



APPENDIX P

BUSHFIRE ASSESSMENT



Canyonleigh Battery Energy Storage System

Bushfire Risk Assessment

PREPARED FOR

X-ELI⁺

DATE

13 January 2026

REFERENCE

0711340



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Canyonleigh Battery Energy Storage System

Bushfire Risk Assessment

0711340



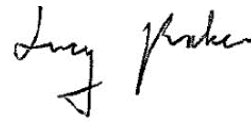
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ACRONYMS AND ABBREVIATIONS

Acronym	Description
AFAC	Australasian Fire and Emergency Service Authorities Council
AFDRS	Australian Fire Danger Rating System
APZ	Asset Protection Zones
BC Act	<i>Biodiversity Conservation Act 2016</i>
BESS	Battery Energy Storage System
BFMCs	Bushfire Management Committees
BOM	Bureau of Meteorology
CFA	Country Fire Authority
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPHI	Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
ERM	Environmental Resources Management Australia Pty Ltd
FBI	Fire Behaviour Index
FEBQ	Fire Engineering Brief Questionnaire
FDR	Fire Danger Rating
FFDI	Forest Fire Danger Index
FRNSW	Fire and Rescue New South Wales
ha	hectare
HIPAP	Hazardous Industry Planning and Assessment Paper
IFSR	Initial Fire Safety Report
IPA	Inner Protection Zone
km	kilometers
LGA	Local Government Area
m	meters
MW	Megawatts
MWh	Megawatt hour
MNES	Matter of National Environmental Significance
NSW	New South Wales
PBP	Planning for Bushfire Protection 2019
PCT	Plant Community Type
RFS	New South Wales Rural Fire Service

Acronym	Description
RF Act	NSW Rural Fires Act 1997
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
TOBAN	Total Fire Ban

Important Note:

Despite the mitigation measures and treatments that are put in place, it is noted that some bushfire risk will always remain and that some of the infrastructure may be subject to direct flame contact. The absence of any identified hazard or asset in the Project Area should not be interpreted as a guarantee that such hazards or impacts do not exist. It is also important that a Bushfire Emergency Management Plan is prepared prior to the commencement of any construction works in conjunction with relevant stakeholders, including local fire services, NSW RFS, NSW Fire and Rescue, landowners and adjoining property owners.

Any representation, statement of opinion, or advice expressed or implied in the bushfire assessment will be made in good faith on the basis that ERM employees and / or agents are not liable (whether by reason of negligence, lack of care or any other reason) to any person, company or their agents for any damage or loss whatsoever which has occurred or may occur in relation to that person taking (or not taking) action in respect of any representation, statement or advice provided within the bushfire assessment.

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by X-Elio Aus2 Pty Ltd (X-Elio, The Applicant) to consider bushfire risk in the vicinity of the proposed Canyonleigh Battery Energy Storage System (BESS) (the Project).

The need for a Bushfire Risk Assessment was identified within the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Infrastructure (DPHI) on 12 December 2024. The *Rural Fires Act 1997* (RF Act) imposes obligations on land occupiers to take all practicable steps to prevent the occurrence and spread of wildfire to adjoining lands from lands under their care and management.

This report identifies potential hazards and the risks associated with the Project. The report has been prepared to support the preparation of the Project's Environmental Impact Statement (EIS). It contains management and mitigation measures designed to address these obligations, consistent with the New South Wales (NSW) Rural Fire Service (RFS) guidelines including Planning for Bush Fire Protection 2019 (PBP 2019) (NSW RFS, 2019) inclusive of the PBP Addendum (2022 and 2025).

It does not assess the individual design or engineering components of the infrastructure, as described in Section 1.2, but does consider locations of the infrastructure relative to the identified hazards and the requirements for separation distances. Electrical hazards including battery fires, and transformer fires are addressed separately as part of the Preliminary Hazard Assessment (PHA) and are not included here.

1.1 LOCATION

The Applicant proposes to construct, operate, maintain and decommission the Canyonleigh BESS at 962 Canyonleigh Road, Brayton, NSW. The site is located approximately 30 kilometers (km) northeast of Goulburn, within the Goulburn Mulwaree Local Government Area (LGA) in the South East and Tablelands region. The Project Area is approximately 130.60 hectares (ha) and is comprised of two allotments: Lot 2341 Deposited Plan (DP) 622834 and Lot 12 DP 727493.

Figure 1-1 shows the Project locality in a regional setting.

1.2 PROJECT OVERVIEW

The BESS is anticipated to have an installed storage capacity of up to 300 Megawatts (MW)/1,200-Megawatt hour (MWh). The Project will also include associated and ancillary infrastructure facilities, including access roads and electrical reticulation network.

The Project layout is shown in Figure 1-2, and Table 1-1 summarises the key indicative Project components and specifications.

A full description of the Project is provided in the Canyonleigh BESS EIS (ERM 2025).

TABLE 1-1 PROJECT SUMMARY

Project Element	Summary
<i>Project Details</i>	
Project Area	The subject land to which this Development Application applies, which covers approximately 130.60 ha.
Development Footprint	- Maximum directly impacted area by Project construction and operation which is 21.53 ha. The Development Footprint is located entirely within the Project Area. It includes all temporary and permanent Development Footprints, and all areas where vegetation may be removed during project construction and operation of the Project until decommissioning. - The Development Footprint comprises of: - The BESS Development Footprint (14.78 ha); and - The section of Canyonleigh Road between the site access point and the intersection with Brayton Road subject to maintenance works, herein referred to as the Road Resurfacing Development Footprint (6.75 ha).
<i>Project Elements</i>	
BESS	- One BESS with 300 MW / 1,200 MWh storage capacity. - Located on Lot 2341 DP 622834 and Lot 12 DP 727493.
Electrical Reticulation Infrastructure	- The Project will connect to the existing Transgrid 330 kV Marulan Substation located on Lot 2341 DP 622834. - New proposed step-up substation will connect from 33 kV to 330 kV underground feeder/connection line, which leads to existing Marulan substation.
Access	The Project will be accessed via three site access points, located on Canyonleigh Road.
On-site Supporting Infrastructure	- Temporary construction and laydown area; - Permanent Operations & Maintenance (O&M) facility including: - A control room; - Storage facilities; - Supervisory Control and Data Acquisition (SCADA) facilities; - Car parking; - Basic office and associated amenities; and - Utilities and waste facilities. - New and/or upgraded internal access roads; - New and/or upgraded drainage system; and - Security fencing and lighting.
Off-site Supporting Infrastructure	- Waste and wastewater disposal facilities - Existing communications network - Existing transport network and minor roadworks, including: - Canyonleigh Road between the intersection with Brayton Road and the site access will be resurfaced where required and in consultation with Goulburn Mulwaree Council; - Brayton Road / Canyonleigh Road intersection will require a Basic Right Turn treatment to access Canyonleigh Road from Brayton Road, including a temporary hardstand and temporary signage relocation; - Installation of sealed hardstand and mountable kerb at the intersection of Botany Road / Bunnerong Road (Matraville, NSW); and - Quarries for construction material (as required).
<i>Construction</i>	
Construction Duration	Approximately 18 months.
Construction Workforce	Approximately 100 Full Time Equivalent (FTE) employees during peak construction. Average annual workforce of 70 FTE.

