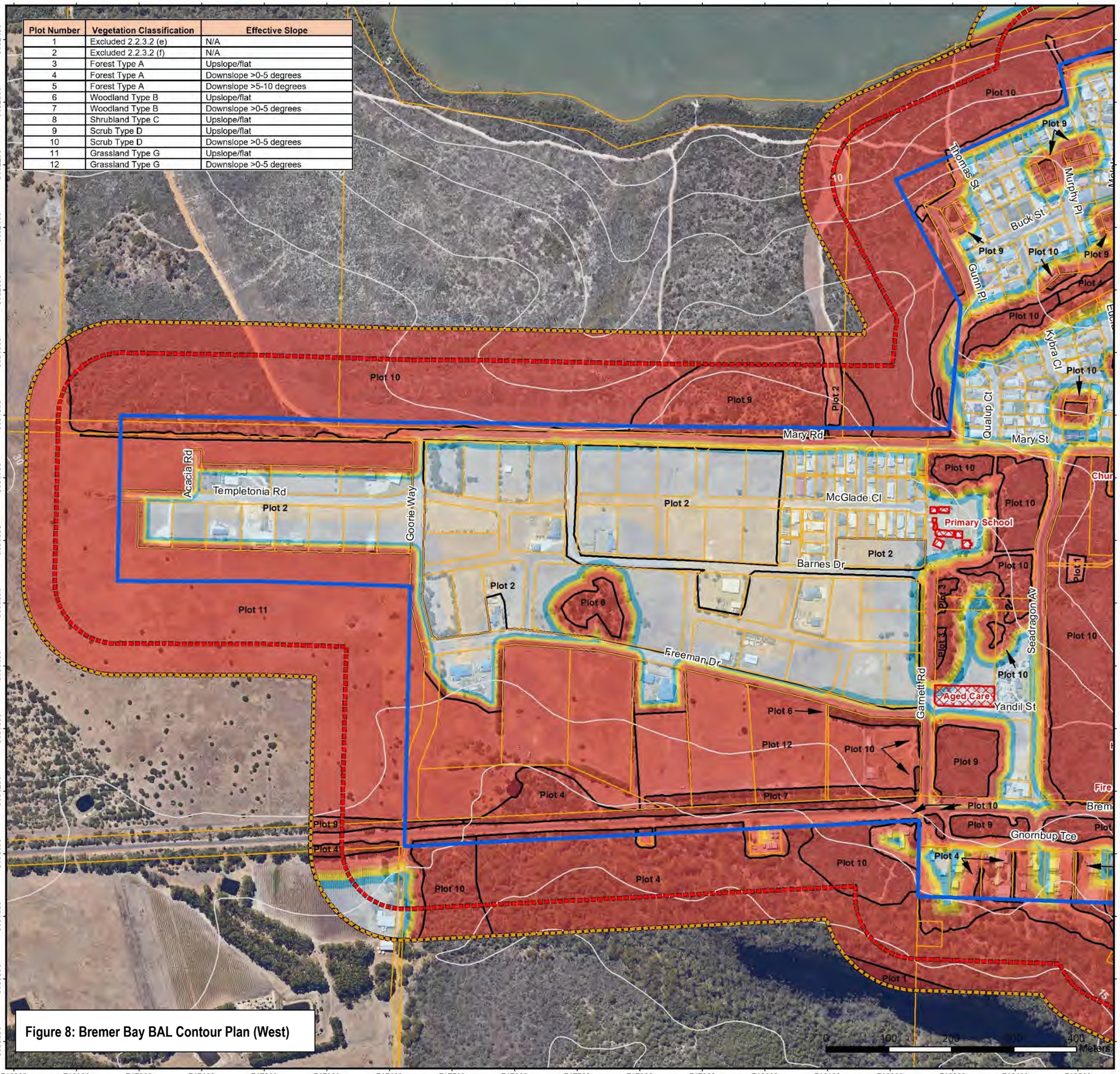

Figure 8: Bremer Bay BAL Contour Plan (West)

Albany Office:
29 Hercules Crescent
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Esperance Office:
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Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Assets and 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 a Bushfire Consultant

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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 BAL Contour Plan - West

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-007	29/04/2024

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

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BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Assets and 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 a Bushfire Consultant

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
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PO Box 92
Jerramungup, WA 6338

Bremer Bay BAL Contour Plan - Central

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

Figure 9: Bremer Bay BAL Contour Plan (Central)

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

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

BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Assets and 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 a Bushfire Consultant

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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 BAL Contour Plan - East

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

Figure 10: Bremer Bay BAL Contour Plan (East)

4.4. Recommendations for Bushfire Management / Mitigation Bremer Bay

The assessment of Bremer Bay townsite has determined the following recommendations for bushfire mitigation, also refer to Figures 11, 12 and 13 "Works Program":

Vulnerable Land Uses

- Aged care facility (Roderick Street), needs vegetation management (parkland clearing) 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. It is noted that there is a future prescribed burn planned for this area.

Fire Control Information Notice

- Landowners of vacant land are required to maintain private property as per the SoJ FCI which is released in accordance with Section 33 of the Bushfires Act 1953.Further implementation of the FCI was noted this year.
- 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" and carry fire through the residential areas, into the town centre during a bushfire event.
- Ensure 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 west and southwest of the subject site still poses a threat of carrying grass fire into the townsite.
- A copy of the Works Program mapping will 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 do not link into the townsite as "wicks" or encourage ember establishment during a bushfire event.

