

Shire of Jerramungup

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



25 March 2021

DOCUMENT CONTROL

TITLE

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

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Job No. SOJ005

Client: Shire of Jerramungup

REVISION RECORD

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Final ID 25/03/2021	Finalised and issued to client	K.Kinnear		25/03/2021

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, 2017) 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. In undertaking this work, the authors made every effort to accurately apply the available information at the time of writing following the instructions of the regulatory authorities and applying best practise as described by the Fire Protection Association Australia.. 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.



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TABLE OF CONTENTS

1.	Introduction and Background	3
1.1.	Statutory Conditions	3
1.2.	Suitably Qualified Bushfire Consultant	4
1.3.	Consultation	4
2.	Aims of this Project	5
2.1.	Objectives	5
2.2.	Methodology	5
2.3.	Previous bushfire assessment and notable changes	6
2.4.	AS3959-2018 disclaimer	6
2.5.	Structure of this report	6
3.	Jerramungup Townsite	7
3.1.	Vegetation Classification	7
3.2.	Identification of Bushfire Impacts	13
3.3.	BAL Contour Plan	13
3.4.	Recommendations for bushfire management/mitigation	15
4.	Bremer Bay Townsite	17
4.1.	Vegetation Classification	17
4.2.	Identification of Bushfire Impacts	35
4.3.	BAL Contour Plan	35
4.4.	Recommendations for bushfire management/mitigation	38
5.	Asset Protection Zones	42
6.	References	43

LIST OF TABLES

Table 1: Summary of the plot data (Jerramungup)

Table 2: Summary of plot data (Bremer Bay)

LIST OF FIGURES

Figure 1: Jerramungup Vegetation Classes

Figure 2: Jerramungup BAL Contour Map

Figure 3: Jerramungup Works Program

Figure 4: Bremer Bay Vegetation Classes - West

Figure 5: Bremer Bay Vegetation Classes - East

Figure 6: Bremer Bay BAL Contour Map - West

Figure 7: Bremer Bay BAL Contour Map - East

Figure 8: Bremer Bay Works Program - West

Figure 9: Bremer Bay Works Program - East

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

APPENDICES

Appendix A – APZ standards to apply

Appendix B – Forever Project fire retardant species

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, 2019).

The Bushfire Prone Vegetation Mapping and the WAPC Bushfire Planning framework has 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, 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 assist 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 2017;
- *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 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 5 years. Bio Diverse Solutions are Silver Corporate Members of the Fire Protection Australia Association. Jason is a suitably qualified Bushfire Practitioner to prepare this Document.

This document has been reviewed and approved by Kathryn Kinnear (nee White), who has 10 years operational fire experience with the (formerly) DEC (1995-2005) and has the following accreditation in bushfire management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Kathryn Kinnear currently has the following tertiary qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies; and
- Graduate Diploma in Environmental Management.

Kathryn Kinnear is an accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794). Bio Diverse Solutions are Silver Corporate Members of the Fire Protection Australia Association. Kathryn is a committee member of the WA Bushfire Working Group (FPAA) and Kathryn is a suitably qualified Bushfire Practitioner to prepare this Bushfire Report.

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 townsites 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 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 1.3 (WAPC, 2017).

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 a Samsung Galaxy S ArcGIS mapping application, field capture sheets (manual entry) and hand mapped on hard copy field maps.
5. Field measurement of 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 1.3 (WAPC, 2017).
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, 2017) methodology;
10. Quality assurance checks of all data fields in ArcGIS (.shp/.lyr files).
11. Preparation of Metadata documentation and files associated with ArcGIS (.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 as either a Type A - Plot 1, Type B- Plot 2, Type C- Plot 3, Type D- Plot 4 or Type G- Plot 5, with examples of differing plot photos/vegetative structure given in the report. The detailed field capture sheets and the .shp file has 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

History of the project includes:

2016 - The original site assessment of the townships 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 township boundary which is consistent with the updated WAPC guidelines methodology (WAPC, 2017).

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.

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 township. Each township (section) of this report details the following:

- Review of original bushfire prone vegetation classifications (additional 2019 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 township) and Section 4 (Bremer Bay Township) 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 7th December 2020 by Jason Benson (BPAD 37893) and Steve Ayling (GIS Expert) 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 2020 assessment with the potential to determine the Bushfire Attack Level is identified below and shown on the Vegetation Classes Map, (Figure 1). The previous data has been reviewed and plots have been renumbered, all plots of the same vegetation type and slope range now have the same plot number. To review previous vegetation and BAL contour plans refer to previous 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

Note: The plot numbers have been simplified, there is now only one plot number for each vegetation type/slope range.

Reclassified Plots and Plot Changes (2020 Assessment)

Plot	7	Classification or Exclusion Clause	Scrub Type D
			<p>Location: Central west of the subject site.</p> <p>Dominant species & description: Small patch of scrub vegetation consisting of low Eucalyptus and Acacia trees, understorey of sedges, grasses and some low shrubs (100-400mm).</p> <p>Average vegetation height: Scrubs 2-4m. Occasional eucalypt at 5m.</p> <p>Vegetation Coverage: >30% foliage cover.</p> <p>Available fuel loading: 25t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>Note: Previously classified as Forest Type A. However, this small area of vegetation has been reclassified as Scrub Type D due to the average height of the vegetation being less than 4m.</p>

Photo Id 1: View facing southwest towards scrub vegetation located central west of the town site. Note 1.8m tall height staff in the photo for reference.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central to the subject site adjacent to the shire building.</p> <p>Description: Maintained gardens and parkland cleared vegetation surrounding shire buildings. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).</p>

Photo Id 2: View facing northwest towards recently modified vegetation central to the subject site, adjacent to the shire buildings.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central to the subject site to the north of the caravan park.</p> <p>Description: Parkland cleared vegetation in lots to the north of the caravan park. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as Forest Type A. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).</p>

Photo Id 3: View facing southwest towards recently modified vegetation central to the subject site, to the north of the caravan park.

Plot	4	Classification or Exclusion Clause	Forest Type A
			<p>Location: Central to the subject site to the north of the caravan park.</p> <p>Dominant species & description: Small patch of Forest vegetation remaining from recent clearing works. Vegetation consists of Eucalypt trees with dense canopy cover, understorey consisting of predominantly sedges and grasses (100-300mm), some multilayering present. Classified as forest based on the overstorey using the precautionary principle.</p> <p>Average vegetation height: Trees 4-8m.</p> <p>Vegetation Coverage: 30-70% foliage cover.</p> <p>Available fuel loading: 25-35t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>Note: Vegetation classification has not changed, the size of the plot has been reduced by recent clearing works.</p>

Photo Id 4: View facing northwest toward small patch of Forest Type A located central to the subject site to the north of the caravan park.

Plot	4	Classification or Exclusion Clause	Forest Type A
			<p>Location: Central east of the subject site.</p> <p>Dominant species & description: Eucalypt trees with dense canopy cover. Understorey consisting of predominantly sedges, shrubs and grasses (100-400mm), some multilayering present. Classified as forest based on the overstorey using the precautionary principle.</p> <p>Average vegetation height: Trees 4-8m.</p> <p>Vegetation Coverage: >30-70% foliage cover.</p> <p>Available fuel loading: 25-35t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>Note: Vegetation classification has not changed for this plot, the boundary of the plot was realigned more accurately.</p>

Photo Id 5: View facing west-southwest towards forest vegetation located central east of the subject site.

Plot	3	Classification or Exclusion Clause	Forest Type A
			<p>Location: East of the subject site.</p> <p>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.</p> <p>Average vegetation height: Trees 4-8m.</p> <p>Vegetation Coverage: 30-70% foliage cover.</p> <p>Available fuel loading: 25-35t/ha.</p> <p>Effective Slope: Upslope/flat.</p> <p>Note: Previously classified as Scrub Type D. In 2020 an analysis of vegetation structure based on the recently updated AS3959-2018 has found this vegetation to be now classified as Forest Type A based on the height of the vegetation and foliage cover being >30%.Precautionary principal applied.</p>

