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Report

Bushfire Management Plan

LOCATION: RIVERBEND PRECINCT 1

CLIENT: GOODROCK PROPERTY GROUP PTY LTD



Project Ref 2543567/ N25-0358 Issue B

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Author:
Madeline Dooley

Bushfire Consultant / Ecologist
BEnvSc Hons (Ecology and Conservation)

Reviewed:
Anthony Power
Bushfire Technical Lead

GDDDBPA UWS, Grad Dip Urb & Reg Plan,
Grad Cert Nat Res UNE, Dip Hort, Dip Arb,
AILA

Version History

Version	Date	Details	Author	Reviewer
Issue A	September 2025	Bushfire Management Plan	MD	AP
Issue B	March 2026	Development Layout Update	MD / AB	AP

Executive Summary

Covey Associates have prepared this Bushfire Management Plan (BMP) to support the proposed Reconfiguring a Lot (ROL) Development Application (DA) for Precinct 1 of the Riverbend Master Planned Community. This report encompasses the DA1 / ROL1 being made under the Greater Flagstone Urban Development Area Development Scheme for Lot 102, 105 and 106 on SP254145 being submitted to Economic Development Queensland.

Parts of the site are identified as a Bushfire Prone Area under the State Planning Policy (SPP) Bushfire Hazard Mapping. This BMP assesses the risk of the proposed development within the defined Bushfire Prone Area, assessing specifically against the Local City Council (LCC) Bushfire Hazard Overlay Code (BHOC) and Assessment Benchmarks in the *Natural Hazards, Risk and Resilience – Bushfire, State Planning Policy State Interest Guidance Material* (Queensland Government, 2019a). The requirements and a description of how these code requirements are addressed in the proposed development design are detailed in Section 6 of this report. This BMP focuses solely on bushfire-related risk and mitigation strategies, and further investigations might be required to support a development application.

The outcomes of this Bushfire Management Plan have identified that:

- Per the Assessment Benchmarks of the State Planning Policy, the proposed lots within Precinct 1 should be sufficiently located beyond bushfire prone vegetation such that they are not impacted by a Radiant Heat Flux (RHF) greater than 29kW/m². Most lots within Precinct 1 achieve this requirement, with the exception of:
 - Lot 19001, and Lots 19076 through to Lot 19081 within Stage 9.
 - These Lots shall have suitably placed Building Envelopes to ensure proposed dwellings are not impacted by an unacceptable level of RHF.
- The proposed State Primary School falls under the Vulnerable Use definition per the SPP; Vulnerable Use developments shall be placed beyond the extent of impact of RHF 10kW/m². The extent of RHF 10kW/m² has been assessed, around this proposed school development lot.
 - Provided that proposed buildings within this Vulnerable Use development lot are placed beyond the extent of RHF 10kW/m², the proposed school development will achieve the SPP assessment benchmarks.
 - Depending upon the building classifications, some buildings proposed within the school may be required to comply with Bushfire Attack Level construction requirements, per AS3959 and the National Construction Code.
- The proposed Stormwater treatment basins have been considered as bushfire prone vegetation in the post development landscape, per Bushfire Resilient Communities technical reference guide.
 - Covey have provided specific assessment of the vegetation within these basins, the landscape design shall align with the vegetation classification, class per this BMP, in terms of species selection and vegetation structure; or a lower risk vegetation.
- Any future landscape design as it is developed within operational works phases of the development shall not exacerbate or increase bushfire prone vegetation from what has been assessed (refer to Figure 3-8),
 - This includes any planting of vegetation that does not align with Clause 2.2.3.2 of AS3959:2018

By adopting the mitigation measures in this BMP, the level of bushfire hazard, risk and RHF for the proposed development are reasonable and are not likely to prohibit the proposed development of the site.

Abbreviations Used in Report

Abbreviation	Full Meaning
AS3959	AS 3959:2018 – Construction of Buildings in bushfire-prone areas
AWS	Automatic Weather Station
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BMP	Bushfire Management Plan
BRC	Bushfire Resilient Communities
DA	Development Application
FFDI	Forest Fire Danger Index
LCC	Logan City Council
NCC	National Construction Code of Australia
RHF	Radiant Heat Flux
ROL	Reconfiguring a Lot
SPP	State Planning Policy
VHC	Vegetation Hazard Class
w	Understorey fuel load
W	Total fuel load

Supporting Documentation		
Document	Prepared by	Abbreviation
<i>Celestino’s Riverbend Masterplan approved by EDQ</i>	<i>Place Design Group (14 March 2025)</i>	Development Masterplan

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1 Introduction

1.1 Scope

The client (Goodrock Property Group), on behalf of the proponent, Celestino Developments Pty Ltd (Celestino), engaged Covey Associates Pty Ltd (Covey) to prepare a site-specific Bushfire Management Plan (BMP) to support a development application for a Reconfiguration of a Lot (ROL) for Precinct 1 of the Riverbend master-planned development. The proposed Precinct 1 development extent (Figure 2-1 in Section 2) is located within Lot 102, 105 and 106 on SP254145 (the site). The development application is being made under the Greater Flagstone Urban Development Area Scheme (Greater Flagstone UDAS) to Economic Development Queensland (EDQ) as the assessment authority.

The Greater Flagstone UDAS, the development is to be designed to mitigate bushfire risk. Further, the development should achieve the assessment benchmarks of the State Planning Policy (SPP) – Part E Natural hazards, risk and resilience (The State of Queensland, 2017), as well as Performance Outcomes of the Logan Planning Scheme 2015: 9.2 and the associated overlay code 8.2.3 Bushfire hazard overlay code (BHOC). The site has been identified as within a bushfire hazard area on the SPP Bushfire Hazard mapping (refer to Figure 3-1 in Section 3).

As such, this BMP assesses the risk of the proposed development being located within a mapped Bushfire Prone Area, and details how the recommended bushfire mitigation measures achieve the purpose and outcomes, in accordance with the Logan City Council BHOC and Assessment Benchmarks in the *Natural Hazards, Risk and Resilience – Bushfire*, and *State Planning Policy State Interest guidance material* (Queensland Government, 2019a) (SPP guidance material).

1.2 Objectives

The objectives of the BMP are to:

1. Achieve consistency with purposes and policy measures of the SPP guidance material, *Bushfire Resilient Communities Technical Reference Guide for State Planning Policy State Interest ‘Natural Hazards, Risk and Resilience – Bushfire’* (BRC) (Queensland Fire and Emergency Services, 2019a), and the LCC BHOC;
2. Assess and refine mapping of the extent of potential bushfire risk for the site / BMP area by undertaking a Radiant Heat Flux (RHF) assessment (including future proposed revegetation areas) of all lands to a distance of 150m surrounding the site as required under the BRC, and
3. Devise bushfire risk mitigation measures for all land subject to the plan, with due regard for people, property, infrastructure, and the environment.

1.3 Document Review

Covey recommends reviewing this BMP after 5 years, or sooner if precinct layout or landscape amendments alter potential bushfire risk interface areas.

1.4 Planning Context

1.4.1 [SPP - Natural hazards, risk and resilience state interest – Bushfire](#)

The SPP - *Natural hazards, risk and resilience state interest – Bushfire*, identifies two ways a site may be designated as bushfire-prone. These are as follows:

1. If the land is identified by a local government in a local planning instrument as a bushfire-prone area, based on a localised bushfire study, prepared by a suitably qualified person; or
2. If the local government has not identified bushfire-prone areas in a local planning instrument in accordance with (1) above, the area is shown on the State Planning Policy Interactive Mapping System as a bushfire-prone area.

1.4.2 [Bushfire Prone Designation](#)

Formal designation of an area as “Bushfire Prone” provides the legislative trigger to enforce all Building Classes to be constructed per AS 3959 – 2018 Construction of buildings in bushfire prone areas (AS3959).

1.4.3 [Logan City Council Bushfire Hazard Overlay Code](#)

The LCC BHOC applies to assessable development identified as bushfire hazard in the Bushfire hazard overlay map OM-03.00. The Riverbend site requires assessment against the assessment benchmarks of the LCC BHOC as it is identified as a bushfire hazard area.

1.5 Bushfire Regulatory Context

The following regulatory documents are identified as being referenced to provide the performance criteria and technical specifications for this Bushfire Management Plan:

1. The State of Queensland (2017). State Planning Policy.
2. Queensland Government (2019). Natural hazards, risk and resilience – Bushfire. State Planning Policy – state interest guidance material.
3. Queensland Government (2021). Natural hazards, risk and resilience state interest – Bushfire. Example planning scheme assessment benchmarks.
4. Logan City Council Planning Scheme Policy 2015 Bushfire Hazard Overlay Code (V9.2 July 2025)
5. Queensland Fire and Emergency Services (2019a). Bushfire Resilient Communities. Technical Reference Guide for the State Planning Policy State Interest “Natural Hazards, Risk and Resilience-Bushfire”.
6. Queensland Fire and Emergency Services (2019b). Fire Hydrant and Vehicle Access Guidelines for Residential, Commercial and Industrial Lots.
7. Standards Australia (2018). AS 3959 - 2018 Construction of buildings in bushfire-prone areas: SAI Global.
8. SAI Global (2021). AS 2419.1:2021 Fire Hydrant Installations for Buildings; Australian Standards.

2 Site Details

The Precinct 1 is located within the Greater Flagstone Priority Development Area along the south-eastern side of Teviot Road (southern end), which is a recently constructed roadway. Precinct 1 is approximately 6.5 km west of Jimboomba at Riverbend (Figure 2-1). The land adjacent to the site to the south and west within the Master-planned area is planned for future development, which will include a mix of residential, recreational, community centre and drainage land use. A neighbourhood connector road is planned for construction along the eastern boundary of Precinct 1, along with two major trunk connection roads through the centre and along the southern boundary of Precinct 1. Access to the proposed development will be from Teviot Road and the trunk road network within the Master-planned area is established. The future trunk road network will provide connections to Teviot Road in the north-west and existing roads in the northeast.

The Master Planned area has been extensively cleared and includes slashed grassland and scattered patches of regrowth *Acacia* species. A patch of vegetation remains within the site at the northwestern boundary, along with a strip of vegetation along a creek line at the southern extent. Directly to the east of Precinct 1, between Precinct 1 and future-planned Precinct 3, is a State-owned vegetation corridor adjoining the development site.

2.1 Proposed Development

Figure 2-1 details the subdivision plan for the proposed development, including the layout of roads, residential lots and open spaces. The proposed development includes residential lots, a state primary, local linear parks, stormwater management areas, and neighbourhood recreation parks. In accordance with Table 3 of the SPP – State Interest Guidance Material, Natural hazards, risk and resilience – Bushfire, the state primary school is defined as a *Vulnerable Use*. Vulnerable uses are more vulnerable to the effects of bushfire attack, therefore require specific bushfire mitigation requirements (Queensland Government, 2019a).

2.2 Access

Prior to plan sealing of the master planned community, the proposed development will be accessed via a new trunk connection road connecting to Teviot Road, along with additional connection roads to the east. Additional trunk connector and neighbourhood connection roads will facilitate access to future proposed developments to the south, east and southwest. Until the proposed development is complete, the applicant will maintain existing vehicle access tracks within the Master-Planned area to allow access and egress to private and emergency vehicles.

2.3 Water Supply

The proposed development will be connected to a reticulated mains water supply, with fire hydrants located within the future road reserve per the South-East Queensland (SEQ) Water Supply Code.

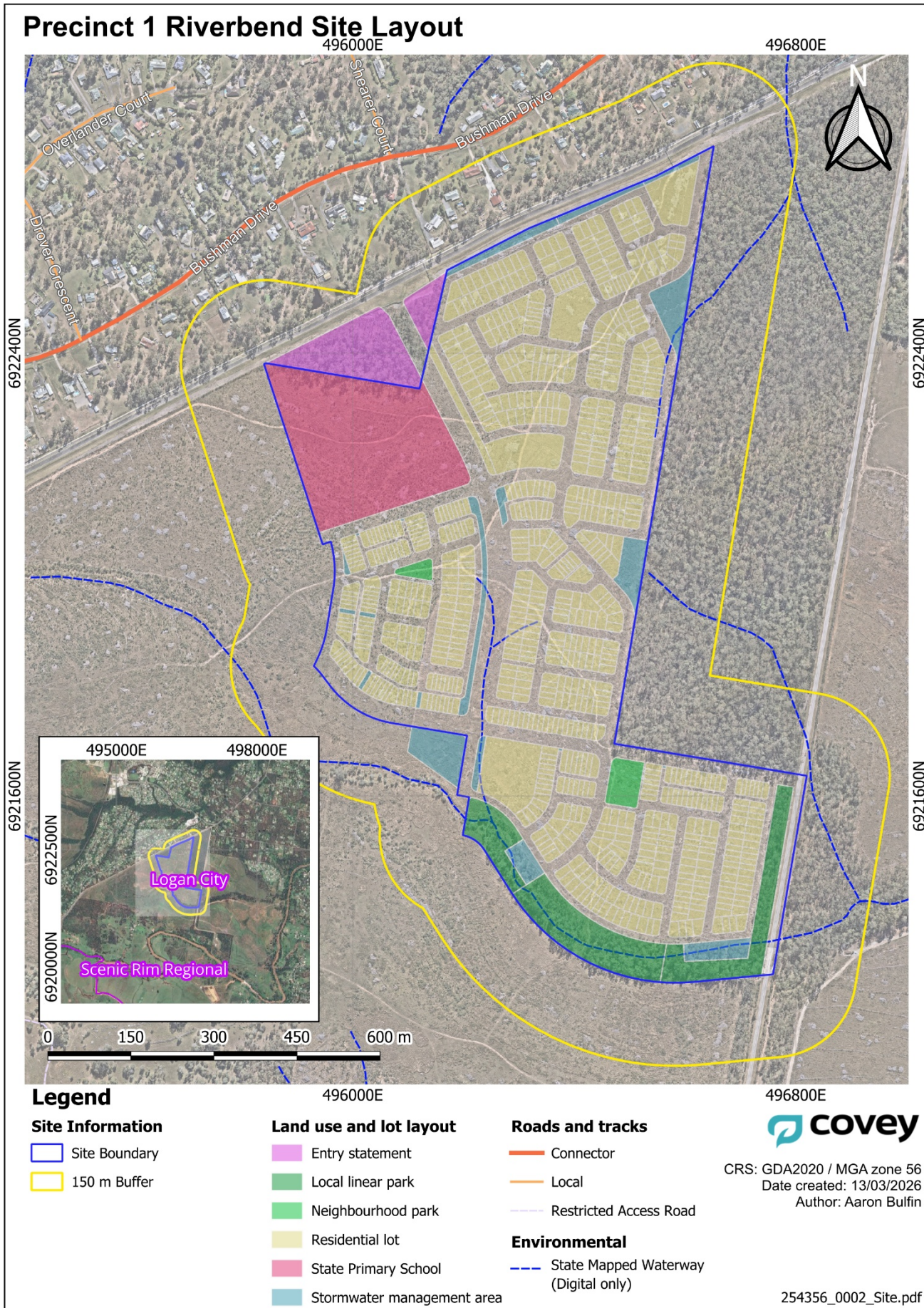


Figure 2-1. Precinct 1 Proposed Development Layout

3 Bushfire Hazard

Bushfire severities are predominantly influenced by fuel, weather, and topography; each of which can have a varying effect on bushfires and their potential – these main influences will be explored below in this section. Bushfire severity as it relates to vegetation and topography is represented on the Bushfire Prone Area mapping developed by the Queensland State government, where increased severity is a result of areas of steeper terrain and vegetation with higher potential fuel loads.

The State Planning Policy (2018) mapping identifies the site as subject to High Potential Bushfire Intensity and Medium Potential Bushfire Intensity – see Figure 3-1. The LCC Planning Scheme Bushfire Overlay Map (OM-03 00) identifies the site as subject to High Potential Bushfire Intensity and Medium Potential Bushfire Intensity. Given there are no State provisions under the existing Logan City Council Planning Scheme, this BMP uses assessment methodologies outlined in BRC and the SPP.

Currently Logan City Council is in the process of drafting their new Planning Scheme Policy, which intends to adopt the SPP BPA mapping. Additionally, given that this development will be assessed by EDQ – a State authority, the SPP BPA mapping has been determined as the assessment trigger.

