

BUSHFIRE DEVELOPMENT ASSESSMENT – LAKESIDE GOOLWA, GOOLWA NORTH SA.



**GOOLWA TOURIST
RESORT PTY LTD**

FINAL REPORT

22 MAY 2024



GRANT FLEMING ENVIRONMENTAL

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EXECUTIVE SUMMARY

Grant Fleming Environmental (GFE) has prepared the Bushfire Development Assessment (BDA) for the proposed Code Amendment to rezone the site from 'Rural Living' to 'Residential Park' to form an expansion of the Lakeside Goolwa Residential Park located at 4, 6-8, 12 and 16 Banfield Road, Goolwa North, SA 5214 (site) for Goolwa Tourist Resort Pty Ltd (client).

A preliminary risk assessment identified the presence of Classified Vegetation - Grassland (G) in accordance with AS3959:2018 located within 100 m surrounding the site with the exception of the land to the south of Banfield Road that is an established residential area. The Grassland (G) to the west of the site included the presence of olive orchards that increases the flammability. There is no separation distance from the Classified Vegetation along the western perimeter.

Where the site adjoins Fidock Road it provides 14 m separation from Grassland (G) within the rural residential properties, while for the remainder of the northern perimeter the site adjoins rural residential properties supporting Grassland (G) with no separation distance. The eastern end of the site adjoins the fringing wetland of Currency Creek where the Grassland (G) is comprised of a 50 m wide band of *Phragmites australis* (Common Reed). The site is separated from the Reed Bed by approximately 5 m.

The site was assessed against the requirements of the Hazards (Bushfire – Medium Risk) Overlay under the P&D Code of the PDI Act and Government of South Australia (2020) *Ministerial Building Standard MBS 008*.

Evidence of fire was recorded at location G at the site that is believed to have resulted from a planned burn off. Arson attack, a fire ignition associated with agricultural activity at the adjoining properties and vehicle related ignition remains the most likely causes of bushfire ignition in the area.

The lack of separation distance means that the western boundary and the majority of the northern boundary of the site have an assessed BAL of FZ. Recommendations have been made to increase the separation distance in order to reduce the BAL to an acceptable level (\leq BAL 19). As there is no planned development to the east within the Conservation Zone, BAL 12.5 will apply at along the zone boundary. BAL 12.5 will also apply at the southern perimeter due to the assigned BAL associated with the Hazards (Bushfire – Medium Risk) Overlay.

The internal access network of the proposed Residential Park must enable forward continuous movement of fire-fighting vehicles or be designed with a turn-around treatment in accordance with the Hazards (Bushfire – Medium Risk) Overlay.

Recommendations

The following key recommendations to improve various aspects of the proposed Residential Park and site with regard to bushfire safety and preparedness are provided as follows.

- Remove the piled flammable material from the site or if this is not practicable break up the mounded material into smaller piles following CFS guidelines.
- Future development is to design the access network to incorporate perimeter access, that is, position access between Ground leases and Classified Vegetation.
- Future development is to design the access network to enable continuous forward movement for emergency service vehicles.
- Future development is to design any no-through access within the Residential Park with an acceptable turning treatment.
- Future development is to design access or fire break (pathway with VMZ) between any reserves and Ground leases.
- Future development is to design the Residential Park to establish a minimum separation distance of 15 m along the western, north western, northern, north eastern perimeters in order to achieve a BAL rating of BAL 19 or BAL 12.5.
- Establish a 5m wide fire break (bare earth) along the southern perimeter (Banfield Road).
- Establish a 30 m APZ or other mechanism along the eastern perimeter (Currency Creek) with the Conservation Zone to be managed as a BBZ for the period in which the land is undeveloped.
- Establish a 15 m APZ along the western, north western, northern, north eastern perimeters with grass to ≤ 10 cm height for the duration of the Fire Danger Season. (Grassland Fuel Hazard Score at 70% cured should be ≤ 10 , Table 2). Refer to Figure 10.

GLOSSARY OF TERMS AND ABBREVIATIONS

GLOSSARY OF TERMS AND ABBREVIATIONS	
AC	Alexandrina Council
AMLR BMAP	Adelaide and Mount Lofty Ranges Bushfire Management Area Plan
APZ (A-zone)	Asset Protection Zone
Assets	Assets may be related to human settlements including existing infrastructure; roads, footpaths, parks, buildings or environmental assets; components of the environment that may be at risk from bush fire including rated species or socioeconomic assets such as historic or culturally significant places or elements of the environment.
BAL	Bushfire Attack Level. AS 3959 (2009) describes six levels of risk of bushfire attack including BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ and are based upon the potential exposure to heat flux thresholds, expressed as kW/m ² .
BDA	Bushfire Development Assessment – the process of evaluating a development within a bushfire prone area against the legal requirements to protect property and lives against bushfire risk.
DEWNR	Department of Water and Natural Resources
BBZ (B-zone)	Bushfire Buffer Zone
BOM	Bureau of Meteorology
BMPU	Bushfire Management Planning Unit
BPA	Bushfire Prone Area/ Bushfire Protection Area
Bushfire	A general term used to describe fire in vegetation, including grass fire and forest fire.
Bushfire Hazard	The potential severity of a bushfire, which is evaluated by fuel load, fuel arrangement and topography under a given climatic condition.
Bushfire Management	A systematic process that identifies and assesses assets and provides a range of treatments that contributes to the wellbeing of communities and the environment, which suffer the adverse effects of wildfire/bushfire.
Bushfire Risk	The chance of a bushfire igniting, spreading and causing damage to the environment, community or assets.
Bushfire Threat	Potential bushfire exposure of an asset due to the proximity and type of a hazard, and the slope on which the asset is situated.
CFS	Country Fire Service, South Australia
Clearance	The physical removal of vegetation. This may involve the removal of all vegetation from an area, for example on a fire track, through to trimming branches or the selective removal of species or a stratum of vegetation. With the exception of a fire track, generally clearance does not mean the removal of all vegetation.
C-zone	Conservation Zone
DA	Development Application
DEM	DEM Digital Elevation Model
DPF	Designated Performance Feature
DENR	Department of Environment and Natural Resources (Now Department for Environment and Water).
DTS	Deemed-to-Satisfy

GLOSSARY OF TERMS AND ABBREVIATIONS	
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
X-zone	Exclusion zone
F BMAP	Fleurieu Bushfire Management Area Plan
FDI	Fire Danger Index
FES Act	Fire and Emergency Services Act 2005
FFDI	Forest Fire Danger Index
FLA	Fuel load assessment
FMZ	Fire Management Zone
FRL	Fire Resistance Level
GAFMWG	Government Agency Fire Management Working Group
GFE	Grant Fleming Environmental
GIS	Geographic Information System
GVM	Gross Vehicle Mass
ha	Hectare, 1 hectare = 10,000 metres ² .
IAPZ	Inner asset protection zone - land adjacent to assets with a low fuel hazard, reducing the level of ember attack, direct flame contact and radiant heat impact and providing a defensible space with increased safety under some conditions (ESA 2014 ¹).
K	Kelvin the primary unit of temperature in the International System of Units.
LG Act	Local Government Act 1999
LSA Act	<i>Landscape South Australia Act 2019</i>
MNES	Matters of national environmental significance
NCC	National Construction Code
Ng	Average annual cloud to ground lightning flash density
NSW RFS	New South Wales Rural Fire Service
NV Act	South Australian <i>Native Vegetation Act 1991</i>
OAPZ	Outer asset protection zone - land adjacent to an inner asset protection zones, where fuel hazard is reduced to a lesser extent than within the IAPZ.
PBP	NSW RFS 2019. <i>Planning for Bushfire Protection: A guide for Councils, planners, fire authorities and developers.</i>
P&D Code	Planning and Design Code, South Australia
PDI Act	<i>Planning, Development and Infrastructure Act 2016</i>
PO	Performance Outcomes
PRA	Preliminary Risk Assessment
S Zone (SFMZ)	Strategic Fuel Management Zone - These zones are strategically located to slow the spread of unplanned fires and reduce fire intensity and spotting.
SA SBCC	South Australian State Bushfire Coordination Committee
VMZ	A zone in which vegetation management measures are prescribed – typically either as an asset protection zone or bushfire buffer zone.

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1 INTRODUCTION

1.1 Purpose

Grant Fleming Environmental (GFE) has been engaged by Goolwa Tourist Resort Pty Ltd (Client) to undertake a Bushfire Development Assessment (BDA) of the proposed code amendment encompassing the following properties in Goolwa North, SA 5214 (site), Figure 1.

- CT 5693/461 Parcel D13542 A103 Area 2.5072 ha
- CT5692/583 Parcel D13542 A106 Area 1.9662 ha
- CT 5062/315 Parcel D13542 A107 Area 1.9719 ha
- CT 6095/954 Parcel D89165 A54 Area 2.6571 ha

This BDA forms part of the Code Amendment seeking to rezone land that forms the site from *Rural Living* to *Residential Park*. The small portion of land adjoining Currency Creek that is zoned *Conservation* is not proposed to be rezoned or to be developed.

As the site is a designated bushfire prone area mapped as within the Hazards (Bushfire – Medium Risk) Overlay of the Planning and Design Code (P&D Code) under the *Planning, Development and Infrastructure Act 2016* (PDI Act) any development on the site would not automatically trigger a referral to the South Australian Country Fire Service (CFS). Any proposed development on the site may be referred by Alexandrina Council (AC) or by an alternate trigger mechanism. The CFS (or a suitably qualified consultant) may undertake a BDA of the site; existing and proposed bushfire overlay amendments and adjoining areas against the statutory requirements that relate to bushfire risk and mitigation.

This BDA will review the vegetation within and surrounding the site against the requirements of classified vegetation in accordance with AS3959:2018. The BDA will consider appropriate bushfire protection measures (BPMs) for incorporation into any future proposed expansion of the Lakeside Goolwa Residential Park at the site. The BDA will consider the appropriate bushfire risk associated with the site following the Code Amendment., while acknowledging that additional bushfire development assessment and associated bushfire protection measures may be required once specific development plans have been established.

This BDA reviews the requirements that may apply to a future proposed development including the positioning of ground leases, access and egress and required dedicated fire-fighting water system with respect to classified vegetation that determines the Bushfire Attack Level (BAL) applicable to the construction of accommodation within a development. Statutory requirements including the Performance Outcomes (PO) required in the National Construction Code (NCC) will be considered including:

- Siting
- Access and Egress (public and emergency vehicles)
- Water supply
- Vegetation clearance
- Construction structural standards
- Firefighting equipment

Bushfire Protection Measures (BPM) will be recommended to minimize the threat of bushfire and to protect life and property in relation to a Residential Park at the site.

1.2 BDA objectives

The BDA objectives are as follows:

- Conduct a Preliminary Risk Assessment (PRA) to establish the nature of bushfire risk that the site may be exposed to.
- Review the proposed Code Amendment against the requirements of the following:
 - Hazards (Bushfire – Medium Risk) Overlay under the P&D Code of the PDI Act.
 - Proposed State-wide Bushfire Hazards Overlay Code Amendment implications for the site
 - Government of South Australia. Ministerial Building Standard MBS 008. Designated Bushfire Prone Areas – Additional Requirements July 2020
 - National Construction Code of Australia (NCC)
 - Australian Standard 3959 – Construction of buildings in bushfire prone areas.
- Consider the proposed development conformance with the NSW Rural Fire Service 2019 *Planning for bushfire protection (PBP) guide*.