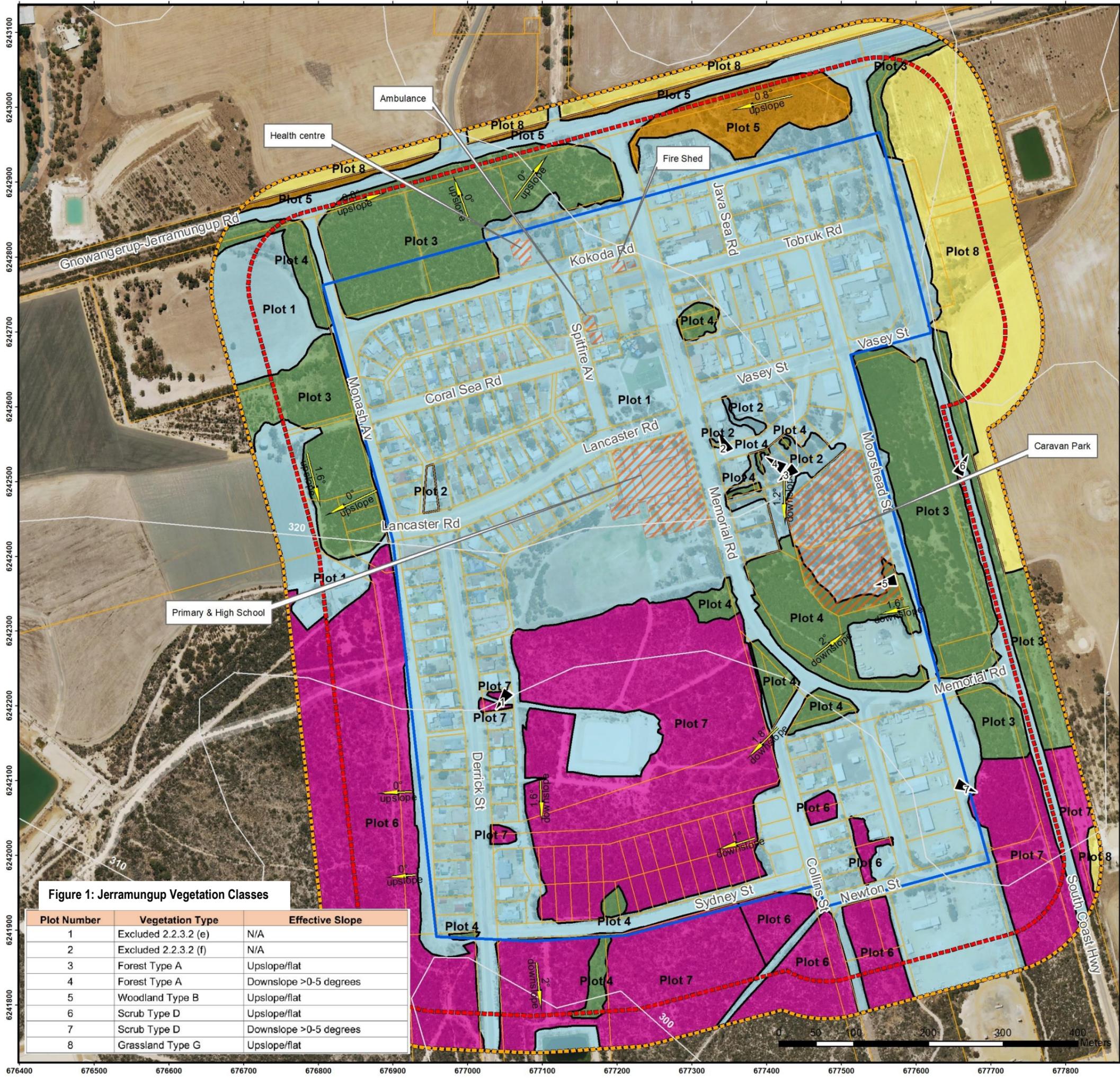
Photo Id 6: View facing north-northeast towards Forest Type A located to the east of the subject site adjacent to South Coast Highway.

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

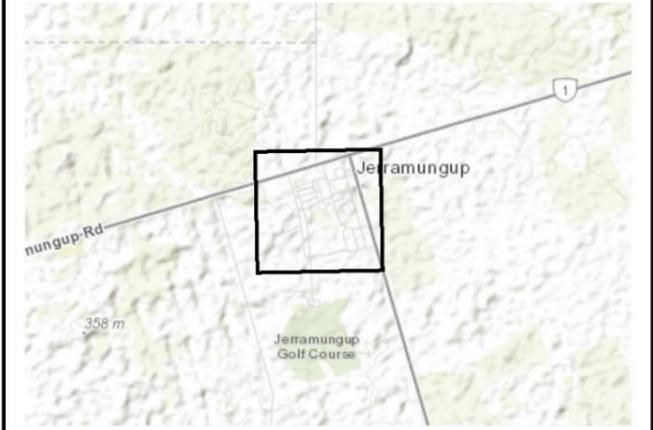
Other notes from Vegetation Classes Mapping in 2020:

Vegetation plots have been merged into vegetation classification and slope range to simplify the report, see below for new plot numbers and corresponding old plot numbers.

- New Plot 1 Excluded 2.2.3.2 (e) - formally Plot 25
- New Plot 2 Excluded 2.2.3.2 (f) - formally Plot 24
- New Plot 3 Forest Type A Upslope/flat - formally Plot 17
- New Plot 4 Forest Type A Downslope >0-5 degrees - formally Plot 10 and 15
- New Plot 5 Woodland Type B Upslope/flat - formally Plot 2
- New Plot 6 Scrub Type D Upslope/flat - formally Plot 4, 6, 19, 20 and 22
- New Plot 7 Scrub Type D Downslope >0-5 degrees - formally Plot 8, 9, 11, 12, 13, 21 and 23
- New Plot 8 Grassland Type G Upslope/flat - formally Plot 18



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Overview Map Scale 1:100,000

- Legend**
- Jerramungup Town Boundary
 - 100m Assessment Boundary
 - 150m Assessment Boundary
 - Cadastre
 - Assets / Vulnerable Landuse
 - 5m Contours
 - 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
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Jerramungup Vegetation Classes		
BAL Assessor	QA Check	Drawn by
JB	BT	SA
STATUS	FILE	DATE
FINAL	JER005	25/03/2021

Figure 1: Jerramungup Vegetation Classes

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	Scrub Type D	Upslope/flat
7	Scrub Type D	Downslope >0.5 degrees
8	Grassland Type G	Upslope/flat

3.2. 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 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 south and north (central) of the townsite.
- Most strategic breaks are now completed to mineral earth standards adjacent to Water Corporation reserves and private property to the north and the west of the townsite.

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:

- Strategic firebreaks to the south, west, north and north west are designed to protect the townsite at large from bushfire. These are being maintained to required standards.
- Strategic work along the western side of dwellings along Derrick Street has seen a marked reduction in BAL allocation in these areas.
- Vegetation modification adjacent to the shire buildings central to the subject site has reduced the BAL rating on the buildings.
- Some vegetation modification to the north of the caravan park has reduced the BAL rating over some of the lot's central east of the subject site but further modification is required.
- Some lots require the Fire Control Notice to be applied to reduce the BAL rating on adjacent lots.
- Risk of bushfire attack over the townsite are from the north, south, southeast and southwest where continuous bushfire prone vegetation exists. Specifically, from the following Plots:
 - Scrub Type D – Plot 6 and 7.
 - Forest Type A – Plot 3 and 4.
 - Woodland Type B – Plot 5.
- The caravan park (vulnerable land use) 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.

3.3. BAL Contour Plan

The Bushfire Attack Level (BAL) was assigned from each distinctive vegetation plot according to AS3950 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.

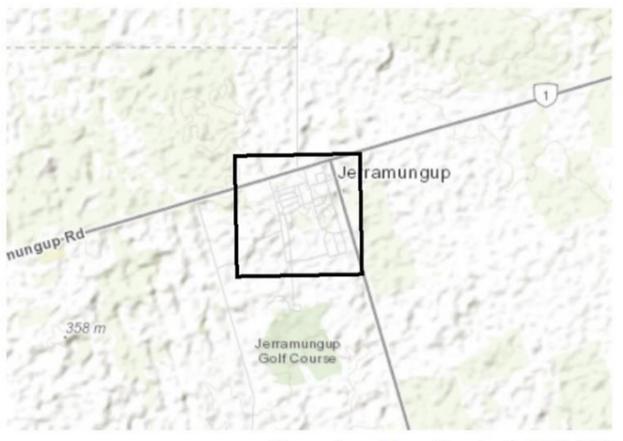
It is noted that the majority of the existing dwellings achieve BAL 29 or less from external bushfire risks. Internal to the townsite there are bushfire hazards emanating from private lots, crown land and Water Corporation managed lands. These areas create BAL FZ to some residential buildings and infrastructure. 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.



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Overview Map Scale 1:100,000

- Legend**
- Jerramungup Town Boundary
 - 100m Assessment Boundary
 - 150m Assessment Boundary
 - Cadastre
 - Assets / Vulnerable Landuse
 - Vegetation/Plot Boundary
- BAL Contours**
- BAL-FZ
 - BAL-40
 - BAL-29
 - BAL-19
 - BAL-12.5
 - BAL-LOW

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

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Jerramungup BAL Contour

BAL Assessor JB	QA Check BT	Drawn by SA
STATUS FINAL	FILE JER005	DATE 25/03/2021

Figure 2: Jerramungup BAL Contour Map

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	Scrub Type D	Upslope/flat
7	Scrub Type D	Downslope >0.5 degrees
8	Grassland Type G	Upslope/flat

3.4. 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 north west, east and south. 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.
- Crown Land within management of the Shire 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. This is particularly evident along Derrick Street.
- 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 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.