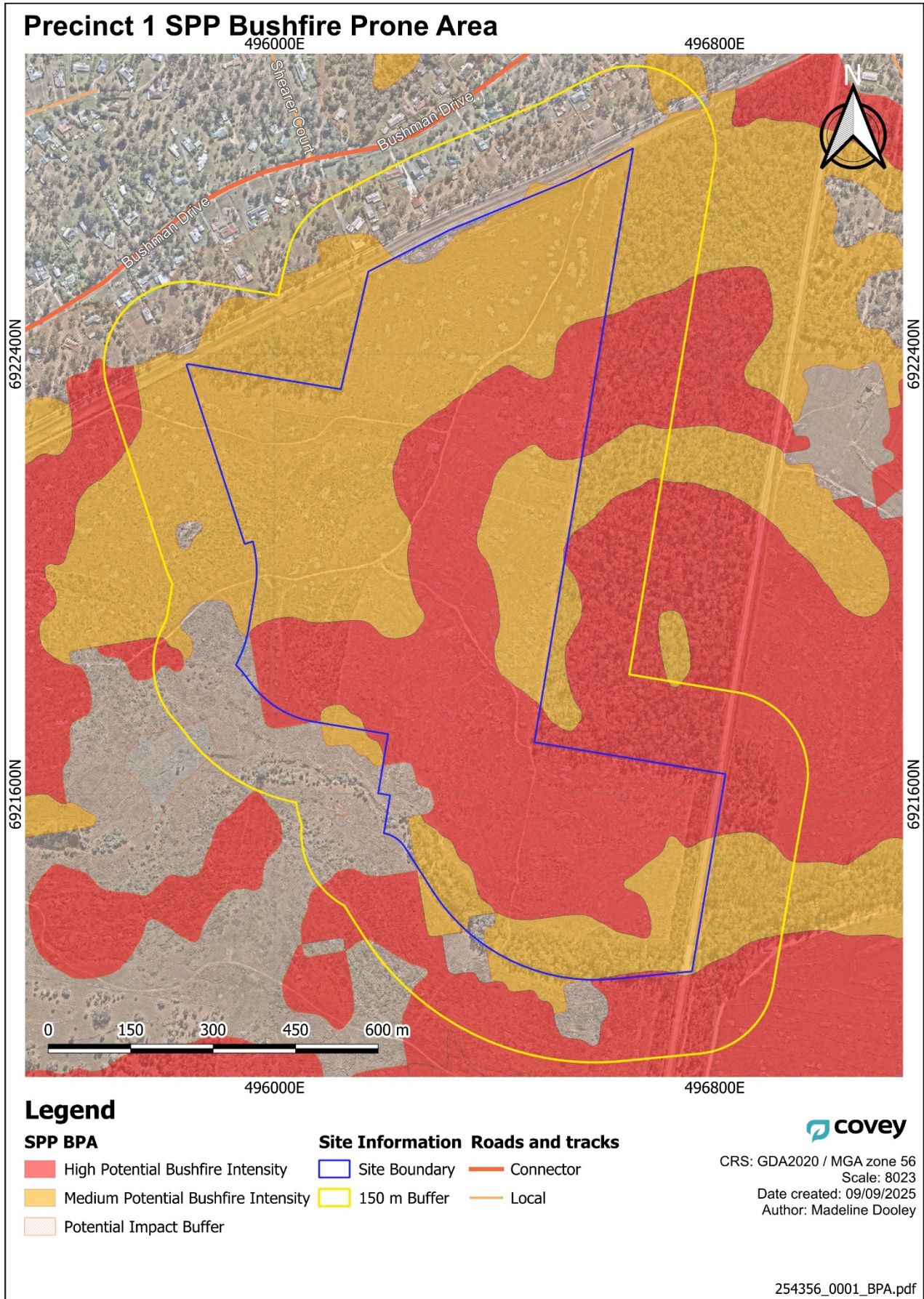


Figure 3-1. Bushfire Prone Area per SPP.

3.1 Site Topography

Topography was verified during the site assessment and was considered consistent with the Digital Elevation Model (DEM) obtained from *Elvis - Elevation and Depth - Foundation Spatial Data (2025)*. The client provided a one-metre resolution design DEM of the existing terrain across the development site. The DEM provided is associated with the design surface (final surface) of the development works that will be undertaken for the proposed development. The design DEM was merged with downloaded Light Detection and Ranging (Lidar) information from Elvis to provide an elevation model that covers the full extent of the assessment area – 150 metres around the development boundary). The slope analysis confirms that the site is gently sloping to a ridge in the centre of the site, with a waterway gully to the south. Further, the stormwater management drainage areas to the north and east of the development contain small embankment depressions.

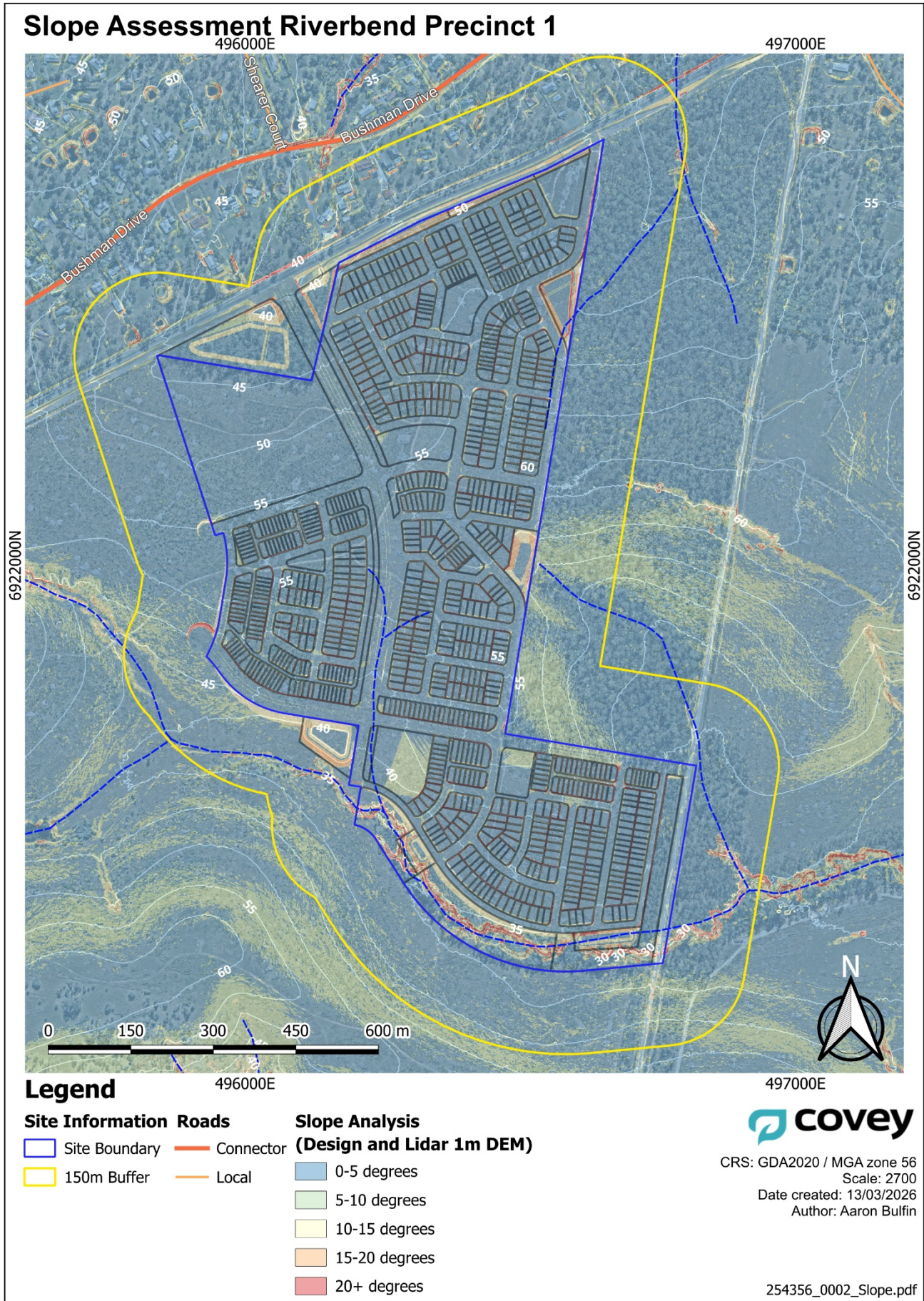


Figure 3-2. Slope analysis of post-development topography – (including planned earthworks).

3.2 Weather

An assessment of the recent past weather patterns and trends was analysed for the site using data extracted from the Bureau of Meteorology recorded from all of Australia’s Automatic Weather Stations (AWS). For this site, we analysed data from Beaudesert (Drumley Street) from 2007 – 2024 (AWS 40983, which is approximately 15.5 km south-east of the development site). To ensure a complete year-to-year assessment of historic weather, the assessment period has been stopped at the end of 2024.

3.2.1 Fire Danger Season

Fire weather refers to meteorological conditions that effect bushfire spread, elevated fire weather conditions can make wildfire suppression more challenging. Fire weather can be influenced by many local factors, including temperature, wind, relative humidity, and drought factor – all of which are used to calculate the Forest Fire Danger Index (FFDI¹). Fire risk is typically linked to the occurrence of fire weather days or sequences of days of FFDI above 25 (Queensland Parks and Wildlife Service, 2013).

Analysis of monthly FFDI distribution indicates that the fire season typically extends between August and November, peaking in September (seasonally dependant) (Figure 3-3). However, fire occurrences can have a random nature, and a few short sharp fire weather periods can result in conditions where fires may cause, or have the potential to cause, major damage. Damaging fires can occur in any given year, despite some years being drier and hotter than others.

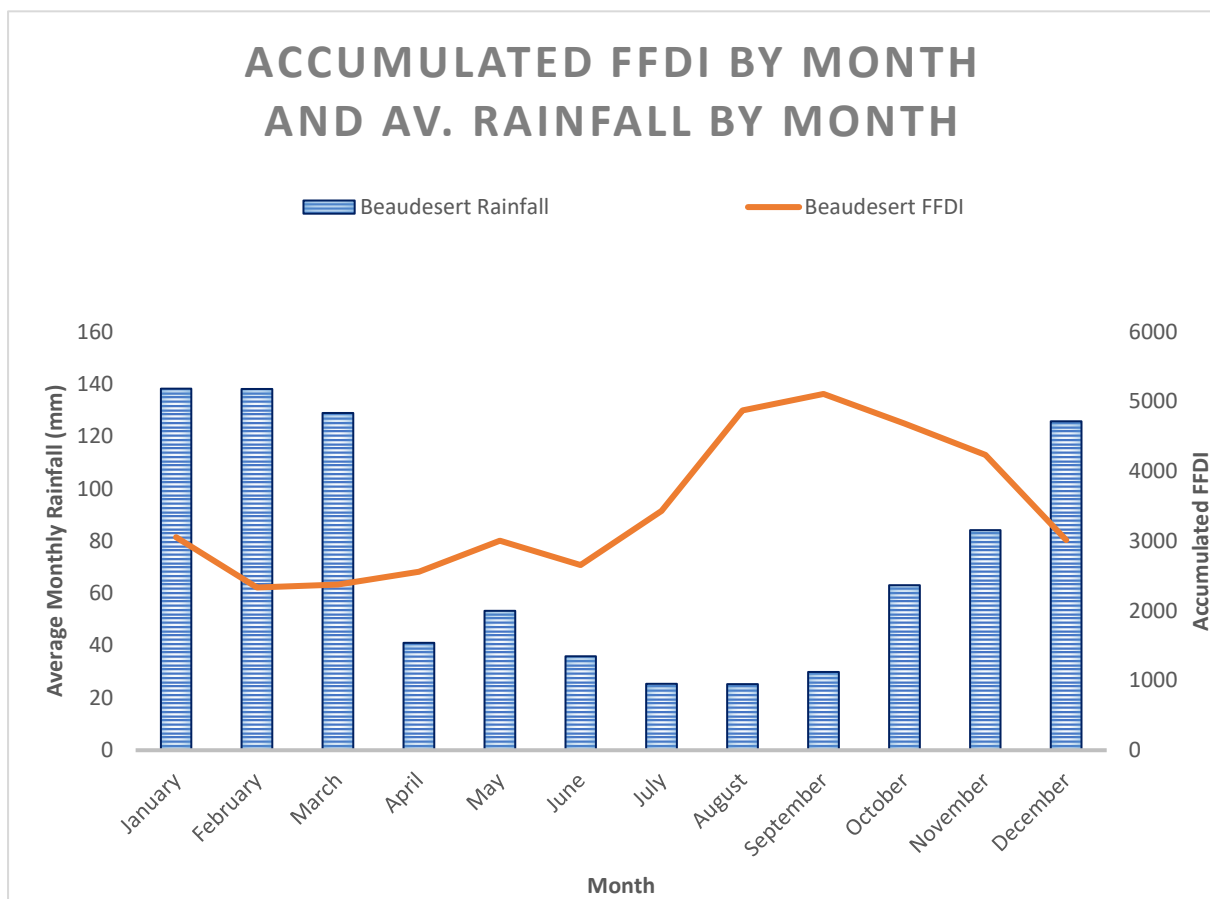


Figure 3-3. Accumulated FFDI by Month for Beaudesert AWS

¹ FFDI were used in this report, instead of the new Australian Fire Danger Rating System and Fire Behavior index, as the data we analyzed was historical. Also, FFDI values are used as input for in RHF modeling consistent with BRC and AS3959.

Table 3-1 provides the highest ranked FFDIs over the recorded period – where the total number in the ranking is the total number of years of historical weather data from Beaudesert (Drumley Street) AWS (i.e. approximately seventeen years for Beaudesert from 2007-2024). These show that the highest ranked fire danger days are typically associated with:

- Air temperatures in excess of 30°C;
- Low RH ($\leq 21\%$);
- Westerly arc winds; and,
- Relatively dry conditions (Drought Factor ≥ 9.2).

Table 3-1 - Highest Ranked FFDI for Beaudesert AWS 2007-2024

Rank	FFDI	FDR	Date	Month	T (°C)	Dew Point [°C]	RH [%]	Wind Speed [km/hr]	Wind direction [deg]	Wind Cardinal Direction	KBDI	Drought Factor
1	58.02	Severe	8/11/2019	November	38.3	-3.5	4	16.6	300	WNW	181	10
2	56.14	Severe	15/11/2019	November	37.1	-8.7	5	18.4	290	W	185	10
3	47.95	Very High	7/11/2019	November	36.4	-9.2	4	11.2	330	NW	181	10
4	47.58	Very High	5/11/2019	November	28.6	8.3	9	29.5	260	WSW	180	10
5	47.26	Very High	6/09/2019	September	34.5	-10.6	5	14.8	310	WNW	168	10
6	45.96	Very High	5/12/2019	December	38.2	-3.6	7	16.6	250	WSW	184	8.8
7	45.75	Very High	5/10/2015	October	34.8	-21.3	2	9.4	60	NE	129	9.8
8	44.99	Very High	16/11/2014	November	40.1	12.1	17	22.3	270	W	169	10
9	44.66	Very High	6/12/2019	December	40.5	-0.1	8	11.2	290	W	185	9.3
10	43.38	Very High	9/09/2019	September	23.6	-14.2	8	31.3	250	WSW	170	10
11	42.94	Very High	16/12/2019	December	41.1	11.2	23	27.7	90	E	191	10
12	41.94	Very High	5/11/2016	November	34.6	4.2	14	24.1	260	WSW	110	9.7
13	41.61	Very High	10/11/2019	November	33	-9.3	6	13	200	S	182	10
14	40.19	Very High	8/09/2019	September	26.1	-9.2	9	25.9	250	WSW	170	10
15	40.09	Very High	16/11/2019	November	38.5	2.8	20	24.1	90	E	186	10
16	39.77	Very High	4/09/2019	September	33.7	-5.1	8	13	250	WSW	166	10
17	38.31	Very High	7/10/2012	October	35.6	5	15	20.5	280	W	152.53	9.65
18	38.27	Very High	28/11/2018	November	35.6	13.1	21	31.3	280	W	90	9.2

Though the number of years for which the AWS has been active is relatively short (seventeen years), it still provides valuable information relating to typical high fire danger weather patterns. The year or 2019 stands out as the worst year on record (2007 to 2024) based on low annual rainfall accumulation through the year and high temperatures, combined with low relative humidity influenced by the dry inland air from the westerly winds.

3.2.2 Rainfall

The occurrence of days with high fire danger is also influenced by annual rainfall by virtue of the Keetch-Byram Drought Index (KBDI) and Drought Factor (DF). As seen for the analysed AWS, where typically low annual rainfall results in higher accumulated annual FFDIs (Figure 3-4). Accumulated annual FFDI is the summed value of all FFDI’s for each year of the analysis. Conversely, years of above-average rainfall can lead to increased vegetation growth. Therefore, although high rainfall levels are less conducive to extensive wildfire impact in the short term, this effect might be reversed in successive years, especially if a period of drought follows. As such, having an above-average year of rainfall cannot be perceived as reducing the ongoing fire risk.

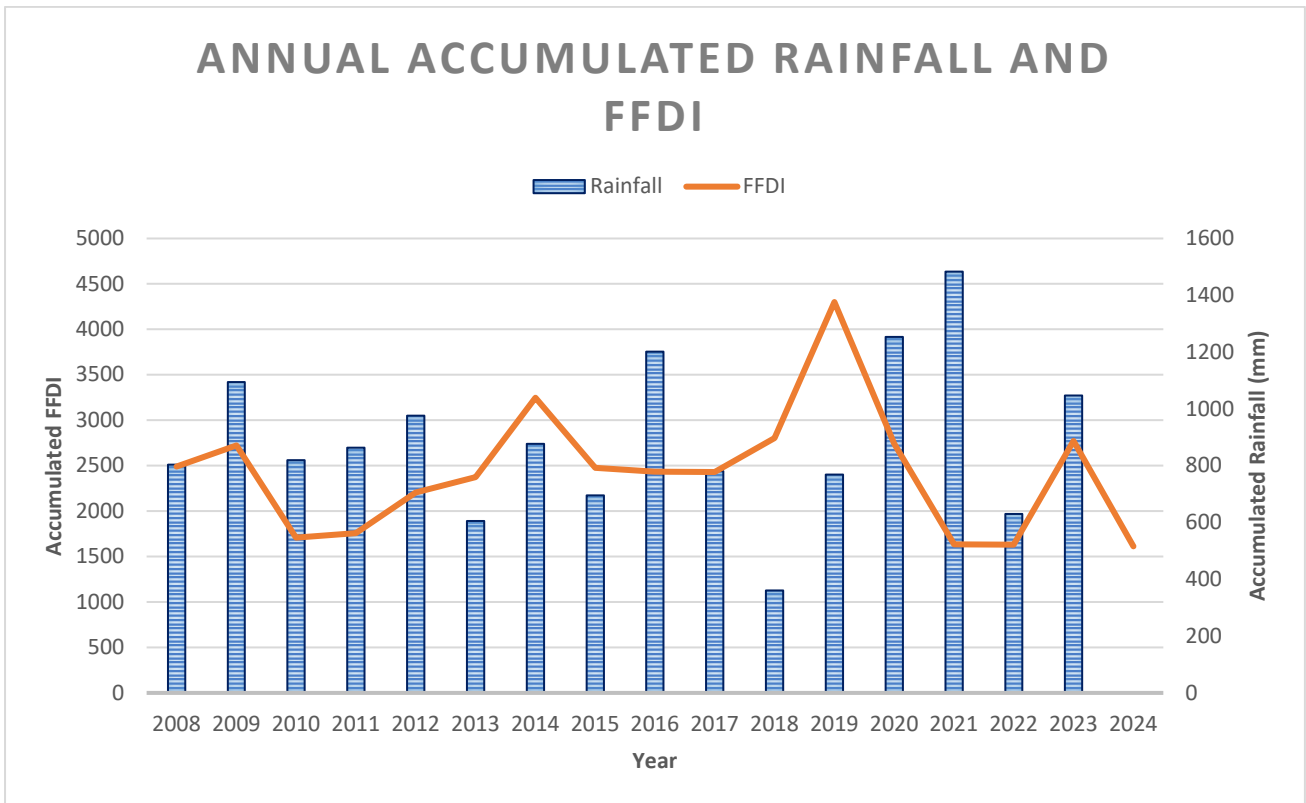


Figure 3-4 - Annual Rainfall vs Accumulated FFDI

3.2.3 Wind Speed & Direction

Fire weather patterns are closely related to wind directions and synoptic setups. Figure 3-5 shows an analysis of wind directions for FFDI classes 0-11, 12-24, 25-49, and 50-74 for Beaudesert AWS assessed period (2007 to 2024). FFDIs greater than 74 have not occurred over the assessed period. The analysis reveals that FFDI above 25 tend to come from a westerly arc, under inland dry wind influences. Winds associated with lower FFDIs tend to be easterlies and have higher relative humidity due to a maritime influence.