1.3 Proposed Code Amendment

The site is located entirely within the Alexandrina Council (AC) Local Government Area (LGA), Figure 1. The property details that comprise the site and are the subject of the Code Amendment are summarized in Table 1. The site is comprised of four properties that occupy approximately 9.1024 ha. The eastern portion of the site is zoned Conservation and this portion of the site is not proposed to be rezoned or developed. The Code Amendment proposes to rezone land zoned as Rural Living to Residential Park. The site is adjacent to the existing Lakeside Goolwa Residential Park that is zoned Residential Park and the future development proposed for the site involves the expansion of the Residential Park.

Table 1. Location of Proposed Code Amendment

Landowner:	Goolwa Tourist Resort Pty Ltd		
Site Address:	16 Banfield Road 12 Banfield Road 6 – 8 Banfield Road 4 Banfield Road		
Local Government Area:	Alexandrina Council	Hundred:	Goolwa
Title ID:	CT 5693/461 CT5692/583 CT 5062/315 CT 6095/954	Parcel ID	D13542 A103 D13542 A106 D13542 A107 D89165 A54

Subject to future design and the outcome of the Code Amendment process, the Residential Park development may include a nursery, community garden shed, accommodate caravan storage and a residential area for up to 180 ground leases, a linear park, river conservation zone, outdoor recreation area, pool, courts and resort function centre. The main entry into the Residential Park will likely be from Banfield Road.

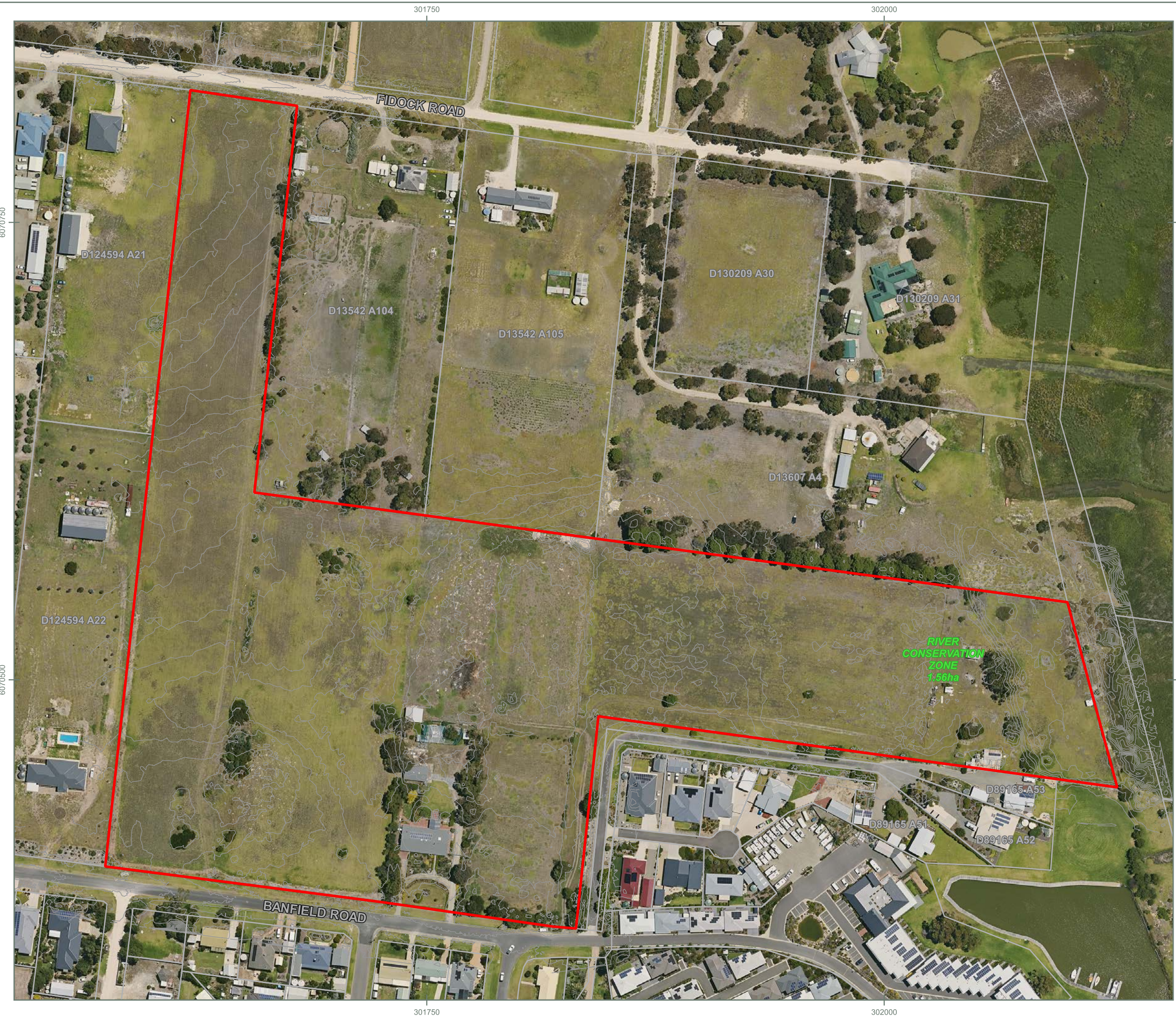
Bushfire Development Assessment – Lakeside Goolwa, Goolwa SA.

The Native Vegetation Overlay applies to the property and all remnant native vegetation present on the site is protected under the *Native Vegetation Act 1991* (NV Act).

The Hazards (Bushfire – Medium Risk) Overlay applies to the site and the BAL is designated BAL 12.5 for the entire site.

Additional overlays that apply to the site include; Airport Building Heights (Aircraft Landing Area), Building Near Airfields, Hazards (Flooding – Evidence Required), Murray Darling Basin and River Murray Flood Plain Protection Area.





**BUSHFIRE DEVELOPMENT
ASSESSMENT - LAKESIDE
GOOLWA RESIDENTIAL PARK
CODE AMENDMENT,
GOOLWA NORTH SA**

**SOUTHERN LIFESTYLE VILLAGES
PTY LTD**

**PROPOSED CODE
AMENDMENT**

Legend

- Elevation Contour
- Approximate Cadastral Boundary
- ▭ Site Boundary

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2. Roads data sourced from SA Data, sourced 25.05.2021.
3. Base drawing sourced from the client.

0 20 40 60 80 100 m

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PROJECTION: GDA2020 / MGA zone 54
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DATE: 19/03/2024
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FIGURE 1



BUSHFIRE DEVELOPMENT ASSESSMENT - LAKESIDE GOOLWA RESIDENTIAL PARK CODE AMENDMENT, GOOLWA NORTH SA

SOUTHERN LIFESTYLE VILLAGES PTY LTD

REGIONAL LOCATION MAP

Legend

- CFS Firestation
- Road
- Watercourse
- NPWSA Reserve
- Site Boundary
- Waterbody

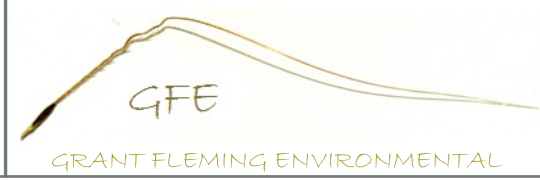
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2. Roads, conservation areas, vegetation heritage area and sa vegetation data sourced from SA Data, sourced 25.05.2021 and 17.11.2023.
3. Base drawing sourced from the client.

0 500 1,000 1,500 2,000 m

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FIGURE 2



1.4 Bushfire Protection Area (BPA)

The site is located within the Hazards (Bushfire – Medium Risk) Overlay under the P&D Code of the PDI Act as mapped by the Attorney General’s Department (Government of South Australia 2022). The southern boundary of the site adjoins an area classified as Hazards (Bushfire – Urban Interface) Overlay, while the site and the land adjoining it to the west, north and east is all classified as within the Hazards (Bushfire – Medium Risk) Overlay, Figure 3. In accordance with the Ministerial Building Standard MBS 008 the Bushfire Attack Level (BAL) within an area identified as being within the Hazards (Bushfire – Medium Risk) Overlay is deemed to be BAL 12.5. The existing Lakeside Goolwa Residential Park adjoining the southeast corner of the site is within the Hazards (Bushfire – Urban Interface) Overlay.



Figure 3 Bushfire Protection Areas (Blue – Medium Bushfire Risk, Grey – Interface Bushfire Risk) Site in yellow. Source: <https://sappa.plan.sa.gov.au/>

GFE is aware that the State-wide Bushfire Hazards Overlays are being reviewed at the time this report was in preparation and that an outcome of this review may be the reclassification of the site Bushfire Overlay. The proposed Bushfire Overlays Code Amendment for the site remains unchanged with the site remaining classified as within the Hazards (Bushfire – Medium Risk) Overlay. However the existing Lakeside Goolwa Residential Park is proposed to change classification from Hazards (Bushfire – Urban Interface) Overlay to the Hazards (Bushfire – Medium Risk) Overlay.

Following the future development of the site the Hazards (Bushfire – Urban Interface) Overlay is considered appropriate for the bushfire risk that the developed area of the site will be exposed to. The area zoned for conservation to the east of the site adjoining Currency Creek should retain the Hazards

(Bushfire – Medium Risk) Overlay due to the bushfire risk posed by the reed beds along the margin of the waterway.

GFE has determined the BAL along the site perimeter in accordance with Australian Standard AS3959 - *Construction of buildings in bushfire-prone areas* (AS 3959) to ensure that the BAL-12.5 would be appropriate and to identify areas in which additional bushfire mitigation measures would be required in order to achieve BAL 12.5.

1.5 Surrounding land use

Immediately north of the site (Allotment 103) is Fidock Road, Photo 1 while rural residential properties occur to the north of Allotments D13542 A106, D13542 A107 and D89165 A54, Photo 2.



Photo 1 Rural residential land north of D13542 A103 across Fidock Road.



Photo 2 Rural residential land north of D89165 A54

East of D13542 A103, the allotment that extends from Banfield Road through to Fidock Road are rural residential properties, while to the east of D89165 A54 is an arm of Currency Creek, Photo 3. The creek bank is dominated by *Phragmites australis* (Common Reed) and the area is mapped as supporting a Tall Closed Grassland (RM2902) native vegetation association with an open water channel beyond the bank of reeds.



Photo 3 View East towards Currency Creek – *Phragmites australis* (Common Reed).

South of the site is Banfield Road with residential properties that form Goolwa North, Photo 5. There is an existing residence on D13542 A107 that forms part of the site and will be demolished to accommodate the future development, Photo 4 and there is another residence located in the far south eastern corner of

the site. The vegetation immediately surrounding both residences has been planted and is therefore not afforded protection under the NV Act. Further to the southeast of the site is the existing Lakeside Goolwa Residential Park.



Photo 4 Residential property (6-8 Banfield Road) that is to be demolished.