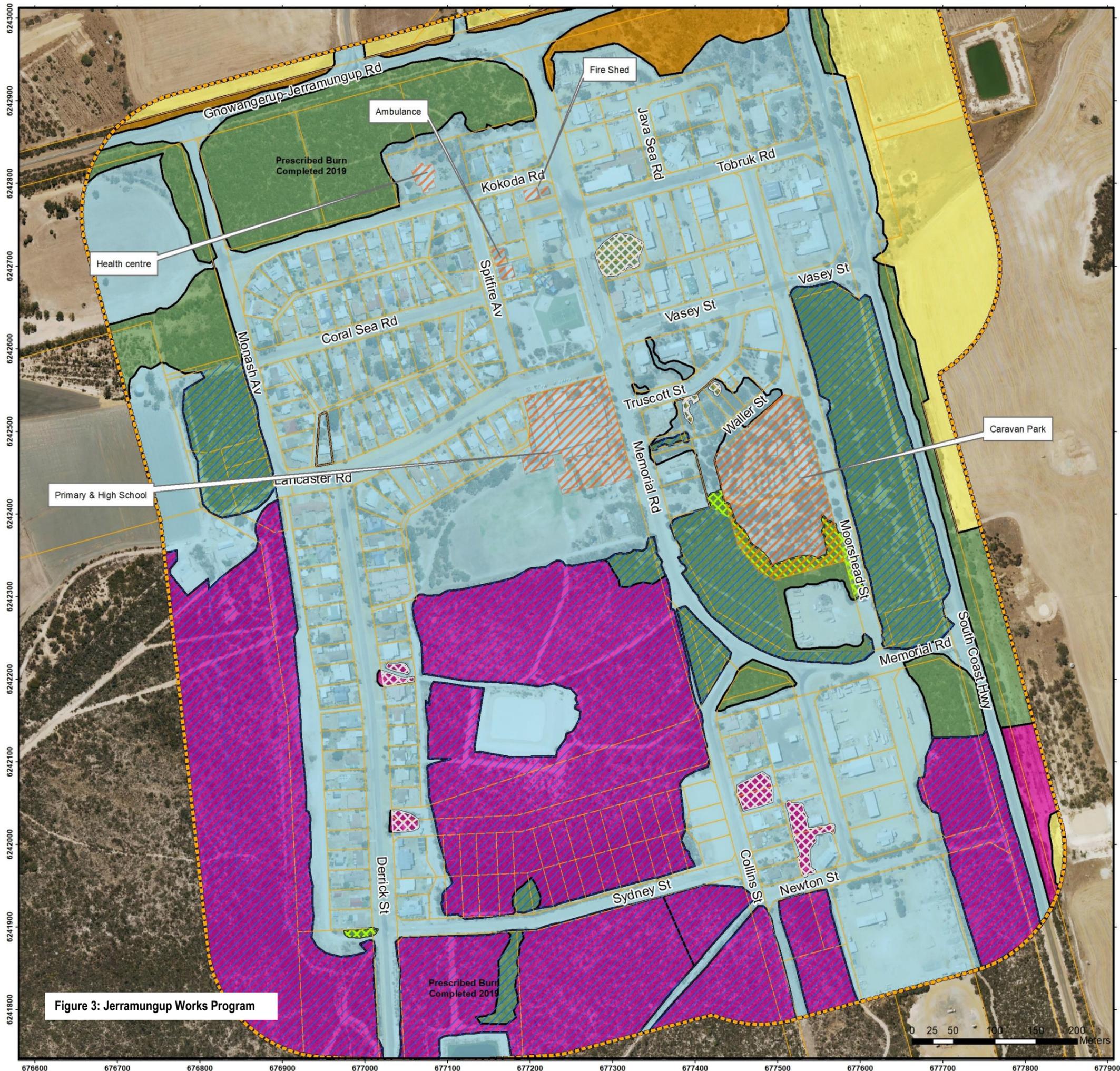
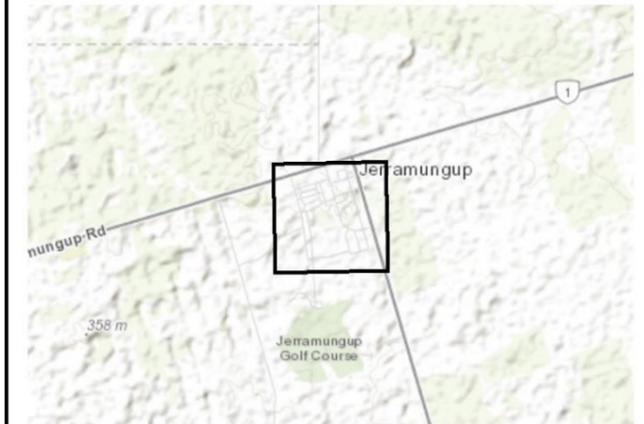


Figure 3: Jerramungup Works Program

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



Overview Map Scale 1:100,000

Legend

- 150m Assessment Boundary
 - Cadastre
 - Assets / Vulnerable Landuse
 - PB - Prescribed Burning
 - MW_APZ - Mechanical Works APZ Standards
 - Fire Control Notice to apply
 - 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
1:4,500 @ 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 - 2021

BAL Assessor JB	QA Check BT	Drawn by SA
STATUS FINAL	FILE JER005	DATE 25/03/2021

4. Bremer Bay Townsite

4.1. Vegetation Classification

The Bremer Bay townsite Vegetation verification/re-assessment occurred on 8th December 2020 by Jason Benson (BPAD 37893) and Steve Ayling (GIS Expert) with all vegetation within the townsite boundary and 150m of its boundary classified/verified in accordance with the original 2016, 17, 18 and 19 Vegetation Assessment and Section 2.2.3 of AS 3959-2018. Additional plot data and revision of the 2016-2018 assessment with the potential to determine the Bushfire Attack Level is identified below and shown on the revised Vegetation Classes Maps, Figure 4 and 5. Additional plots identified in 2020 have been allocated numbering commensurate with original plot ordering. The previous data has been reviewed and plots have been renumbered, all plots of the same vegetation type and slope range now have the same plot number. To review previous vegetation and BAL contour plans refer to previous report. A summary of the plot data is shown in Table 2. Note some plots have been removed from the original 2016 assessment due to works program/reassessment.

Table 2: Summary of plot data (Bremer Bay)

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	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
14	Grassland Type G	Downslope >5-10 degrees

Note: The plot numbers have been simplified, there is now only one plot number for each vegetation type/slope range.

Additional Plots (2020 Assessment)

Plot	3	Classification or Exclusion Clause	Forest Type A
			<p>Location: Central and east of the subject site.</p> <p>Dominant species & description: Small plots of Low open forest consisting of peppermint and eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation.</p> <p>Average vegetation height: Trees 4-8m.</p> <p>Vegetation Coverage: 30-70% foliage cover.</p> <p>Available fuel loading: 25-35t/ha.</p> <p>Effective Slope: Upslope/Flat.</p> <p>Note: These small plots are in the road reserve and were previously classified as low threat but are currently not managed in a low threat state.</p>

Photo Id 5: View facing west-northwest towards forest vegetation located within the Bennett Street road reserve central east of the subject site.

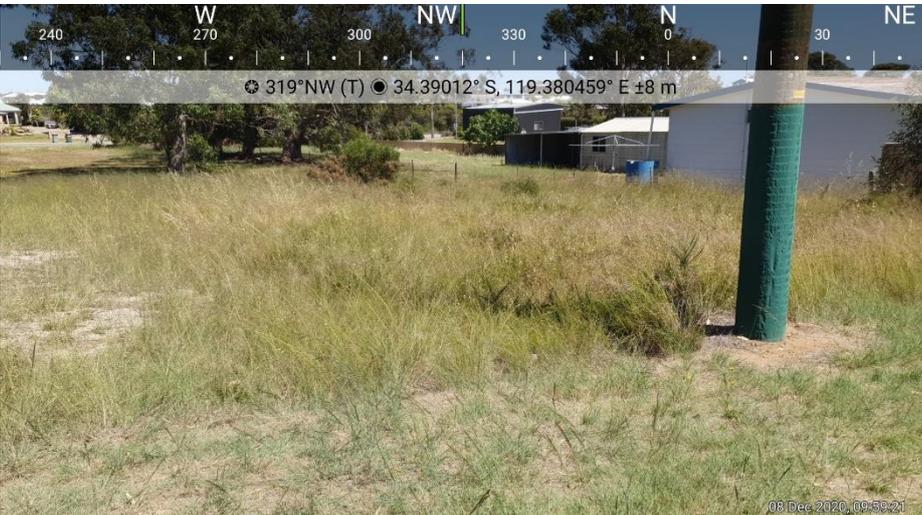
Plot	13	Classification or Exclusion Clause	Grassland Type G
			<p>Location: Central east of the subject site.</p> <p>Dominant species & description: Predominantly unmanaged grasses within an unmaintained lot.</p> <p>Average vegetation height: 100 – 300mm.</p> <p>Vegetation Coverage: <10% tree and scrub cover.</p> <p>Available fuel loading: 4.5t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>Note: This area was previously classified as a managed under the SoJ Fire Control Information but is not currently being maintained in a low threat state, therefore it is classified as Grassland Type G.</p>

Photo Id 11: View facing northwest towards unmanaged grassland located within lot on the western side of Bennett Street.

Plot	11	Classification or Exclusion Clause	Scrub Type D
			<p>Location: Central, south and west of the subject site.</p> <p>Dominant species & description: Closed scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm).</p> <p>Average vegetation height: Scrubs 2-4m. Occasional eucalypt at 5m.</p> <p>Vegetation Coverage: >30% foliage cover.</p> <p>Available fuel loading: 25t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>Note: This area was previously classified as managed under the SoJ Fire Control Information but is not currently being maintained in a low threat state, therefore it is classified as Scrub Type D.</p>

Photo Id 17: View facing northeast towards unmanaged scrub vegetation located within lot on the northern side of Mary Street.