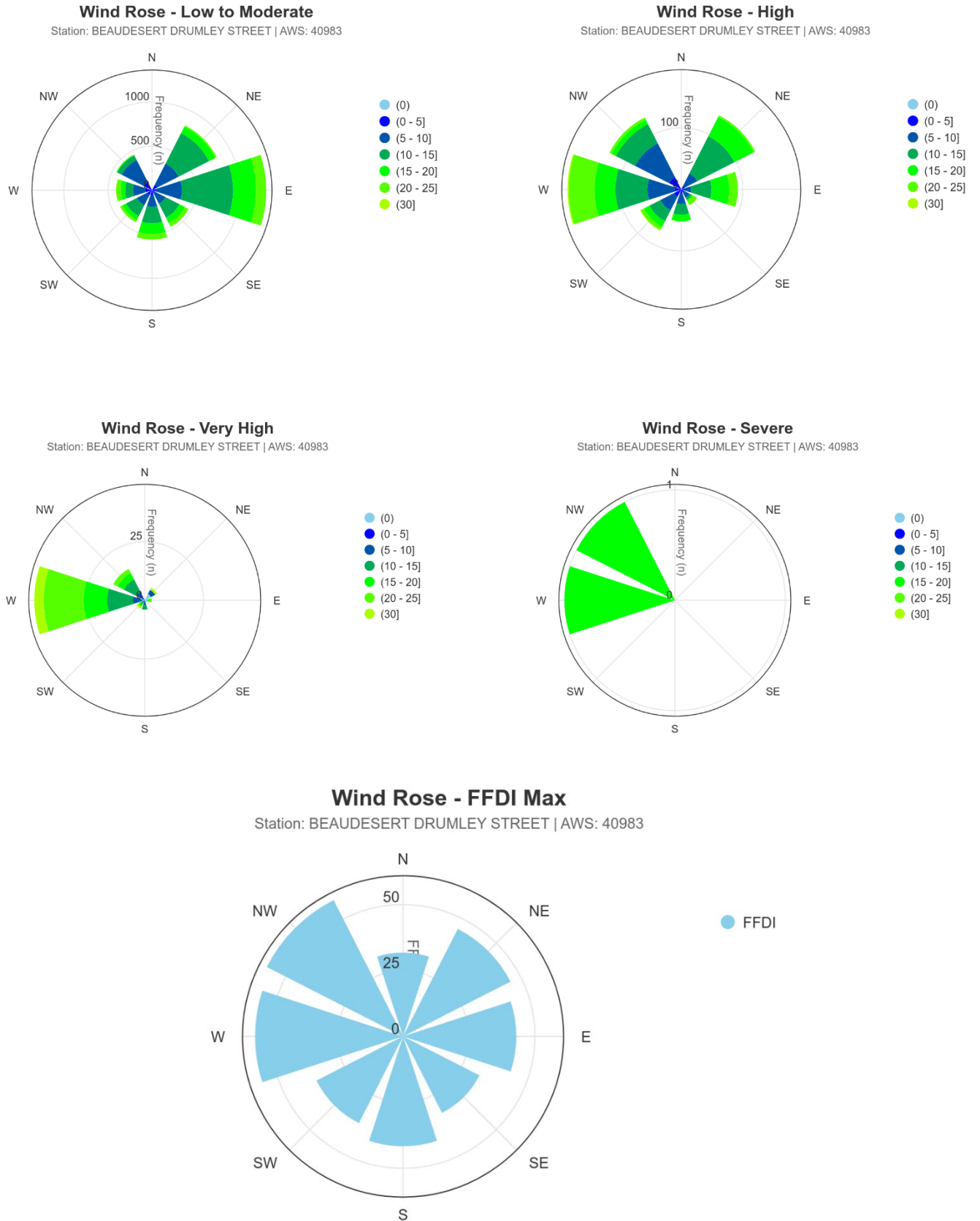


Figure 3-5. Wind Rose and accumulated days (count) for 'Low to Moderate' (0<FFDI<12), 'High'(12<FFDI<25), 'Very High' (25<FFDI<50) and 'Severe' (50<FFDI<75) Fire Danger Rating Days and 'Max FFDI for each wind direction'.

3.2.4 Generalised Extreme Value

A Generalised Extreme Value Analysis (GEV), a regression technique was completed to determine the Annual Exceedance Probability (AEP) of FFDI values. The GEV technique is frequently used to predict extreme weather such as storms, cyclones and flooding events (Douglas et al., 2014). Covey completed a GEV analysis based on the recorded FFDI data at Beaudesert AWS for the study period (Figure 3-6).

$$y = 39.1681 + 6.3155 \times \ln(x) \quad (r^2 = 0.9779) \quad (\text{Beaudesert AWS})$$

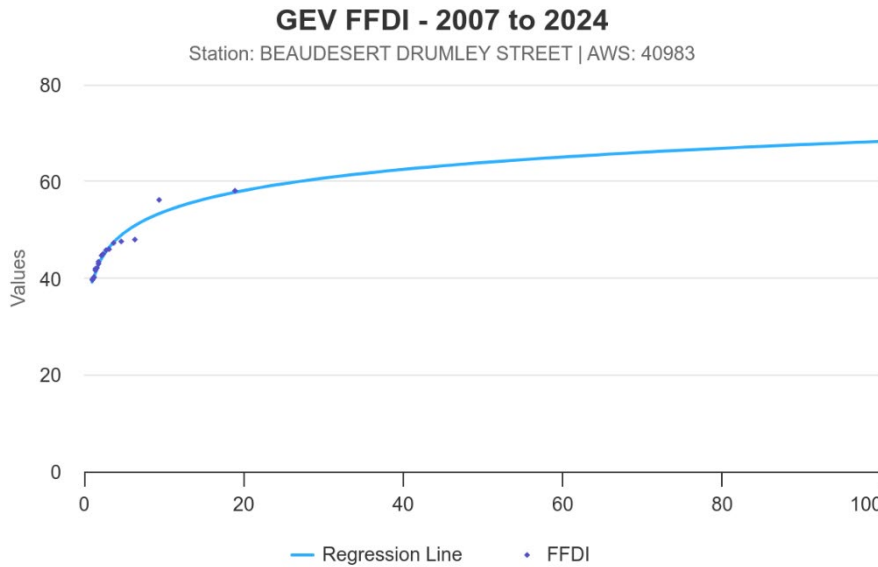


Figure 3-6. GEV Regression analysis Beaudesert (2007-2024) y axis = FFDI; x axis = recurrence years.

This analysis provides an indication of the Annual Return Interval (ARI) of fire weather. Table 3-2 contains the calculated FFDI values for key return intervals. It is important to note that the GEV recurrence value indicates the likely return period of fire weather and not a fire event. Extreme fire weather may come and go without a fire occurring. Therefore, the probability of a fire occurring within the right position within the landscape during these periods of extreme weather and impacting the development are orders of magnitude lower. The ARI FFDI reflects existing baseline conditions and not ARIs that are inclusive of the effect of climate change.

Table 3-2. GEV Recurrence Interval of FFDI Beaudesert (2007-2024)

Annual Recurrence Interval (Years)	Beaudesert AWS FFDI
1	39
20	58
25	59
50	64
100	68

3.2.5 Selection of FFDI value using SPP

Per the recommendations of BRC for undertaking Method 2 Radiant Heat Flux (RHF) calculation method, the mapped SPP 1:20 year ARI FFDI spatial data (available at [BRC MapViewer](#)) has been adopted for the RHF analysis within this BMP. The SPP-prescribed spatial FFDI for the site and for the Beaudesert BoM AWS location is 56. These calculations of the FFDI ARI are based on an A1F1 climate change scenario (Queensland Fire and Emergency Services, 2019a)

The SPP mapped FFDI spatial data, created in 2014, doesn't consider the latest 10 years of weather data. Our GEV analysis indicate that these values approximately represent a 1 in 14-year recurrence Interval for the site under baseline conditions

Note, that the SPP prescribed FFDI is higher than the results of our analysis. This difference can be attributed to the difference in the way the ARIs are determined as discussed above. Per the recommendations of BRC Method 2, an FFDI of 56 was used in the radiant heat flux (RHF) analysis outlined in Section 4 of the SPP.

3.2.6 Climate Change Impact on FFDI

Climate change relative to the project site can be referenced in the *Climate Change in Australia Report for East Coast Cluster* developed by CSIRO and BOM (A. Dowdy et al., 2015), key findings for projected climate change within the East Coast Cluster is summarised below:

Very high confidence in:

- Higher temperatures,
- Hot and more frequent hot days, with less frost, and;

High Confidence in:

- Increased intensity of heavy rainfall events, though changes to drought less clear,
- Increase evaporation rates and reduced soil moisture,
- Little change in solar radiation and reduced humidity throughout the year,
- Some decrease in Winter wind speed, with fewer East Coast Lows,
- A harsher Fire Weather climate is expected in the future.

Climate modelling projections for predicted fire weather and fire danger based on the latest IPCC reports (AR5 and AR6) are available and could provide valuable information when assessing potential future fire risk to the site – as projections exist from the current year to 2100. These climate models have been developed by the Department of Environment and Science, based on accepted climate models and data, and are available in gridded format relative to the project site (CSIRO et al., 2021).

It should be noted that fire weather and fire behaviour are, by nature, difficult to predict with certainty. Therefore, the following limitations exist when predicting bushfires and designing for bushfire mitigation:

- Fire behaviour at elevated FFDIs and under the influence of fire-induced winds driven by strong convection rates can become erratic and thus can be beyond the bounds of predictive models (Cruz et al., 2012); and
- Human-induced climate change may exacerbate fire behaviour and affect vegetation structure and floristics in different ways to those assumed in this project (A. J. Dowdy, 2018).

3.3 Bushfire Fuels

Fuel load and arrangement significantly impact the bushfire behaviour, potential severity, and scale. Fuel characteristics vary along with changes in type, density, and extent of vegetation communities and land use. The SPP through BRC requires assessment of the 150 m of vegetation adjacent to assets. The vegetation within the study area was classified into Vegetation Hazard Classes (VHC) (Queensland Fire and Emergency Services, 2019a) based on information gathered from a combination of:

- Site-verified Regional Ecosystem data from field observations;
- State Regional Ecosystem spatial data (<https://qldspatial.information.qld.gov.au/catalogue>);
- Vegetation Hazard Class (<https://qldspatial.information.qld.gov.au/catalogue>); and
- Aerial imagery.

BRC assigns specific fuel loads based on the type of the mapped vegetation community (mapped as VHC), which is based on Queensland Regional Ecosystems (RE) mapping. BRC defines Bushfire Prone vegetation as a VHC that can have a potential fireline intensity greater than 4,000 kW/m, with values lower than this considered as vegetation associated with grass fire prone, or low hazard areas. BRC requires the bushfire assessment to consider vegetation up to 150m around the development lot, which has been desktop reviewed and refined to understand the bushfire risk and potential by evaluating the fuel type and continuity across the whole development site.

3.3.1 Site Assessment

A site inspection was undertaken on the 7th of August 2025 to assess the mapped regional ecosystems and verify the corresponding vegetation hazard classes at the site. The site was traversed on foot to document dominant species composition of site vegetation and compare these with State mapped REs and VHCs. The VHC observed within the site or within 150m of the proposed development lot pre-development are detailed in .Figure 3-7

The majority of the development site has been previously cleared with slashed grassland remaining along with scattered patches of regrowth *Acacia sp.* There is a vegetated creek line along the southern boundary of the site consisting of a canopy of Eucalypt / sclerophyll trees, including *Eucalyptus tereticornis*, *E. crebra* and *Corymbia citriodora* and an understorey of *Acacia sp.* with patchy introduced *Lantana camara* shrubs. The adjoining State-owned lot (Lot 71 on SL8963) to the east of Precinct 1 boundary, will remain in its current vegetated state. This area consists of open forest dominated by *Corymbia citriodora*, *Eucalyptus tereticornis*, *Corymbia intermedia* and *E. crebra* with a subcanopy of *Acacia sp.* and *Alphitonia excelsa*. Some areas contain dense to scattered *Lantana camara* shrubs through various creek line gullies. A small triangle of vegetation remains at the north-western extent of the development boundary, consistent with the vegetation in the State-owned corridor.

The remnant vegetation mapped includes RE 12.9-10.2 to the east, 12.9-10.3 along the south-eastern extent and 12.3.3 through the creek to the south. This vegetation aligns with VHC 10.1 and VHC 13.1 to the east and VHC 16.1 along the southern creek line. The VHC mapping within the site and surrounding 150 m has been refined per BRC methodologies (Queensland Fire and Emergency Services, 2019a), based on the site assessment, aerial imagery, and mapped RE boundaries.

3.3.2 Post-Development Vegetation

Table 3-3 and Figure 3-8 detail the post-development VHC types and extent, as per the Development Layout Plan, site assessment and design earthworks layout provided by Goodrock Property Group. The mapped VHC was modified to account for the landscape intent of proposed local linear parks, neighbourhood parks, linear pockets and stormwater management areas.

Table 3-3. Site post-development VHC.

VHC	VHC Description	Prone Type per BRC
VHC 10.1	Spotted gum dominated open forests	Bushfire Prone
VHC 13.1	Dry to moist eucalypt open forests on undulating metamorphics and granite	Bushfire Prone
VHC 16.1	Eucalyptus dominated forest on drainage lines and alluvial plains	Bushfire Prone
VHC 29.3	Heathlands and associated scrubs and shrublands	Bushfire Prone
VHC 29.5	Sedgeland communities associated with heathlands, scrubs and shrublands	Bushfire Prone
VHC 39.2	Discontinuous low to moderate tree cover in built-up areas	Non-bushfire prone
VHC 40.4	Continuous low grass or tree cover	Grassfire prone
VHC 41.4	Discontinuous low grass or tree cover	Grassfire Prone
VHC 42.6	Nil to very low vegetation cover	Non-bushfire-prone
VHC 43.6	Water bodies or very low vegetation cover	Non-bushfire-prone

The basin floors of the proposed bio-retention (WSUD) stormwater management basins have been classified as *VHC 29.5 – Sedgeland communities associated with heathlands, scrubs and shrublands* with the adjoining batters mapped as *VHC 29.3 – Heathlands, scrubs and shrublands*, except for the WSUD (within Lot 15901) next to Lots 15062 and 15071. The basin floor of this WSUD has been classified as *VHC 29.5*, and batters classified as *VHC 29.3*; with the exception of the entire western batter which has been classified as *VHC 39.2*. These VHC’s are consistent with the Water by Design guidelines and typical landscape palette within WSUD areas – per Table 28 of the Water By Design Guidelines (2024) Note, the WSUD basin floors are assumed to have only surface coverage vegetation of grasses and sedges, with no shrubs or tree species to be planted.

The southern east-west orientated linear park was classified as *VHC 16.1 – Eucalyptus dominated forest on drainage lines*, as the intent is to retain existing vegetation within this area and our site assessment suggests existing vegetation aligns with this VHC. The corridor of vegetation within the eastern lot adjoining the development boundary was consistent with the vegetation identified within the field assessment, classified as *VHC 10.1 – Spotted gum open forest* and *VHC 13.1 – Dry to moist Eucalypt open forest*.

Covey has assumed that the adjoining future development stages will be constructed generally per the master-planned layout. These areas are considered to align with *VHC 42.6 – Nil to very low vegetation cover*. However, in the interim, before the development of areas to the west, south and east of Precinct 1, it is assumed that these areas will remain as grassland. As such, vegetation adjoining the Precinct 1 boundary to the south and west that is planned for future development within Riverbend Masterplan was classified as *VHC 40.4 – Low grass or tree cover* which is defined as “Grass-fire Prone”. Per the Bushfire Resilient Communities Guideline document, RHF and BAL are not calculated for non-bushfire prone VHC’s. Therefore, we have excluded these areas from our assessment. All temporary and permanent grassland areas will need to be maintained and managed in perpetuity, before and after construction of the development to restrict the growth of grass and

bushfires e.g. low grass height <100 mm, fuel loads <8 t/ ha, prior to development occurring (as outlined in Section 5).

Advice from the client indicates that the “Neighbourhood recreation parks”, “Regional Recreation Park”, and other internal parks will be managed landscapes and therefore a non-bushfire prone VHC. Specifically, these areas were classified as *VHC 39.2 – Low to moderate tree cover in built-up areas*. This vegetation is assumed to be managed in a minimal fuel condition per AS3959:2018 Exclusion Clause 2.2.3.2(f).