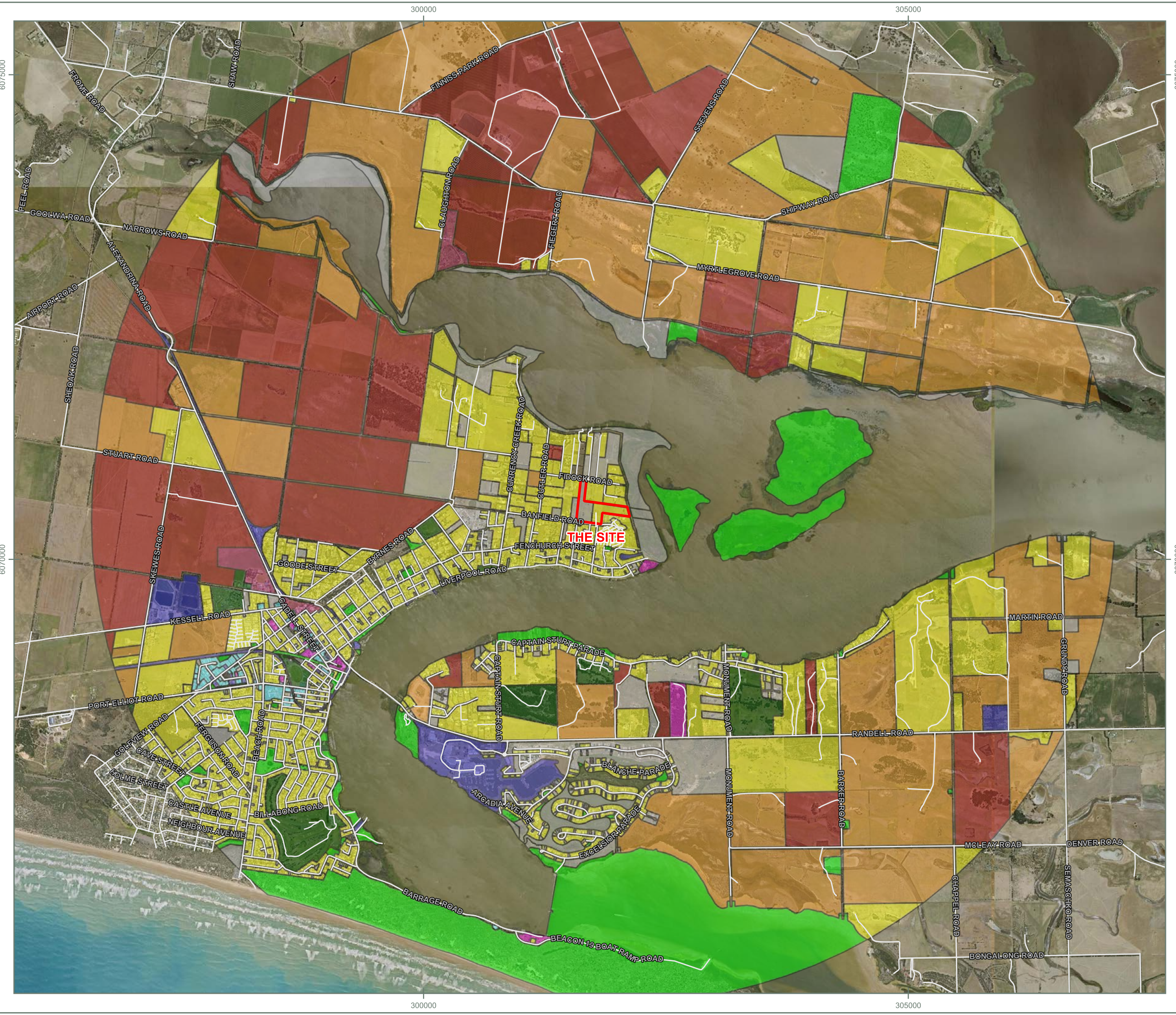
Photo 5 Residential properties on the southern side of Banfield Road, opposite the site.

The western side of the site is characterised by rural residential properties that have Olive groves planted and beyond the adjoining properties the majority of properties are rural residential with intensive land use with some areas of dryland agriculture remaining further to the west.



Photo 6 Olive production west of the site.

The generalised land use surrounding the site is shown in, Figure 4.



BUSHFIRE DEVELOPMENT ASSESSMENT - LAKESIDE GOOLWA RESIDENTIAL PARK CODE AMENDMENT, GOOLWA NORTH SA

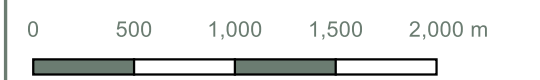
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SURROUNDING LAND USE

- Legend**
- Road
 - ▭ Site Boundary
 - Generalised Land Use**
 - ▭ Agriculture / Horticulture
 - ▭ Commercial / Retail Commercial
 - ▭ Education
 - ▭ Food Industry
 - ▭ Golf Course / Recreation
 - ▭ Livestock
 - ▭ Mine / Quarry
 - ▭ Public Institution
 - ▭ Reserve
 - ▭ Residential / Non-private
 - ▭ Residential / Rural Residential
 - ▭ Utility Industry
 - ▭ Vacant / Vacant Residential

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- Roads and generalised land use data sourced from SA Data, sourced 25.05.2021 and 17.11.2023.
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FIGURE 4

1.6 Legislative Context

1.6.1 The Local Government Act 1999

The AC has a responsibility under the *Local Government Act 1999* (LG Act) to take action that will help to protect the Council area from bushfires or acts of arson. Under Section 7 of the LG Act Council is required “(d) to take measures to protect its area from natural and other hazards and to mitigate the effects of such hazards”.

The AC is currently responsible for managing the road reserves on Banfield Road and Fidock Road that provide street frontages to the site to the south and north of the site respectively.

The LG Act is not prescriptive in that it does not instruct Council with regard to how Council is to manage bushfire, although it does provide Council with some powers to make orders (Section 254), including the power to “remove overgrown vegetation, cut back overhanging branches, or to remove a tree” and the power to make by-laws (Section 246).

1.6.2 Fire and Emergency Services Act 2005 & Fire and Emergency Services (Review) Amendment Act 2009

AC is provided with more extensive fire prevention powers under the *Fire and Emergency Services Act 2005* (FES Act) that incorporates the *Fire and Emergency Services (Review) Amendment Act 2009* and forms the principal legislation under which AC operates with regard to fire management. Section 105F requires private land owners to:

- (a) prevent or inhibit the outbreak of fire on the land
- (b) prevent or inhibit the spread of fire through the land
- (c) protect property on the land from fire
- (d) minimise the threat to human life from fire on the land.

This legislation also creates the establishment of the fire danger season and establishes the fire districts.

Under Section 105F of the *Fire and Emergency Services Act 2005* (FES Act) Council can issue notices to landholders in order to clean up fire fuels and to prepare and maintain their property ahead of the fire danger season.

1.6.3 Planning, Development and Infrastructure Act 2016

The PDI Act is the principal legislation that addresses bushfire risk within South Australia with regard to planning and building within bushfire prone areas.

Bushfire prone land within South Australia has been categorized and mapped into six Bushfire Protection Areas (BPAs). Each BPA category corresponds to the level of bushfire risk determined to be present. The six categories as follows are published as Overlays in the *Planning and Design Code* within the *Planning, Development and Infrastructure Act 2016*:

- Hazard (bushfire – general risk) Overlay
- Hazard (bushfire – medium risk) Overlay
- Hazard (bushfire – high risk) Overlay
- Hazard (bushfire – regional) Overlay

- Hazard (bushfire – outback) Overlay
- Hazard (bushfire – urban interface) Overlay

The Bushfire Protection Area (BPA) for the area in which the site occurs has been designated as MEDIUM. The Hazards (Bushfire – Medium Risk) Overlay as published in the *Planning and Design Code* within the *Planning, Development and Infrastructure Act 2016* applies to the site. In addition to the Hazards (Bushfire – Medium Risk) Overlay the *Ministerial Building Standard MBS 008 - Designated bushfire prone areas - additional requirements* document identifies bushfire prone areas and additional bushfire safety requirements.

The South Australian PDI Act contains the Building Rules that call up the Building Code of Australia (BCA) that is in turn comprised of Volume 1 and 2 of the National Construction Code (NCC). The Australian Standard AS 3959-2009 *Construction of Buildings in Bushfire Prone Areas* is called up by the BCA for residential buildings and accommodation buildings on land that has been declared bushfire prone.

The NCC specifies general fire safety construction and performance requirements.

1.6.4 Native Vegetation Act 1991

The proposed development is located within the application boundary of the *Native Vegetation Act 1991* (NV Act), that is the NV Act applies to the proposed development area. A native vegetation clearance application is required to be submitted the Native Vegetation Council (NVC) for approval prior to removal of native vegetation at the site. A native vegetation assessment has been prepared for the site by Fleming (2024) and the majority of trees at the site are planted or non-native species and are thereby not afforded protection under the NV Act.

1.6.5 National Parks and Wildlife Act 1972

Landscape managers must be cognisant of the potential for bushfire risk management control measures to have a negative impact upon threatened plant and animal species present within the landscape and avoid such impacts.

1.6.6 Landscape South Australia Act 2019

The site is located within the Hills and Fleurieu Landscape Management Region established in accordance with the *Landscape South Australia Act 2019* (LSA Act). A part of this legislation relevant to any future development is the requirement for landholders to control proclaimed weed species, in particular as some proclaimed weeds may increase the intensity of a bushfire and its ability to spread.

1.6.7 Environment Protection Biodiversity and Conservation Act 1999

The *Environment Protection Biodiversity and Conservation Act 1999* (EPBC Act) must be considered where bushfire or bushfire management measures may impact upon matters of national environmental significance (MNES) such as the RAMSAR listed wetland of International Significance that occurs adjacent the eastern end of the site.

2 BUSHFIRE HISTORY

2.1 Fires Last 10 Years

The bushfire history mapping has been obtained from Fire Management Maps (2023), Nature Maps (2023) and site observations, while it is acknowledged that small fires that burn less than 1 ha in size have historically not been recorded by the CFS. The bushfires discussed are typically within a 5 km buffer area of the site and have been mapped, Figure 5, although significant bushfires beyond this buffer area have also been included where they are considered to provide important context. Prescribed burns have been excluded from the discussion unless they escaped control and became a bushfire.

The site walkover identified evidence of fire at location G (E301697 N6070559) within the site, Photo 7, Photo 8 and Photo 9, Figure 6. As no bushfires have been recorded as having occurred across the site a possible explanation may be the burning off a rubbish heap or burning crop stubble. Regarding the timing of when the fire occurred while it is difficult to be precise the surrounding vegetation shows no evidence of fire suggesting that it has grown after the fire event. A review of available aerial/satellite imagery shows what appears to be a spot like fire scar from 19 January 2015 and with vegetation at the location intact on 6 November 2010, therefore it is considered that the fire occurred approximately 9 to 10 years ago most likely in 2014 as a result of a burn-off. The view that the fire occurred as a result of a burn-off is supported by the presence of an additional area that appears to have been produced by a pile burn in 2010, Photo 10.



Photo 7 Charred timber at location G (E301697 N6070559)



Photo 8 Burnt timber at location G



Photo 9 Burnt timber with moss present at location G.