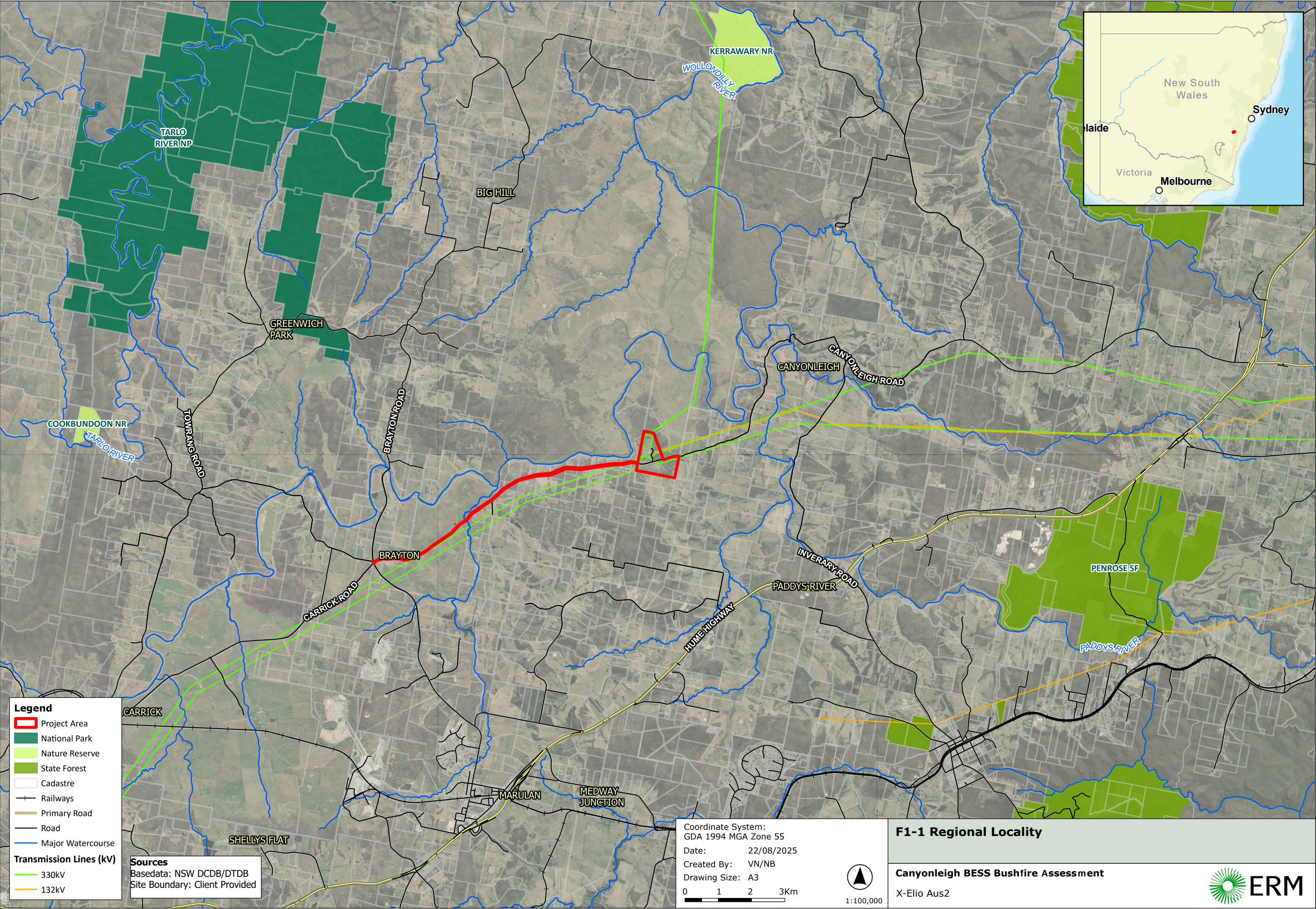
Project Element	Summary
Ancillary Activities	• Delivery of Project components, including battery modules, substations, transformers and associated components • Installation of underground and overhead cabling, maintenance and environmental management processes and equipment • Access roads upgrade • Earthworks, as required • Sourcing of water for construction (this may include offsite or onsite water sourcing, including the construction of bores and / or manmade dams onsite) • Geotechnical investigations to inform the siting and location of Project layout and infrastructure
Services and Utilities	• Adjustment, protection or relocation of existing utilities
Transport Route	• Main equipment and Oversize Overmass (OSOM) deliveries via Port Botany • Associated external road upgrades (also used for operational maintenance or decommissioning activities)
Access	• OSOM / heavy vehicle enabling works at the one northern and two southern access points.
<i>Operations</i>	
Duration	• Development Consent in perpetuity • Infrastructure life minimum of 20-30 years
Hours of Operation	• 24 hours a day, 7 days a week
Operational Workforce	• Maximum of five workers on-site, required periodically for operational and maintenance activities.
<i>Decommissioning</i>	
Duration	• It is assumed decommissioning is going to take 3 months
Decommissioning Workforce	• To be confirmed in Decommissioning and Rehabilitation Plan to be prepared for the Project no less than five years prior to decommissioning.