Plot	11	Classification or Exclusion Clause	Scrub Type D
			<p>Location: Central south of the subject site.</p> <p>Dominant species & description: Thin strip of closed scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm).</p> <p>Average vegetation height: Scrubs 2-4m. Occasional eucalypt at 5m.</p> <p>Vegetation Coverage: >30% foliage cover.</p> <p>Available fuel loading: 25t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>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 Scrub Type D.</p>

Photo Id 26: View facing south towards thin strip of scrub vegetation located on the western side of Garnett Road.

Plot	13	Classification or Exclusion Clause	Grassland Type G
			<p>Location: Central south of the subject site.</p> <p>Dominant species & description: Predominantly unmanaged grasses within paddock area.</p> <p>Average vegetation height: 100 – 300mm.</p> <p>Vegetation Coverage: <10% tree and scrub cover.</p> <p>Available fuel loading: 4.5t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>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.</p>
<p><i>Photo Id 27: View facing west towards grassland vegetation located in paddock area to the west of Garnett Road.</i></p>			

Reclassified Plots and Plot Changes (2020 Assessment)

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central east of the subject site.</p> <p>Description: Parkland cleared vegetation and managed grass in vacant lots. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as Woodland Type B. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).</p>
<p><i>Photo Id 1: View facing north-northwest towards vacant lots managed in a low threat state located to the north of Blossoms Avenue.</i></p>			

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: On the south-eastern boundary of the subject site adjacent to the Bremer Bay Resort.</p> <p>Description: Parkland cleared vegetation and recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>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.</p>

Photo Id 2: View facing west towards recently modified vegetation adjacent to the Bremer Bay Resort accommodation buildings.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Southeast of the subject site adjacent to the Bremer Bay Resort.</p> <p>Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>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.</p>

Photo Id 3: View facing north towards recently modified vegetation located in the southeast of the subject site adjacent to the Bremer Bay Resort.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central east of the subject site.</p> <p>Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>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.</p>

Photo Id 4: View facing south towards recently modified vegetation located central east of the subject site adjacent to Bremer Bay Road.

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

Photo Id 6: View facing north-northeast towards vegetation managed in a low threat state located central east of the subject site adjacent to Esplanade.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central east of the subject site.</p> <p>Description: Parkland cleared and recently modified vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as a small patch of Woodland Type B. However, recent vegetation modification has reduced the classification to exclusion clause 2.2.3.2 (f).</p>

Photo Id 7: View facing east towards recently modified vegetation located central east of the subject site to the south of John Street.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central east of the subject site.</p> <p>Description: Parkland cleared vegetation and managed grass in vacant lots. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as a small patch of Woodland Type B. However, these vacant lots look to be being managed in a low threat state. Classification reduced to exclusion clause 2.2.3.2 (f).</p>

Photo Id 8: View facing southwest towards vacant lots managed in a low threat state located central east of the subject site to the west of Barbara Street.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central southeast of the subject site.</p> <p>Description: Maintained gardens and lawns surrounding existing buildings. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as a small patch of Forest Type A. However, this area looks like it's being managed in a low threat state. Classification reduced to exclusion clause 2.2.3.2 (f).</p>

Photo Id 9: View facing north towards managed APZ area located central southeast of the subject site to the north of Barbara Street

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central east of the subject site.</p> <p>Description: Parkland cleared and recently modified vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as a small patch of 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).</p>

Photo Id 10: View facing south towards recently modified vegetation located central east of the subject site to the west of Bennett Street.

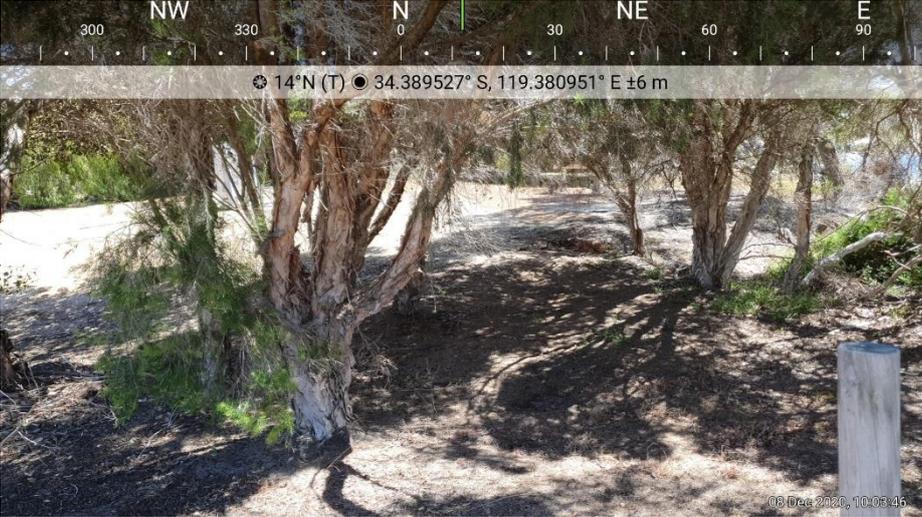
Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Eastern boundary of the subject site.</p> <p>Description: Recently modified vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: 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.</p>

Photo Id 12: View facing north towards recently modified vegetation located on the eastern boundary of the subject site.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central east of the subject site.</p> <p>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).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as a small patch of Forest Type A. However, this area is being maintained in a low threat state. Classification reduced to exclusion clause 2.2.3.2 (f).</p>

Photo Id 13: View facing southeast towards vegetation maintained in a low threat state located near the eastern boundary of the subject site.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central north of the subject site.</p> <p>Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>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.</p>

Photo Id 14: View facing south towards recently modified vegetation central north of the subject site to the south of Margaret Street.

Plot	13	Classification or Exclusion Clause	Grassland Type G
			<p>Location: Central to the subject site.</p> <p>Dominant species & description: Predominantly unmanaged grasses along firebreak.</p> <p>Average vegetation height: 100 – 300mm.</p> <p>Vegetation Coverage: <10% tree and scrub cover.</p> <p>Available fuel loading: 4.5t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>Note: This area was not classified in the previous assessment of the area as it was a slashed firebreak. However, it is not currently being managed in a low threat state and has been classified as Grassland Type G. Requires re-slashing.</p>

Photo Id 15: View facing west-southwest along firebreak that has not been slashed recently located central to the subject site at the northern end of Agnes Place.

Plot	4	Classification or Exclusion Clause	Forest Type A
			<p>Location: Central to the subject site.</p> <p>Dominant species & description: Small plots of low open forest consisting of eucalypts trees with dense canopy cover, understorey consisting of predominantly scrub, sedges, shrubs and grasses (100-400mm), multilayered vegetation.</p> <p>Average vegetation height: Trees 4-8m.</p> <p>Vegetation Coverage: 30-70% foliage cover.</p> <p>Available fuel loading: 25-35t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>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.</p>

Photo Id 16: View facing east towards forest vegetation within private property located at the end of Eucla Court.

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

Photo Id 18: View facing northeast towards recently modified vegetation located near the north western boundary adjacent to Gunn Place.

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

Photo Id 19: View facing north-northwest towards recently modified vegetation located near the north western boundary adjacent to Margaret Street.

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

Photo Id 20: View facing west-northwest towards recently modified vegetation located near the north western boundary adjacent to Buck Street.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central northwest of the subject site.</p> <p>Description: Vegetation maintained in a low threat state including parkland cleared vegetation and managed grass. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as a small patch of Forest Type A. However, this area is being maintained in a low threat state. Classification reduced to exclusion clause 2.2.3.2 (f). Vegetation boundary has been realigned and the remaining vegetation reclassified as Scrub Type D.</p>

Photo Id 21: View facing west-southwest towards recently modified vegetation central northwest of the subject site at the southern end of Murphy Place.