Photo 10 Burnt patch (circled) in the paddock 6 November 2010

The practice of burning off at the site may explain the patchy distribution of *Acacia* species as the species present at the site may be triggered to germinate following exposure to a hot fire.

The Fleurieu Bushfire Management Area Plan (F BMAP) provides a list of major bushfires within the Fleurieu BMA including the 2009 Clayton bushfire, 2013 Finnis bushfire that burnt approximately 332 ha and 2015 Mosquito Hill Bushfire that burnt approximately 300 ha (BMPU 2017).

In the reported statistics for the Goolwa Brigade for 2022 – 2023 there were 10 (5.65%) grass/stubble fires responded to in the 177 incidents reported (CFS Promotions Unit 2024). There were two responses to mobile property fires involving passenger vehicles (1.13%) (CFS Promotions Unit 2024). There was a single response to a brush fence fire, a tree fire, three responses to rubbish fires and four responses to unspecified outdoor fires.

A bushfire occurred at Clayton Bay², Figure 5 (Incident Number 1510095) approximately 8.1 km east of the site on 4 January 2023 and burnt approximately 14.92 ha of agricultural land, Photo 11 (Naturemaps 2024). The footprint of this bushfire was immediately adjacent to the 2009 Clayton Bay¹ bushfire.



Photo 11 Clayton Bay bushfire 4 January 2023 (Anon 2023 Uncredited Photo: Victor Harbor Times 10/1/2023)

The Milang Bushfire occurred on 3 December 2018 approximately 15.5 km NE of the site, Photo 12. This bushfire burnt approximately 32 ha of reed beds south of the township of Milang. This bushfire has been included in this review as it demonstrates the potential threat posed by reed beds once they have cured. The eastern end of the site is adjacent a fringing wetland that is approximately 50 m wide dominated by *Phragmites australis* (Common Reed), Photo 3.

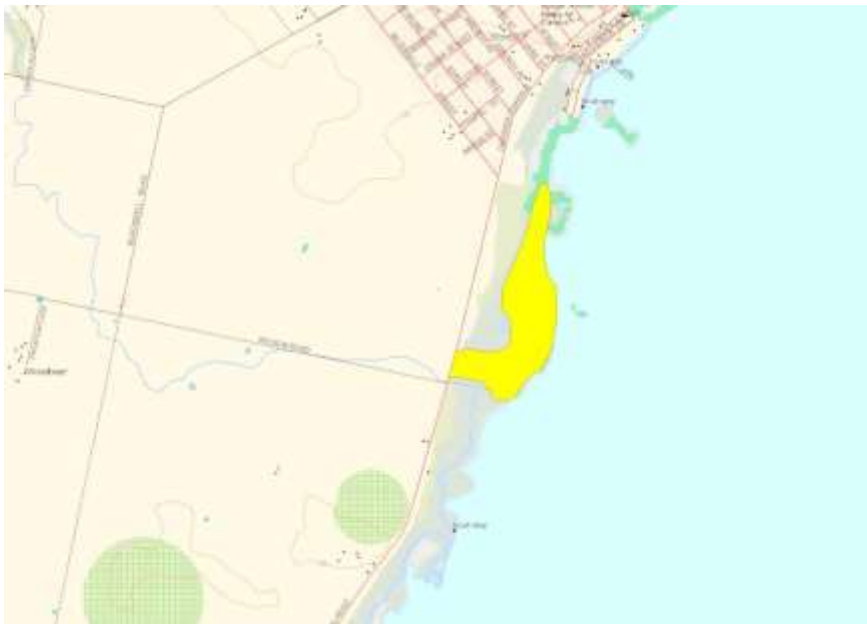


Photo 12. Milang grass fire 2018. (Naturemaps 2024)

The Mosquito Hill² bushfire located approximately 11.4 km northwest of the site (Incident Number 201512023) occurred on 31 December 2015 and burnt 461 ha, Photo 13.



Photo 13 Mosquito Hill bushfire² (Photo Credit CFS Observers – supplied by CFS) (Fedorowytsch 2016)

The Finnis bushfire located approximately 8.5 km north of the site occurred on 4 January 2013 and burnt approximately 332 ha of agricultural land, Photo 14 (Naturemaps 2024).



Photo 14 Finnis bushfire crossing the Steam Ranger railway line near Gilbert's siding (Anon 2013 Photo Credit: Tim Morris Channel 7).

2.2 Fires Last 40 Years

A review of the fire history over the last 40 years from within 5 km of the site indicates that the Tokuremoar bushfire (Incident Number 200701137) occurred on 16 January 2007 on rural residential property south of Port Elliot Road and burnt approximately 3.36 ha (Naturemaps 2024)

The Clayton Bay¹ bushfire occurred on 21 January 2009 and burnt a 79.2 ha area of agricultural land approximately 7.5 km east of the site.

A Mosquito Hill¹ bushfire located approximately 8.6 km northwest of the site (Incident Number 200312045) occurred on 30 December 2003 and burnt approximately 461 ha (Naturemaps 2024).

The Wyndgate Ruins Paddock bushfire (Incident Number 200912112) approximately 7.5 km southeast of the site on Hindmarsh Island occurred on 24 December 2009 and burnt approximately 6.32 ha (Naturemaps 2024).

The distribution of bushfires within 5 km of the site is presented in Figure 5.

Lightning, in particular dry lightning has been acknowledged as a cause of bushfires and usually occurs November to December and again during March to April (FBMAP 2017). The average annual ground lightning flash density (Ng) for the area is 0.1 to 0.2 flashes km^{-2} year (BOM 2016). This equates to the site receiving a ground lightning flash once every 56 to 111 years or 0.009 to 0.018 ground flashes per year.



BUSHFIRE DEVELOPMENT ASSESSMENT - LAKESIDE GOOLWA RESIDENTIAL PARK CODE AMENDMENT, GOOLWA NORTH SA

SOUTHERN LIFESTYLE VILLAGES PTY LTD

BUSHFIRE HISTORY

Legend

- Road
- Site Boundary
- Bushfire History**
- 2003
- 2007
- 2009
- 2023



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2. Roads and fire history data sourced from SA Data, sourced 25.05.2021 and 14.03.2024.
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0 500 1,000 1,500 2,000 m

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FIGURE 5



3 BUSHFIRE ATTACK LEVEL

3.1 Standing Fuel Load

The Grassland Fuel Hazard Score (at 70% cured) was determined at nine fuel load assessment (FLA) locations across the site by measuring the average height of grass present (m) and the percentage cover of grass. These field measurements enable the determination of the Grassland Fuel Hazard Score using Table 2 and the results are presented in Figure 6.

Table 2: Grassland Fuel Hazard Score at 70% cured [Source Table4, ESA 2009].

Height (metres)	Cover %									
	10	20	30	40	50	60	70	80	90	100
0.1	1	2	3	4	5	6	7	8	9	10
0.2	2	4	6	8	10	12	14	16	18	20
0.3	3	6	9	12	15	18	21	24	27	30
0.4	4	8	12	16	20	24	28	32	36	40
0.5	5	10	15	20	25	30	35	40	45	50
0.6	6	12	18	24	30	36	42	48	54	60
0.7	7	14	21	24	35	42	49	56	63	70
0.8	8	16	24	32	40	48	56	64	72	80
0.9	9	18	27	36	45	54	63	72	81	90
1.0	10	20	30	40	50	60	70	80	90	100

The results of the on-site fuel load assessment (FLA) shown in Figure 6. The highest Grassland Fuel Hazard Score of 70 was recorded at FLA location C, Figure 6. The ground layer at location C was dominated by **Ehrharta calycina* (Perennial Veldt Grass), **Scabiosa atropurpurea* (Pincushion), **Lagurus ovatus* (Hare's Tail Grass) and **Cenchrus clandestinus* (Kikuyu), Photo 15.

The Grassland Fuel Hazard Score measured at FLA location A adjacent Banfield Road was 8 and was reflective of a higher percentage of **Scabiosa atropurpurea* (Pincushion) weed growth with a spreading habit and a higher proportion of bare ground, Photo 16. The grass present at location A was predominantly **Lagurus ovatus* (Hare's Tail Grass) with much of this grass 100 % cured and having collapsed.





Photo 15 FLA C Southern paddock, view north (Grass height 0.7 m, 100 % cover - Grassland Fuel Hazard Score = 70)



Photo 16 FLA A (Grass height 0.1m, 80% cover – Fuel Hazard Score = 8)

The lowest Grassland Fuel Hazard Score of 5 was measured at FLA location I in approximately the middle of D13542 A 107 where there was a higher percentage of bare ground that included calcrete at the surface, Photo 17. The majority of grass at this location appeared to have been grazed to just above ground level, most likely by rabbits and the area had become dominated by the colonising weed species **Marrubium vulgare* (Horehound), **Polygonum aviculare* (Wire Weed) and **Euphorbia terracina* (False Caper). At the time the site was visited this area was assessed as unlikely to carry a fire as both the surface and near-surface fuel layers were low with large patches of bare earth.



Photo 17 FLA location I (Grass height 0.1m, 50% cover – Fuel Hazard Score = 5)

A mound of discarded vegetation and rubbish that included wooden pallets that was approximately 1.75 m tall, 12 m wide and 22 m long, Photo 18 was present at location H (E301779 N6070503) poses a significant fire hazard. This mound of combustible material has the potential to self-combust due to exothermic microbial activity and due to the size of the pile, Photo 19. It is assumed that this flammable material is being piled in order for it to be burnt when burning restrictions allow, however in the interim the pile presents a fire hazard, especially as it is located to the north of the residence. It is recommended that the large mound of material be removed or if this is not practicable then it should be broken up into smaller piles so as to reduce the risk of spontaneous combustion and to reduce the size of the fire when burnt. The material piled has the potential to produce embers that may ignite spot fires. It is recommended that Goolwa CFS be notified and supervision be requested when the material is to be burnt due to the inherent risk.

Recommendation: Remove the piled flammable material from the site or if this is not practicable break up the mounded material into smaller piles following CFS guidelines.

Recommendation: Request Goolwa CFS attendance when the piled material is to be burnt due to the inherent risk.



Photo 18 Piled vegetation and rubbish – Location H, Figure 4.



Photo 19 Vegetation and timber piled in the paddock on site.

The Grassland Fuel Hazard Score at the eastern end of the site was 30 and was dominated by **Bromus hordeaceus* (Soft Brome), **Aizoon pubescens* (Galenia) and to a lesser extent **Lagurus ovatus* (Hare's Tail Grass), with areas nearby including *Phragmites australis* (Common Reed) and *Distichlis distichophylla* (Australian Salt Grass).



Photo 20 View north at FLA location L at eastern end of site (Grass height 0.3m, 100% cover – Fuel Hazard Score = 30)

The Grassland Fuel Hazard Score can be used to set a value required to be maintained within an Asset Protection Zone (APZ) while providing some flexibility in how this can be achieved. For example, a requirement to have a Grassland Fuel Hazard Score of 10 or less can be achieved with grass 30 cm high with 30% cover or grass 10 cm high with 100% cover. It is also possible to set different Grassland Fuel Hazard Scores for Inner APZs versus Outer APZs. The alternative vegetation management requirement would be to maintain grass height to 10 cm for the duration of the fire season. The vast majority of the Asset Protection Zone (APZ) establishment and maintenance would involve slashing or mowing grassland to a specified distance from the road verge or site boundary.