To conclude, the bushfire-prone vegetation within the site and 150 m surrounding the Precinct 1 boundary comprises the mapped VHC 10.1, VHC 13.1, VHC 16.1, VHC 29.3 and VHC 29.5. These areas are located within the corridor of State-owned vegetation to the east of the development, vegetation remaining at the south-west of the site, the creekline corridor in the south and stormwater management areas. These areas were used to model RHF to determine the level of bushfire exposure on the proposed lots as detailed in Section 4.

3.4 Summary

The proposed development is situated on a cleared lot bound by a corridor of vegetation to the east and creekline to the south. Areas planned for future development are located to the west, further south and east in the broader area. Based on analysis of Beaudesert AWS weather data, the baseline 1-in-20-year recurrence FFDI is 48; and the highest recorded FFDI was 58.02, in 2019.

Climate change modelling completed by the CSIRO and included in the BRC document projects an ARI 1:20 FFDI of 56 for the site. Note that, in our Radiant Heat Flux analysis, we adopted FFDI 56 per SPP. Higher fire risk is expected to be associated with westerly wind arcs, under inland continental dry winds influence, high temperatures (above 30°C), low relative humidity ($\leq 21\%$) and relatively dry conditions (Drought Factor typically ≥ 9.2).

Bushfire-prone vegetation has been identified as the State-owned corridor of vegetation east of the development, vegetation within a creekline to the south, retained Eucalypt dominated vegetation the south-eastern extent and the proposed stormwater management areas within the Precinct 1 development extent.

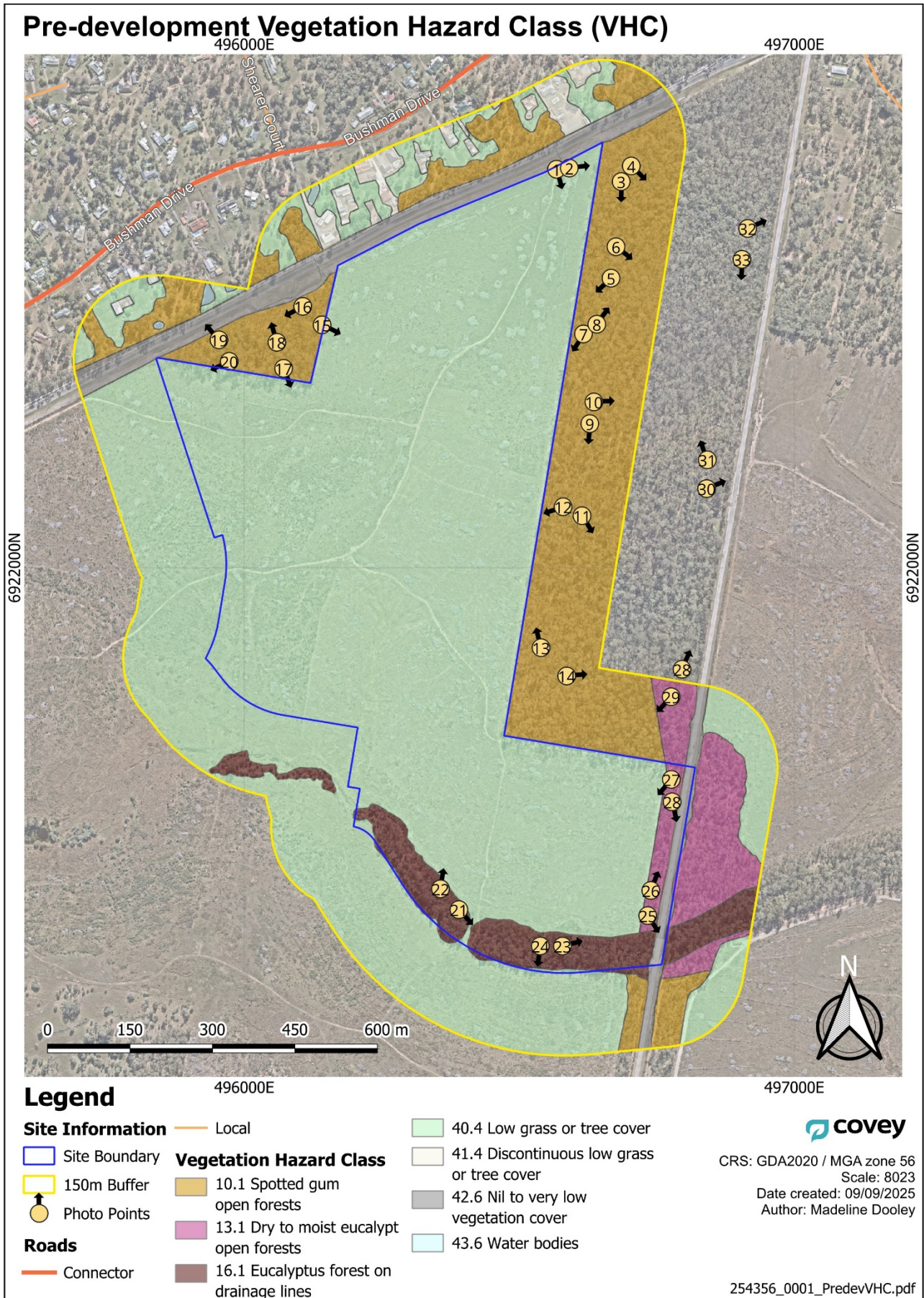


Figure 3-7. Pre-development Vegetation Hazard Class within Precinct 1 development extent and site assessment photo points.

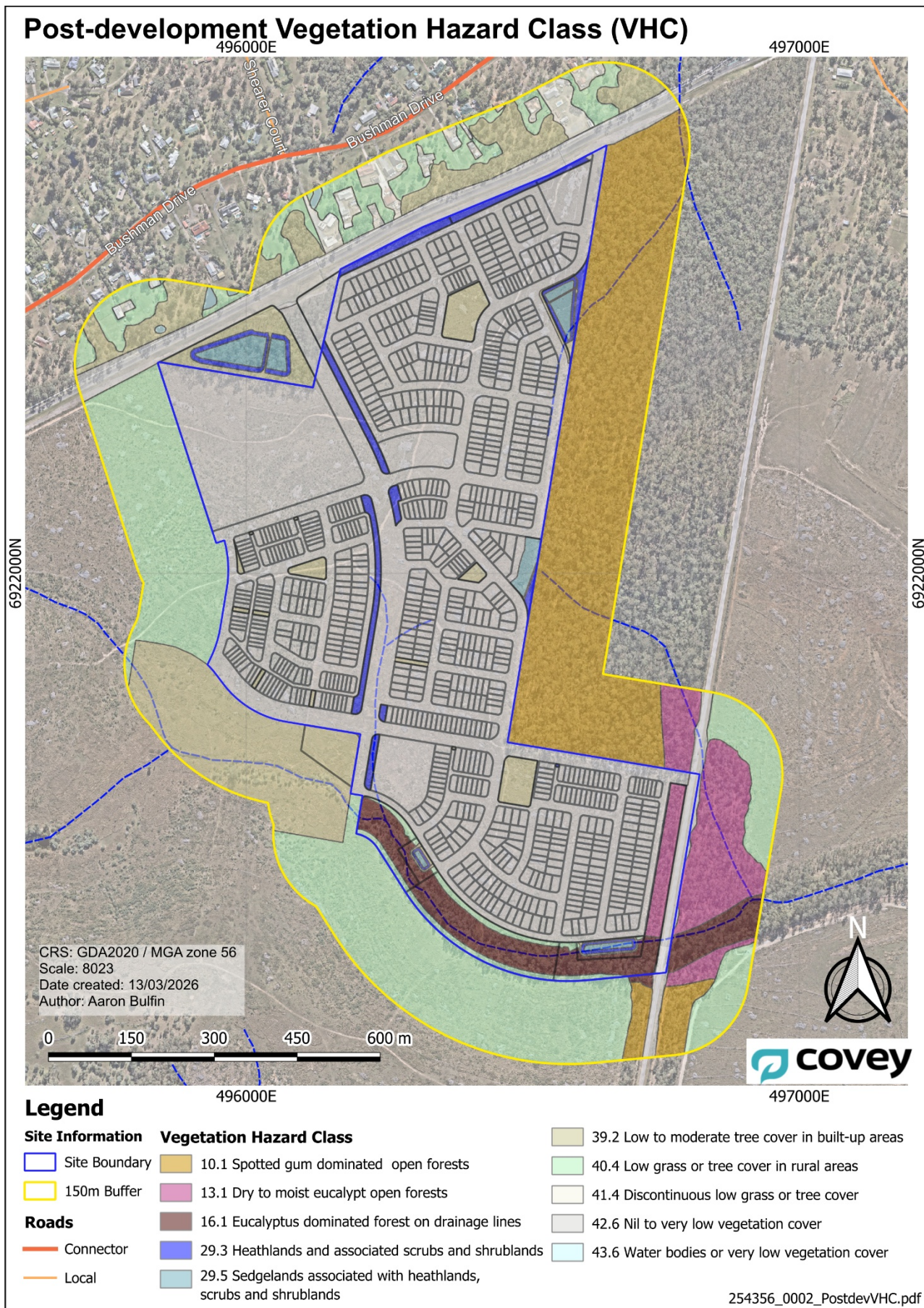


Figure 3-8. Post-development Vegetation Hazard Class within Precinct 1 development extent.

4 Bushfire Assessment

4.1 Bushfire Impact Analysis and RHF Ratings

Radiant Heat Flux (RHF) modelling identifies the rate at which heat transfers to a receiver from a potential fire and how the energy dissipates with increasing distance from the fire. Covey completed Radiant Heat Flux modelling per Method 2 of AS3959, with the adoption of BRC prescribed Forest Fire Danger Index (FFDI) and fuel loads from the SPP (Table 4-1). Also, given that vulnerable uses are included in the proposed development, Covey undertook two RHF models, adopting:

1. 1,090°K flame temperature for general infrastructure associated with the development (residential houses), and
2. 1,200°K flame temperature for proposed Vulnerable Use lots within Precinct 1 (specifically the State Primary School at the north-western extent of Riverbend development).

Note, the results of the Vulnerable Use flame temperature model only assess the line of RHF 10kW/m² which is considered as the requirement for developments involving the Vulnerable Use per BRC.

Covey completed the RHF model using Inferno modelling software, developed in-house by Covey (refer to Appendix B for further details). The model incorporated the following input values, satisfying BRC:

- The 5% annual exceedance probability (1:20 ARI) fire weather FFDI 56, according to SPP Bushfire Prone Area Input Mapping [BRC MapViewer](#) (Queensland Fire and Emergency Services, 2019a).
- Site specific vegetation hazard classes and their associated potential fuel loads for Bushfire Prone vegetation only (see Table 4-1 below). Vegetation bushfire-prone type, understorey and total fuel loading (referred to as *w* and *W*, respectively) were derived from BRC, and
- 1 metre DEM of a combined design and existing terrain surface.

According to Section 7.6 of the BRC, radiant heat flux is not required to be calculated for grassfire-prone VHCs or low-hazard VHC's (Queensland Fire and Emergency Services, 2019a). VHC 40.4 is considered *grassfire prone* and 39.2, 41.4, 42.6 and 43.6 are *low hazard* and contain *discontinuous bushfire fuel*; as such, these vegetation communities were not included in the RHF model (refer to BRC Figure 14 and s 7.6(5)).

Table 4-1. VHC fuel loading, vegetation prone type and Rate of Spread model adopted

VHC	VHC Description	Vegetation Type	w (t/ha)	W (t/ha)	Prone Type	Modelled
VHC 10.1	Spotted gum dominated open forests	Forests	19.3	20.8	Bushfire	Y
VHC 13.1	Dry to moist eucalypt open forests on undulating metamorphics and granite	Forests	19.4	21.8	Bushfire	Y
VHC 16.1	Eucalyptus dominated forest on drainage lines and alluvial plains	Forests	13.8	16	Bushfire	Y
VHC 29.3	Heathlands and associated scrubs and shrublands	Scrub	14.5	20.1	Bushfire	Y
VHC 29.5	Sedgeland communities associated with heathlands, scrubs and shrublands	Scrub	8	11.5	Bushfire	Y
VHC 39.2	Discontinuous low to moderate tree cover in built-up areas	Low-threat	5	8	Low Hazard	N
VHC 40.4	Continuous low grass or tree cover	Grassland	4.5	5	Grassfire	N
VHC 41.4	Discontinuous low grass or tree cover	Low-threat	2.5	3	Low Hazard	N
VHC 42.6	Nil to very low vegetation cover	Low-threat	2	2	Low Hazard	N
VHC 43.6	Water bodies or very low vegetation cover	Low-threat	0	0	Low Hazard	N

4.1.1 Small Patch and Corridor Modified Fuel Intensity

Section 4.2.6 of BRC outline small patch and narrow corridor mapping rules which suggest that small patches of vegetation (<3 ha) and corridors of flammable vegetation less than 50 m in width are unlikely to support a fully developed flame front (Queensland Fire and Emergency Services, 2019a). Patches of vegetation < 3 hectares that are surrounded by non-continuous fuel and are further than 100 m away from any other continuous fuel vegetation patch larger than 2 hectares, are less likely to ignite due to being disconnected from continuous bushfire fuel that carry a running fire front (Leonard & Opie, 2017). Further, if a fire starts from a point ignition within these small patches of vegetation, it is less likely that these areas will support the development of a hazardous running fire because this requires sufficient distance and area. A fire within small patches and narrow corridors is expected to be narrower in width and therefore lower intensity (Leonard & Opie, 2017).

Using the methodology from the BRC (Section 4.2.6, Queensland Fire and Emergency Services, 2019), patches of vegetation were excluded from bushfire hazard analysis based on their size and disconnection to other patches of continuous fuel. Specifically, patches of vegetation < 1 ha in area, that were further than 100 m away from other patches of continuous fuel > 2 ha were removed. Further, narrow corridors of vegetation that are less than 50m wide and surrounded by discontinuous fuel were excluded as these areas are unlikely to support hazardous running fires and are considered low hazard. Note, while mapped as VHC 40.4, which is continuous fuel, Covey considered the patch of grassland to the west of Precinct 1 to be discontinuous fuel as this should be regularly mown or slashed within 100 m of the development per Section 5.6.

The WSUD area at the north-western extent of the development, adjoining the State Primary School was determined to be a bushfire-prone area. As outlined, the basin floor was classified as VHC 29.5 and the batters as VHC 29.3 based on typical planting palette within these areas (Water By Design (2024)). This WSUD has a total area of approximately equal to 1.1 ha. As outlined in Section 4.2.6 of BRC, following the methodology of Leonard and Opie (2017), patches of vegetation less than 3 ha in size that are surrounded by discontinuous fuel or greater than 100 m from other large patches of continuous fuel are less likely to ignite and if ignited may have a lower intensity than a fully developed fire within a larger patch of vegetation.

To account for the lower fire intensity, the fuel loads of the vegetation (VHC 29.3 and VHC 29.5) within the north-western WSUD were reduced by 66% per Step 2 of BRC Section 4.2.6 for patches of vegetation that are 1 – 2 ha (Table 4-2). Figure 4-1 shows bushfire and grass fire-prone vegetation after applying the patch and narrow corridor filtering rules, and vegetation classified as low hazard under State Planning Policy.

Table 4-2. Reduced VHC fuel loading for northern WSUD area

VHC	Surface Fuel Load	Reduced by 66%	Total Fuel Load	Reduced by 66%
	w (t/ha)	w (t/ha)	W (t/ha)	W (t/ha)
VHC 29.3	14.5	4.93	20.1	6.83
VHC 29.5	8	2.72	11.5	3.91

4.1.2 Results

The SPP guidance material (Queensland Government, 2019a) states that development footprints should be exposed to less than 29 kW/m² RHF, and vulnerable uses to be exposed to less than 10 kW/m² RHF (calculated with an input flame temperature of 1,200°K). Further, LCC BHOC requires development to be located and constructed to have a bushfire attack level less than or equal to BAL-29.

Based on the RHF modelling results, most of the proposed lots within Precinct 1 of Riverbend are located to have a RHF of less than 29 kW/m² during credible worst-case bushfire events impacting the development (Figure 4-2 to Figure 4-6). Several lots which adjoin bushfire prone vegetation are subject to between RHF 12.5 kW/m² and RHF 29 kW/m² (except for the lots outlined below). Extending beyond these areas there are lots that remain within 100 m of the vegetation corridor (shown as RHF <12.5 kW/m²). Per the Building Code of Australia, certain buildings within these allotments (or within 100 m of hazardous vegetation) must be designed and constructed with the relevant Bushfire Attack Level (BAL) construction standards per Australian Standard, AS3959:2018 (refer to Section 5 for further information).

The vulnerable use which comprises the state primary school is exposed to RHF above 10 kW/m² (calculated with an input 1,200°K flame temperature, Figure 4-2). Several allotments within Precinct 1 are subject to RHF > 29 kW/m² (Figure 4-6); these lots shall have suitably sized building envelopes installed to ensure that future dwelling buildings are not subject to unacceptable levels of radiant heat from potential bushfires.

Area 1 – Vulnerable Use (State Primary School)

The vulnerable use within Precinct 1 comprises the state primary school at the north-western extent. This lot is exposed to RHF above 10 kW/m² (calculated with an input 1,200°K flame temperature, Figure 4-2). The maximum RHF to the subject lot is approximately 39.377 kW/m² based on the modelling output. To satisfy the requirements of the State Planning Policy and LCC BHOC, buildings within the State Primary School should be set-back at least 33 m from bushfire prone vegetation within the drainage area to achieve RHF < 10 kW/m². Further details and APZ requirements are outlined in Section 5.