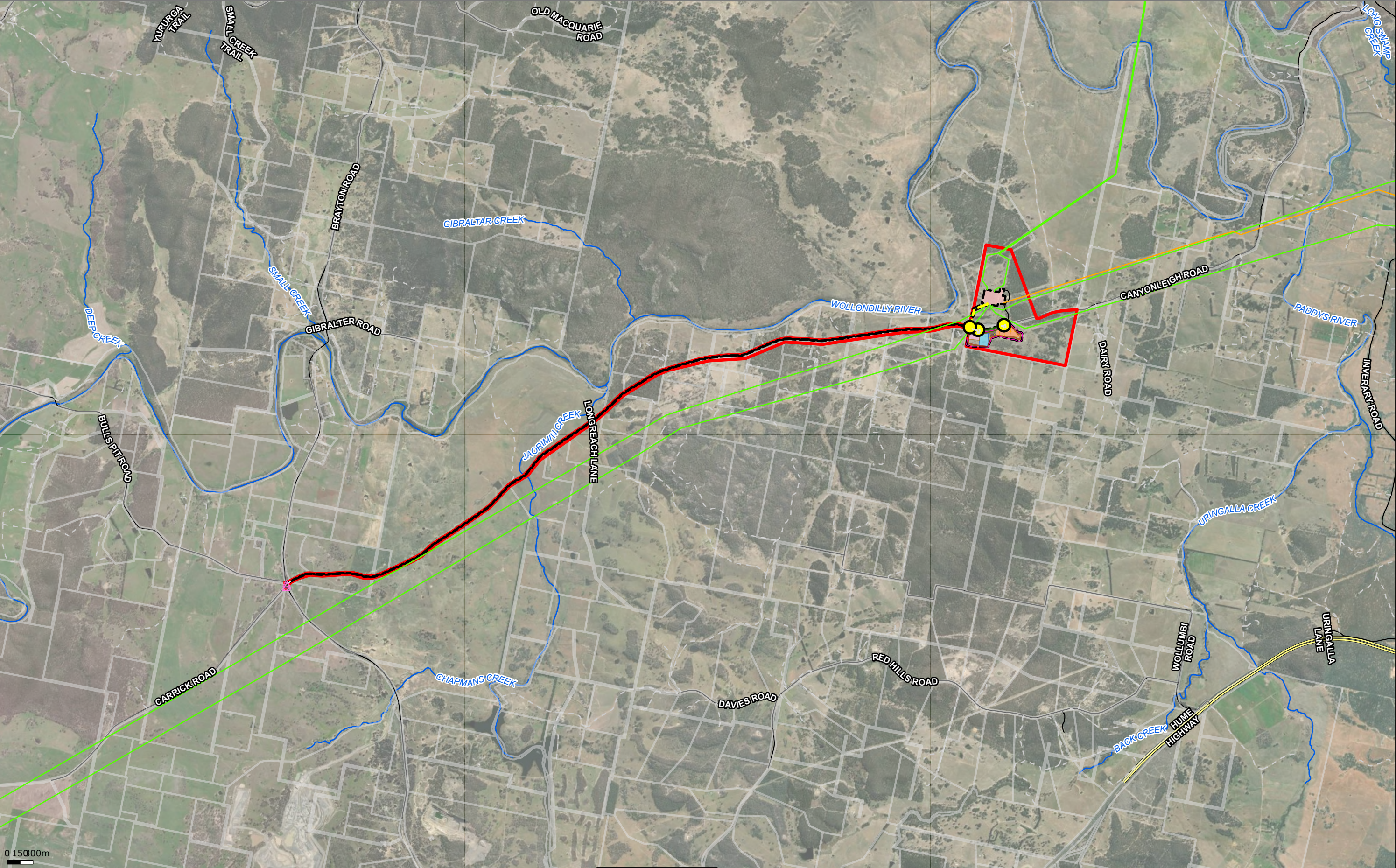
1.3 AIMS AND OBJECTIVES

Bushfire presents a threat to both human life and assets and can adversely impact ecological values. Bushfire risk can be considered in terms of environmental factors that increase the risk of fire (fuel quantity and type, topography, and weather patterns), as well as specific activities (such as hot works e.g. cutting, grinding, and soldering) or infrastructure components that exacerbate combustion or ignition risks (such as transmission lines and other electrical components).

This Bushfire Risk Assessment aims to address the requirements identified by the SEARs to identify potential hazards and risks associated with bushfires / use of bushfire prone land and demonstrate that the proposed BESS can be designed, constructed and operated to minimise ignition risks and provide for asset protection consistent with relevant NSW RFS design guidelines, PBP (2019) and Standards for Asset Protection Zones (APZs) (2019).

The objectives of this assessment are to identify, and where possible reduce, the likelihood of a bushfire impacting the site or spreading from the site to surrounding properties. Despite the mitigation measures and treatments that are put in place, it is noted that some bushfire risk will always remain and that some of the infrastructure may be subject to direct flame contact.





Legend

Site Access	Tree Protection Area	Parking Slots	330kV
Traffic sign	Platform	Storage Containers	132kV
Indicative 330kV Connection	Water Tank	Substation	Cadastre
Fence	Laydown Area	Site Access	Primary Road
Project Area	BESS Battery Containers	Internal Roads	Road
Development Footprint	BESS Area	Existing substation	Track-Vehicular
Access Roads - Earthworks	O&M Control Building	O&M Facility	Major Watercourse

Coordinate System:
GDA 1994 MGA Zone 55

Date: 12/03/2026

Created By: NB

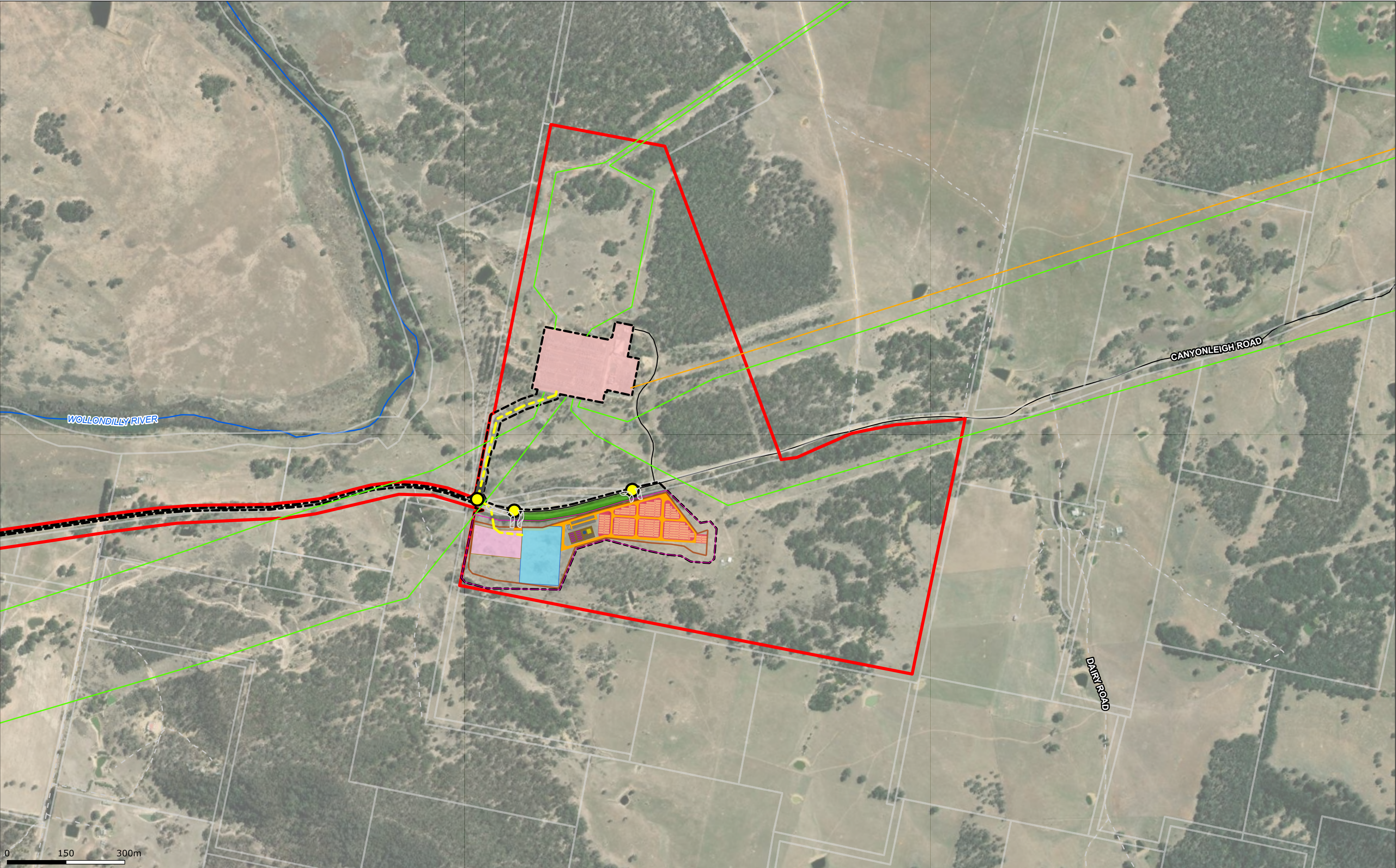
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F1-2 Project Layout
Map 1 of 7