Caravan Park

- Trimming of all trees along road boundary/edge to the north and north west to APZ standards is recommended.
- 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).
- A Bushfire Emergency Evacuation Plan (BEEP) for the caravan park should be considered to assist the evacuation of occupants in the event of an emergency.
- 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

- A Bushfire Emergency Evacuation Plan (BEEP) for the tavern should be considered to assist the evacuation of occupants in the event of an emergency.
- 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.

A "Works Program" has been developed (refer to Figures 11, 12 and 13) 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_PC – defined as Mechanical Works Parkland Clearing 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.

Note: Post Treatment BAL Contour Maps are indicative only and should not to be used for Development or Building Approval.

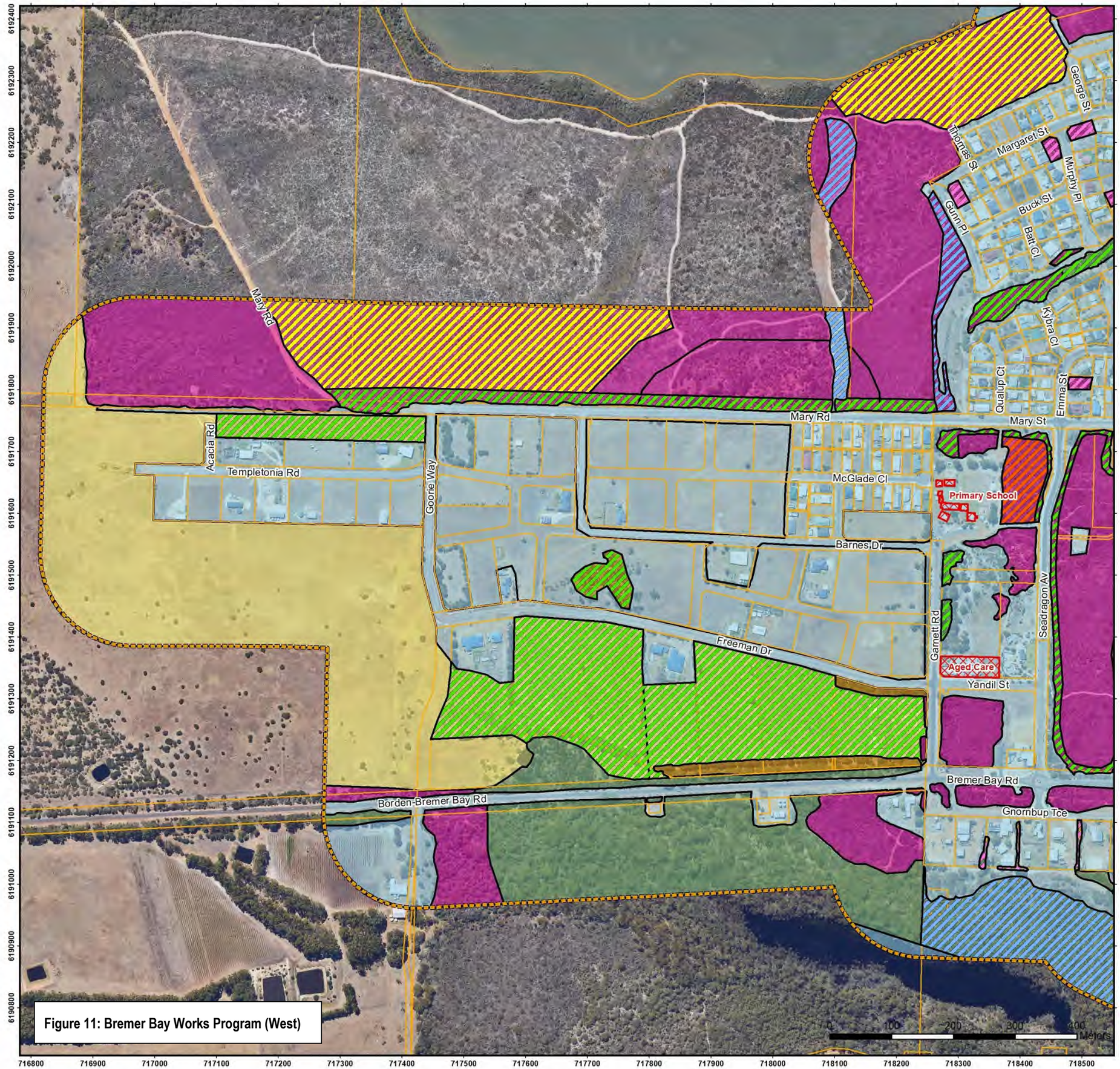

Figure 11: Bremer Bay Works Program (West)

Albany Office:
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(08) 9842 1575

Denmark Office:
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BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- MW_APZ - Mechanical Works APZ Standards
- MW_SB - Mechanical Works Strategic Break
- PB - Prescribed Burn (Nominal Cells)
- FCI - Fire Control Information to Apply
- Weed Management
- Assets and Vulnerable Land Use
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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 Works Program - West

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	**JRB**	**BRM**
STATUS	*FILE*	*DATE*
FINAL	**JER005-007**	**29/04/2024**