Note that depending upon the building classifications within the proposed school, some building may be required to be built to achieve a Bushfire Attack Level. It should be noted that under the SPP Natural hazards, risks and resilience State interest - Bushfire(2019b) acknowledges that under the NCC, some Vulnerable Use buildings are not required to be built to withstand bushfire attack (BAL requirements of AS3959); though this is typically because Vulnerable Use developments should not be located within bushfire prone areas (i.e., beyond 100m from bushfire prone vegetation).

Area 2 – Residential

Several allotments (19076 to 19081) adjoining the EPBC corridor in the east of Precinct 1 are exposed to RHF above 29 kW/m² (Figure 4-6). Setbacks shall be achieved and APZ areas will need to be established to ensure RHF exposure to the building envelopes within these lots is below 29 kW/m² in accordance with the details outlined in Section 5.

4.2 Potential human impact and sheltering sites

Radiant heat flux exposure from bushfires can be detrimental to people and property, expected impacts on the human body are outlined in Table 4-3 for reference.

Table 4-3. Radiant heat flux impacts (Penney et al., 2020).

Radiant Heat Flux (kW/m ²)	Human effect
30	Significant chance of instantaneous fatality for unprotected exposed persons.
23.5	Likely fatality for extended exposure and chance of instantaneous fatality for unprotected exposed persons.
16.7	Significant chance of fatality for unprotected extended exposure.
10	Tenability threshold for bushfire fighters.
5	Limited human trials indicated no adverse effects
4.2	Will cause pain in 15-20 seconds of unprotected exposure. It will cause injury after 30 seconds of unprotected exposure.
3	Operational threshold for bushfire fighters attempting suppression.
2.5	Level of exposure permitted for evacuating occupants in the Building Code of Australia
2.1	Minimum heat radiation required to cause pain after 60 seconds of unprotected exposure
1.3	Exposure from mid-day sun

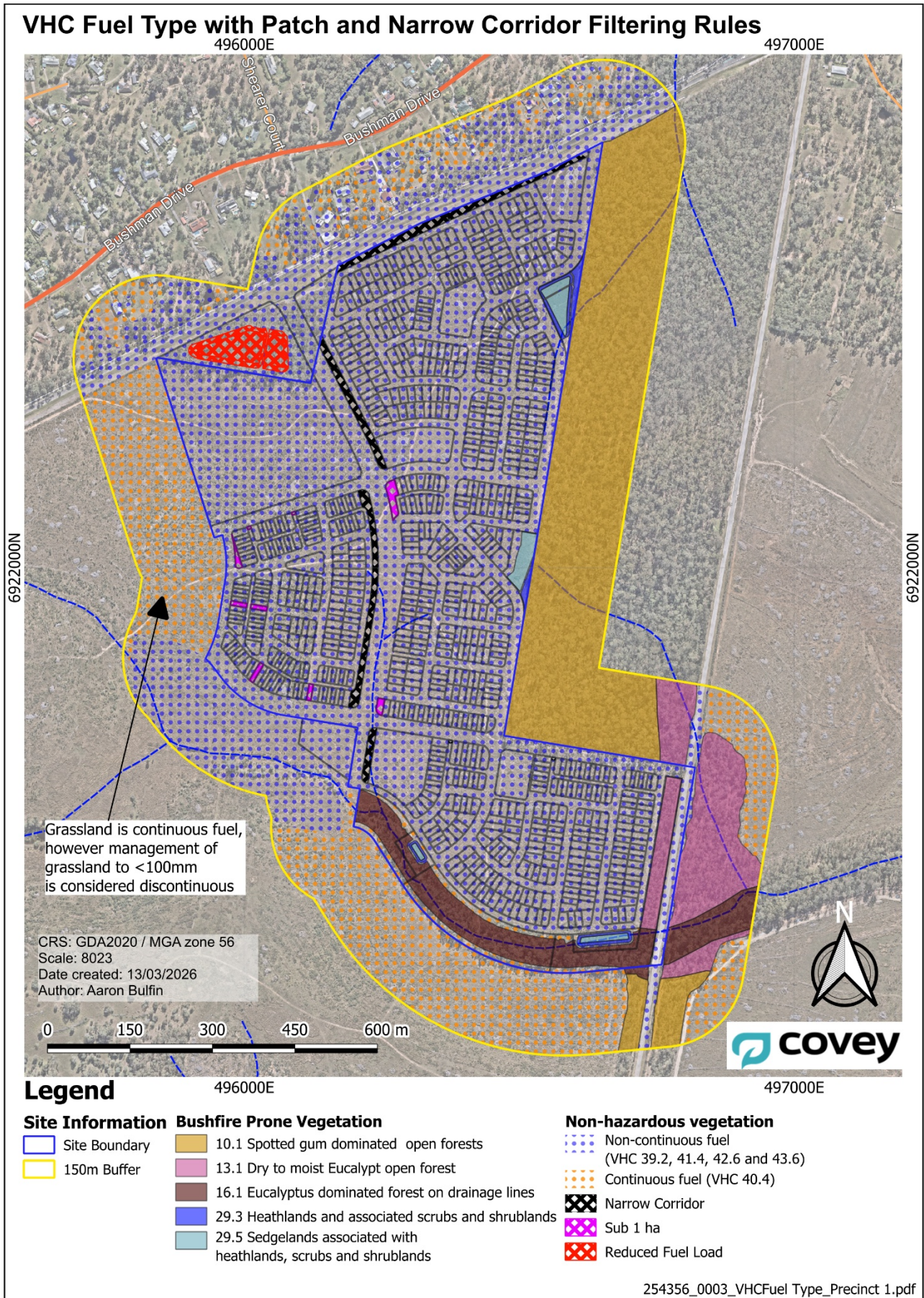


Figure 4-1. Post-development Prone Type vegetation per BRC technical reference guide.

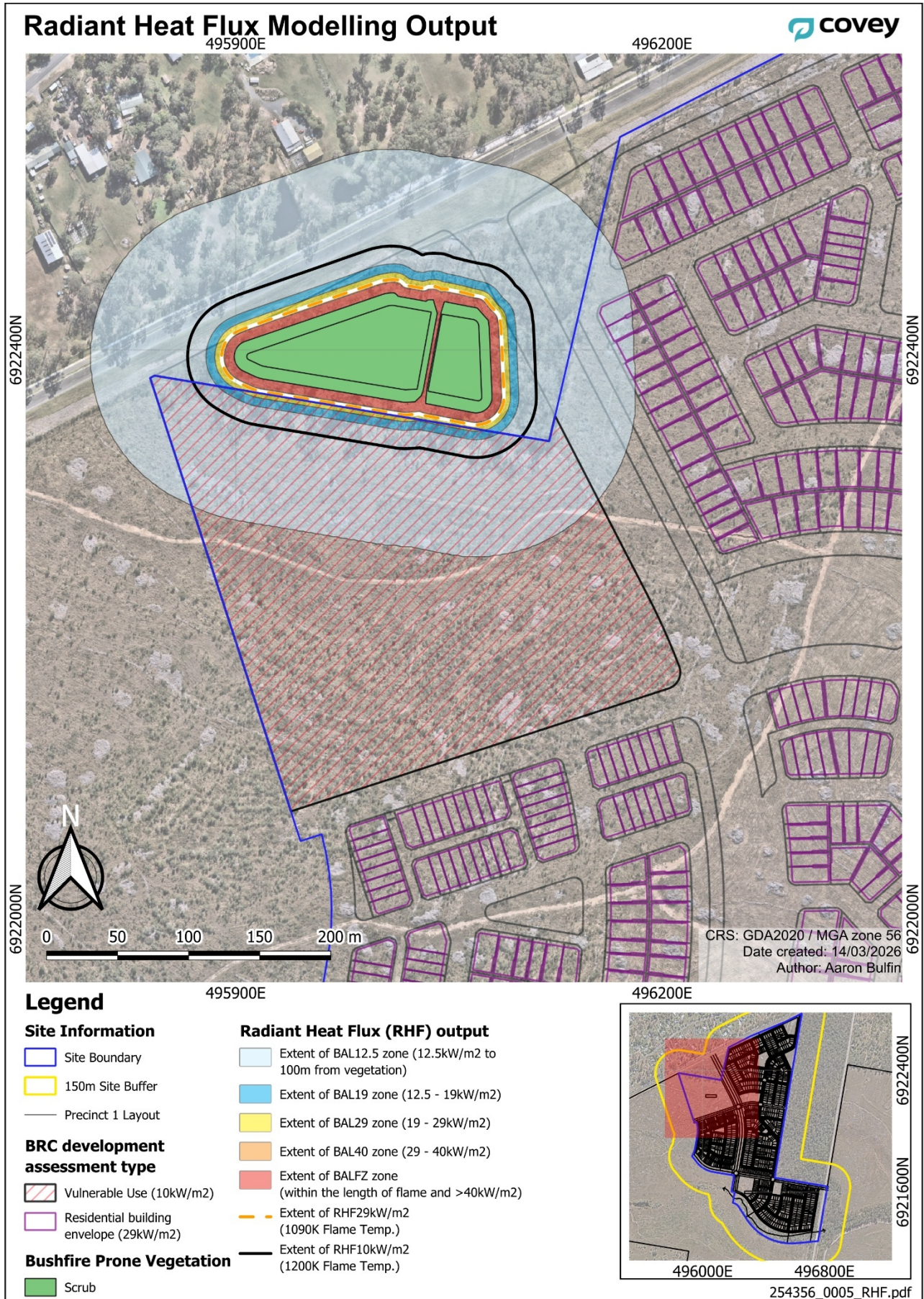


Figure 4-2. Radiant Heat Flux and Indicative BAL on the vulnerable use lot (Note reduced fuel load applied to basin vegetation prior to RHF modelling, per BRC methodology – see Section 4.1.1).

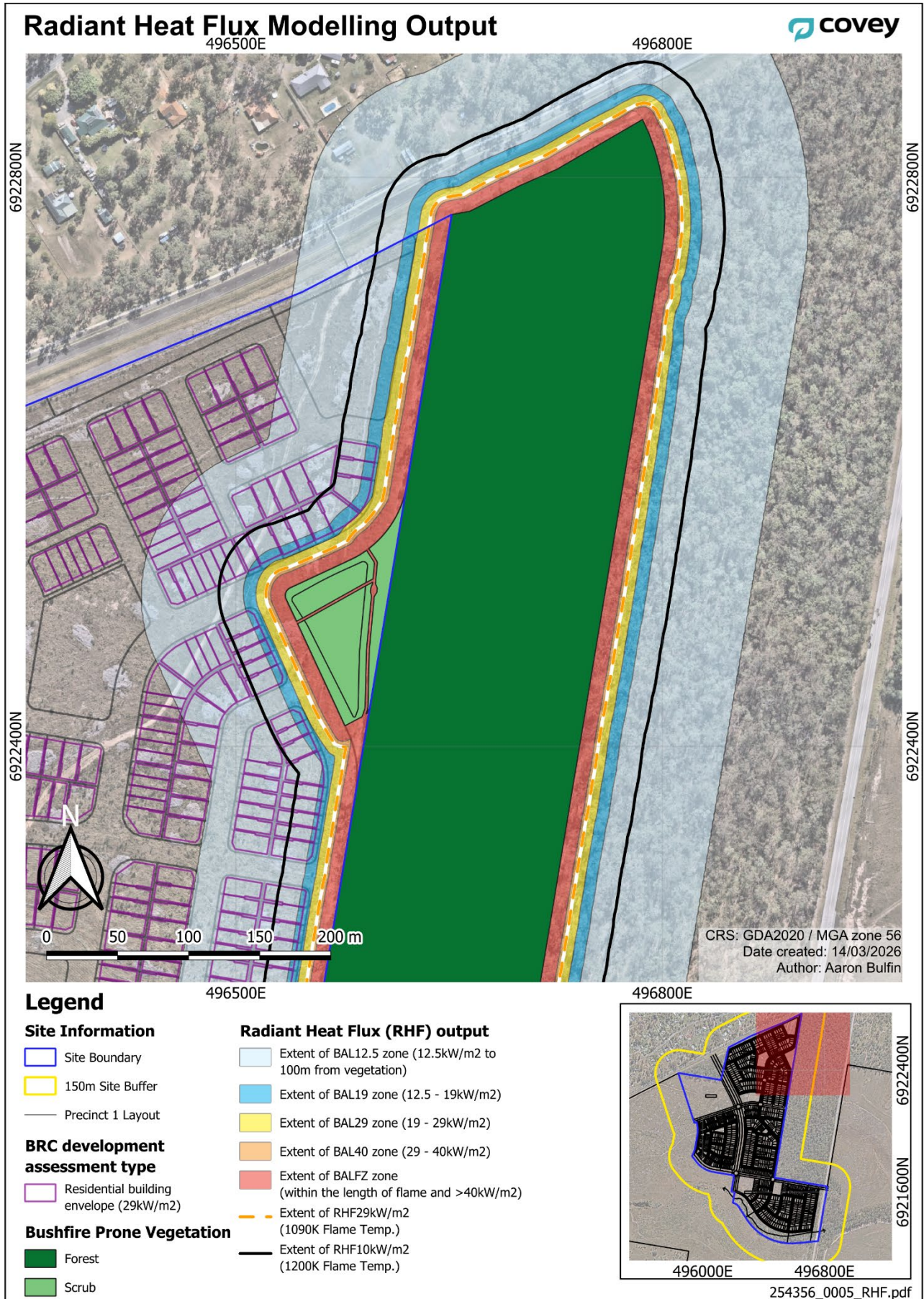


Figure 4-3. Radiant Heat Flux and Indicative BAL Residential Frame 2.

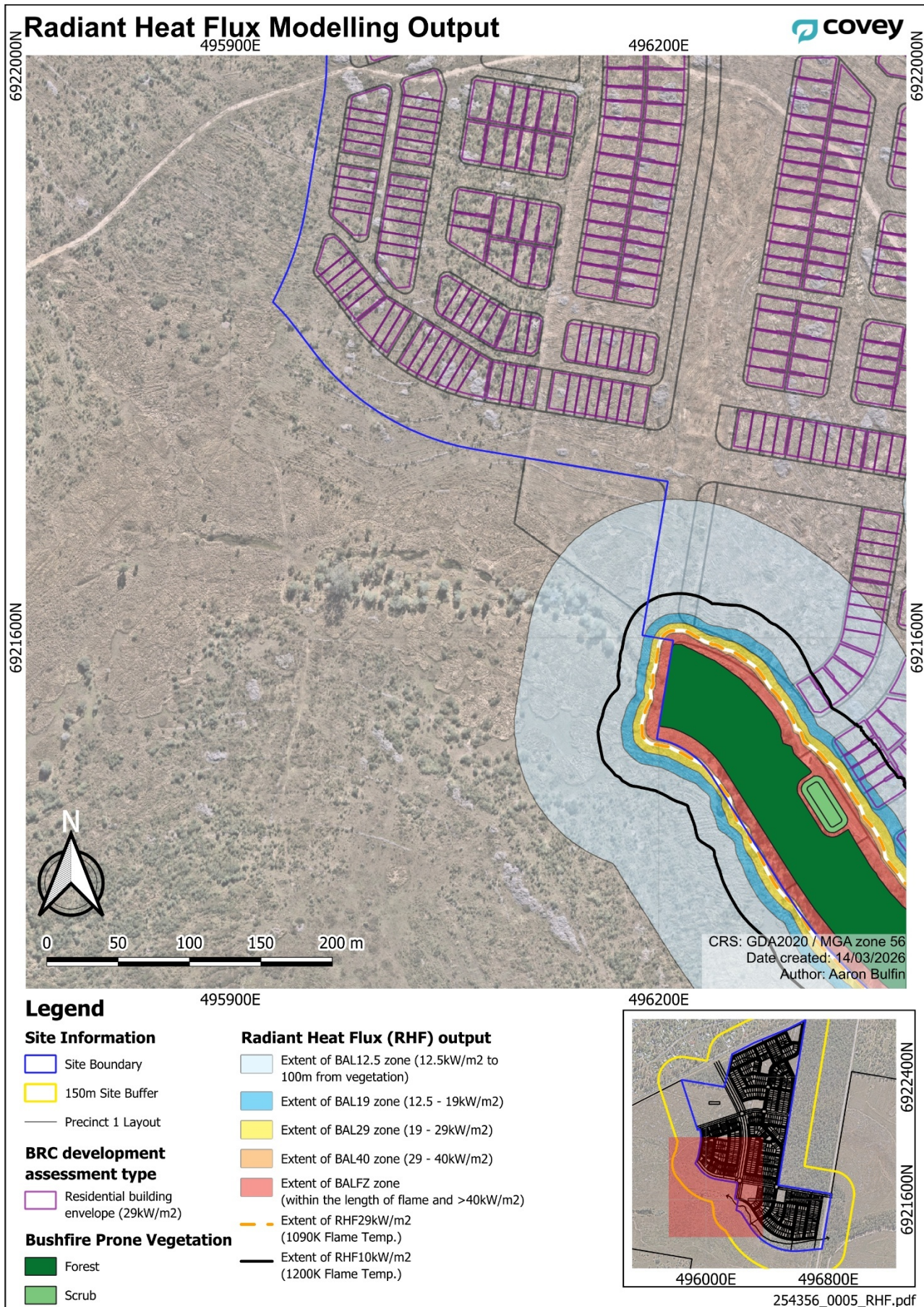


Figure 4-5. Radiant Heat Flux and Indicative BAL Residential Frame 4.

5 Bushfire Mitigation Measures

The following section outlines bushfire mitigation measures to be incorporated into the proposed development design. These measures aim to comply with the BRC and SPP guidance material. Provided that the mitigation measures outlined in this section are implemented, the bushfire risk for the proposed development is deemed to be acceptable.