Canyonleigh BESS

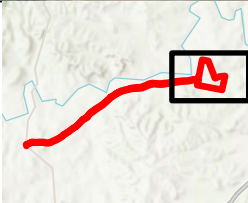
X-Elio Aus2



0 150 300m

Legend

- | | | | |
|-----------------------------|-------------------------|---------------------|-------------------|
| Site Access | Tree Protection Area | Parking Slots | 330kV |
| Indicative 330kV Connection | Platform | Storage Containers | 132kV |
| Fence | Water Tank | Substation | Cadastre |
| Project Area | Laydown Area | Site Access | Road |
| Development Footprint | BESS Battery Containers | Internal Roads | Track-Vehicular |
| Access Roads - Earthworks | BESS Area | Existing substation | Major Watercourse |
| | O&M Control Building | O&M Facility | |



Coordinate System:
GDA 1994 MGA Zone 55
Date: 12/03/2026
Created By: NB
Drawing Size: A3



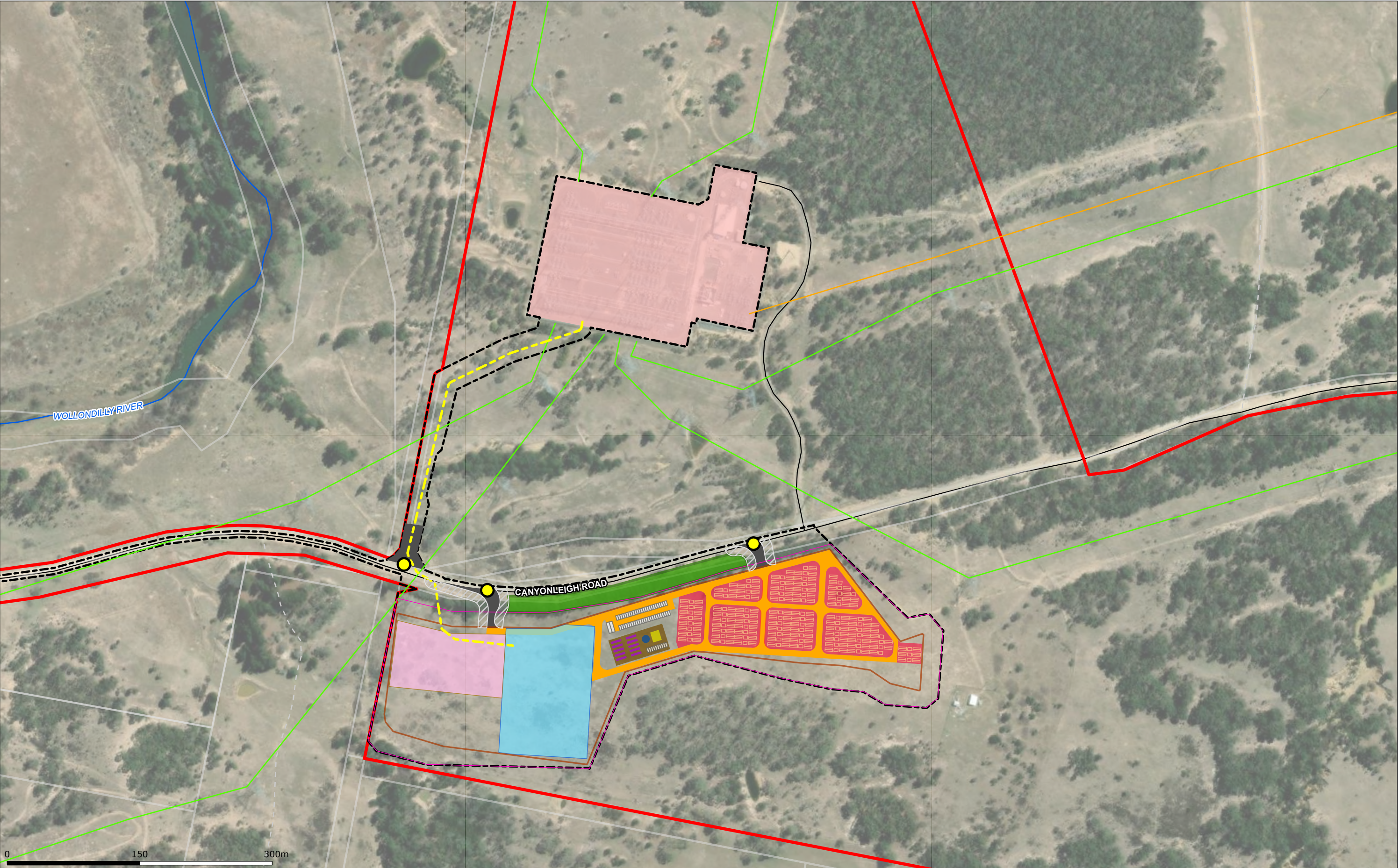
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**F1-2 Project Layout
Map 2 of 7**

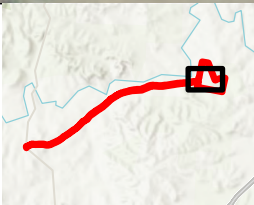
Canyonleigh BESS

X-Elio Aus2





Legend			
Site Access	Tree Protection Area	Parking Slots	330kV
Indicative 330kV Connection	Platform	Storage Containers	132kV
Fence	Water Tank	Substation	Cadastre
Project Area	Laydown Area	Site Access	Road
Development Footprint	BESS Battery Containers	Internal Roads	Track-Vehicular
Access Roads - Earthworks	BESS Area	Existing substation	Major Watercourse
	O&M Control Building	O&M Facility	



Coordinate System:
GDA 1994 MGA Zone 55
Date: 12/03/2026
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F1-2 Project Layout Map 3 of 7