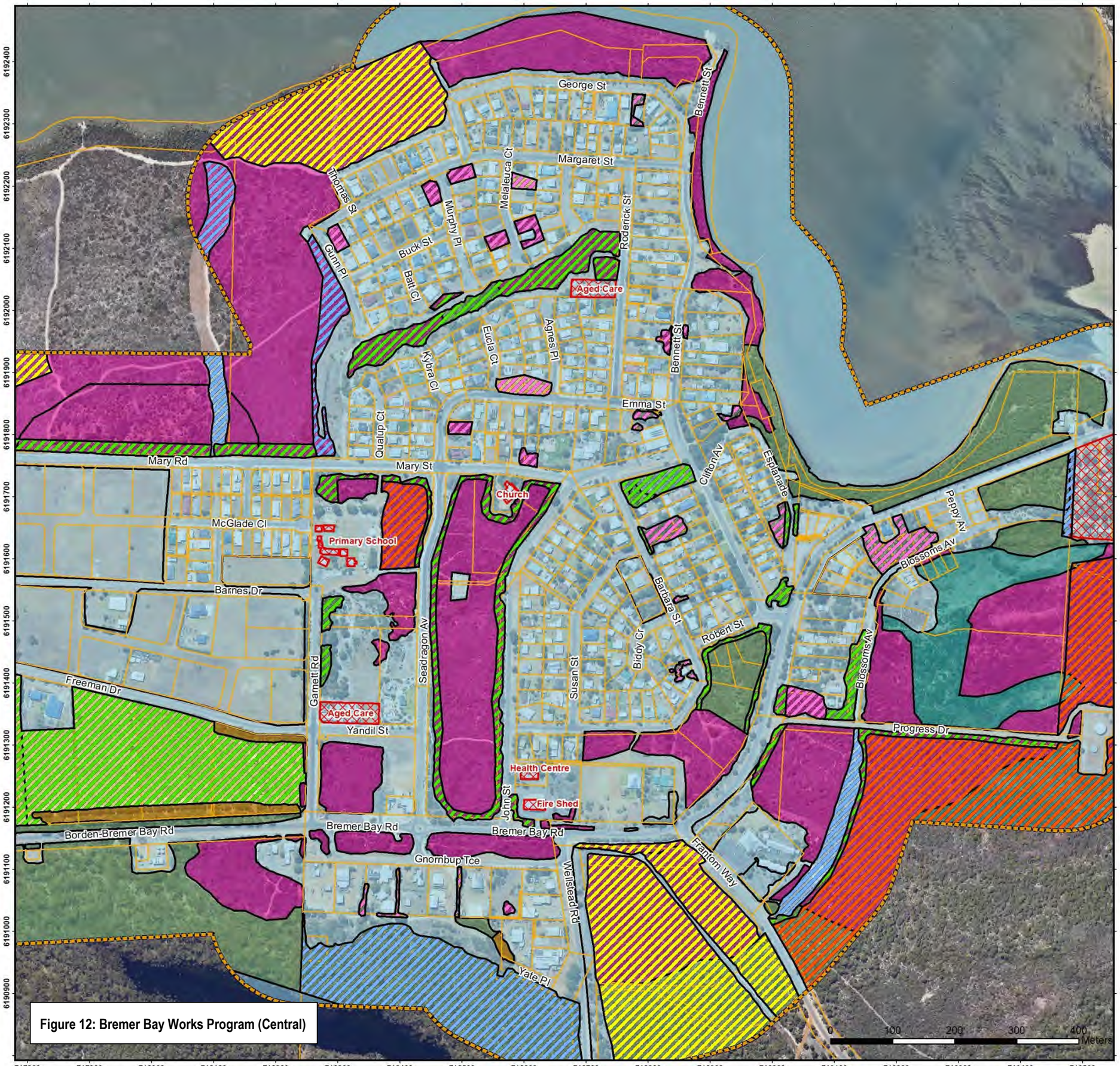

Figure 12: Bremer Bay Works Program (Central)

Albany Office:
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Esperance Office:
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Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- MW_PC - Mechanical Works Parkland Clearing
- MW_SB - Mechanical Works Strategic Break
- PB - Prescribed Burn (Nominal Cells)
- FCI - Fire Control Information to Apply
- Weed Management
- Assets and Vulnerable Land Use
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
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PO Box 92
Jerramungup, WA 6338