3.2 Classified Vegetation & Effective Slope

The type of vegetation present across the site and surrounding it is a determinant of the maximum fire size that an asset may be exposed to due to the fuel characteristics of each vegetation type. Fuel comprises material that can be ignited and sustain a fire. This can include grass, leaf litter and live vegetation. Fuel is categorised according to the layer in which it occurs, including the surface, near surface, elevated (e.g. shrubs and understorey), bark and canopy.

AS3959:2018 sets minimum requirements for vegetation to be considered as classified vegetation. The classified vegetation where present, was determined as the dominant vegetation within 150 m of the perimeter of the site. The distribution of classified vegetation is shown in Figure 6 and presented in Table 3. Classified vegetation is situated adjoining the site to the west, north and east of the site. The presence of olive orchards that are highly flammable within the adjoining properties to the west of the site increases the fire risk from the west. The remainder of the properties to the west are grassed and the vegetation present is Classified Vegetation – Grassland (G) that is effectively an open shrubland due to the presence of the olive orchards. At present there is no separation distance between the adjoining properties and the site with both the vegetation on site and that adjoining the site qualifying as Classified Vegetation – Grassland (Group G) in accordance with AS3959:2018.

To the north of the site at the end of D13542 A103 there is Classified Vegetation – Grassland (G) on the northern side of Fidock Road. The presence of Fidock Road establishes a 14 m separation distance between the site and the Classified Vegetation.

The northeastern perimeter of D13542 A103 adjoins Classified Vegetation – Grassland (G) with no separation between the site and the Classified Vegetation. The Classified Vegetation 0 Grassland (G) that is present within the properties that are located between the northern perimeter of the site and Fidock Road extends to Currency Creek in the east. The adjoining land north of D89165 A54 also contains a band of pine trees along the perimeter that increases the risk of ember attack at the site in the event of a bushfire, Figure 6. While the Classified Vegetation that occurs adjacent the site is comprised of pasture grasses and environmental weeds the Classified Vegetation – Grassland (G) that adjoins the site to the east is comprised of a stand of *Phragmites australis* (Common Reed) and is approximately 50 m wide. The average separation distance along the eastern perimeter of the site is 5 m, although it is considered that without active vegetation management at the site the reeds will re-establish along the eastern boundary and into the site.

To the southeast of the site is the existing Lakeside Goolwa Residential Park, while the remainder of the area south and southwest of the site is developed residential land. There is no Classified Vegetation present on the southern side of Banfield Road within 150 m of the site.

Table 3 Location of Classified Vegetation, Separation Distance and Effective Slope.

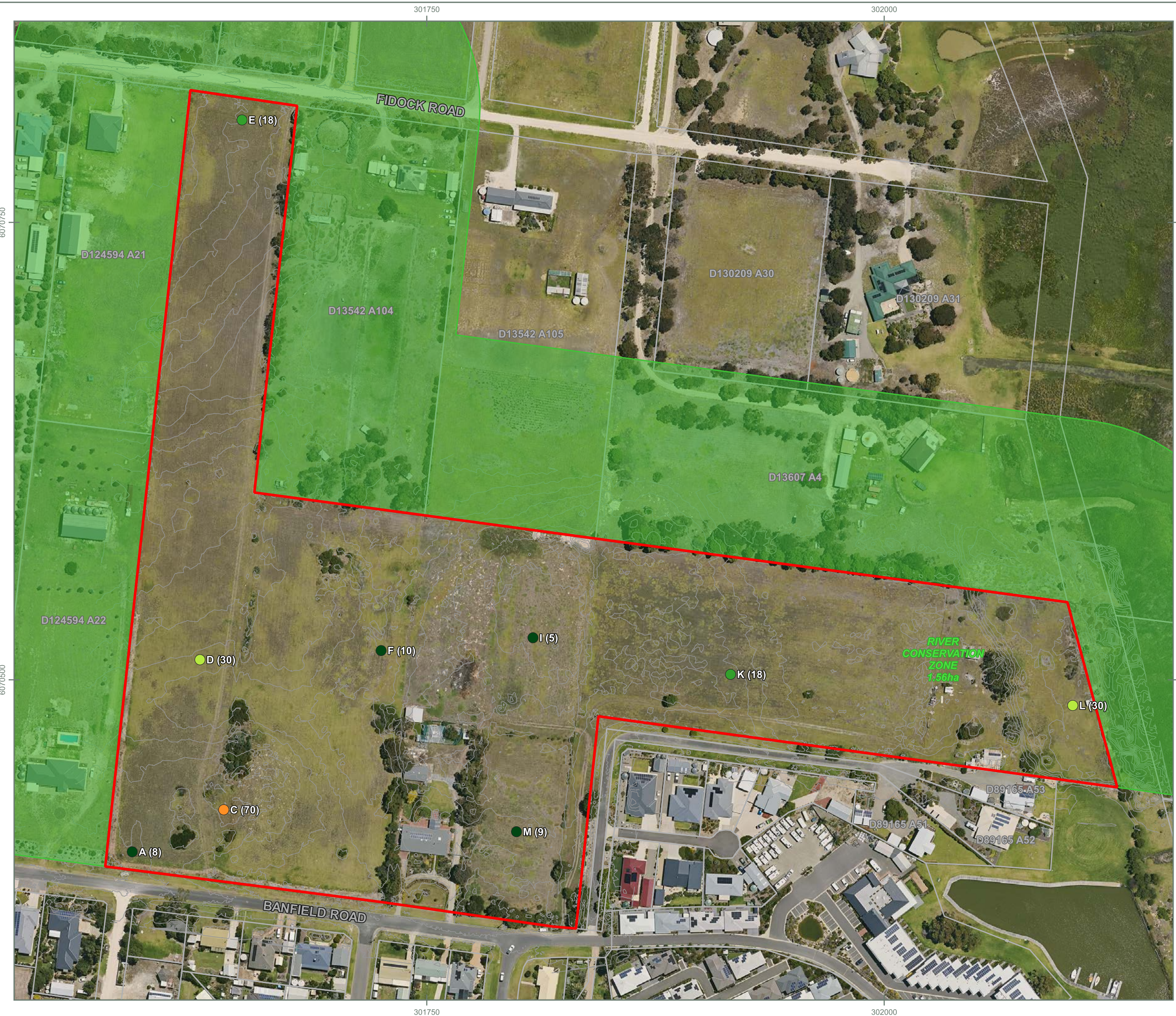
Direction	Distance to classified vegetation (m)	Distance to classified vegetation – with VMZ applied (15m or 30m)	Classified Vegetation Group	Effective Slope under classified vegetation	Comment
North (Fidock Road)	14	29 (15mVMZ)	Grassland (G)	Flat	The area north of Fidock Road. Rural residential properties
North (paddocks)	0	15 (15mVMZ)	Grassland (G)	Flat	Refers to the properties adjoining the northern perimeter of the site, located between the site and Fidock Road.
Northeast (Long paddock)	0	15 (15mVMZ)	Grassland (G)	Flat	Refers to the eastern side of the long paddock adjacent rural residential properties.
East (Currency Creek)	5	35 (30mVMZ)	Grassland (G)	Flat	The fringing wetland of Currency Creek.
Southeast	100+	Not applicable	Residential Area	Not applicable	Residential area – existing Lakeside Goolwa
South	100+	Not applicable	Residential Area	Not applicable	Residential area south of Banfield Road
Southwest	100+	Not applicable	Residential Area	Not applicable	Residential area south of Banfield Road

Direction	Distance to classified vegetation (m)	Distance to classified vegetation – with VMZ applied (15m or 30m)	Classified Vegetation Group	Effective Slope under classified vegetation	Comment
West	0	15 (15mVMZ)	Grassland (G)	Flat	Rural Residential properties – many with olive orchards.
Northwest	0	15 (15mVMZ)	Grassland (G)	Flat	Rural Residential properties – many with olive orchards.

The effective slope under the Classified vegetation is categorized as flat.

The vegetation classifications may be utilised to determine the Bushfire Attack Level (BAL) for buildings constructed at the site although it is recognised that ground leases will require individual assessments.





BUSHFIRE DEVELOPMENT ASSESSMENT - LAKESIDE GOOLWA RESIDENTIAL PARK CODE AMENDMENT, GOOLWA NORTH SA

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CLASSIFIED VEGETATION AND FUEL LOAD

Legend

● Fuel Load Assessment (FLA) Location

Grassland Fuel Hazard Score

- 1 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 60
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100

- Elevation Contour
- Approximate Cadastral Boundary
- Grassland (G)
- Site Boundary

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0 20 40 60 80 100 m

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FIGURE 6

3.3 Topography

The local topography including slope and aspect are determinants of the part of the fire (e.g. head, flank, back) that an asset may be exposed to. The site is located within the floodplain of Currency Creek with the slope categorized as flat, that is, slopes ranging from zero degrees to 5 degrees. The surrounding Goolwa North area is also categorized as flat, while there is a gentle rise towards the northwest and a small hill 2.1 km northwest of the site.

3.3.1 Slope

Slope can affect bushfire behaviour with fires burning faster up slope than down slope, in particular when aligned with the prevailing wind direction. A fire burning up a 10 degree slope will generally spread at double the rate of a fire on level ground (Bushfire CRC 2009). Likewise a fire burning up a 20 degree slope will generally spread at a rate that is four times the rate of spread across level ground (Bushfire CRC 2009).

Slopes within the site have been calculated using 2 metre contour intervals within ArcView Spatial Analyst, Geographic Information System (GIS) to produce a digital elevation model (DEM) that enabled the slope to be calculated in degrees. Slope was classified into five categories, Table 4, Figure 7.

The entire site is categorized as flat (flat to 5 degrees), although there are small undulations present but these changes in slope are less than 5 degrees.

Table 4: Slope categories.

Description	Slope Category
Flat	Flat to 5 degrees
Gentle	6 to 10 degrees
Moderate	11 to 15 degrees
Steep	16 to 20 degrees
Very Steep	20+ degrees

The effective slope under all classified vegetation present adjacent the site has been deemed to be flat. Slope therefore has limited potential as a factor influencing bushfire behavior within the vicinity of the site as the majority of the surrounding land is flat.

3.3.2 Aspect

Aspect is another topographical factor affecting bushfire behaviour. North facing slopes receive more solar radiation that dries surface fuel faster than on south facing slopes (Bushfire CRC 2009). Later in summer and during drought, fuels may become uniformly dry across slopes with different aspects, at which stage slope orientation to the prevailing wind becomes a more important factor (Bushfire CRC 2009).

Aspect is mapped for the site in Figure 8 that shows that the eastern end of the site has an easterly aspect while two low rises extend across the site with northwest and southeast aspects whilst southern and eastern aspect slopes occur across the remainder of the site. The influence of aspect upon a potential fire is negligible due to the flatness of the site and surrounding land.