Canyonleigh BESS

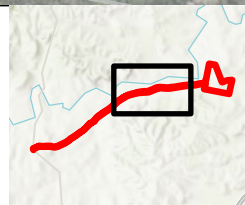
X-Elio Aus2





Legend

- | | |
|---------------------------|-------------------|
| Project Area | Cadastre |
| Development Footprint | Road |
| Access Roads - Earthworks | Track-Vehicular |
| 330kV | Major Watercourse |



Coordinate System:
GDA 1994 MGA Zone 55
Date: 12/03/2026
Created By: NB
Drawing Size: A3



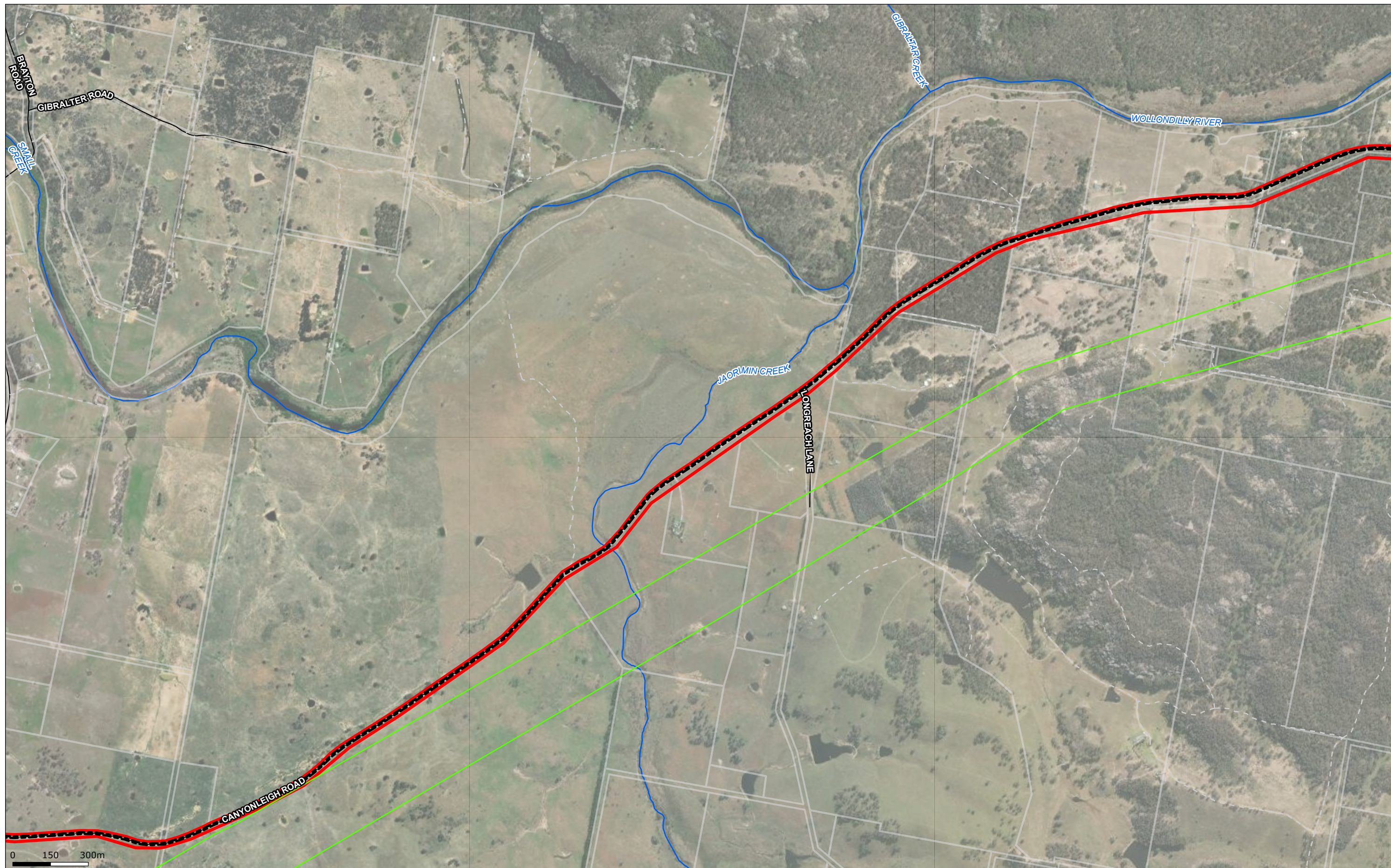
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**F1-2 Project Layout
Map 4 of 7**

Canyonleigh BESS

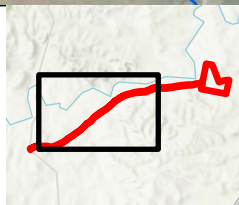
X-Elio Aus2





Legend

- | | |
|---------------------------|-------------------|
| Project Area | Cadastre |
| Development Footprint | Road |
| Access Roads - Earthworks | Track-Vehicular |
| 330kV | Major Watercourse |



Coordinate System:
GDA 1994 MGA Zone 55
Date: 12/03/2026
Created By: NB
Drawing Size: A3



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**F1-2 Project Layout
Map 5 of 7**

Canyonleigh BESS

X-Elio Aus2





Legend

- Traffic sign
- Project Area
- Development Footprint
- Access Roads - Earthworks
- Tree Protection Area
- 330kV
- Cadastral
- Road
- Track-Vehicular
- Major Watercourse

Coordinate System:
GDA 1994 MGA Zone 55

Date: 12/03/2026

Created By: NB

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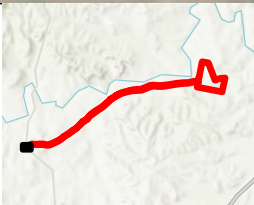
F1-2 Project Layout
Map 6 of 7

Canyonleigh BESS

X-Elia Aus2



- Legend**
- △ Traffic sign
 - ▬ Project Area
 - - - Development Footprint
 - ▨ Access Roads - Earthworks
 - Tree Protection Area
 - ▭ Cadastre
 - Road



Coordinate System:
GDA 1994 MGA Zone 55
Date: 12/03/2026
Created By: NB
Drawing Size: A3



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**F1-2 Project Layout
Map 7 of 7**

Canyonleigh BESS

X-Elio Aus2



2. PLANNING FRAMEWORK

2.1 RELEVANT LEGISLATION AND GUIDELINES

Table 2-1 outlines the relevant legislation and guidelines and how they have been considered in this Bushfire Risk Assessment.