Bremer Bay Works Program - Central

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

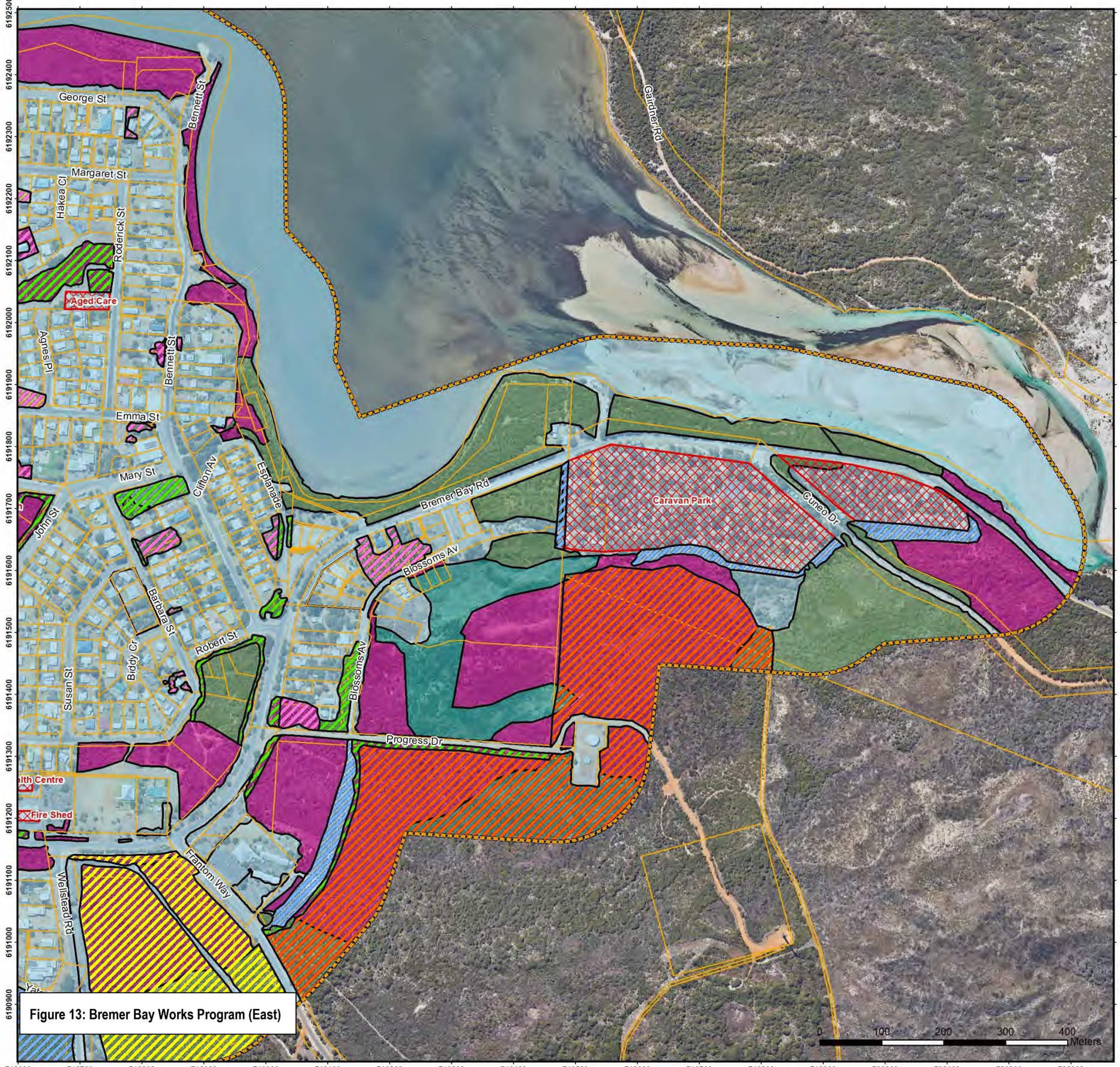

Figure 13: Bremer Bay Works Program (East)

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BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
- Cadastre
- MW_PC - Mechanical Works Parkland Clearing
- MW_SB - Mechanical Works Strategic Break
- PB - Prescribed Burn (Nominal Cells)
- FCI - Fire Control Information to Apply
- Weed Management
- Assets and Vulnerable Land Use
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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 Works Program - East

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	**JRB**	**BRM**
STATUS	*FILE*	*DATE*
FINAL	**JER005-007**	**29/04/2024**