BUSHFIRE DEVELOPMENT ASSESSMENT - LAKESIDE GOOLWA RESIDENTIAL PARK CODE AMENDMENT, GOOLWA NORTH SA

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SLOPE ACROSS THE SITE

Legend

 Site Boundary

Slope

-  Flat (Flat - 5 degrees)
-  Gentle (6 - 10 degrees)
-  Moderate (11 - 15 degrees)
-  Steep (16 - 20 degrees)
-  Very Steep (+20 degrees)



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4. DEM data sourced from Elvis - Elevation and Depth - Foundation Spatial Data, <https://elevation.fsdf.org.au/>, sourced March 2024.

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FIGURE 7



**BUSHFIRE DEVELOPMENT
ASSESSMENT - LAKESIDE
GOOLWA RESIDENTIAL PARK
CODE AMENDMENT,
GOOLWA NORTH SA**

**SOUTHERN LIFESTYLE VILLAGES
PTY LTD**

**ASPECT OF LAND AT THE
SITE**

Legend

Site Boundary

Aspect

- Flat (-1)
- North (0-22.5)
- Northeast (22.5-67.5)
- East (67.5-112.5)
- Southeast (112.5-157.5)
- South (157.5-202.5)
- Southwest (202.5-247.5)
- West (247.5-292.5)
- Northwest (292.5-337.5)
- North (337.5-360)

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FIGURE 8

3.4 Bushfire Attack Level (BAL)

The Fire Danger Index (FDI) for South Australia is 80 (1090 K), therefore Table 2.5 of AS 3959:2018 has been used to determine the Bushfire Attack Level (BAL) for the site. The determination of the BAL utilises the categories presented in Table 5 that are associated with the presence of Group G – Grassland as Classified Vegetation. The Classified Vegetation surrounding the site is shown in Figure 6. The BAL has been calculated to provide a determination of the heat flux each ground lease may experience during a bushfire, Figure 9.

Table 5 Excerpt from Table 2.5 AS 3959:2018 Upslopes and Flat Land associated with Classified Vegetation

Bushfire Attack Levels AS 3959:2018 – Up-slopes and Flat Land					
Vegetation Classification	BAL – FZ	BAL – 40	BAL – 29	BAL – 19	BAL – 12.5
G. GRASSLAND	<6 m	6 - <8 m	8 - <12 m	12 - <17 m	17 - <50 m

The determination of the BAL that is applicable from the site perimeter is represented in Figure 9. The presence of Fidock Road provides 14 m of separation to the Classified Vegetation providing a BAL at the site perimeter of BAL 19 that can be further reduced with the application of a 15 VMZ to BAL 12.5. The northern paddocks of the site were determined to have a BAL at the perimeter of BAL FZ that is reduced to BAL 19 with the application of a 15 m VMZ. It is noted that siting a house further away from the perimeter may provide the additional 2m of separation distance that would enable BAL 12.5 to be achieved. The same situation exists along the northeastern perimeter and the western and north western perimeters of the site where there is no separation distance from the Classified Vegetation on the adjoining properties.

At the eastern end of the site a Conservation Zone exists and is proposed to be retained and remain undeveloped. The BAL determined at the western edge of the conservation zone was BAL LOW whereby no bushfire construction standard would apply, however as the site is within the Hazards (Bushfire – Medium Risk) Overlay the BAL 12.5 is deemed to apply.

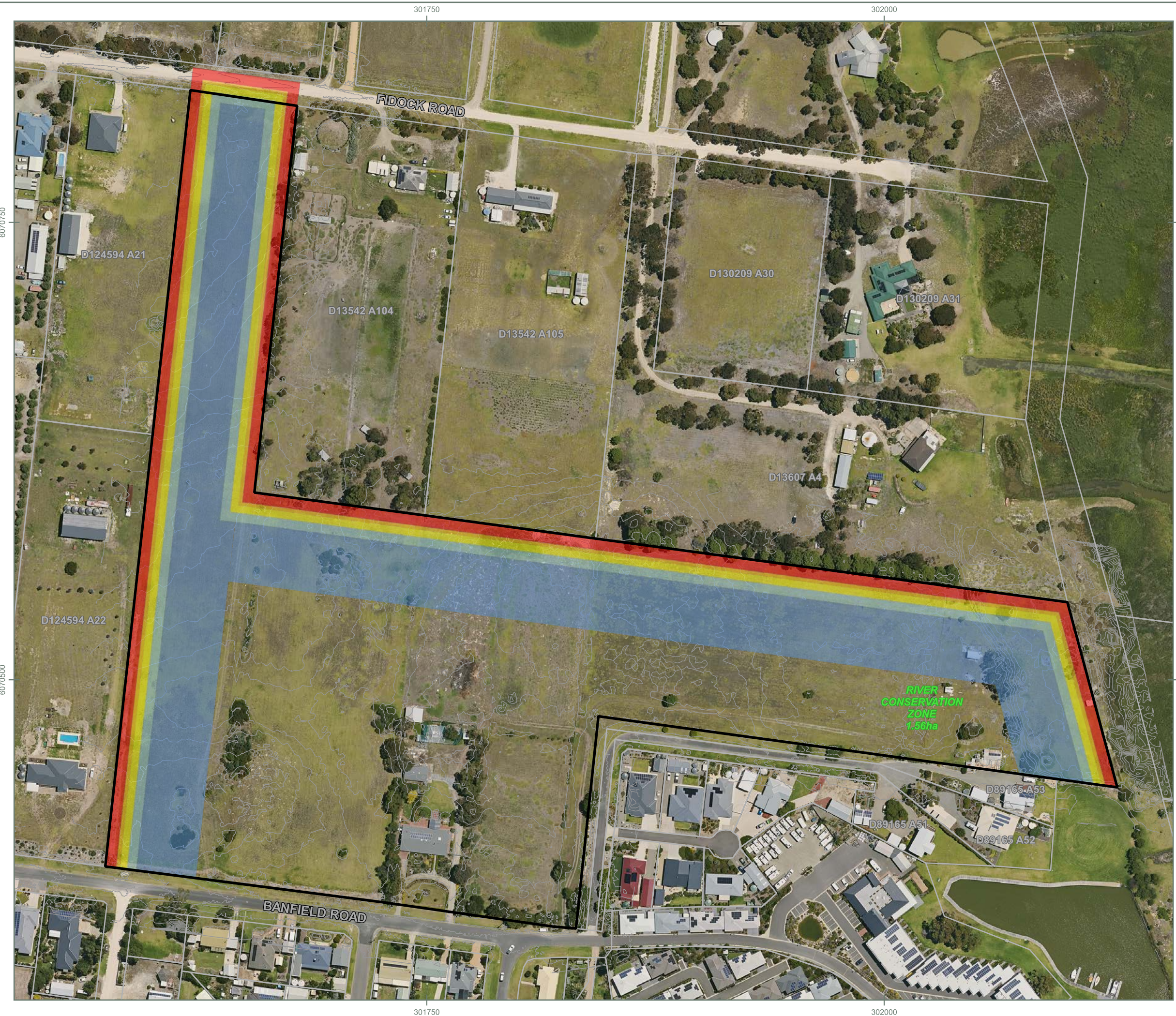
It is important to note that the SA CFS would refuse a land subdivision that cannot achieve a BAL of BAL 29 or less (*C. Siegfriedt, Bushfire Safety Officer SA CFS personal communication 2023*). GFE considers that this BAL threshold would also apply to the proposed development as a Residential Park rather than a subdivision.

Table 6 BAL determination at site perimeter.

Direction	Distance to closest Classified Vegetation (m)		Classified Vegetation Group	Effective Slope under Classified Vegetation	BAL (kW/m ²) without / with VMZ applied		AS3959-2018 Construction Section <u>without</u> VMZ Applied
	Existing (m)	VMZ applied (15m or 30m)			Existing	APZ Applied	
North (Fidock Road)	14	29 (15mVMZ)	Grassland	Flat	19	12.5	3 and 6
North (paddocks)	0	15 (15mVMZ)	Grassland	Flat	FZ	19	3 and 9

Direction	Distance to closest Classified Vegetation (m)		Classified Vegetation Group	Effective Slope under Classified Vegetation	BAL (kW/m ²) without / with VMZ applied		AS3959-2018 Construction Section <u>without</u> VMZ Applied
	Existing (m)	VMZ applied (15m or 30m)			Existing	APZ Applied	
Northeast (Long paddock)	0	15 (15mVMZ)	Grassland	Flat	FZ	19	3 and 9
East (site boundary Currency Creek)	5	35 (30mVMZ)	Grassland	Flat	FZ	12.5	3 and 5
East Cons. Zone boundary	100+	100+ (30mVMZ)	Grassland	Flat	BAL LOW	BAL LOW (Site 12.5)	Not applicable
West	0	15 (15mVMZ)	Grassland	Flat	FZ	19	3 and 9
Northwest	0	15 (15mVMZ)	Grassland (G)	Flat	FZ	19	3 and 9

Recommendation: Design the Residential Park to establish a minimum separation distance of 15 m along the western, north western, northern, north eastern perimeters in order to achieve a BAL rating of BAL 19 or BAL 12.5.



BUSHFIRE DEVELOPMENT ASSESSMENT - LAKESIDE GOOLWA RESIDENTIAL PARK CODE AMENDMENT, GOOLWA NORTH SA

SOUTHERN LIFESTYLE VILLAGES PTY LTD

BUSHFIRE ATTACK LEVEL (BAL) CONTOURS

Legend

- Elevation Contour
- Approximate Cadastral Boundary
- Site Boundary
- Bushfire Attack Level (BAL)**
- BAL-12.5
- BAL-19
- BAL-29
- BAL-40
- BAL-FZ

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FIGURE 9

4 ACCESS & EGRESS

It is understood that the access created within the proposed Residential Park is technically defined as driveways. It is considered that from a bushfire perspective consideration of the internal access layout within the proposed residential park, should comply with the Bushfire – Medium Risk Overlay, Ministerial Building Standard MBS 008 and PBP with regard to access and egress in a BPA. The specifications for *Vehicle Access – Roads, Driveways and Fire Tracks* within the Bushfire – Medium Risk Overlay are provided within Deemed to Satisfy (DTS) and Designated Performance Feature (DPF) 5.1, 5.2 and 5.3.

- PO 5.1** *Roads are designed and constructed to facilitate the safe and effective:*
- (a) access, operation and evacuation of fire-fighting vehicles and emergency personnel*
 - (b) evacuation of residents, occupants and visitors.*

The proposed road will be required to comply with the following requirements:

- a) Constructed with a formed all weather surface*
- b) A gradient of not more than 16 degrees at any point along the road*
- c) A cross-fall of not more than six degrees at any point along the road.*
- d) A minimum formed road width of 6 m.*
- e) Overhead clearance of ≥ 4 m minimum between the road surface and overhead structures/obstructions.*
- f) Allow fire-fighting services to travel in a continuous forward movement around road curves by constructing the curves with a minimum external radius of 12.5 m.*
- g) Incorporating cul-de-sac endings or dead end roads are provided with an alternative evacuation route and do not exceed 200 m in length and the end of the road has either*
 - o A turning area with a minimum formed surface radius of 12.5 m OR*
 - o A 'T' or 'Y' shaped turning area with a minimum formed surface length of 11 m and a minimum internal radius of 9.5m.*
- h) Incorporate solid all weather crossings over any watercourses that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.*

The Masterplan design is to avoid no-through access to enable continuous forward movement of emergency service vehicles. Where a no-through access is to be incorporated into the design it should have a formed turning area as prescribed within Figure 3 and Figure 4 of the Hazards (Bushfire – Medium Risk) Overlay. The establishment of a perimeter access remains the preferred solution.