TABLE 2-1 RELEVANT LEGISLATION GUIDELINES

Relevant Legislation / Guidelines	Description
<i>Environment Planning and Assessment Act 1979</i>	The Project was declared a State Significant Development (SSD) and will be assessed under Part 4 of the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act). Section 4.41 of the EP&A Act excludes projects approved under Part 4 of the EP&A Act from requiring “a bushfire safety authority under section 100B of the <i>Rural Fires Act 1997</i>” (RF Act).
<i>NSW Rural Fires Act 1997</i>	Under Section 63 of the RF Act, owners and occupiers of land have a duty to take practicable steps to prevent the occurrence of bushfires on, and to minimise the danger of the spread of bushfires on or from, that land. This assessment considers the risk of spreading bushfires from the Project to the surrounds and provides measures to minimise the risk of bushfires. Additionally, as the occupier, in accordance with Section 64 of the RF Act, if a fire is burning on any land at any time during a bushfire danger period, the BESS operators must: - immediately on becoming aware of the fire and whether the occupier has lit or caused the fire to be lit or not, take all possible steps to extinguish the fire; and - if the occupier is unable, without assistance to extinguish the fire and any practicable means of communication are available, ensure that the fire is reported immediately to the 000 emergency telephone number. The operators of the Project must also be aware of operations that can be carried out on days of Total Fire Ban (TOBAN) and any prohibited activities or exemptions that are notified by the Commissioner of the NSW RFS under Section 99 of the RF Act. <u>Bushfire Management Committee</u> Set up under the RF Act, Bushfire Management Committees (BFMCs) coordinate fire management planning, prevention and suppression in local areas. The relevant committee for the Project is the Southern Tablelands BFMC. Each BFMC is required to prepare and submit to the Bush Fire Risk Management Plan (BFRMP). The relevant plan to the Project is the Southern Tablelands BFRMP (2018).
<i>Planning for Bushfire Protection 2019</i>	PBP (2019) is a planning document to link responsible planning and development control with the protection of life, property and the environment. Consideration has been given to the following overall aims and objectives of PBP 2019:

Relevant Legislation / Guidelines	Description
	• Afford buildings and their occupants protection from exposure to a bushfire; • Provide for a defendable space to be located around buildings; • Provide appropriate separation between a hazard and buildings which, in combination with other measures, minimises material ignition; • Ensure that appropriate operational access and egress for emergency service personnel and residents is available; • Provide for ongoing management and maintenance of bushfire protection measures; and • Ensure that utility services are adequate to meet the needs of firefighters. Section 8.3.9 of PBP 2019 identifies that some developments are considered by their very nature to be hazardous, as much for their ability to start bushfires as their susceptibility to bushfire impacts. New developments of this nature may require the preparation of a performance-based solution, including a bushfire design brief and Fire Safety Study (FSS), prepared under the DPHI Hazardous Industry Planning and Assessment Papers (HIPAPs). Electrical hazards including battery fires, and transformer fires are addressed separately as part of the PHA and are not included here. Section 8.3.10 of PBP 2019 confirms that where no residential component is included, commercial and industrial development is addressed through the aims and objectives of PBP 2019. A suitable package of bushfire protection measures should be proposed commensurate with the type/scale of the development and number of people likely to be occupying the building/space. Essential equipment should be designed and housed in such a way as to minimise the impact of bushfires on the capabilities of the infrastructure during bushfire emergencies. It should also be designed and maintained so that it will not serve as a bushfire risk to surrounding properties.
<i>Design Guidelines and Model Requirements for Renewable Energy Facilities 2023</i>	The Victorian Country Fire Authority (CFA), in conjunction with industry and regulatory authorities, has developed the Design Guidelines and Model Requirements for Renewable Energy Facilities (CFA, 2022) to support designers and operators of facilities to consider and mitigate fire risk. This includes fires which originate within the facility itself as well as bushfire impact on the site from external factors. While these were developed in a Victorian context, the guidance represents the current leading practice and has been referred to in this assessment as it builds upon the principles and knowledge from recent fires at large-scale renewable energy facilities.
<i>Commonwealth Environment Protection and Biodiversity Act 1999</i>	<i>The Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) is the primary piece of Federal legislation relating to the environment. Under the EPBC Act any action that has, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES) requires approval from the Commonwealth Minister for the Environment. An action is defined as a project, development, undertaking activity (or series of activities), or alteration to any of these.

Relevant Legislation / Guidelines	Description
	The EPBC Act MNES Impact Assessment (ERM, 2024) identified four species as having the potential to be significantly impacted by the Project: ◦ Hoary Sunray (<i>Leucochrysum albicans subsp. tricolor</i>) ◦ Diamond Firetail (<i>Stagonopleura guttata</i>) ◦ Pink-tailed Legless Lizard (<i>Aprasia parapulchella</i>) ◦ Striped Legless Lizard (<i>Delma impar</i>) Consideration of the impact of the proposed activity on MNES is provided in Canyonleigh BESS - Biodiversity Development Assessment Report (BDAR) (ERM, 2025).
<i>Biodiversity Conservation Act 2016</i>	The <i>Biodiversity Conservation Act 2016</i> (BC Act) requires the consideration of threatened species and their habitats in the developmental planning process. Schedule 3 of the BC Act lists 'Key Threatening Processes' for species, populations and ecological communities within NSW. 'Clearing of native vegetation', 'high frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' and 'removal of dead wood and dead trees', are listed as Key Threatening Processes. Refer to <i>Canyonleigh BESS - BDAR</i> (ERM, 2025) for more detail on the habitat requirements and confirmed records of these species.

2.2 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The SEARs were issued for the proposed development on 12 December 2024 (SSD-78247462). SEARs regarding bushfire risk are addressed in Table 2-2.

TABLE 2-2 SEARS

SEARS	Addressed in...
A bushfire hazard assessment completed by a suitably qualified consultant is required, to identify potential hazards and risks associated with bushfires/use of bushfire prone land including the risks that a BESS would cause a bushfire and demonstrate compliance with PBP (2019).	This report

Fire and Rescue New South Wales (FRNSW) also provided bushfire related advice on the SEARs, as reproduced in Table 2-3 below

TABLE 2-3 FRNSW AGENCY ADVICE

Agency	Date	Advice	Addressed in...
FRNSW	2 December 2024	FRNSW stated that BESS Facilities present unique issues in regard to fighting fire and suitable additional provisions are required in accordance with E1D17 and E2D21 of the National Construction Code (2022). FRNSW recommend a FSS be developed in accordance with the Hazardous Industry Planning Advisory Paper No 2 (2011) as a condition of consent. The FSS should be prepared consistent with the relevant FRNSW Fire Safety Guidelines and FRNSW Technical Information Sheets with particular focus to Large-scale external lithium-ion battery energy storage systems – Fire safety study considerations (2023).	Electrical hazards including battery fires, and transformer fires are addressed separately as part of the PHA. The Applicant commits to undertaking a FSS following project approval and based on the final development design.

3. EXISTING SITE CONDITIONS

3.1 LOCAL CONTEXT

The site is located within the Goulburn Mulwaree LGA, approximately 8 km northeast of Brayton, 34 km northeast of Goulburn and 112 km northeast of Canberra. Goulburn is the closest major regional centre, with a population of approximately 24,565 (ABS, 2021).