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

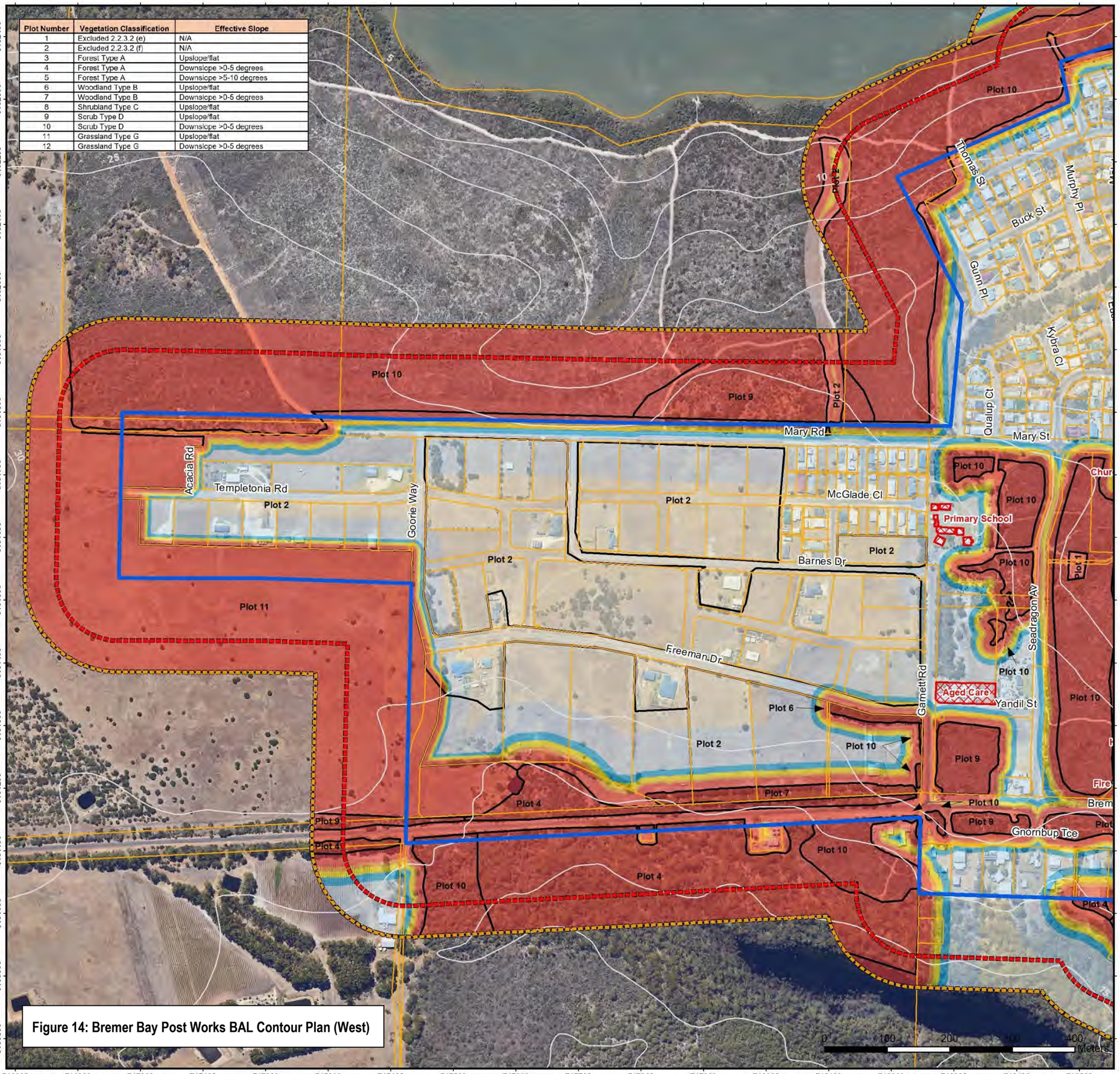

Figure 14: Bremer Bay Post Works BAL Contour Plan (West)

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

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

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

BAL Contours

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

This BAL Contour Map is Indicative only, it has been produced to show how fuel mitigation can reduce the potential radiant heat impact on certain areas of the townsite.
Not for Development or Building Approval.

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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 Post Works BAL Contour Plan (West)

BAL Assessor	*QA Check*	*Drawn by*
MEH & BRM	JRB	BRM
STATUS	*FILE*	*DATE*
FINAL	JER005-007	29/04/2024

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

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BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

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

BAL Contours

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

This BAL Contour Map is Indicative only, it has been produced to show how fuel mitigation can reduce the potential radiant heat impact on certain areas of the townsite. Not for Development or Building Approval.

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Shire of Jerramungup
PO Box 92
Jerramungup, WA 6338

Bremer Bay Post Works BAL Contour Plan (Central)

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

Figure 15: Bremer Bay Post Works BAL Contour Plan (Central)

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	Forest Type A	Downslope >5-10 degrees
6	Woodland Type B	Upslope/flat
7	Woodland Type B	Downslope >0-5 degrees
8	Shrubland Type C	Upslope/flat
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Grassland Type G	Upslope/flat
12	Grassland Type G	Downslope >0-5 degrees

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Albany, WA 6330
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Denmark, WA 6333
(08) 9848 1309

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

BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

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

BAL Contours

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

This BAL Contour Map is Indicative only, it has been produced to show how fuel mitigation can reduce the potential radiant heat impact on certain areas of the townsite. Not for Development or Building Approval.

Scale
1:6,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
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 Post Works
BAL Contour Plan (East)

BAL Assessor	QA Check	Drawn by
MEH & BRM	JRB	BRM
STATUS	**FILE**	**DATE**
FINAL	JER005-007	29/04/2024

Figure 16: Bremer Bay Post Works BAL Contour Plan (East)

5. 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, 2021). This is also defined as a "defendable space" which is an area adjacent to the asset within which firefighting operations can be undertaken to defend the structure (WAPC, 2021). 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).

The 2020 Bushfire Risk Treatment standards allow for vegetation to be modified round existing buildings. The WAPC Schedule 1 APZ standard is recommended to be defined in the annual gazetted Shire firebreak notice. Any replanting, revegetation and landscaping in bushfire prone areas is recommended to meet the Schedule 1 APZ standards as per WAPC Guidelines v 1.4 (WAPC, 2021). The WAPC Schedule 1 APZ standard is provided in Appendix B.

The Shire should ensure their personnel is responsible for implementing and maintaining Shire managed verges, reserves and parks are aware of the WAPC Schedule 1 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 D. The Country Fire Authority (CFA) *"Landscaping for Bushfire – Garden Design and Plant Selection"* (CFA, 2022) 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, gardens and street verges should be aware and understand the WAPC Schedule 1 APZ required standards (see Appendix B) and complete mitigation works to the APZ standard. It is particularly vital they understand the requested works area is not to be devastated by broadscale clearing, for example trees can remain (trimmed and fuel reduced) and clumps of shrubs can remain in areas no greater than $5m^2$ in size. The WAPC APZ standard can form a guide for the contractors who are appointed by the Shire to conduct fuel reduction works (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.

6. Disclaimer

The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959 – Building in Bushfire Prone Areas, WAPC SPP3.7, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021) and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.

7. Certification

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level (s) stated in this document have been prepared in accordance with the requirements of AS 3959-2018 and the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021).