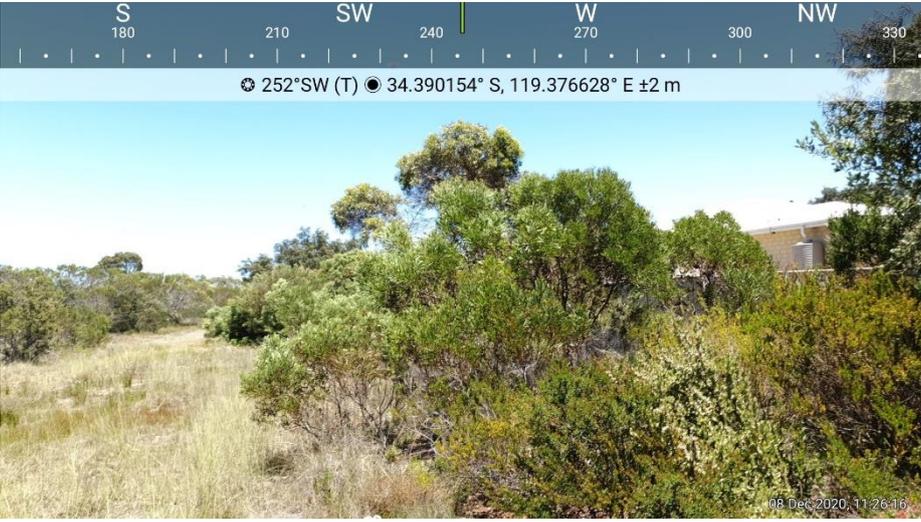
Plot	11	Classification or Exclusion Clause	Scrub Type D
			<p>Location: Central west of the subject site.</p> <p>Dominant species & description: Thin strip of closed scrub consisting of Eucalyptus, Melaleuca and Acacia understorey of sedges, grasses and some low shrubs (100-400mm).</p> <p>Average vegetation height: Scrubs 2-4m. Occasional eucalypt at 5m.</p> <p>Vegetation Coverage: >30% foliage cover.</p> <p>Available fuel loading: 25t/ha.</p> <p>Effective Slope: Downslope >0-5 degrees.</p> <p>Note: This area was previously classified as Forest Type A. However, the larger trees within the adjacent lot have been removed. Vegetation boundary has been realigned and the remaining vegetation reclassified as Scrub Type D.</p>

Photo Id 22: View facing west-southwest towards thin strip of scrub vegetation located central west of the subject site at the southern end of Murphy Place.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
 			<p>Location: Southwest of the subject site.</p> <p>Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>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.</p>

Photo Id 23: View facing west-northwest towards recently modified vegetation located to the southwest of the subject site to the south of Bremer Bay Road.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
 			<p>Location: Central of the subject site.</p> <p>Description: Vegetation maintained in a low threat state including parkland cleared vegetation and managed grass. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>Note: Previously classified as a thin strip of Forest Type A. However, this area is being maintained in a low threat state. Classification reduced to exclusion clause 2.2.3.2 (f).</p>

Photo Id 24: View facing east-northeast towards vegetation managed in a low threat state located central to the subject site to the north of Bremer Bay Road.

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			<p>Location: Central of the subject site.</p> <p>Description: Recently cleared vegetation. Excluded as per AS3959 exclusion clause 2.2.3.2 (f).</p> <p>Available fuel loading: <2 t/ha.</p> <p>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.</p>

Photo Id 25: View facing southwest towards vegetation managed in a low threat state located central to the subject site to the north of Bremer Bay Road.

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

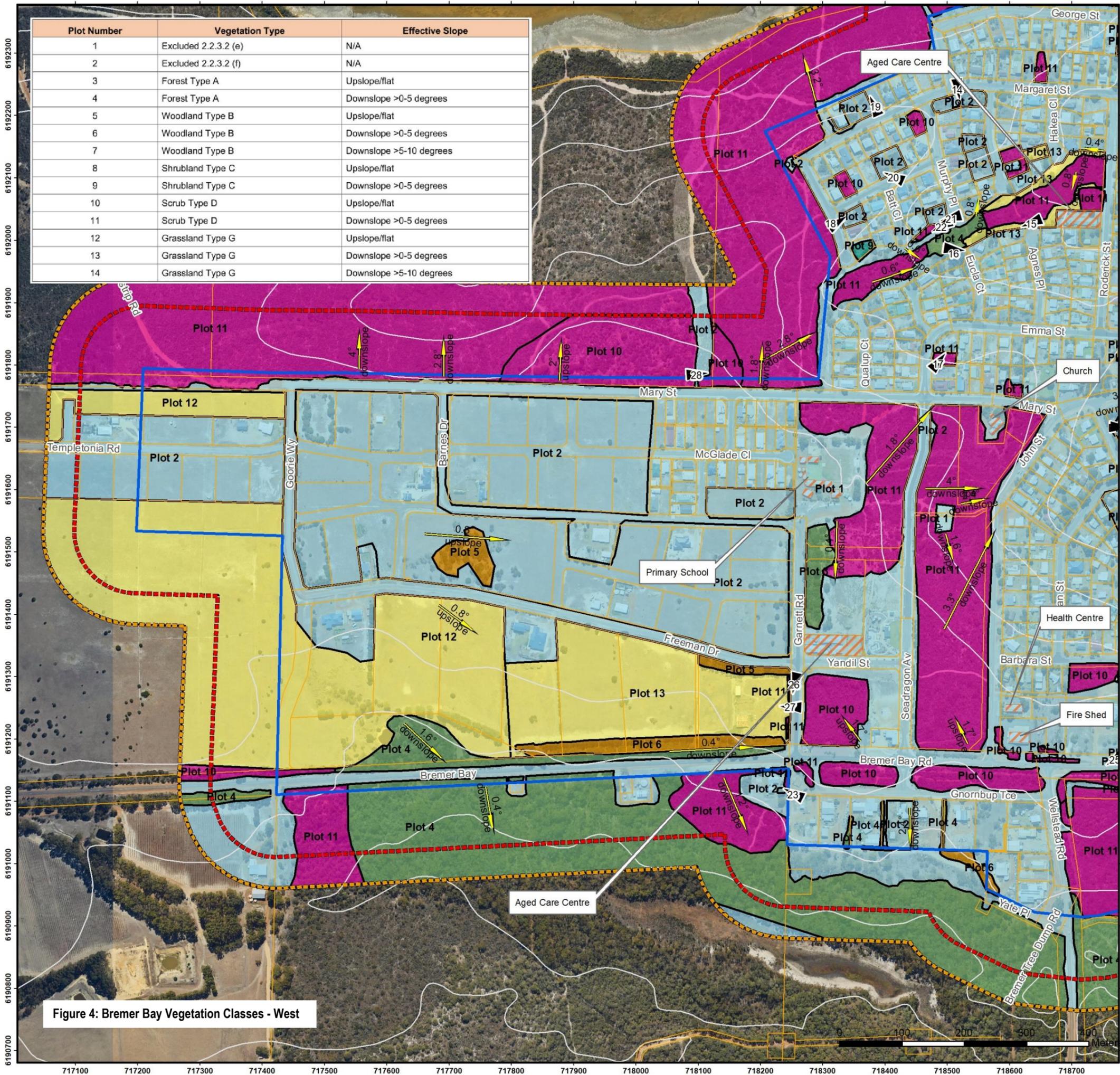
Photo Id 28: View facing east towards recently cleared firebreak located to the north of the subject site on the northern side of Mary Street.

Other notes/alterations on 2020 Plot data:

Vegetation plots have been merged into vegetation classification and slope range to simplify the report, see below for new plot numbers and corresponding old plot numbers.

- New Plot 1 Excluded 2.2.3.2 (e) - formally Plot 1
- New Plot 2 Excluded 2.2.3.2 (f) - formally Plot 14
- New Plot 3 Forest Type A Upslope/flat - formally Plot 7, 21 and 29
- New Plot 4 Forest Type A Downslope >0-5 degrees - formally Plot 9, 16 and 23

- New Plot 5 Woodland Type B Upslope/flat - formally Plot 3, 13 and 28
- New Plot 6 Woodland Type B Downslope >0-5 degrees - formally Plot 18
- New Plot 7 Woodland Type B Downslope >5-10 degrees - formally Plot 31
- New Plot 8 Shrubland Type C Upslope/flat - formally Plot 20
- New Plot 9 Shrubland Type C Downslope >0-5 degrees - formally Plot 30
- New Plot 10 Scrub Type D Upslope/flat - formally Plot 2, 4, 11 and 12
- New Plot 11 Scrub Type D Downslope >0-5 degrees - formally Plot 10, 17, 19, 24 and 26
- New Plot 12 Grassland Type G Upslope/flat - formally Plot 5
- New Plot 13 Grassland Type G Downslope >0-5 degrees - formally Plot 33
- New Plot 14 Grassland Type G Downslope >5-10 degrees - formally Plot 32



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	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
14	Grassland Type G	Downslope >5-10 degrees

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



Legend

- Bremer Bay Town Boundary
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Photo Point
- Slope Degrees
- 5m Contours
- Assets / Vulnerable Landuse
- 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
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Bremer Bay Vegetation - West		
BAL Assessor JB	QA Check KK	Drawn by SA
STATUS FINAL	FILE JER005	DATE 18/03/2021

Figure 4: Bremer Bay Vegetation Classes - West

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	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
14	Grassland Type G	Downslope >5-10 degrees