Key land uses within the region comprise rural living and agricultural operations (GMC 2022). Health Care and Social Assistance, Public Administration and Safety, Retail, Trade and Education and Training are all occupations within the LGA (ABS, 2021), but agriculture is the primary employment sector. Renewable energy is also becoming a prominent part of the landscape.

The site contains one dwelling and ancillary structures located south of Canyonleigh Road, on Lot 12 DP 727493.

3.2 CURRENT LAND USE

The site is zoned RU2 Rural Landscape under the Goulburn Mulwaree Local Environmental Plan (LEP) 2009 and is currently used for agricultural activities including crop production and livestock grazing. The existing land uses surrounding the site are also predominantly agricultural grazing with a combination of native and modified pastures.

3.3 CURRENT BUSHFIRE MANAGEMENT CONTROLS

Current bushfire control is limited to general land management practices including maintenance of access tracks and consideration of fire danger ratings and total fire bans.

The relevant BFRMP for the Project is the Southern Tablelands BFRMP (2018). The Site is not mapped as a bushfire management zone under this plan. The closest asset to the site identified in the plan is the 'Big Hill Development in Upper Lachlan', a residential area, which is 8 km northwest of the BESS development footprint. The Big Hill Development is identified as having low potential for a bushfire event. Treatment strategies applied in this area include maintaining fire trails, hazard reduction (e.g., ploughing, slashing, grading or grazing), community education, and ignition management.

3.4 CLIMATE AND FIRE WEATHER

Weather conditions influence the size, intensity, speed, and predictability of bushfires and how dangerous they can be to the community. While bushfires can happen at any time of the year in Australia, the time of peak bushfire activity varies across the country with the changes in the seasonal weather patterns. Within the region, the prevailing weather conditions associated with the bushfire season in the Southern Tablelands BFMC area are north / north westerly winds, although in late afternoons southerly and easterly winds may occur for short periods. The exposure to wind effects will not vary across the Subject Land, due to the gently undulating nature of the landscape, although strong winds will rapidly spread fires across the open landscape.

Lightning strikes during storms occur frequently in the bushfire season. The bushfire season generally runs from October to March / April. The majority of serious bushfire events occur from this period until the cooler temperatures of autumn are experienced (Southern Tablelands BFMC, 2018).

Data from the Bureau of Meteorology (BOM, 2025) weather station at Goulburn Airport (Station No:070330), located 16 km from the site, confirms that both low humidity and high temperatures occur within the bushfire season and would contribute to the fire hazard within this region (refer Figure 3-1).

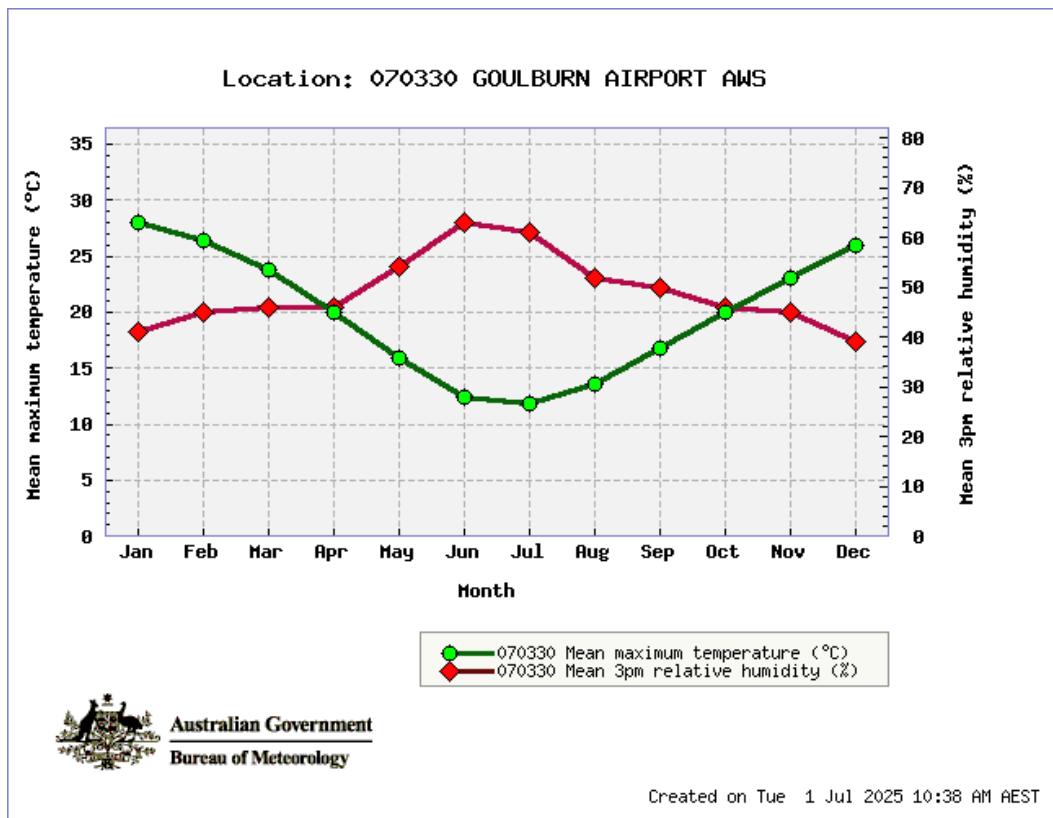


FIGURE 3-1 MEAN HUMIDITY VS MEAN HIGH TEMPERATURE (BOM, 2025)

3.5 TOPOGRAPHY

The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the level of radiant heat flux. A fire will burn faster uphill. Radiant heat pre-heats the fuel in front of the fire, making the fuel even more flammable. As described by CFA (2023), for every 10° slope, the fire will double its speed. By increasing in speed the fire also increases in intensity, becoming even hotter. The opposite applies to a fire travelling downhill. The flames reach less fuel, and less radiant heat pre-heats the fuel in front of the fire. For every 10° of downhill slope, the fire will halve its speed.