SIGNED, ASSESSOR: ..... DATE: 29/04/2024

Jason Benson Bio Diverse Solutions

Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD-37893)

8. Revision Record

Revision	Summary	Prepared By	Reviewed By	Date
Draft ID	Internal Q.A review	Melanie Haymont and Bob McGonnell	Michelle Gray	21/03/2024
Draft ID	Internal Technical review	Melanie Haymont and Bob McGonnell	Jason Benson	21/03/2024
Draft ID	Released to Shire for draft review	Melanie Haymont and Bob McGonnell		22/03/2024
Final ID	Released to Shire	Melanie Haymont and Bob McGonnell		29/04/2024

9. References

AS3959-2018 Australian Standard inc Amendments No 1, 2 and 3, *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 (2022) Landscaping for Bushfire – Garden Design and Plant Selection. Victorian Government.

OBRM Map of Bushfire Areas Standard accessed from the Department of Fire and Emergency Services Website accessed January 2021: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, Lands and Heritage, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015) State Planning Policy 3.7 Planning in Bushfire Prone Areas. Department of Planning, Lands and Heritage and Western Australian Planning Commission.

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

10. Appendices

Appendix A: Jerramungup and Bremer Bay Vegetation Classification Plot Data – 2023 Assessment

Appendix B: APZ Standards to Apply

Appendix C: Bushfire Mitigation Terminology and Guidelines

Appendix D: The Forever Project - List of Fire Retardant Species

Jerramungup – Reclassified Plots, Plot Changes and Mitigation Treatment Areas (2023 Assessment)

Plot	1	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			**Location:** Internal and external of the subject site. **Description:** Roads, driveways, waterbodies and other non-vegetated areas. Excluded as per AS3959-2018 exclusion clause 2.2.3.2 (e).
Photo Id 1: View facing north-northwest along Derrick Street, located central west of the subject site.			
Plot	**1 cont.**	**Classification or Exclusion Clause**	**Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)**
			**Location:** Internal and external of the subject site. **Description:** Roads and other non-vegetated areas. Excluded as per AS3959-2018 exclusion clause 2.2.3.2 (e).
Photo Id 2: View facing east along Memorial Road, located internal to the subject site in the southeast.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Internal and external of the subject site. **Description:** Maintained lawns and gardens in Asset Protection Zone (APZ) areas surrounding existing dwellings, firebreaks and other areas of the low-threat vegetation. As per exclusion clause 2.2.3.2 (f) of AS3959-2018. **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 3: View facing south-southwest towards recently removed/modified vegetation, located internal to the subject site in the southeast.

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.**

Photo Id 4: View facing south-southeast towards vegetation managed in a low-threat state adjacent to Jerramungup Primary and High School oval, located central west of the subject site.

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			Additional photo of Plot 2.
Photo Id 5: View facing northeast towards vegetation managed in a low-threat state to Jerramungup Primary and High School oval, located central west of the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			Additional photo of Plot 2.
Photo Id 6: View facing south-southwest towards managed lawns and gardens surrounding existing dwellings, located to the internal to the subject site in the southeast.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.**
Photo Id 7: View facing west-northwest towards trees in single row, located on the southern boundary of the subject site in the southeast.			
Plot	**3**	**Classification or Exclusion Clause**	**Forest Type A**
			**Location:** Internal to the subject site in the northwest. External to the north, east and west. **Dominant species & description:** 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:** 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Upslope/flat. *Note: Dead and fallen material needs to be removed. Slashing required.*
Photo Id 8: View facing west-northwest towards forest vegetation, located internal to the subject in the northwest.			

Plot	3 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 3.** *Note: Emergent grasses and weeds remain growing through burnt area. Slashing/weed management required.*
Photo Id 9: View facing south-southeast towards forest vegetation, located to the east of the subject site.			
Plot	**4**	**Classification or Exclusion Clause**	**Forest Type A**
			**Location:** Internal to the subject site in the north, east and south. External to the northwest, west and south. **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:** 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Downslope >0-5 degrees. *Note: Fire Control Information to apply. Dead and fallen material needs to be removed. Slashing required.*
Photo Id 10: View facing east towards forest vegetation, located internal to the subject site in the north.			

Plot	4 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 4.**
Photo Id 11: View facing west-southwest towards forest vegetation, located internal to the subject site in the southeast.			

Plot	4 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 4.** *Note: Emergent grasses. Only slashing required.*
Photo Id 12: View facing west-northwest towards forest vegetation, located on the southern boundary of the subject site in the southwest.			

Plot	6	Classification or Exclusion Clause	Woodland Type B

Location: Internal to the subject site in the east.

Dominant species & description: Woodland vegetation consisting of Eucalyptus trees. No canopy connection. Limited multilayering.

Average vegetation height: 6-8m.

Vegetation Coverage: 15-30% foliage cover.

Available fuel loading: 15-25t/ha.

Effective slope: Downslope >0-5 degrees.

Note: This area was classified as low-fuel in previous reviews, as it is currently unmanaged, it has been reclassified as Woodland Type B. Dead and fallen material needs to be removed for this plot to return to low-fuel status.

Photo Id 13: View facing west-southwest towards woodland vegetation, located internal to the subject site in the east.

Plot	7	Classification or Exclusion Clause	Scrub Type D

Location: Internal to the subject site in the southeast. External to the south and east.

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: Upslope/flat.

Note: Fire Control Information to apply.

Photo Id 14: View facing east-northeast towards scrub vegetation, located internal to the subject site in the southeast.