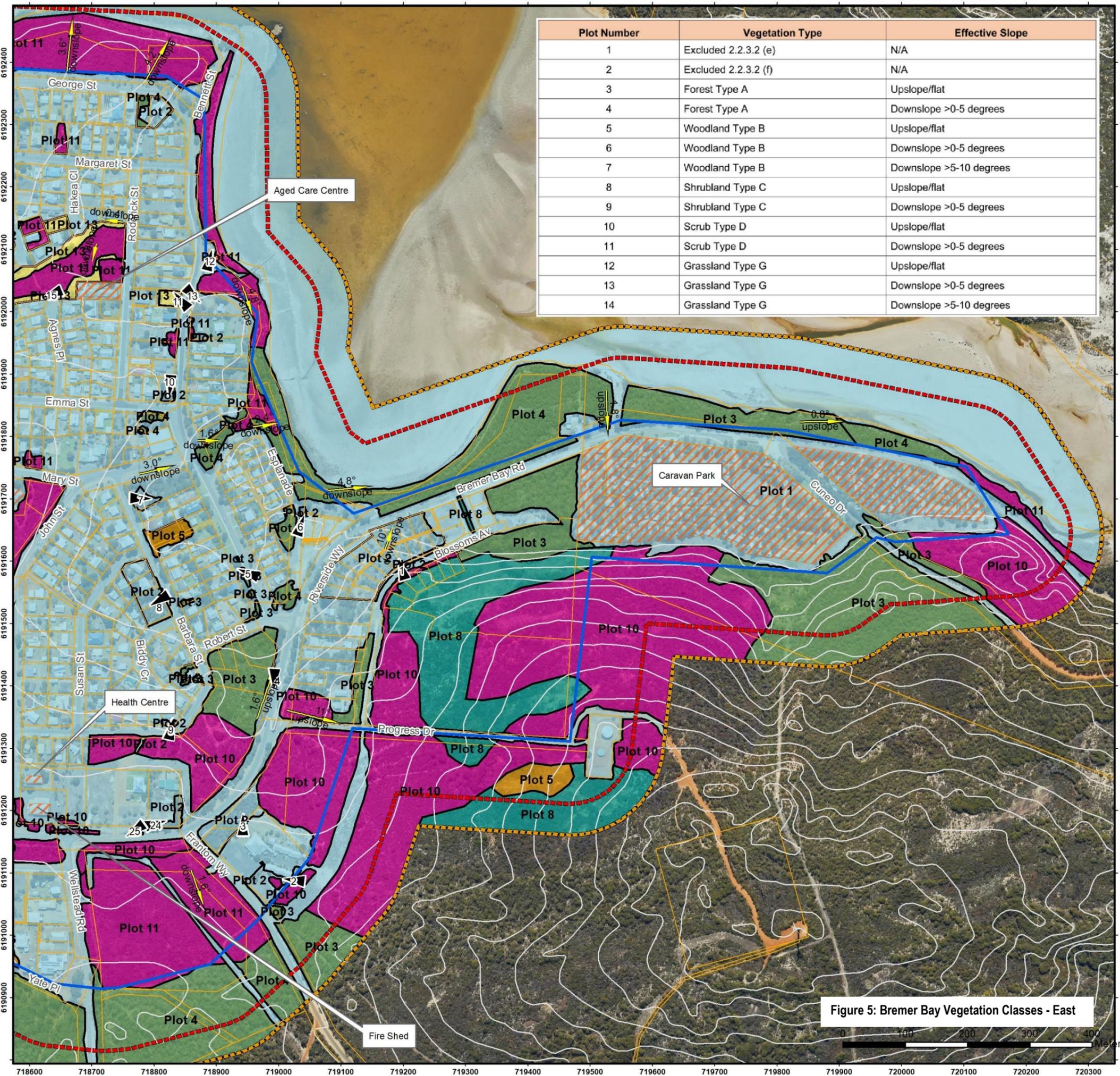


Figure 5: Bremer Bay Vegetation Classes - East

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



Overview Map Scale 1:100,000

- Legend**
- Bremer Bay Town Boundary
 - 100m Assessment Boundary
 - 150m Assessment Boundary
 - Cadastre
 - Photo Point
 - Slope Degrees
 - 5m Contours
 - Assets / Vulnerable Landuse
 - 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

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Bremer Bay Vegetation - East

BAL Assessor JB	QA Check KK	Drawn by SA
STATUS FINAL	FILE JER005	DATE 18/03/2021

4.2. Identification of Bushfire Impacts

The bushfire threats associated with the townsite include:

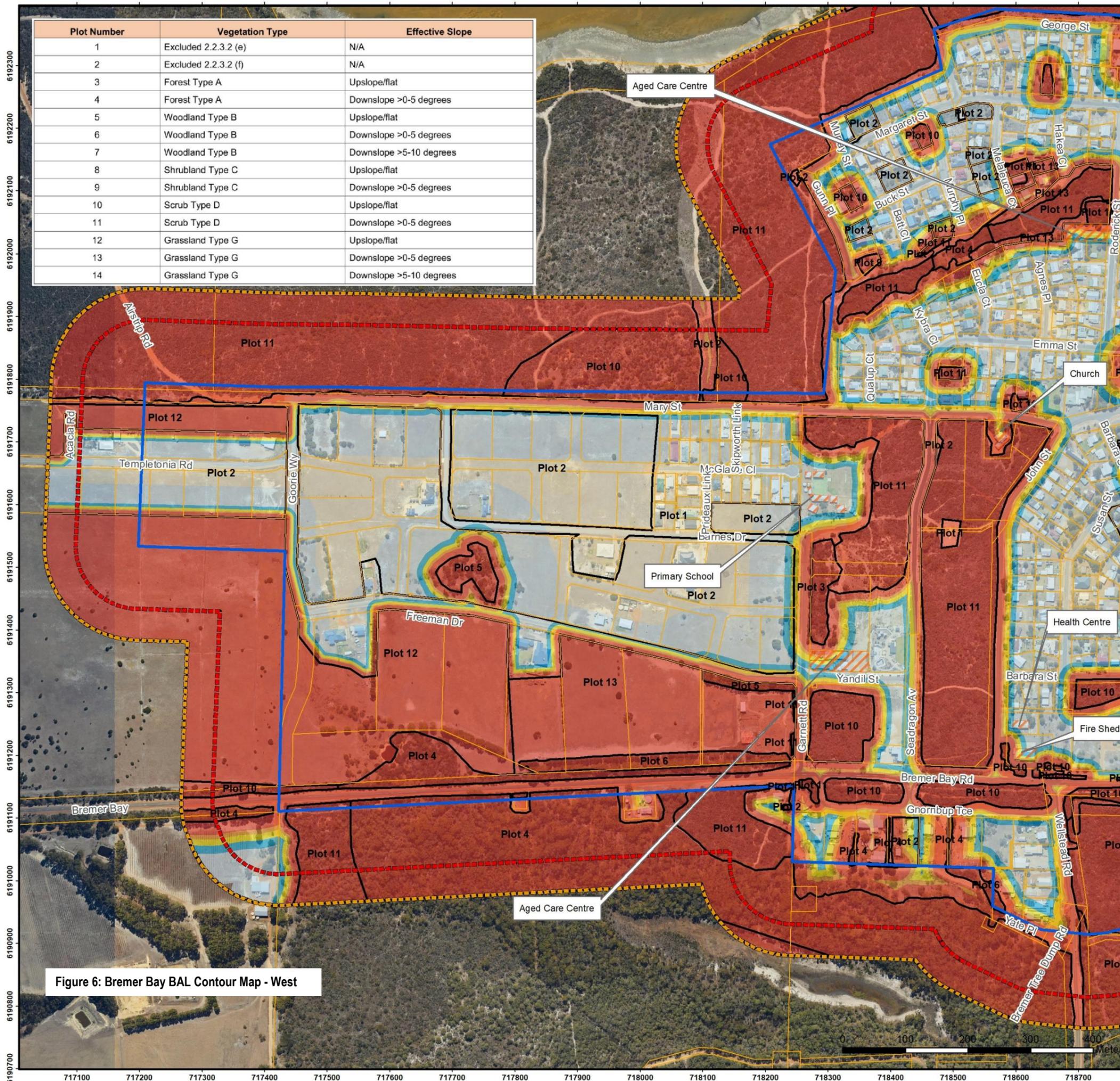
- The vegetated “wicks” which are present from the remnant reserve areas entering the town site to the west (north of Mary Street) and the south east/south west (adjacent to remnant vegetation reserves).
- Low fuel areas near the estuary to the north of the townsite which present little risk from bushfire radiant heat impacts, however on high Fire Danger Index (FDI) could present ember attack from the north and east.
- Central townsite reserves which consist of remnant vegetation present “wicks into the townsite”. Particularly of note those adjacent to the Vulnerable Land uses such as Age Care Units (Roderick Street), Primary School, Aged Care Units (Yandil Street), Health Centre and the Fire Shed.
- Small areas of remnant/overgrown vegetation in private property lots in the north and 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.

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/strategic works to the south of Bremer Borden Road and south of the caravan park site have had noted effect on bushfire risks to adjacent properties.
- 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 increase 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.
- 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. On the last field review of this site there was a thin break to the north and west of the site. The break has not been slashed or managed and has been reclassified as Grassland Type G. Therefore, increasing the overall risk to the aged care facility.
 - Fire station is no longer in BAL FZ from the east however still have 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 predominantly BAL 29; however, some further strategic work could be done to the east of the site in UCL reserve to reduce the BAL rating and further protect the school site.
 - The caravan park has had strategic 20m breaks applied to the south and south east, which has greatly increased protection of the site (s). Internally work has been undertaken to reduce fuel (especially noted at the caravan park is removal of dead tree limbs removed throughout the site). The 20m breaks should continue to be slashed and maintained in a low threat state.
 - 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.

4.3. BAL Contour Plan

BAL was assigned from each revised distinctive vegetation plot according to AS3950 and shown as a series of BAL Contours (Figure 6 and 7). 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.