5.1 Setbacks / RHF exposure

The modelling indicates that all of the proposed lots within Precinct 1 provide a suitable setback from bushfire hazard vegetation so that they will be exposed to less than 29 kW/m² RHF per BRC (Figure 4-2 to Figure 4-6). The exception are the lots identified as having the assessed RHF encroachment into the boundary, shown below in Figure 5-2 and Figure 5-3; which will require suitably placed building envelopes within the proposed lots to ensure dwellings are not exposed to greater than RHF 29 kW/m². The proposed lot for the state primary school though subject to >10 kW/m² (calculated with an input 1,200°K flame temperature) allows for the opportunity to locate buildings beyond the extent of RHF 10 kW/m² (Figure 5-1).

5.1.1 Asset Protection Zone

All neighbourhood recreation parks, linear open spaces, local recreation parks, landscape buffers and sports fields should have landscape intent that ensures low threat or minimal fuel conditions per Clause 2.2.3.2 of AS3959 (examples being mown grass and maintained public reserves, parklands, nature strips). Within these parks and open spaces will then need to be maintained as APZs, ensuring suitable management practices are implemented so that these do not allow for continuity of fuel across the landscape. The vegetation should be modified and/or maintained to reduce fuel load and mechanisms of bushfire attack, such as flame and radiant heat.

Generally, the landscape intent should be to not increase planting density beyond what has been assessed within this BMP, unless it achieves the exclusions Clause of AS3959. Specifically, APZs are required to ensure that building envelopes are exposed to less than 29 kW/m² in perpetuity. The APZs are to follow the Bushfire Landscaping Guidelines detailed in Section 5.4.

Naturally APZs will be established through development activities including the establishment of roads, verges, and pathways within road reserve corridors that will exist between bushfire prone vegetation and development lots. These APZs have not specifically been identified within this BMP; though it is understood the intent of development activities within the road reserves will ensure separation from bushfire prone vegetation to the extent of RHF 29kW/m² towards development lots will be established and maintained in perpetuity. Road reserves that exist between bushfire prone vegetation and development lots as identified within this BMP shall not have landscaped vegetation that extends the bushfire risk beyond the extent for which has been assessed.

Additional APZs have been identified and shall be established to ensure that the bushfire risk is appropriately mitigated to development lots – refer to Figure 5-1 and Figure 5-2.

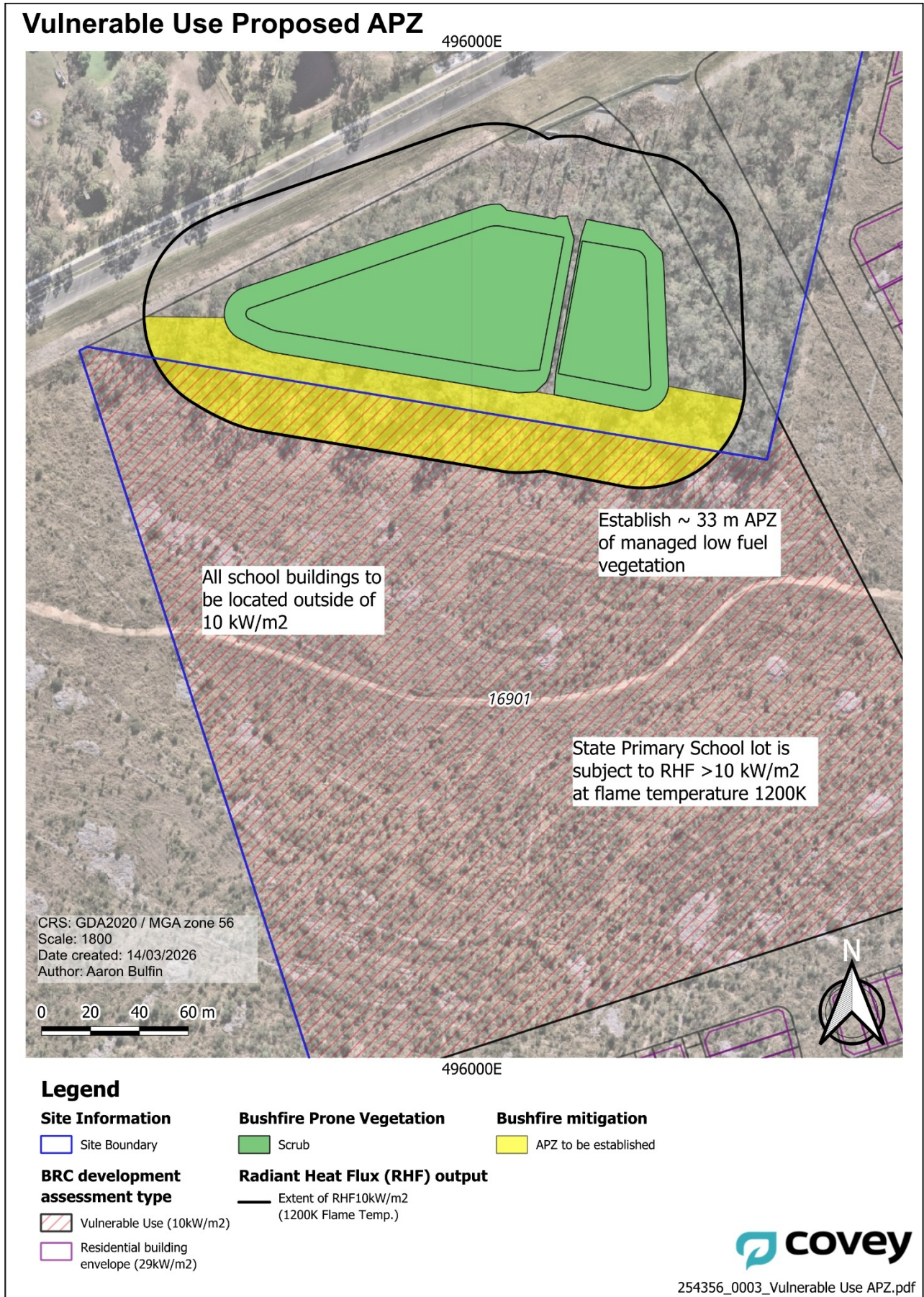


Figure 5-1. Proposed Asset Protection Zone Setback for Vulnerable Use Primary School.

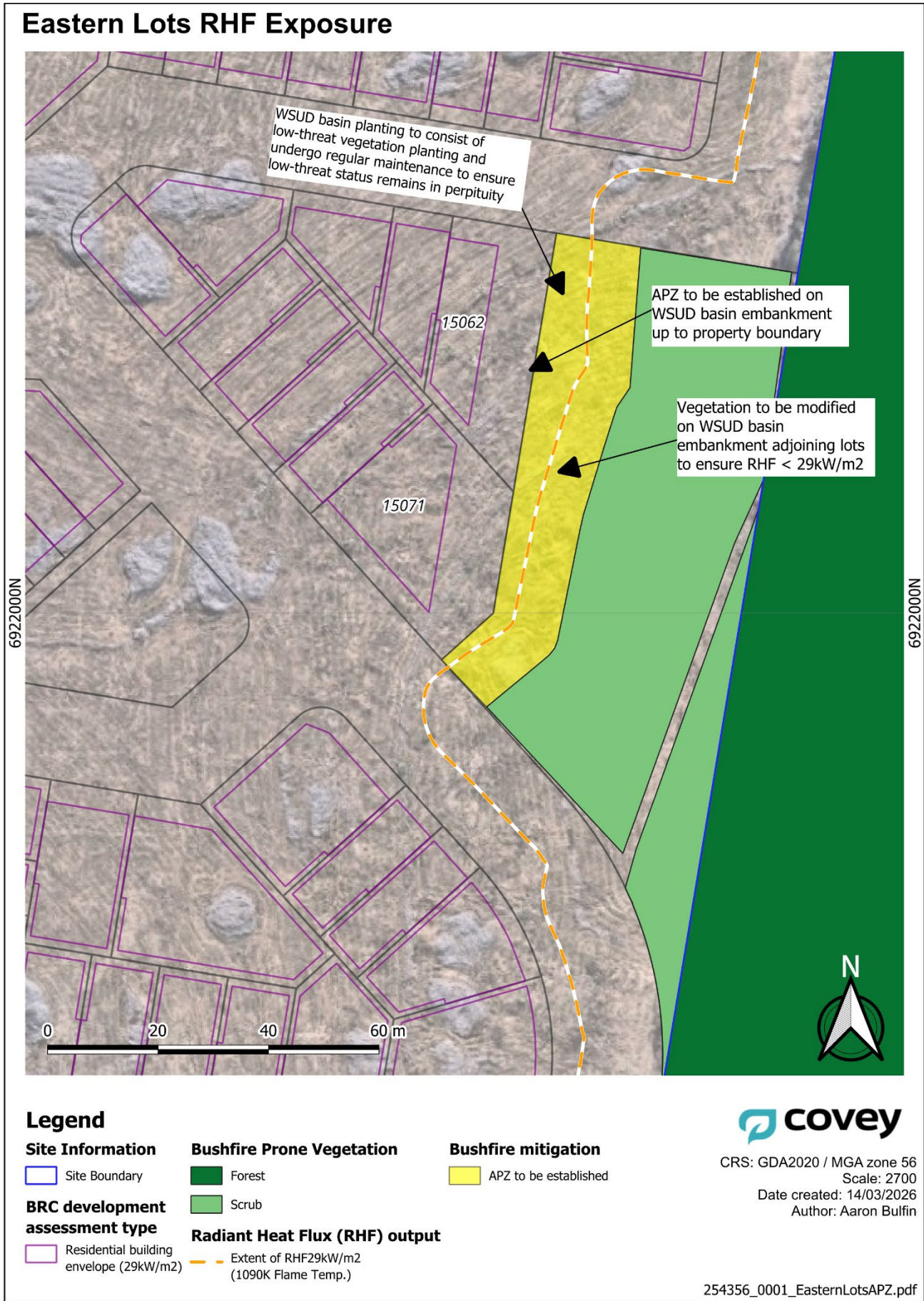


Figure 5-2. Proposed Asset Protection Zone for two impacted lots from proposed WSUD basin

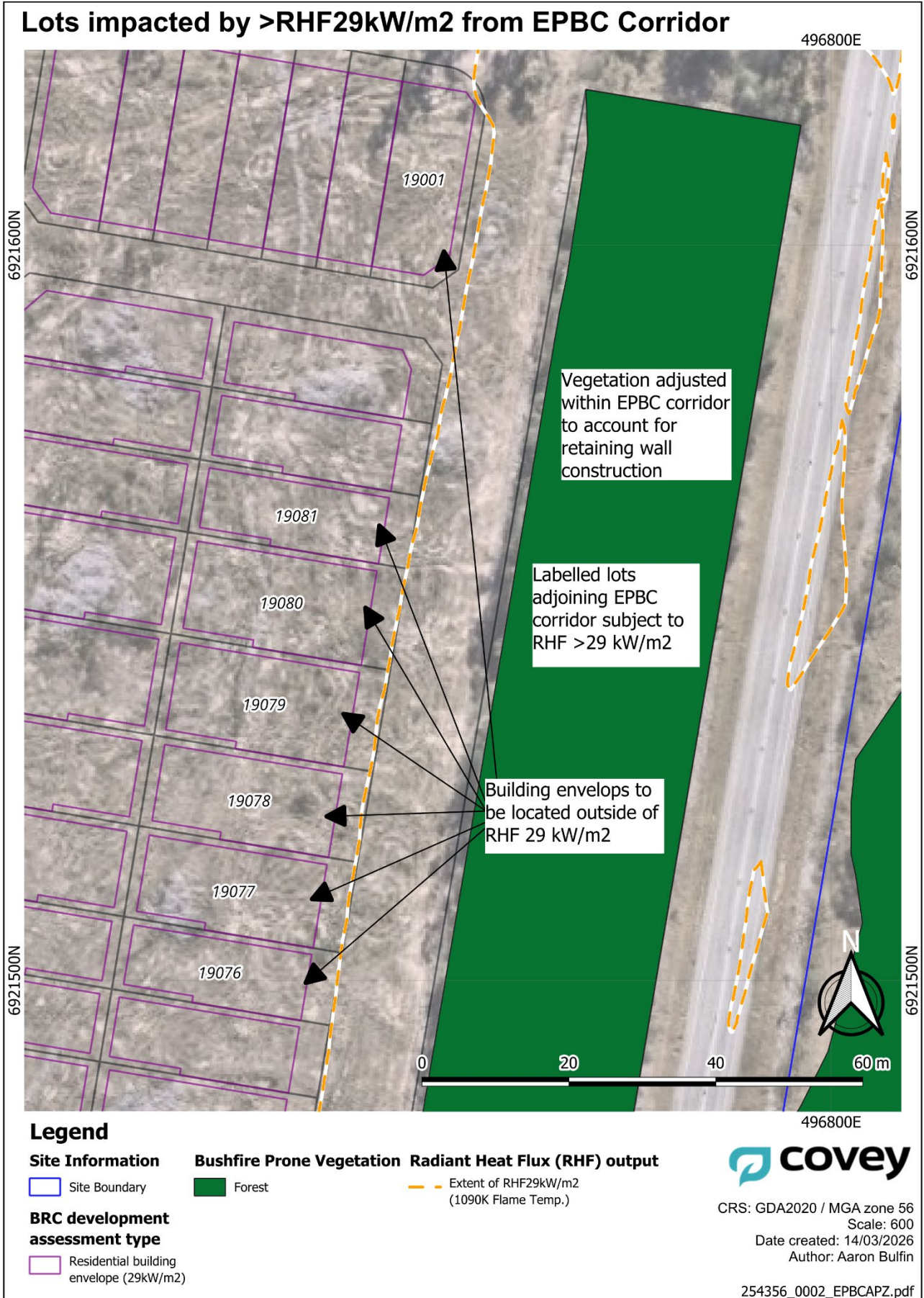


Figure 5-3. Proposed Asset Protection Zone Setback for Lots adjoining EPBC Corridor.

5.2 National Construction Code (NCC)

Per the Building Code of Australia, any buildings within 100 m of hazardous vegetation must be designed and constructed with the relevant Bushfire Attack Level (BAL) construction standards per Australian Standard, AS3959:2018. Note that a BAL assessment may be required to be undertaken in accordance with AS3959 before building design or construction works of the proposed buildings on the created lots. A Bushfire Attack Level (BAL) assessment does not form part of the assessment within this report. A BAL assessment will identify the potential RHF exposure encountered to the proposed dwelling or relevant structure based upon the siting of the building at the building approval application stage. For example, though some lots have been identified as being impacted by greater than RHF 12.5 kW/m², the placement of the dwelling within the lot may be such that the proposed dwelling may be situated within the lot to be exposed to less than RHF 12.5 kW/m², therefore changing the BAL requirement of that dwelling.

The BCA requires Class 1, Class 2, Class 3 buildings, and a Class 10a building or deck associated with a Class 1, 2 or 3 to be constructed per AS 3959-2018 (National Construction Code, 2022a, 2022b). The NCC was updated in 2022, and certain Class 9 Buildings are now subject to additional bushfire requirements; refer to Part G5 and Specification 43 of NCC Volume 1 (National Construction Code, 2022). The four RHF values (40 kW/m², 29 kW/m², 19 kW/m² and 12.5 kW/m²) trigger specific construction requirements under the Building Code of Australia.

Note: the RHF assessment undertaken within this assessment may not negate the need to undertake a separate BAL assessment for each proposed dwelling as part of a building approval application.

5.3 Access

The proposed development will be accessed via a new trunk connection road connecting to Teviot Road and connecting into existing roads to the east. Additional trunk connector and neighbourhood connection roads will facilitate access to future proposed developments to the south, east and southwest. Until the proposed development is complete, the applicant will maintain existing vehicle access tracks within the Master-planned area to allow access and egress to private and emergency vehicles.

Per AO4(a) of the LCC BHOC, perimeter roads shall be a minimum of 20 m wide between the premises and adjoining vegetation. Where the road reserve width of perimeter roads is less than 20 m, an APZ shall be established between the perimeter road and the vegetation (such as mown grass) to achieve the balance of the width and ensure 20 m is achieved. These APZs shall be maintained as low-fuel load such that would constitute the APZ to be classified as excluded vegetation per Clause 2.2.3.2 of AS3959.

Where a temporary cul-de-sac is proposed as part of the development, these areas will connect to future Precinct stages

The design and construction of infrastructure is to ensure accessibility to all existing and proposed infrastructure to emergency services. Access roads, including internal driveways are to follow *Fire hydrant and vehicle access guidelines* (Queensland Fire and Emergency Services, 2019d). This guideline defers to the *Road Planning and Design Manual – 2nd Edition* (Department of Transport and Main Roads, 2021). Access design and construction should incorporate the following parameters:

- Minimum roadway clearance of 3.5 m wide by 4.8 m high to allow access for a fire truck;
- Be accessible in all weather conditions and able to accommodate a vehicle of 15 tonnes for the trafficable road width;
- Road grades must facilitate the safe passage of fire trucks;
- Roads must allow for fire trucks to turn at the end of dead-end roads; and

- Provision is made for fire trucks to turn at the end of dead-end roads (Figure 5-5)

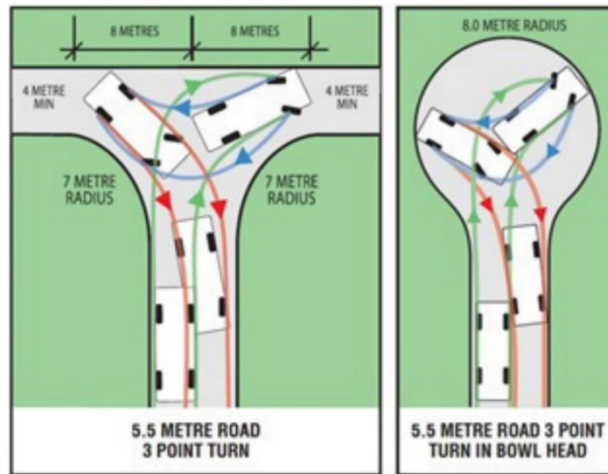


Figure 5-4. Vehicle Turning Points (Queensland Fire and Emergency Services, 2019b).