Any reserves incorporated into the Residential Park design should be separated from Ground leases by an access or alternative solution. It is considered that if an access is not practicable along the entire length of the reserve another form of fire break should be incorporated into the design, especially where Ground leases back onto a reserve. The fire break could be in the form of a dual walking/cycling path with a concrete or gravel surface including a vegetation management zone (VMZ) on either side in order to achieve a 4m wide fire break.

- PO 5.2** *Access to habitable buildings is designed and constructed to facilitate the safe and effective:*
- (a) use, operation and evacuation of fire-fighting vehicles and emergency personnel*
 - (b) evacuation of residents, occupants and visitors.*

The access driveway will comply with either (a) or (b):

- a) A clear and unobstructed vehicle or pedestrian pathway of not greater than 60 metres in length is available between the most distant part of the habitable building and the nearest part of a formed public access road.*

b) Driveways

- i. Do not exceed 600 m in length
- ii. Constructed with a formed all-weather surface.
- iii. Connected to a formed, all weather public road with the transition between the driveway having a gradient of not more than 7 degrees.
- iv. A gradient of not more than 16 degrees at any point along the driveway.
- v. A cross-fall of not more than six degrees at any point along the driveway.
- vi. A minimum formed width of 3 m plus 0.5 metres clearance either side of the driveway from overhanging branches or other obstructions, including buildings and or structures.
- vii. Incorporate passing bays with a minimum width of 6 m and length of 17 m every 200 m.
- viii. Provide overhead clearance of not less than 4 m between the driveway surface and overhanging branches or other obstructions, including buildings and or structures.
- ix. Allow fire-fighting services (personnel and vehicles) to travel in a continuous forward movement around driveway curves by constructing the curves with a minimum external radius of 12.5 m
- x. Allow fire-fighting vehicles to safely enter and exit an ground lease in a forward direction by using a U-shaped drive through design or by incorporating at the end of the driveway either:
 - A. a loop road around the building OR
 - B. a turning area with a minimum radius of 12.5 m OR
 - C. a 'T' or 'Y' shaped turning area with a minimum formed length of 11 m and minimum internal radii of 9.5 m.
- xi. Incorporate solid all-weather crossings over any watercourses that support fire-fighting vehicles with a gross vehicle mass (GVM) of 21 tonnes.

Driveways within a Residential Park will be required to comply with PO 5.2.

PO 5.3 *Development does not rely on fire tracks as means of evacuation or access for fire-fighting purposes unless there are no safe alternatives available.*

The proposed expansion of the Lakeside Goolwa Residential Park should incorporate two additional points of access with these locations able to utilize either Banfield Road and/or Fidock Road along the southern and northern perimeters of the site respectively. It is considered that any future residential park development should be designed so as not to rely upon fire tracks for access and egress.

The Hazards (Bushfire – Medium Risk) Overlay includes a number of Performance Outcomes for Land Division and while a Residential Park is not a Land Division the performance outcomes remain applicable with respect to a bushfire. It is therefore considered appropriate that the design of the Residential Park take the Land Division measures into consideration as they are typically included within the NSW RFS (2019) *Planning for bushfire protection (PBP) guide*.

Recommendation: Future development is to design the access network to incorporate perimeter access, that is, position access between Ground leases and Classified Vegetation.

Recommendation: Future development is to design the access network to enable continuous forward movement for emergency service vehicles.

Recommendation: Future development is to design any no-through access within the Residential Park with an acceptable turning treatment.

Recommendation: Future development is to design access or fire break (pathway with VMZ) between any reserves and Ground leases.

5 SITING

PO 1.1 *Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type and terrain.*

As no development is proposed to occur within the Conservation Zone it will function as a buffer zone from the Classified Vegetation - Grassland in the form of the fringing wetland. Across the site the flat terrain will not have an influence on bushfire behavior. Therefore, provided that effective separation distances can be incorporated into the proposed Residential Park design the associated bushfire risk is acceptable for the proposed development. The Residential Park design should follow those contained within the NSW Rural Fire Service (2019) *Planning for bushfire protection (PBP) guide* and the performance requirements within the Hazards (Bushfire – Medium Risk) Overlay.

PO 3.1 *To minimize the threat, impact and potential exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of ground leases away from steep slopes.*

The site has ground with slopes classified as flat (Flat to 5 degrees) and therefore the site is considered to be suitable for a Residential Park.

PO 3.2 *Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.*

Residential and tourist accommodation and habitable buildings for vulnerable communities are provided with asset protection zone(s) in accordance with (a) and (b)

- a) *The asset protection zone has a minimum width of at least*
 - i. *50 metres to unmanaged grasslands*
 - ii. *100 metres to hazardous bushland vegetation*
- b) *The asset protection zone is contained wholly within the allotment of the development.*

The location of the proposed development is not considered to pose an unacceptable bushfire risk provided that the proposed development as a Residential Park is able to incorporate adequate separation distances from Classified Vegetation by strategic location of VMZs and perimeter access. The CFS recognizes that roads and areas of managed vegetation can be incorporated into APZs, in that they do not practically need to be developed entirely within the site.

6 WATER SUPPLY

PO 3.3 Residential and tourist accommodation and habitable buildings for vulnerable communities, (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation), has a dedicated area available that is capable of accommodating a bushfire protection system comprising firefighting equipment and water supply in accordance with Ministerial Building Standard MBS 008 - Designated bushfire prone areas - additional requirements.

6.1 Ground leases

In accordance with *Table 2.5.1* (Government of South Australia 2020) that prescribes the capacity and fittings required for a dedicated fire-fighting water supply, each Ground lease that is connected to mains water should install a 2000 litre dedicated fire-fighting water supply with domestic fittings, *Table 7*. It is considered that as the intent is to afford residents the capability to defend their property against ember attack that Ground leases should be treated functionally the same as allotments. Each Ground lease installing a dedicated fire-fighting water supply is considered prudent due to the likelihood of increased fire and fire intensity within the landscape in the near future due to climate change and acknowledging the distances (≥ 30 km) that embers are able to travel (Williams 2017). It is considered that an alternate solution would be the installation of a 39,000 L (or larger) dedicated fire-fighting water storage tank at a suitable accessible location within the proposed Residential Park.

Table 7 Capacity and fittings required for a dedicated water supply (Government of South Australia 2020 from Table 5.2.1)

Availability of water supply	Minimum Water supply (Litres) and fittings required for the site.		
	Allotment size	Connected to mains	Not connected to mains
Within a General or Medium Bushfire Risk Area. Within an Urban Interface Area that is within 500 m of a High Bushfire Risk Area.	Any allotment size	2000 litres with domestic fittings	5000 litres with domestic fittings

The water supply tank must be constructed of a non-combustible material, either concrete or metal although an alternative material may be utilised subject to consideration and approval by the relative authority.

It is considered that a 2000 litre dedicated fire-fighting water supply should be available for each Ground lease irrespective of the presence of any other fire-fighting system unless of a 39,000 L (or larger) dedicated fire-fighting water storage tank is installed.

7 BUSHFIRE MANAGEMENT

Bushfire management is divided into managing the physical bushfire hazards (i.e. Hazard Management) and the behaviours that contribute to bushfires and the safety of personnel (i.e. Risk Management). This BDA is focused on proposing bushfire management measures for identified hazards within and surrounding the proposed Residential Park.

7.1 Fire Management Zones – A-Zone

In South Australia strategic fire management utilises the following Fire Management Zones (FMZs):

- Asset Protection Zone (APZ or A-Zone)
- Bushfire Buffer Zone (BBZ or B-zone)
- Strategic Fuel Management Zone (S-zone)
- Conservation Zone (C-zone)
- Exclusion Zone (X-zone)

An asset protection zone (APZ) is defined by NSW Rural Fire Service (2005) as “a fuel reduced area surrounding a built asset or structure.” In the context of the report the asset is considered to be the proposed residential dwellings within each allotment. Fuel reduction within the APZ aims to prevent bushfire travelling either along the ground or through a canopy to the asset. An APZ can comprise a combination of perimeter roads, fire trails or managed lands so that a fire path is not created between the hazard and the asset.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows fire suppression;
- an area from which back burning may be conducted; and
- a relatively safe area for firefighters to operate in and allows emergency services access (NSW RFS 2005).

Fleming (2024) assessed vegetation across the site and found that no native vegetation exists at the site in accordance with the NV Act. While native scattered trees and plants occur they are not deemed native vegetation in accordance with the provisions of the NV Act.

7.2 Site - APZ (A-zone)

As there is no separation distance between Classified Vegetation along the northern and western site perimeter it is recommended that a 15 m APZ be established along the northern perimeter of the site within the site boundary. This APZ is to extend along the western perimeter of the site. The APZ may incorporate site perimeter road, pathways or other infrastructure that has an inherent low flammability and creates the necessary separation distance to reduce the BAL to BAL 19 or lower.

A 30 m APZ is recommended to be established at the eastern perimeter adjacent the fringing wetland. While across the southern perimeter of the site a 5 m VMZ or firebreak is recommended to be established while the site remains undeveloped. It is acknowledged that the undeveloped site presents a bushfire risk

to the surrounding land and the establishment of the recommended VMZs around the perimeter work to prevent fire entering the site and exiting the site equally.

The landscape plan accompanying any proposed developed should be reviewed to ensure that it meets the specifications of an APZ as follows:

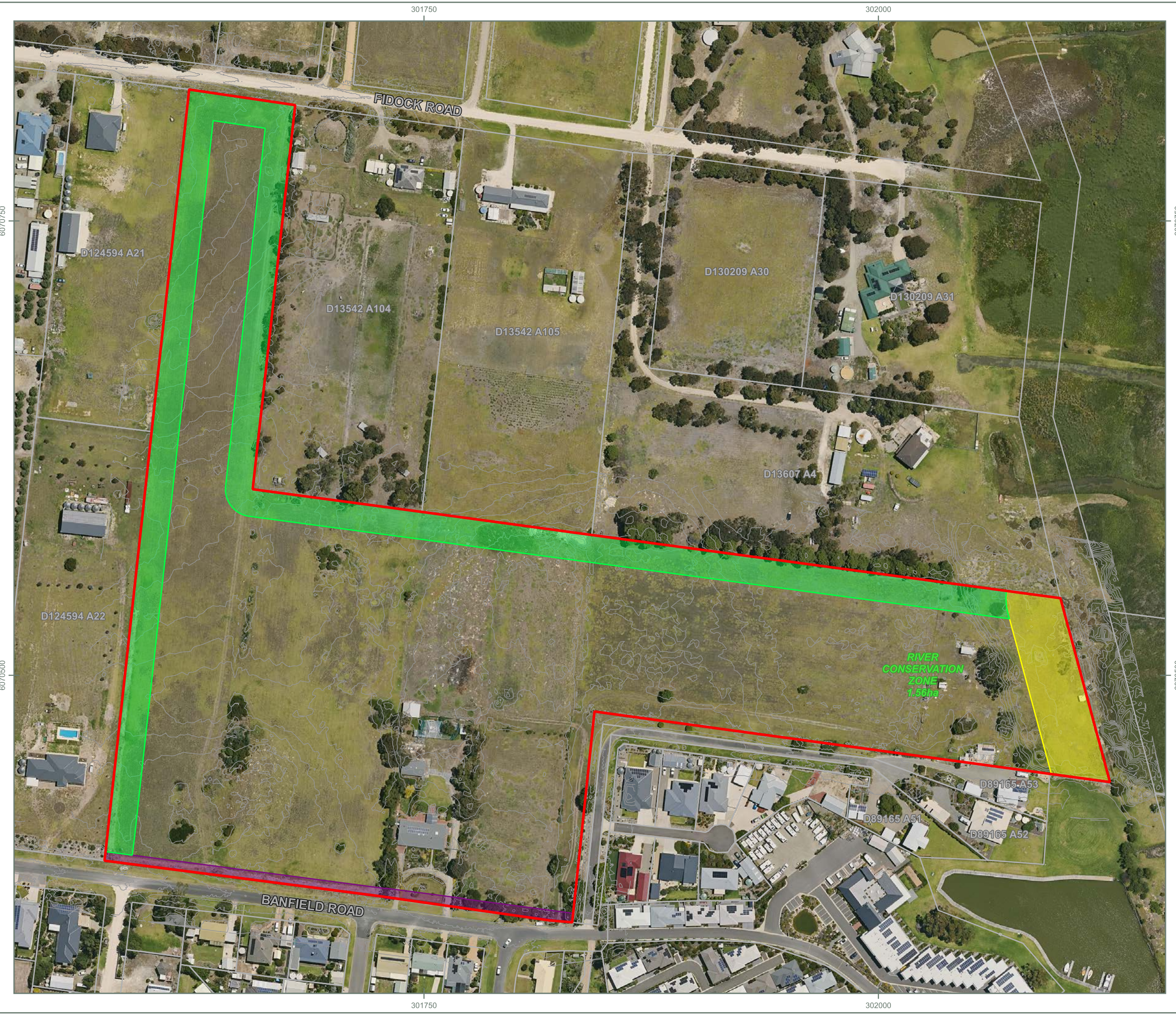
- Manage vegetation so that the leaf area of the vegetation is not vertically or horizontally continuous. A disconnected 'clumping' of shrubs is more desirable than even connected coverage. Separate shrubs and trees to minimise vertical fuel 'ladders'.
- Vegetation coverage (shrubs and trees) should be a maximum of 15% within the APZ.
- All trees should be 'skirted' to a height of 2 m, that is, lateral branches are to be removed to a height of 2 m to avoid a grassfire climbing into the canopy.
- No heath or shrub understorey species are to be within 2 m of the proposed residences.
- Tree canopies within the APZ should be separated by at least 2m.
- Tree branches must be pruned so that no branches overhang or are likely to be in contact with proposed dwellings. Branches are to be at least 2 m from any proposed dwelling.
- Grass should be maintained ≤ 10 cm throughout the bushfire season. Mown grass cuttings are to be removed from the APZ.
- Grass should preferably be kept green (watered) throughout the bushfire season.
- Leaf litter (Fine fuels) in the APZ is required to be maintained to ensure that surface and shrub level fine fuels are maintained at ≤ 2 cm.
- Paths should be constructed of a non-flammable material such as concrete, gravel, compacted mineral dust. Garden bed edging should similarly be constructed of a non-flammable material.

The responsibility for the management of the vegetation across the APZ must be clearly established, in particular during the development phase.

Recommendation: Establish a 15 m APZ along the western, northwestern, northern, northeastern perimeters with grass to ≤ 10 cm height for the duration of the Fire Danger Season. (Grassland Fuel Hazard Score at 70% cured should be ≤ 10 , Table 2).

Recommendation: Establish a 30 m APZ perimeter at the eastern perimeter adjacent the fringing wetland with grass to ≤ 10 cm height for the duration of the Fire Danger Season. (Grassland Fuel Hazard Score at 70% cured should be ≤ 10 , Table 2).

Recommendation: Establish a 5m wide fire break along the southern perimeter (Banfield Road).



BUSHFIRE DEVELOPMENT ASSESSMENT - LAKESIDE GOOLWA RESIDENTIAL PARK CODE AMENDMENT, GOOLWA NORTH SA

SOUTHERN LIFESTYLE VILLAGES PTY LTD

FIRE MANAGEMENT ZONES

Legend

-  Elevation Contour
-  Approximate Cadastral Boundary
-  5m Vegetation Management Zone
-  15m Vegetation Management Zone
-  30m Vegetation Management Zone
-  Site Boundary

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1. Aerial image sourced from Metromap, aerial dated 20.01.2024, sourced 05.03.2024.
2. Roads data sourced from SA Data, sourced 25.05.2021.
3. Base drawing sourced from the client.

0 20 40 60 80 100 m

SCALE (at A3): 1:2,000
 PROJECTION: GDA2020 / MGA zone 54
 DRAWING NO: GFE-036-F0009-Rev0.qgs
 DATE: 23/05/2024
 DRAWN: KB
 CHECKED: GF

FIGURE 10

8 VEGETATION MANAGEMENT

8.1 Conservation Zone

The Conservation Zone is located on the eastern side of the site and as this area is not proposed to be developed or re-zoned as part of this Code Amendment it is recommended that the area be managed as a Bushfire Buffer Zone (BBZ), Figure 10 with a 30 m wide area along the eastern perimeter adjoining the fringing wetland to be managed as an APZ.

The BBZ should be maintained as a grassland or similar ground cover species or suite of species, typically with low flammability that would tolerate mechanical slashing in order to reduce the height to < 20 cm for the duration of the Fire Danger Season. The Grassland Fuel Hazard Score at 70% cured should be ≤ 10 , Table 2. The APZ should be a managed grassland or similar vegetation that is to be maintained at a maximum height of 10 cm for the duration of the fire danger season.

The BBZs should be free of obstructions or designed in a manner so as to facilitate mechanical slashing or mowing. Fuel load management within the BBZ should not exceed High as an average throughout the zone (SA SBCC 2020).

Recommendation: Establish a 30 m APZ or other mechanism along the eastern perimeter (Currency Creek) with the Conservation Zone to be managed as a BBZ.

8.2 Undeveloped Land (Development Staging)

If the proposed Residential Park is to be a staged development the fuel load present across the managed grassland covered site within the undeveloped stages must be managed by mechanical slashing or mowing in order to reduce the height to ≤ 10 cm for the duration of the Fire Danger Season. The Grassland Fuel Hazard Score at 70% cured should be ≤ 10 , Table 2. This requirement is to apply to undeveloped allotments, regardless of whether the development is being staged or not.

A 20 m wide BBZ is to be established and maintained at the boundary of the stage being developed. The creation and maintenance of a BBZ at each stage boundary would be required to be sequentially established across the site as each stage is developed.

The responsibility for the management of the vegetation across the site must be clearly established.

9 BUILDING CONSIDERATIONS

The site is within the Hazards (Bushfire – Medium Risk) Overlay and therefore has a deemed to apply BAL of BAL 12.5. All proposed homes to be constructed on ground leases at the site are required to conform to *Section 3 General Construction Requirements* and *Section 5 Construction Requirements for BAL- 12.5* of AS3959:2018.

It is considered appropriate that the Hazards (Bushfire – Urban Interface) Overlay should be applied to the site in accordance with the proposed development of the site as a Residential Park as an outcome of this rezoning.

Proposed ground leases that are assessed to have a BAL rating higher than BAL 12.5 in accordance with AS3959:2018 must be constructed to the corresponding construction requirement as specified within AS3959:2018.

Please refer to the National Construction Code (NCC), relevant standards including *the Ministerial Building Standard MBS 008* and state provisions for construction requirements and performance provisions.

10 RECOMMENDATIONS

A number of recommendations have been made to improve various aspects of the proposed Code Amendment and future development as a Residential Park with regard to bushfire safety and preparedness.

- Remove the piled flammable material from the site or if this is not practicable break up the mounded material into smaller piles following CFS guidelines.
- Request Goolwa CFS attendance when the piled material is to be burnt due to the inherent risk.
- Future development is to design the access network to incorporate perimeter access, that is, position an access between Ground leases and Classified Vegetation.
- Future development is to design the access network to enable continuous forward movement for emergency service vehicles.
- Future development is to design any no-through access within the Residential Park with an acceptable turning treatment.
- Future development is to design an access or fire break (pathway with VMZ) between any reserves and Ground leases.
- Design the Residential Park to establish a minimum separation distance of 15 m along the western, north western, northern, north eastern perimeters in order to achieve a BAL rating of BAL 19 or BAL 12.5.
- Establish a 5m wide fire break (bare earth) along the southern perimeter (Banfield Road).
- Establish a 30 m APZ or other mechanism along the eastern perimeter (Currency Creek) with the Conservation Zone to be managed as a BBZ.
- Establish a 15 m APZ along the western, north western, northern, north eastern perimeters with grass to ≤ 10 cm height for the duration of the Fire Danger Season. (Grassland Fuel Hazard Score at 70% cured should be ≤ 10 , Table 2). Refer to Figure 10.

11 LIMITATIONS

This BDA has been completed based upon the information provided to Grant Fleming Environmental (GFE) and the agreed scope of works between GFE and Mr Andy Ward, Managing Director, Lakeside Goolwa, Goolwa Tourist Resort Pty Ltd (client).

Extensive consultation with stakeholders was outside of the scope of works for this BDA, although limited input was sought from key stakeholders where it was considered important to the risk assessment process and for integrated management.

Bushfire risk assessment and management is not a precise science and a significant number of factors may influence how bushfire risks are assessed and managed at any particular location. These factors include the landscape hazards, weather conditions, vulnerability of assets, community preparedness, and implementation of management programs, practicality and cost. It must be acknowledged that the level of bushfire risk in any given situation and the potential for mitigation remains a complex balance of these and other factors, most of which are outside of the control of GFE. It is not possible to guarantee that a bushfire will not occur as a result of mitigation measures proposed or that the associated consequences can be removed. It must be acknowledged that under catastrophic bushfire conditions bushfires may occur that cannot be controlled by fire-fighting services and bushfire mitigation measures may not be effective in preventing loss of property or life.

GFE has prepared this BDA in accordance with the usual care and thoroughness of the consulting profession, by reference to applicable industry standards, guidelines and assessment criteria in existence at the date of issue of this Report and based upon the information and advice provided to GFE. For the reasons outlined, no warranty or guarantee, whether expressed or implied, is made as to the data, observations and recommendations expressed in this BDA.

Any reliance of this BDA by a third party shall be entirely at such party's own risk. GFE provides no warranty or guarantee to any third party, express or implied, as to the information and or professional advice indicated in this BDA, and accept no liability whatsoever for or in any respect of any use or reliance upon this BDA by a third party.

SIGNATURE PAGE

GRANT FLEMING ENVIRONMENTAL

A handwritten signature in black ink, appearing to read 'G Fleming', is centered on the page.

Grant Fleming BSc(Hons), BAppSc, MAppSc
Principal Environmental Scientist

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