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	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
14	Grassland Type G	Downslope >5-10 degrees

Figure 6: 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



Overview Map Scale 1:100,000

- Legend**
- Bremer Bay Town Boundary
 - 100m Assessment Boundary
 - 150m Assessment Boundary
 - Cadastre
 - Assets / Vulnerable Landuse
 - Vegetation/Plot Boundary
- BAL Contours**
- BAL-FZ
 - BAL-40
 - BAL-29
 - BAL-19
 - BAL-12.5
 - BAL-LOW

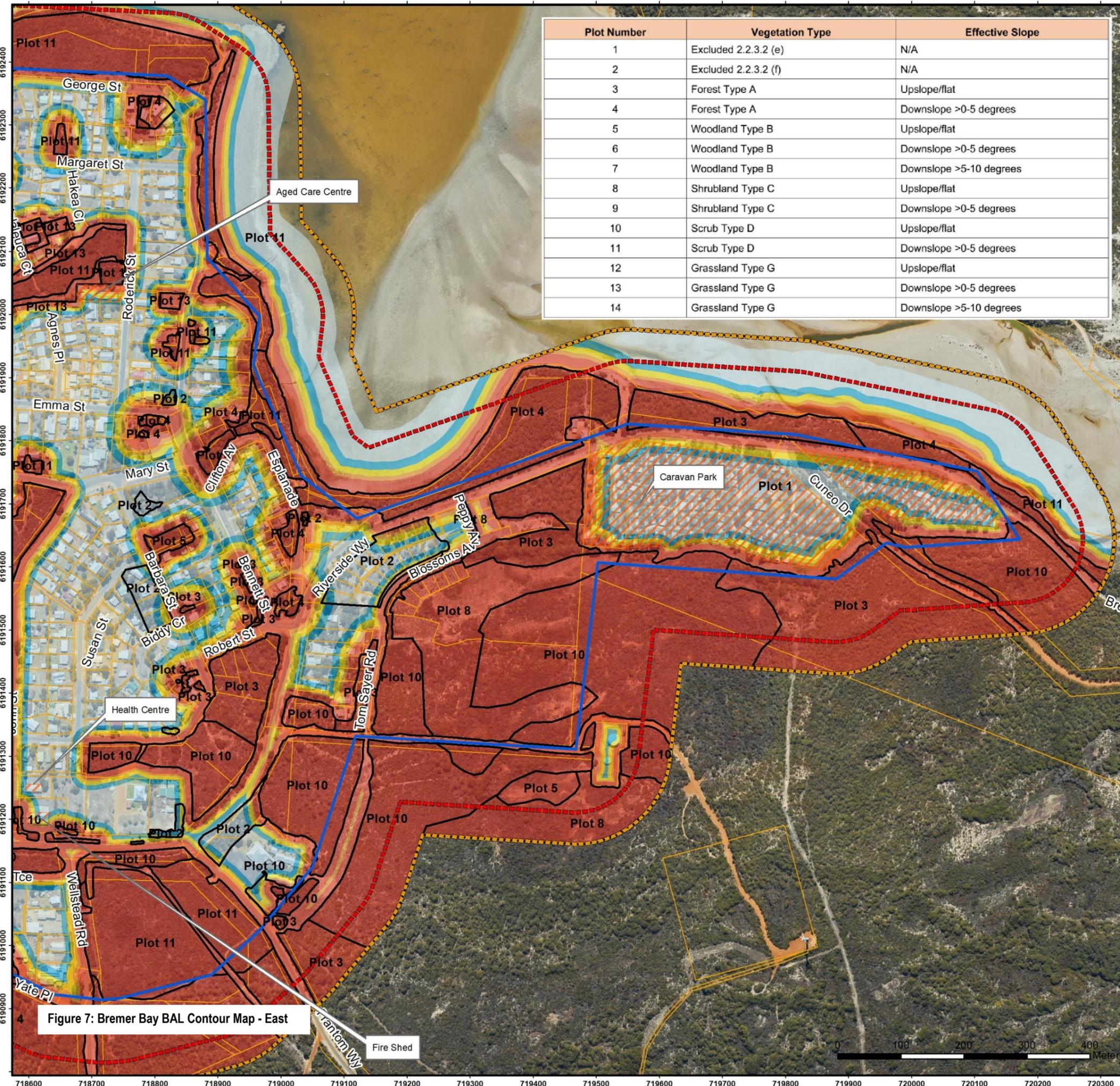
Scale 1:6,000 @ A3
 GDA MGA 94 Zone 50

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
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Bremer Bay BAL Contour - West

BAL Assessor JB	QA Check KK	Drawn by SA
STATUS FINAL	FILE JER005	DATE 18/03/2021



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



- Legend**
- Bremer Bay Town Boundary
 - 100m Assessment Boundary
 - 150m Assessment Boundary
 - Cadastre
 - Assets / Vulnerable Landuse
 - Vegetation/Plot Boundary
- BAL Contours**
- BAL-FZ
 - BAL-40
 - BAL-29
 - BAL-19
 - BAL-12.5
 - BAL-LOW

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
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Bremer Bay BAL Contour - East

BAL Assessor JB	QA Check KK	Drawn by SA
STATUS FINAL	FILE JER005	DATE 18/03/2021

4.4. Recommendations for bushfire management/mitigation

The assessment of Bremer Bay townsite has determined the following recommendations for bushfire mitigation, also refer to Figure 8 and 9 “Works Program”:

Vulnerable land uses

- The Vulnerable land use of the Aged care facility (Roderick Street), new units on Yandil Street and east of the Primary School should have 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 Fire Control Information are adjacent to UCL/Crown reserves and internal Shire reserves where unmanaged private land can act as “wicks” into the townsite from 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).
- 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 should consider prescribed burns to reduce fuel loads adjacent to the townsite. Autumn to winter burning is recommended in these areas. Some possible cells are nominally shown on the Works Program mapping.
- 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.
- Powerline slashing Recreation centre road and along Bremer Bay Borden Road is undertaken.
- Extend openings of strategic breaks to a minimum of 6m vertical clearance for fire truck and appliance access. Bollards and gates may be required to control access. Encroaching vegetation at entry/exit points to strategic breaks creates an unsafe work area for mitigation works to be undertaken.

Caravan Park

- Trimming of all trees along road boundary/edge to APZ standards is recommended.
- Maintenance of strategic break to the south of eastern portion 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 Tavern

- The Tavern undertakes fuel reduction to APZ standards to a minimum of 20m on the south and east or to the lot boundary to provide protection for visitors and staff.
- Consider small burn of land internal to the site and backing to the UCL reserve south of the property.
- Consider a Bushfire Emergency Evacuation Plan (BEEP) for the Tavern as per the policy requirements of SPP 3.7.
- Some vegetation modification has taken place to the north and south of the Tavern, this has improved the safety of the main building and the accommodation. Although, further vegetation modification is recommended on the southern side of the accommodation buildings.

A "Works Program" has been developed (Figure 8 and 9) 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.