5.4 Fire-fighting Water Supply

The proposed development will be conditioned to provide a connection to the mains water supply, including for firefighting purposes. Provision will be made to connect to the water mains supply, with suitable allocation of fire-fighting infrastructure (hydrants) in accordance with the SEQ Water Supply Code and the *Australian Standard – Fire hydrant installations system design, installation and commissioning* (AS 2419.1:2021).

5.5 Bushfire Landscaping Guidelines

Landscaping within the site, including areas mapped as low-hazard vegetation (refer to Section 3.3 and 5.1.1 of this BMP) should utilise plant species that do not exacerbate the level of bushfire threat. Aside from the drainage areas, the landscaping design within the proposed development must not constitute a bushfire threat. The proposed neighbourhood recreation parks, regional recreation park, other internal parks and landscape buffers should all be maintained regularly to reduce woody regrowth, weeds and keep grass mown to no more than 100 mm, per exclusions under AS3959 2.2.3.2 (f). These areas are to be maintained in minimal fuel condition and comprise only low-threat vegetation.

Landscaping within these areas should align with Low Threat exclusion clauses defined in AS3959, S2.2.3.2. Examples include:

- (i) Landscaping design within the low fuel zone, being consistent with AS3959 S2.2.3.2(f) to ensure vegetation does not create vertically and horizontally continuous fuel structures that may contribute to bushfire intensity (Figure 5-6);
- (ii) Where areas of bushland are to be included as part of landscaping design in the low fuel zone, ensure they are consistent with AS3959 S2.2.3.2, being less than 0.25 ha in area and not within 20 m of each other or proposed dwellings (Figure 5-7);
- (iii) Utilise non-vegetated areas within the development consistent with AS3959 S2.2.3.2 (e) to provide enhanced separation between buildings and vegetation identified as a bushfire threat external to the site boundaries;
- (iv) Follow landscape guidance provided within BRC Section 8, and plant section aligned with BRC Section 8.5.2(2019b), and,
- (v) Utilise ‘Fire-Wise’ plant species that are resistant to the effects of fire (guidance can be found at <http://www.cfa.vic.gov.au/plan-prepare/landscaping-for-bushfire>).



Figure 5-5. Low Threat vegetation (left) and Low Threat public open space (right).

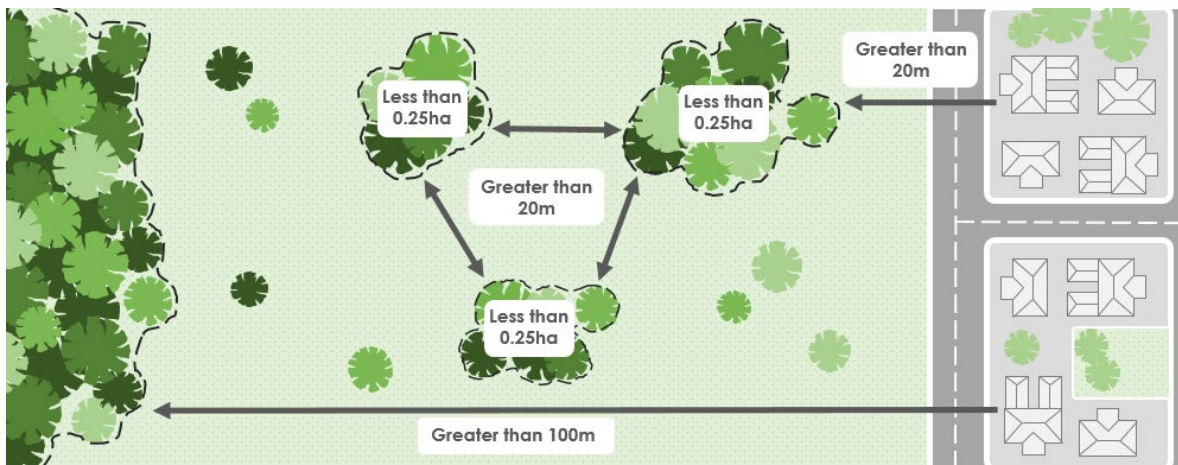


Figure 5-6. AS3959 Exclusions—Low threat vegetation and non-vegetated areas.

5.5.1 [WSUD / Drainage Areas](#)

To further reduce the potential bushfire threat of the planted WSUD areas throughout the development, Covey recommends planting within the WSUD / drainage areas with low hazard species and reducing vertical fuel connectivity aligned with the landscaping guidelines above. This can be achieved through limiting planting of species such as *Melaleuca sp.*, *Eucalyptus sp.* and *Corymbia sp.* and aligning the vegetation planting palette with lower hazard VHC's (Prone Type 2 or 3 in BRC Vegetation hazard class descriptions table) consisting of low threat species. Vertical fuel connectivity can be reduced by limiting the density and planting of shrub species. The total WSUD planted areas and widths includes the basin bottoms, embankments, tops, and batters.

Planting within the basin bottoms should be aligned with VHC 29.5 as has been assessed within this BMP, consisting of a sedgeland vegetation community mostly devoid of trees and shrubs. Planting within the WSUD batters should limit the use of tree and shrub species, and where these are to be planted, ensure they are planted in low densities. Further, Covey recommends ongoing vegetation maintenance such as thinning and weed control should occur in WSUD areas to ensure that the bushfire threat remains acceptable in perpetuity per the assessments made within this BMP.

Specifically, for the WSUD basin that adjoins Lots 15062 and 15071 (Figure 5-2) shall have landscape design elements on the western embankment that aligns with a vegetation of low-threat status. In addition to this, on-going vegetation management must be outlined within a Vegetation Management Plan (VMP) to outline regular maintenance activities to retain this vegetation on the embankment as low hazard through removal of dead litter material, and removal of emerging species that will naturally occur over time.

5.6 Grassland Maintenance

As outlined above, vegetation surrounding the proposed development is expected to be maintained as grassland in the interim period before the adjoining developments are constructed. Within 100 m of the Precinct 1 development boundary, grassland should be mown and/or slashed regularly to ensure that the grass is always maintained to a height of less than 100 mm, to remain consist with Low Threat Vegetation exclusions under AS3959 2.2.3.2(f).

6 Performance Criteria and Compliance

This proposed development will be assessed by EDQ as a Riverbend falls under the Greater Flagstone Priority Development Area. EDQ exists as a State governing body, as such the SPP assessment benchmarks have been assessed within this BMP. Though as the example SPP BHOC does not hold Statutory effect itself, the LCC BHOC will be used for the compliance assessment below.

This BMP has been prepared using the BRC technical reference guideline, which outlines the Assessment Benchmarks outlined within the SPP. This BMP also applies acceptable outcomes to achieve the Performance Outcomes as assigned by Logan City Council’s Bushfire Hazard Overlay Code (8.2.3). The Performance Outcomes detailed in the LCC BHOC are addressed in the development design are summarised in Table 6-1.

Table 6-1. Assessment of Development against Logan City Council Bushfire Hazard Overlay Code (8.2.3)

Performance outcomes	Acceptable outcomes	Assessment
For accepted development (subject to requirements) and assessable development		
Location, design and siting of development		
<p>PO1 Development is designed to:</p> <ul style="list-style-type: none"> a. minimise risk of bushfire hazard. b. provide safe premises. c. create efficient emergency access for firefighting and other emergency vehicles. <p>Note - Planning scheme policy 6 - Management of bushfire hazard provides guidelines on how to achieve this outcome.</p>	<p>AO1 Development:</p> <ul style="list-style-type: none"> a. does not increase the number of persons living in, or lots in, the Bushfire hazard area identified on Bushfire hazard overlay map OM-03.00; or b. is on a site that a bushfire hazard assessment prepared in accordance with the methodology in Planning scheme policy 6 - Management of bushfire hazard determines is of low bushfire hazard. 	<p>Satisfies Acceptable Outcome</p> <p>This bushfire management plan has been prepared in accordance with the methodology outlined in the Logan City Planning Scheme 2015 – Planning Scheme Policy 6: management of bushfire hazard.</p> <p>The majority of the proposed Precinct 1 development is located within areas of low bushfire hazard, subject to RHF 12.5 kW/m² or less.</p> <p>Asset Protection Zones have been proposed that will provide defendable space for emergency response in the event of a bushfire around the proposed development.</p> <p>It has been demonstrated that the development can be undertaken to ensure all building envelopes will be subject to less than 29 kW/m² RHF, which is the assessment benchmark of the State Planning Policy guiding document for bushfire assessment – BRC. Appropriate BAL construction requirements shall be applied to the relevant buildings.</p>

<p>PO2 Development is sited and constructed to minimise the bushfire hazard and maximise the protection of life and property from bushfire. Editor's note - Planning scheme policy 6 - Management of bushfire hazard contains guidance on the preparation of bushfire management plans.</p>	<p>AO2 Development is located and constructed:</p> <ul style="list-style-type: none"> a. where there is no bushfire management plan approved by an existing development approval: <ul style="list-style-type: none"> i. such that the bushfire attack level is less than or equal to BAL-29; ii. away from the most likely direction of a fire front; iii. so that elements of the development least susceptible to fire are sited closest to the bushfire hazard; iv. such that asset protection zones are sited on land with a slope less than 18 degrees; v. such that asset protection zones are entirely within the boundaries of the private property of the development site; or b. where an approved bushfire management plan directs development to be located. <p>Note - BAL = Bushfire attack level is the radiant heat flux a building will experience during a bushfire and is a measure of heat energy impacting on a surface expressed as kW/m². BAL is calculated from the following factors; vegetation type, fuel loads, distance to vegetation, Forest Fire danger Index (FDI), flame length, fire behaviour/intensity and slope. BAL is used to determine the required construction level of a building and the size of asset protection zones (inner and outer radiation zones). Further information on calculating the BAL can be obtained from AS3959-2009. Editor's note - Asset protection zones are not located on slopes greater than 18 degrees to ensure maintenance is practical, soil stability is not compromised and the potential for crown/canopy fires is reduced.</p>	<p>Satisfies Acceptable Outcome No previous bushfire management plan exists for the site. The proposed development has been located so that all building envelopes are subject to less than 29 kW/m² RHF – equating to BAL-29. Appropriate BAL construction requirements shall be applied to the relevant infrastructure.</p> <p>The proposed development provides suitable access along Teviot Road to facilitate emergency service vehicles and is situated to provide suitable egress away from the likely direction of a bushfire from the south. To the west a perimeter road is located between the bushfire prone vegetation and proposed lots to ensure the elements of the development least susceptible to fire are sited closest to the bushfire hazard.</p> <p>The proposed development and APZ are positioned on gently sloped terrain (less than 18 degrees) and the development will undergo minimal change to the surrounding topography.</p> <p>Asset Protection Zones have been proposed that will provide defensible space for emergency response in the event of a bushfire around the proposed development. These APZ's are to be maintained as having low-fuel in perpetuity by undertaking regular mowing activities, such that would constitute the APZ to be classified as excluded vegetation per Clause 2.2.3.2 of AS3959.</p> <p>Radiant Heat Flux calculations have been undertaken using the methodology set out in the SPP/QFES Bushfire Resilient Communities guideline. This methodology is based on the methodology defined in AS3959.</p>
<p>PO3 Reconfiguring a lot ensures that lots are designed to minimise bushfire hazard and provide safe sites for people, property and buildings.</p>	<p>AO3 Lots:</p> <ul style="list-style-type: none"> a. are suitable for people, property and buildings by: <ul style="list-style-type: none"> i. having a bushfire attack level less than or equal to BAL-29; or 	<p>Satisfies Acceptable Outcome All lots within the proposed development will contain building envelopes that are subject to less than 29 kW/m² RHF – equating to BAL-29.</p>

	<ul style="list-style-type: none"> ii. containing a development envelope area that has a bushfire attack level less than or equal to BAL-29; b. provide asset protection zones that: <ul style="list-style-type: none"> i. are located on land with a slope less than 18 degrees; ii. are located on the same lot. 	<p>Asset Protection Zones have been proposed that will provide defendable space for emergency response in the event of a bushfire around the proposed development.</p> <p>These APZ's are to be maintained as having low-fuel in perpetuity by undertaking regular mowing activities, such that would constitute the APZ to be classified as excluded vegetation per Clause 2.2.3.2 of AS3959.</p> <p>No parts of the development are located on land with a slope greater than 18 degrees.</p>
<p>Vehicular access and fire maintenance trails</p>		
<p>PO4 Access for fire management and evacuation is provided by access that:</p> <ul style="list-style-type: none"> a. separates premises from adjoining vegetation; b. is safely accessible by fire fighting vehicles; c. has regular vehicular access points for bushfire management, response and evacuation; d. has regular vehicle passing and turning areas for bushfire management, response and evacuation; e. allows access at all times for fire fighting vehicles; f. allows for maintenance, burning off and bushfire response; g. has vehicular links to an alternative through road; h. is readily maintained. <p>Editor's note - Planning scheme policy 6 - Management of bushfire hazard provides details on alternative solutions for providing fire management access and evacuation</p>	<p>AO4 Access for fire management and evacuation is provided by vehicular access in the form of a perimeter road:</p> <ul style="list-style-type: none"> a. with a minimum reserve width of 20 metres; b. located between the premises and adjoining vegetation; c. with a maximum gradient of 12.5 percent; d. constructed to otherwise comply with section 3.4 - Movement infrastructure standards of Planning scheme policy 5 - Infrastructure; e. that has a layout that does not include a cul-de-sac. 	<p><u>Satisfies Acceptable Outcome</u></p> <p>The development lot is accessed directly from Teviot. Internally, all-weather trunk, local and connector roads will be constructed throughout the development to facilitate safe and efficient access for fire management and evacuation.</p> <p>A perimeter road has been established between the premises and adjoining vegetation. The road has a minimum reserve width of 20 metres in the majority of areas, and where the width is less than 20 m, APZ areas are proposed (such as mown grass) to maintain low-fuel load such that would constitute the APZ to be classified as excluded vegetation per Clause 2.2.3.2 of AS3959.</p> <p>Where a temporary cul-de-sac is proposed as part of the development, these areas will connect to future Precinct stages.</p>
<p>Water supply</p>		
<p>PO5 Development has access to adequate water supply for firefighting purposes.</p>	<p>AO5 Development:</p> <ul style="list-style-type: none"> a. is connected to a reticulated water supply scheme that has sufficient flow and pressure characteristics for firefighting purposes at all times with a minimum pressure and flow of 10 litres per second at 200kPa; or b. has an on-site water storage in accordance with Table 8.2.3.3.2 - Water storage for firefighting, dedicated or retained 	<p><u>Satisfies Acceptable Outcome</u></p> <p>The development will be connected to a reticulated water supply suitable for firefighting purposes.</p>

	<p>for firefighting purposes that is made of fire resistant materials and is:</p> <ul style="list-style-type: none"> i. a separate tank; or ii. a reserve section in the bottom part of the main water supply tank. <p>Editor's note - The requirement in AO5 is:</p> <ul style="list-style-type: none"> - in addition to the requirement for potable water supply/storage in AO2 in Table 9.4.3.3.1 - Infrastructure code: accepted development (subject to requirements) and assessable development.; - reflected in AO5 in Table 9.4.3.3.1 - Infrastructure code: accepted development (subject to requirements) and assessable development. 	
<p>For assessable development</p>		
<p>Community infrastructure</p>		
<p>PO6 Community infrastructure is not located in a bushfire hazard area or is able to function effectively during and immediately after a bushfire event.</p>	<p>AO6 Community infrastructure is:</p> <ul style="list-style-type: none"> a. not located in a Bushfire hazard area identified on Bushfire hazard overlay map OM-03.00; or b. located to ensure that: <ul style="list-style-type: none"> i. the core services provided by the community infrastructure is able to function effectively during bushfire events; ii. access to the community infrastructure is not compromised by bushfire events. <p>the safe storage of valuable records, public records and items of cultural or historic significance is able to be maintained during a bushfire event.</p>	<p>Satisfies Acceptable Outcome The State Primary school is located to ensure that it will not be comprised by bushfire events. All school buildings are to be subject to less than 10 kW/m² and located outside of the defined APZ area defined within Section 5.1.1. This APZ is to be maintained as having low-fuel in perpetuity by undertaking regular mowing activities, such that would constitute the APZ to be classified as excluded vegetation per Clause 2.2.3.2 of AS3959.</p>
<p>Hazardous materials</p>		
<p>PO7 Public safety and the environment are not adversely affected by the adverse impacts of bushfire on hazardous materials including fuels, explosives and flammable chemicals manufactured or stored in bulk on premises.</p>	<p>AO7 Hazardous materials:</p> <ul style="list-style-type: none"> a. storage is in compliance with AS1940 - The storage and handling of flammable and combustible liquids; <p>manufacturing does not occur in a Bushfire hazard area on Bushfire hazard overlay map OM-03.00.</p>	<p>Not Applicable to this development Storage or manufacturing of hazardous materials will not occur on site as part of the proposed development.</p>

7 Conclusion

The Riverbend Precinct 1 development site is subject to a High and Medium Potential Bushfire Intensity per SPP BPA mapping, though much of the current site has been cleared of vegetation. Covey have assessed the post-development vegetation landscape per BRC within Precinct 1 to identify the residual bushfire hazard.

This BMP detailed the bushfire hazards to which the development is exposed and the bushfire mitigation measures required to be implemented to reduce the risk to acceptable levels per *Natural Hazards, Risk and Resilience, State Planning Policy State Interest guidance material* (Queensland Government, 2019a) and BRC.

Specifically, this report outlines the required bushfire mitigation measures required for the development to satisfy SPP Assessment Benchmarks and LCC BHOC Assessment Criteria (Section 5 and 6 respectively).