Plot	8	Classification or Exclusion Clause	Scrub Type D
			**Location:** Internal to the subject site in the south. External to the south and southwest. **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. Plot still remains as originally classified as no permanent control mechanism is in place over this plot.*
Photo Id 15: View facing northeast towards scrub vegetation, located internal to the subject site in the west.			

Bremer Bay – Plot Changes and Mitigation Treatment Areas (2023 Assessment)

Plot	1	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			**Location:** Internal and external of the subject site. **Description:** Roads, driveways, waterbodies and other non-vegetated areas. As per exclusion clause 2.2.3.2 (e) of AS3959-2018.
Photo Id 1: View facing west-northwest along Cuneo Drive, located adjacent to the southeast corner of the subject site.			
Plot	**1 cont.**	**Classification or Exclusion Clause**	**Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)**
			**Additional photo of Plot 1.**
Photo Id 2: View facing south-southwest along Blossoms Avenue, located internal to the subject site in the east.			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Location:** Internal and external of the subject site. **Description:** Maintained lawns and gardens in Asset Protection Zone (APZ) areas surrounding existing dwellings, firebreaks and other areas of the low-threat vegetation. As per exclusion clause 2.2.3.2 (f) of AS3959-2018. **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 3: View facing northwest towards recently removed/modified vegetation within nature strip, located internal to the subject site in the east.

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f). Vegetation plot boundary realigned.*

Photo Id 4: View facing northwest towards recently removed/modified vegetation to the south of Bremer Bay Caravan Park, located to the south of the subject site.

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f). Vegetation Plot Boundary realigned.*
Photo Id 5: View facing west towards recently removed/modified vegetation to the south of Bremer Bay Caravan Park, located along the southern boundary of the subject site in the east.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified as Shrubland Type C. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f). Vegetation Plot Boundary realigned.*
Photo Id 6: View facing west-northwest towards recently removed/modified vegetation adjacent to residential lots (mostly vacant), located internal to the subject site in the east.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified as Shrubland Type C. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f). Vegetation Plot Boundary realigned.*
Photo Id 7: View facing southeast towards recently removed/modified vegetation adjacent to residential lots (mostly vacant), located internal to the subject site in the east.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f). Vegetation Plot Boundary realigned.*
Photo Id 8: View facing west-southwest towards recently modified vegetation to the west of Bremer Bay Caravan Park, located internal to the subject site in the east.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			Additional photo of Plot 2.
Photo Id 9: View facing south along fire access to the east of Bremer Bay Caravan Park, located internal to the subject site the east.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			Additional photo of Plot 2.
Photo Id 10: View facing northeast towards Bremer Bay Caravan Park, located along the southern boundary of the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified as Scrub Type D. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f). Vegetation Plot Boundary realigned.*
Photo Id 11: View facing north-northeast towards recently removed/modified vegetation, located central to the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.**
Photo Id 12: View facing west towards vegetation managed in a low-threat state along Mary Street, located central to the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *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 13: View facing north towards recently cleared lot along Margaret Street, located central north of the subject site.

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified Grassland Type G. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f).*

Photo Id 14: View facing west-southwest towards vacant lot managed in a low-threat state along Bennett Street, located internal to the subject site in the north.

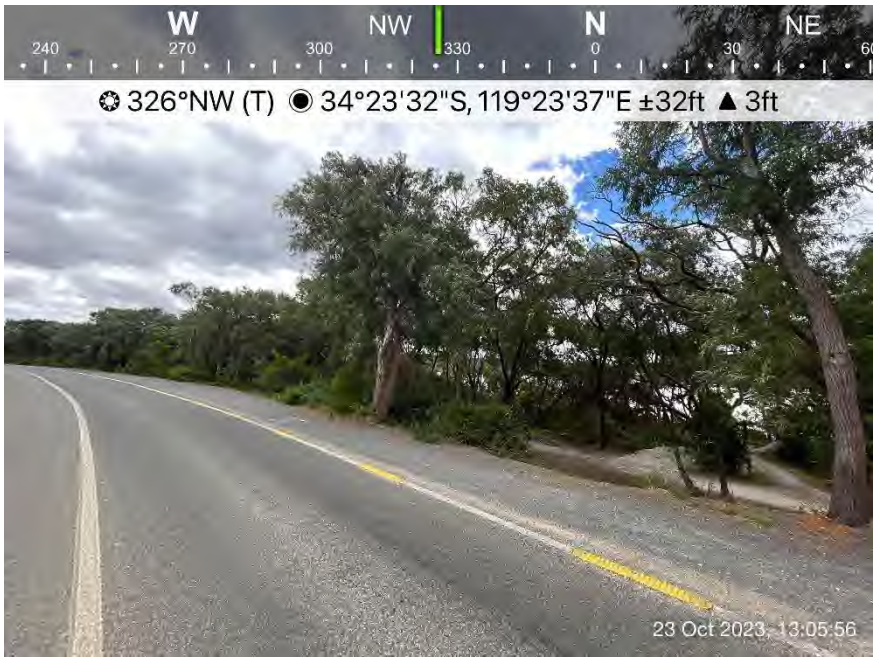
Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *Note: Previously classified Grassland Type G. However, recent vegetation modification has reduced the classification to Exclusion Clause 2.2.3.2 (f).*
Photo Id 15: View facing west towards vacant lot managed in a low-threat state along Hakea Close, located central north of the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional photo of Plot 2.** *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 16: View facing south towards recently removed/modified vegetation within Bennett Street Road Reserve, located central east of the subject site.			