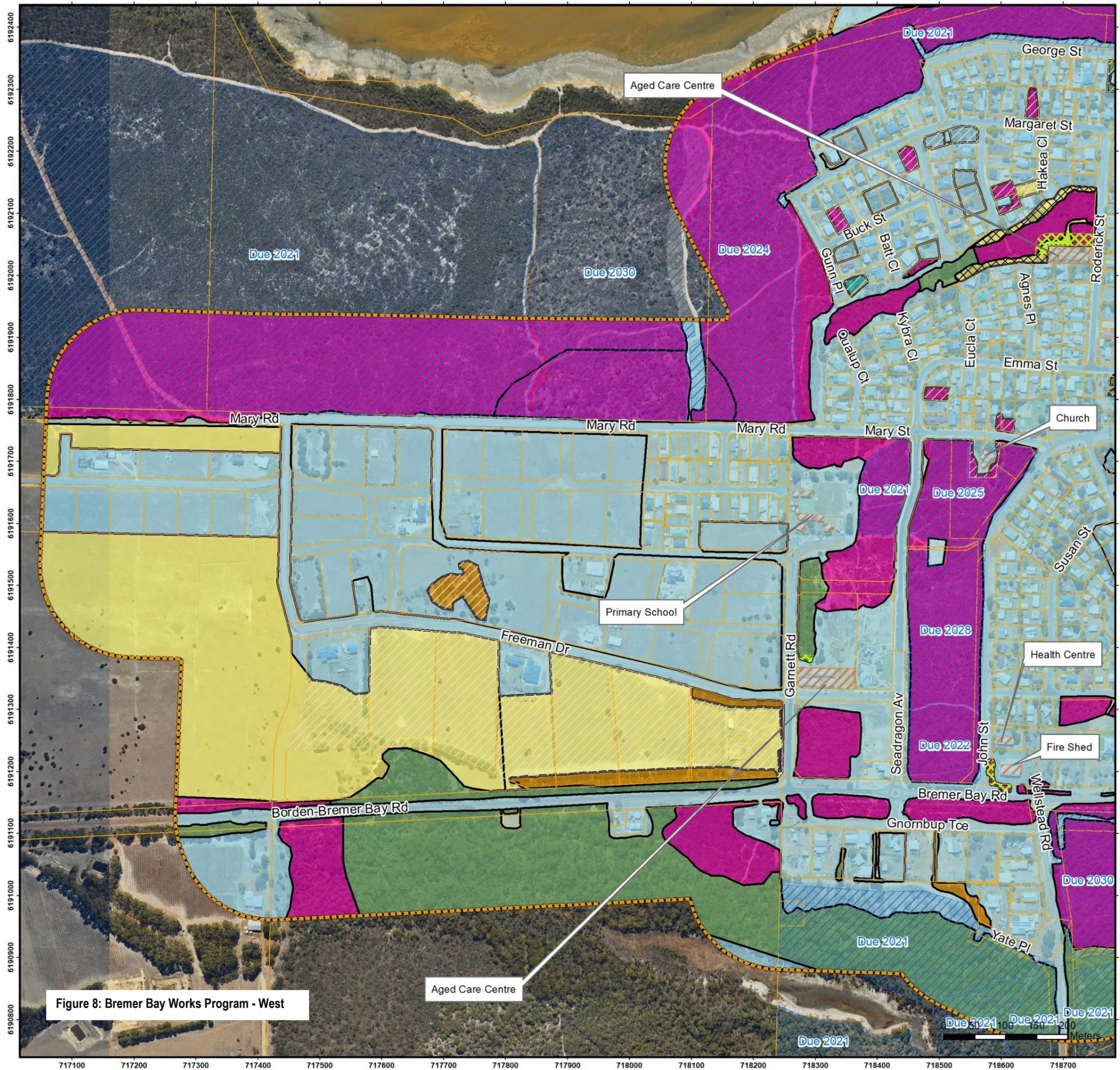
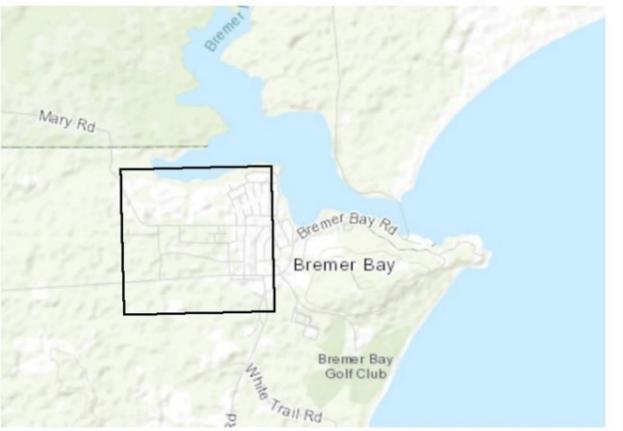


Figure 8: Bremer Bay Works Program - West

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



Overview Map Scale 1:100,000

- Legend**
- 150m Assessment Boundary
 - Cadastre
 - Assets / Vulnerable Landuse
 - PB - Prescribed Burning (Nominal Cells)
 - MW_APZ - Mechanical Works APZ Standards
 - MW_SB - Mechanical Works Strategic Break
 - Fire Control Notice to apply
 - Fuel reduce - Slashing
 - 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
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Bremer Bay Works Program - West 2021

BAL Assessor JB	QA Check BT	Drawn by SA
STATUS FINAL	FILE JER005	DATE 25/03/2021

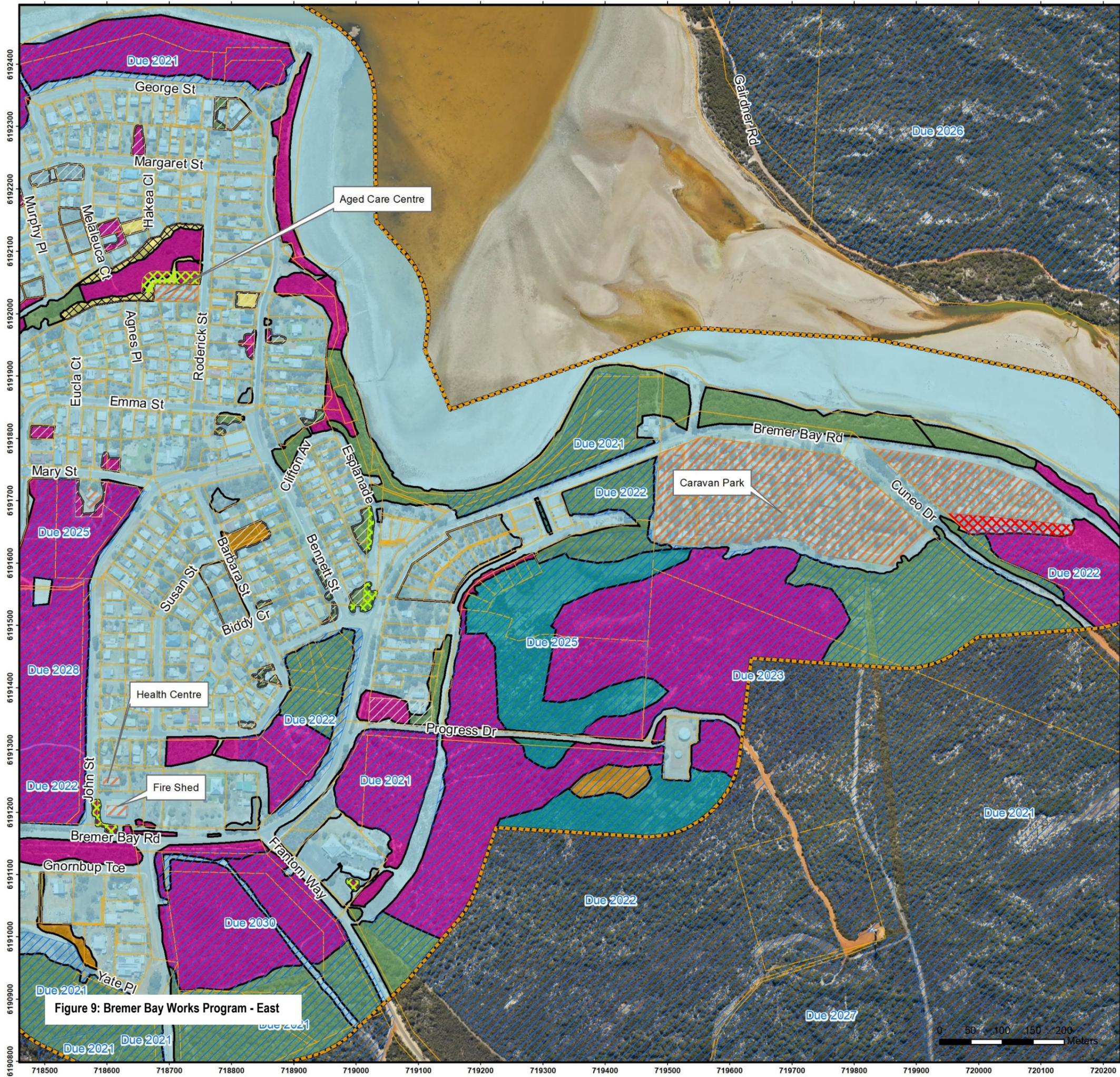


Figure 9: Bremer Bay Works Program - East

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

Denmark Office:
7/40 South Coast Highway
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Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450



Overview Map Scale 1:100,000

- Legend**
- 150m Assessment Boundary
 - Cadastre
 - Assets / Vulnerable Landuse
 - PB - Prescribed Burning (Nominal Cells)
 - MW_APZ - Mechanical Works APZ Standards
 - MW_SB - Mechanical Works Strategic Break
 - Fire Control Notice to apply
 - Fuel reduce - Slashing
 - 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
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Bremer Bay Works Program - East 2021

BAL Assessor JB	QA Check BT	Drawn by SA
STATUS FINAL	FILE JER005	DATE 25/03/2021

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, 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 1.3 (WAPC, 2017). 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 devastated by broadscale clearing, trees can remain and be trimmed and fuel reduced, clumps of shrubs can remain in areas 5m² 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.

6. References

AS 3959-2018 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 (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) (2017) *Guidelines for Planning in Bushfire Prone Areas Version 1.3*. 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) (2019). *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 2020/2021

Appendix A

APZ standards to apply
(WAPC, 2017)

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/m^2 (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, 2017)

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.

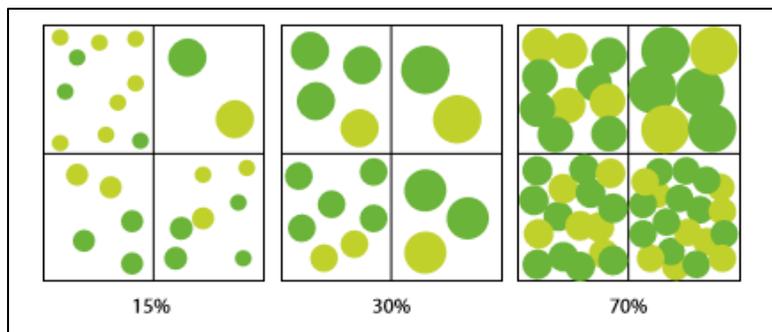


Figure 10: Tree Canopy Coverage – ranging from 15 to 70% at maturity (WAPC, 2017).

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
Crocea exalata – Small Crocea
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
Zygophyllum billardieri – Coast Twin Leaf