This BMP has identified that:

- Building Envelopes will need to be incorporated within some residential lots to ensure that proposed dwellings are not impacted by a Radiant Heat Flux (RHF) greater than 29kW/m², these include
 - Lot 19001, and Lots 19076 through to Lot 19081 within Stage 9.
- Asset Protection Zones shall be established between bushfire prone vegetation and proposed lots where identified,
- The proposed State Primary School falls under the Vulnerable Use definition per the SPP,
 - Ensure that proposed buildings within this Vulnerable Use development lot are placed beyond the extent of RHF 10kW/m²,
- The landscape design for proposed stormwater treatment basins align with the vegetation hazard class per this BMP, in terms of species selection and vegetation structure, or a lower risk vegetation.
- All future landscape design as it is developed within operational works phases of the development shall not exacerbate or increase bushfire prone vegetation from what has been assessed, this includes any planting of vegetation that does not align with Clause 2.2.3.2 of AS3959:2018.

Provided that the bushfire mitigation measures detailed in this BMP are implemented, the bushfire hazard level, bushfire-related risk level and RHF level applicable to the proposed development are not considered unreasonable and should not prohibit the development of the site.

This BMP focused solely on bushfire-related risk and mitigation strategies, and further investigations, such as an engineering services report or ecological assessments, might be required to support a development application.

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Appendix A

Site Assessment Photos

Photo Point 1



Photo Point 2



Photo Point 3



Photo Point 4



Photo Point 5



Photo Point 6



Photo Point 7



Photo Point 8



Photo Point 9



Photo Point 10



Photo Point 11



Photo Point 12



Photo Point 13



Photo Point 14



Photo Point 15



Photo Point 16



Photo Point 17



Photo Point 18



Photo Point 19



Photo Point 20



Photo Point 21



Photo Point 22



Photo Point 23



Photo Point 24



Photo Point 25



Photo Point 26



Photo Point 27



Photo Point 26



Photo Point 28



Photo Point 29



Photo Point 30



Photo Point 31



Photo Point 32



Photo Point 33



Appendix B

Inferno-BAL

Inferno-BAL is a module of the Inferno geospatial system designed by Covey Associates, to calculate radiant heat flux and Bushfire Attack Level (BAL) from Method 2 in the AS3925 standard. Rather than calculating radiant heat flux at a single point, Inferno-BAL assesses heat flux at each point within a given area. This allows contours of radiant heat flux to be determined, as well as the maximum potential radiant heat flux and subsequent BAL level over plots and structures. The system is designed to work over very large areas (10s of kilometres) at high spatial resolution (meter scale). All intensive computations utilise graphics processing units (GPUs) where possible allowing the rapid calculation of radiant heat flux over these large spatial scales. The system also utilises a server-driven approach where calculations can be queued until resources are available, then data delivered on request.

The heat flux calculations require the following to determine flame length:

- the vegetation characteristics, i.e., fuel type and fuel load;
- the distance to the vegetation patch;
- the site slope between the calculation point and the vegetation patch; and,
- the effective slope under the vegetation influencing the fire behaviour.

To obtain the above information, Inferno-BAL requires the following inputs:

- a digital elevation map, giving the vertical height above a given datum, and
- a geo-located vector data set consisting of flammable vegetation polygons. Each vegetation polygon, or patch, must encode total and surface fuel loads, and fuel type (Forest, Woodlands, Shrublands, Scrub, Mallee, Rainforest, Moorlands or, Grassland – per AS 3959). This can be encoded as a field within the polygon data, or the values can be populated using a code from an auxiliary table.

If required, an additional vector data set representing building envelopes can be included in the model to obtain the aggregate maximum radiant heat flux over spatially specified polygons.

Pre-Processing

Given that (1) radiant heat flux calculations are computationally intensive and (2) Inferno-BAL was designed to be able to calculate radiant heat flux over entire Local Government Areas, each combination of fuel load and fuel type is categorised and the RHF calculations are run only on nearest vegetation type/load combination. Specifically, the software undertakes the following pre-processing actions:

1. Verify the input layers;
2. Rate-of-spread model and fuel load values are populated for each vegetation patch. Any patches with an un-burnable fuel type are removed (e.g., VHC 43.6 waterbodies).
3. All combination of fuel type and fuel load are categorised, and each combination assigned an ID.
4. For each unique ID the polygon nearest to the calculation point, is used in radiant heat flux calculations.

An example of this categorisation is shown in Figure 1. The four vegetation patches depicted are classified as ID 1 (Grass fuel type of 1 t/ha fuel load), ID 2 (Grass fuel type of 0.5 t/ha fuel load, and ID 3 (Forest fuel type of 10 t/ha). The radiant heat flux calculation is performed three times, one for each of the nearest ID patches. In this case, the grass patch of ID 1 located at a greater distance from the calculation point (shown with a dashed line) is not included in the radiant heat flux model.

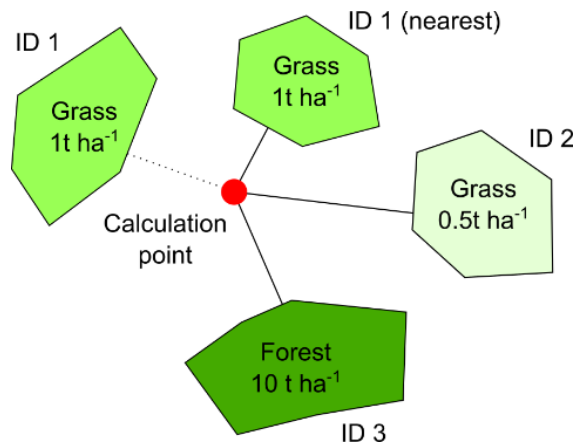


Figure 1 – Pre-processing of vegetation.

Note that this methodology may, in very marginal cases, result in a potential underestimation of radiant heat flux. This would only occur if ID patches at further distances were located on very steep terrain. This shortcoming will be addressed in future revisions of the system.

Distance Calculation

The distance is determined by searching for the point on the nearest edge over all polygons surrounding the calculation point. Once this nearest point is found the direction and distance to the patch can be found from the vector connecting the calculation point to the point on the edge (as shown by the arrow in Figure 2).

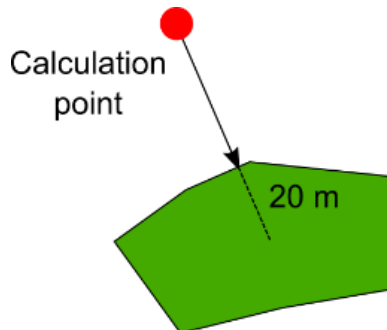


Figure 2 - Path to assess effective slope.

Site Slope Calculation

The site slope is calculated using the arctangent of the difference in elevation over the vector divided by the length of the vector. The site slope is clamped from -20 to 20 degrees, as in the AS3959 Method 2 standard.

Effective Slope Calculation

The effective slope is determined by extending a path 20 m into the vegetation patch (as shown by the dashed line in Figure 2) and calculating the slope over this path, per the method used in site slope calculations. The effective slope is clamped from -15 to 30 degrees, as in the AS3959 Method 2 standard.

Radiant Heat Flux calculation

The encoded vegetation characteristics from the vegetation vector layer are then used to determine which of the eight AS 3959 rate-of-spread models to adopt. From each of these a model for flame length is used (which may depend on an intermediate fire intensity empirical model for some fuel types, as in the AS3959 standard Eqns. B3, B4 and B5). The flame length is then used in the AS3959 iterative process to determine the flame angle giving the view factor, and hence maximum radiant heat flux, at the calculation point. This step involves some significant assumptions as outlined in the AS3959 standard, including the application of an empirical model for the atmospheric transmissivity (Eq. B9) and use of formula for view factor assuming a rectangular flame with a fixed width (Eq. B8 of AS 3959).

This process is repeated for each of the vegetation IDs and the maximum value over all these calculations is used as the final value of the radiant heat flux. The final steps in the process are to find the maximum radiant heat flux in each polygon plot, if supplied, and to categorise these into the BAL levels and to generate the vector isolines of the radiant heat flux.

Appendix C

NCC certain Class 9 Buildings

The proposed childcare centre and State Primary School would be considered an *early childhood centre* and *primary school* classified as a Class 9b building within the National Construction Code (NCC) Building Code of Australia (2022). Class 9b buildings describe buildings where people may gather for social, theatrical, political, religious or civil purposes, which includes childcare centres and schools (National Construction Code, 2019). Five BAL standards (BAL-FZ, BAL-40, BAL-29, BAL-29 and BAL-12.5) calculated per AS 3959 trigger specific construction requirements under the Building Code of Australia. Further, certain Class 9 buildings are subject to additional bushfire protection requirements. This Appendix replicates relevant sections of the NCC , particularly focusing on deem-to-satisfy solutions.

Part G5 Construction in bushfire prone areas

G501 Objective

The Objective of this Part is to—

- (a) safeguard occupants from injury from the effects of a bushfire; and
- (b) protect buildings from the effects of a bushfire; and
- (c) facilitate temporary shelter for building occupants who may be unable to readily evacuate the building prior to a bushfire.

Applications

- (1) G501(a) and (b) apply in a designated bushfire prone area to—
 - (a) a Class 2 or 3 building; or
 - (b) a Class 10a building or deck associated with a Class 2 or 3 building.
- (2) G501(a), (b) and (c) apply in a designated bushfire prone area to—
 - (a) a Class 9a health-care building; and
 - (b) a Class 9b—
 - (i) early childhood centre; and
 - (ii) primary or secondary school; and
 - (c) a Class 9c residential care building; and
 - (d) a Class 10a building or deck immediately adjacent or connected to a building of a type listed in (a) to (c).

G5P2 Additional bushfire requirements for certain Class 9 buildings

A building that is constructed in a designated bushfire prone area and occupied by people who may be unable to readily evacuate the building prior to a bushfire must, to the degree necessary—

- (a) (a) reduce the risk of an untenable indoor environment for occupants during a bushfire event, appropriate to the—
 - (i) location of the building relative to fire hazards, including—
 - (A) classified vegetation; and
 - (B) adjacent buildings, structures and movable objects; and
 - (C) carparking areas and allotment boundaries; and
 - (D) other combustible materials; and
 - (ii) number of occupants to be accommodated within the building; and
 - (iii) intensity of bushfire attack on the building; and
 - (iv) duration of occupancy; and

- (v) intensity of potential consequential fires; and
 - (vi) occupant tenability within the building before, during and after the bushfire event; and
 - (vii) (vii)combined effects of structural, fire exposure and other effects to which the building may reasonably be subjected; and
 - (viii) provision of fire fighting equipment and water supply to facilitate protection of the building; and
- (b) be provided with vehicular access to the site to enable firefighting and emergency personnel to defend or evacuate the building; and
 - (c) have access to a sufficient supply of water for firefighting purposes on the site; and
 - (d) provide safe access within the site to the building (including carparking areas), as well as safe egress after the bushfire event.

Applications

G5P2 applies to the following buildings located in a designated bushfire prone area—

- (a) a Class 9a health-care building; and
- (b) a Class 9b—
 - (i) early childhood centre; and
 - (ii) primary or secondary school; and
- (c) a Class 9c residential care building; and

Notes

For a building that is subject to G5P2, and therefore outside the scope of G5V1, the building would need to comply with either—

- (a) Performance Requirement G5P2 by means of a Performance Solution; or
- (b) the Deemed-to-Satisfy Provisions of G5D4 if the building is located in an area subject to a Bushfire Attack Level (BAL) not exceeding BAL – 12.5.

Deemed-to-Satisfy Provisions

G5D4 Protection – certain Class 9 buildings

- (1) In a designated bushfire prone area, the following must comply with Specification 43:
 - (a) a Class 9a health-care building; and
 - (b) a Class 9b—
 - a. early childhood centre; and
 - b. primary or secondary school; and
 - (c) a Class 9c residential care building; and
- (2) In a designated bushfire prone area, a Class 10a building or deck immediately adjacent or connected to a building of a type listed in (1) must comply with S43C2 and S43C13.

Deemed-to-Satisfy Provisions

Specification 43 – Bushfire Protection for Certain Class 9 Buildings

The following section outline the additional bushfire protection measures required within Specification 43 of the NCC Building Code of Australia (National Construction Code, 2019).

S43C2 Separation from classified vegetation

- (1) The building must be separated from classified vegetation –
 - a. By not less than the minimum distance specified in Table S43C2; or
 - b. Such that radiant heat flux on exposed building elements will not exceed 10 kW/m².
- (2) For the purposes of (1), the term ‘classified vegetation’ has the meaning that it has in AS 3959.

Table S43C2: Minimum distance of building to classified vegetation

Vegetation Classification	Slope	Minimum distance (m) of the building to classified vegetation
High risk	Upslope and flat land	60
High risk	Downslope max 20 degrees	110
Medium risk	Upslope and flat land	40
Medium risk	Downslope max 20 degrees	80
Low risk	Upslope and flat land	30
Low risk	Downslope max 20 degrees	50

Table Notes

- (1) Table values are based on FDI of 100 in accordance with AS 3959.
- (2) High risk equates to vegetation classification of forest and woodland in accordance with AS 3959.
- (3) Medium risk equates to vegetation classification of scrub and rainforest in accordance with AS 3959.
- (4) Low risk equates to vegetation classification of shrubland, mallee/mulga and grassland in accordance with AS 3959.

S43C3 Separation between buildings

- (1) The building must be located not less than 12 m from any other building.
- (2) The separation distance *required* by (1) need not be complied with if the building is constructed:
 - a. With *external walls* that have an FRL of not less than 60/60/60 when tested from the outside, including any openings protected in accordance with AS 3959 for BAL – 19 or greater; or
 - b. For *external walls* and roof, using a material or system that satisfies the test criteria of AS 1530.8.1 for a radiant heat flux of 10 kW/m² or greater.

S43C4 Separation from allotment boundaries and carparking areas

- (1) The building must be located not less than 10 m from any allotment boundary or open carparking area/spots.
- (2) The separation distance *required* by (1) need not be complied with if the building is constructed:
 - a. With *external walls* that have an FRL of not less than 60/60/60 when tested from the outside, including any openings protected in accordance with AS 3959 for BAL – 19 or greater; or

- b. For *external walls* and roof, using a material or system that satisfies the test criteria of AS 1530.8.1 for a radiant heat flux of 10 kW/m² or greater.

S43C5 Separation from hazards

The *external walls* and roof of the building must be protected from potential hazards on the *site* such as liquefied petroleum gas bottles, fuel storage, storage of combustible materials, waste bins, vehicles, machinery and the like, by –

- (a) A separation distance of not less than 10 m; or
- (b) Where within the 10 m separation described in (a), constructed with *external walls* that have an FRL of not less than 60/60/60 when tested from the outside, including any openings protected in accordance with AS 3959 for BAL – 19 or greater; or
- (c) For *external walls* and roof, using a material or system that satisfies the test criteria of AS 1530.8.1 for a radiant heat flux of 10 kW/m² or greater.

S43C6 Non-combustible path around building

A *non-combustible* pathway directly adjacent to the building and not less than 1.5 m wide must be provided around the perimeter of the building.

S43C7 Access pathways

- (1) Access pathways that lead to a road or *open space* must:
 - a. be readily identifiable; and
 - b. have an even surface; and
 - c. have a minimum clear width of not less than 1 m.
- (2) If the access pathway is an *accessway* that is *required* to comply with Part D4, the requirements of Part D4 override (1) to the extent of any inconsistency.

S43C8 Exposed external areas

An external area designed to hold people unable to be safety accommodated within the building, that may be exposed to radiant heat flux from a fire front during a bushfire event, must not be exposed to an incident radiant heat flux from the fire from exceeding 1 kW/m² above background solar radiant heat flux.

S43C9 Internal tenability

To maintain internal tenability throughout the duration of occupancy during a bushfire event, the building must comply with the following:

- (a) An air handling system must be provided that is capable of—
 - (i) being adjusted for full recycling of internal air for a period of not less than 4 hours to avoid the introduction of smoke into the building; and
 - (j) maintaining an internal air temperature of not more than 25°C.
- (b) The building envelope must be designed such that if an air handling system required by (a) fails, then—
 - (i) internal air temperatures can be maintained below 39°C; and
 - (j) internal surface temperatures can be maintained below 60°C.
- (c) If the building is divided into separate compartments then, for the purposes of (a), each compartment must have a separate air handling system.
- (d) Each air handling system required by (a) must be designed to account for the activation of smoke detectors from low concentrations of smoke from external sources, so as to ensure that air-conditioning and other essential systems remain operational.

S43C10 Building envelope

The building envelope must be constructed in accordance with AS 3959 – BAL 19 or greater, except that where the use of combustible materials is permitted by AS 3959, they are not to be used unless permitted by C2D10(4), (5) or (6).

S43C11 Supply of water for fire-fighting purposes

Water for fire-fighting purposes must be available and consist of—

- (a) a fire hydrant system complying with E1D2, or
- (b) a static water supply consisting of tanks, swimming pools, dams or the like, or a combination of these, together with suitable pumps, hoses and fittings, capable of providing the required flow rate for a period of not less than 4 hours, determined in consultation with the relevant fire brigade.

S43C12 Emergency power supply

- (1) Emergency power must be provided to support, for not less than 4 hours before and 2 hours after the passing of the fire front during a bushfire event, the ongoing operation of—
 - a. air handling systems to maintain internal tenability; and
 - b. any pumps for fire-fighting; and
 - c. any emergency lighting and exit signs; and
 - d. any other emergency equipment listed in C3D14(6) and required to be provided.
- (2) Manual control for emergency back-up power supply must be provided to facilitate manual intervention where the power supply fails or runs out.

S43C13 Signage

Signage must be provided to warn building occupants against storing combustible materials under or adjacent to the building.

S43C14 Vehicular access

Vehicular access to the building must be provided in accordance C3D5(2), as if the building were a large, isolated building for the purposes of C3D4.

Bushfire Management Plan

Client: Goodrock Property Group Pty Ltd

Location: Greater Flagstone PDA