Plot	3	Classification or Exclusion Clause	Forest Type A
			**Location:** Internal to the subject site in the east and centre. External to the north and south. **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:** 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Upslope/flat.
Photo Id 17: View facing south towards forest vegetation, located central to the subject site in the east.			
Plot	**3 cont.**	**Classification or Exclusion Clause**	**Forest Type A**
			**Additional photo of Plot 3.**
Photo Id 18: View facing west-southwest towards forest vegetation, located internal to the subject site in the east.			

Plot	3 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 3.**
Photo Id 19: View facing east towards forest vegetation, located internal to the subject site in the east.			

Plot	4	Classification or Exclusion Clause	Forest Type A
			**Location:** Internal to the subject site in the north, south east and west and centre. External to the north and south. **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:** 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Downslope >0-5 degrees.
Photo Id 20: View facing northeast towards forest vegetation, located internal to the subject site in the east.			

Plot	4 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 4.**
Photo Id 21: View facing northwest towards forest vegetation along Bremer Bay Road, located on the northern boundary of the subject site in the east.			

Plot	4 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 4.**
Photo Id 22: View facing west towards forest vegetation along The Esplanade, located internal to the subject site in the east.			

Plot	4 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 4.**
Photo Id 23: View facing northeast towards forest vegetation, located central west of the subject site.			

Plot	4 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 4.** *Note: Fire control information to apply.*
Photo Id 24: View facing southeast towards forest vegetation, located central to the subject site in the east.			

Plot	5	Classification or Exclusion Clause	Forest Type A
			**Location:** Internal to the subject site in the east. **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:** 4-8m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective Slope:** Downslope >5-10 degrees. *Note: Fire control information to apply.*
Photo Id 25: View facing northwest towards forest vegetation, located internal to the subject site in the east.			

Plot	5 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional photo of Plot 5.** *Note: Fire control information to apply.*
Photo Id 26: View facing east-southeast towards forest vegetation, located internal to the subject site in the east.			

Plot	8	Classification or Exclusion Clause	Shrubland Type C

Location: Internal to the subject site in the east and external to the south.

Description: Low shrubs.

Average vegetation height: 0.5 – 1m.

Vegetation Coverage: >30% foliage cover.

Available fuel loading: 25t/ha.

Effective slope: Downslope >10-15 degrees.

Photo Id 27: View facing east-northeast towards shrubland vegetation, located internal to the subject site in the east.

Plot	9	Classification or Exclusion Clause	Scrub Type D

Location: Internal and external to the subject site in the north, south and east.

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: Upslope/flat.

Note: Vacant lot. Fire Control Information to apply.

Photo Id 28: View facing northeast towards scrub vegetation within vacant lot along Gunn Place, located internal to the subject site in the north.

Plot	9 cont.	Classification or Exclusion Clause	Scrub Type D
			**Additional photo of Plot 9.** *Note: Vacant lot. Fire Control Information to apply.*
Photo Id 29: View facing west-southwest towards scrub vegetation within vacant lot along Murphy Place, located internal to the subject site in the north.			

Plot	9 cont.	Classification or Exclusion Clause	Scrub Type D
			**Additional photo of Plot 9.**
Photo Id 30: View facing west-northwest towards scrub vegetation adjacent to Volunteer Fire and Emergency Services Shed, located central south of the subject site.			

Plot	10	Classification or Exclusion Clause	Scrub Type D
			**Location:** Internal and external to the subject site in the north, south, east and west. **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: Vacant lot. Fire Control Information to apply.*
Photo Id 31: View facing west towards scrub vegetation within vacant lot along Melaleuca Court, located central north of the subject site.			

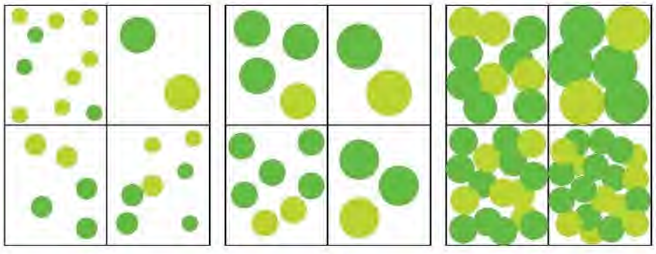
Plot	10 cont.	Classification or Exclusion Clause	Scrub Type D
			**Additional photo of Plot 10.**
Photo Id 32: View facing west towards scrub vegetation, located internal to the subject site in the north.			

Plot	10 cont.	Classification or Exclusion Clause	Scrub Type D
			**Additional photo of Plot 10.**
Photo Id 33: View facing west-northwest towards scrub vegetation, located central of the subject site.			
Plot	**12**	**Classification or Exclusion Clause**	**Grassland Type G**
			**Location:** Internal to the subject site in the north and west. **Description:** Mixed unmanaged grasses. **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: Vacant lot. Fire Control Information to apply.* *Error in photo direction.*
Photo Id 34: View facing east towards grassland vegetation within vacant lot along Melaleuca Court, located central of the subject site.			

Appendix B
APZ standards to apply
(WAPC, 2021)

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. **Figure 19:** Tree canopy cover – ranging from 15 to 70 per cent at maturity  15% 30% 70%
Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

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