In accordance with the requirements of PBP 2019, the effective slope of the land is categorised into one of the following classes, relative to the location of the hazard:

- All upslope vegetation (considered 0 degrees);
- >0 to 5 degrees downslope vegetation;
- >5 degrees to 10 degrees downslope vegetation;

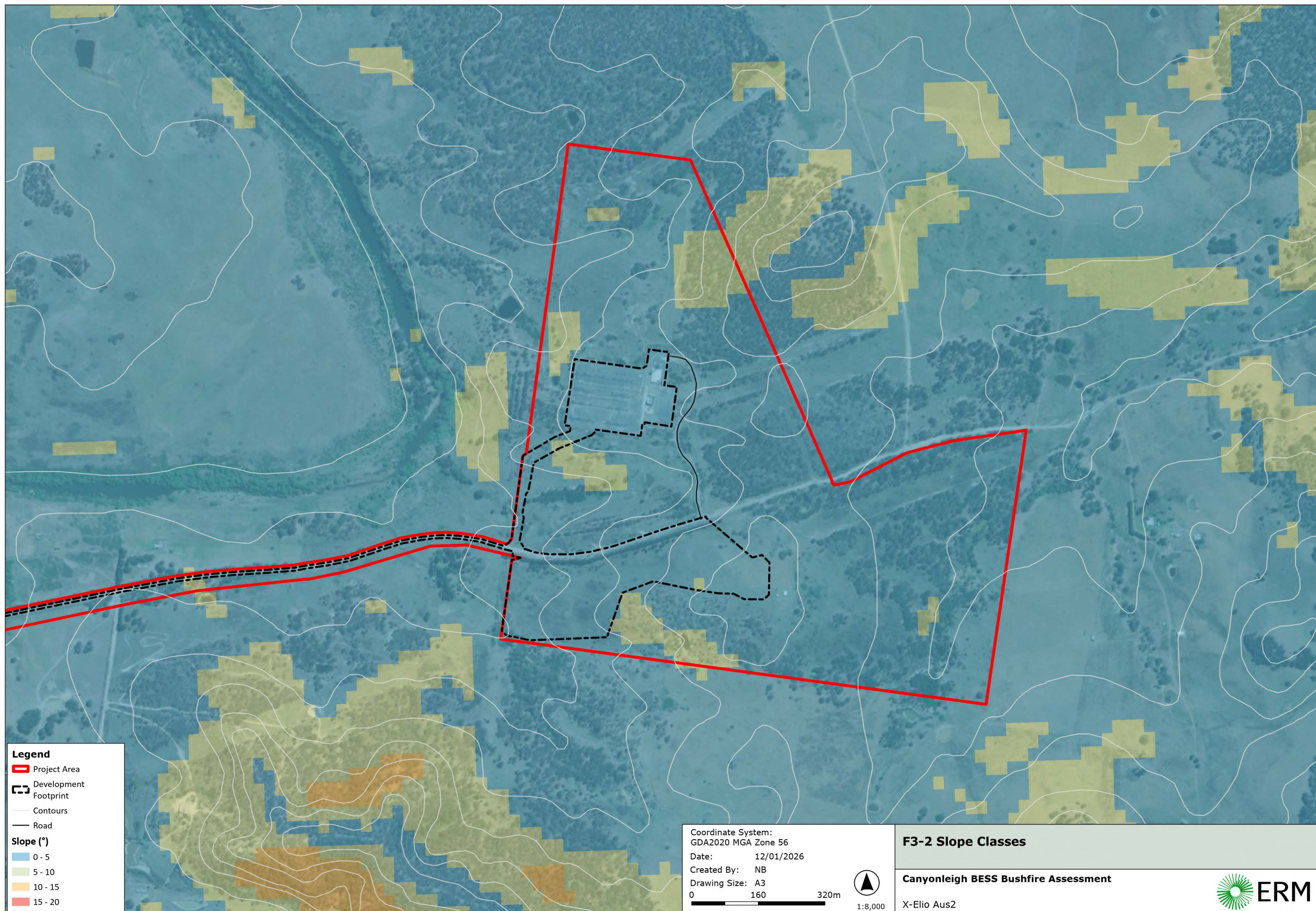
- >10 degrees to 15 degrees downslope vegetation; and
- >15 degrees to 20 degrees downslope vegetation.

In identifying the effective slope, it may be found that there are a variety of slopes covering different distances within the vegetation. The effective slope is considered to be the slope under the vegetation which will most significantly influence the bushfire behaviour for each aspect. As described in PBP 2019, this is usually the steepest slope.

The site is generally flat with gentle undulations, transitioning into low-lying hills and ridges in the southwest and northeast sections. Elevation ranges from around 600 metres (m) to 667 m above sea level, peaking in the northeast section. The effective slope over a distance of 100 m from the proposed development footprint is relatively flat to gently undulating and has been calculated as:

- >0 to 5 degrees downslope to the west and north towards Wollondilly River;
- >0 to 5 degrees downslope to the east;
- >5 to 10 degrees upslope to the south; and
- >0 to 5 degrees upslope to the south.

Figure 3-2 shows that the Site is located up upslope from the Wollondilly River to the west and north, and downhill from an elevated area of woodland to the south. Both landscape features provide potential barriers to the spread of bushfires.



3.6 VEGETATION HAZARD

Vegetation classifications within the site are detailed in Table 3-1 and presented in Figure 3-3. The Plant Community Type (PCT) mapping within the site (plus 50 m buffer) has been confirmed by ERM during the extensive field surveys undertaken to inform the BDAR. Vegetation mapping beyond the site boundary is sourced from State Vegetation Type Mapping (SVTM) (DCCEEW, 2020).

Descriptions of the vegetation types, including species composition and structural diversity are provided in the Canyonleigh BESS BDAR (ERM, 2025). For the purposes of this bushfire risk assessment, the vegetation has been simplified in line with the vegetation formations as per Keith (2004) and is presented in Table 3-1.

TABLE 3-1 VEGETATION CLASSIFICATION

Vegetation formation	Structure as per ERM 2025	Bushfire Characteristics
Native grassland	Grassland	Native grassland was observed as several large patches to the north, east and southeast of the Subject Land. Fuel characteristics that influence fire behaviour in grasslands are fuel arrangement and quantity. Standing grass, as found in ungrazed pastures sustain higher rates of spread than matted or compacted grass characteristic of a grazed area.
Planted vegetation	Woodland	A row of planted <i>Pinus</i> spp. have been identified on the southern side of Canyonleigh Road and extends into the proposed development footprint.
Grassy Woodlands	Woodland	Open eucalypt woodland 15-30 m tall, with a sparse non-sclerophyll shrub stratum and continuous groundcover of grasses and herbs.
Dry Sclerophyll Forests	Woodland	Open dry eucalypt forest or woodland 15-20 m tall, with an open to sparse sclerophyll shrub stratum and open groundcover of tussock grasses. Forests are stunted on exposed stony hills and taller on deeper soils in undulating terrain.
	Shrubland	
	Planted Natives	
Forested Wetlands	Woodland	Open Casuarina Forest, 10-40 m tall, with a variable non-sclerophyll shrub stratum and patchy groundcover of sedges and herbs, interspersed with leaf litter, cobbles and open sand.

The dominant vegetation types across the site that would influence fire behaviour are the areas of Grassy Woodlands, which characterise the eastern half of the site and the areas of Dry Sclerophyll Forests (Shrubby sub-formation) that extend off site to the south.

The proposed infrastructure is located within the south western portion of the site within an area dominated by native grassland.



PHOTOGRAPH 1
GRASSLAND VEGETATION WITHIN THE
SITE



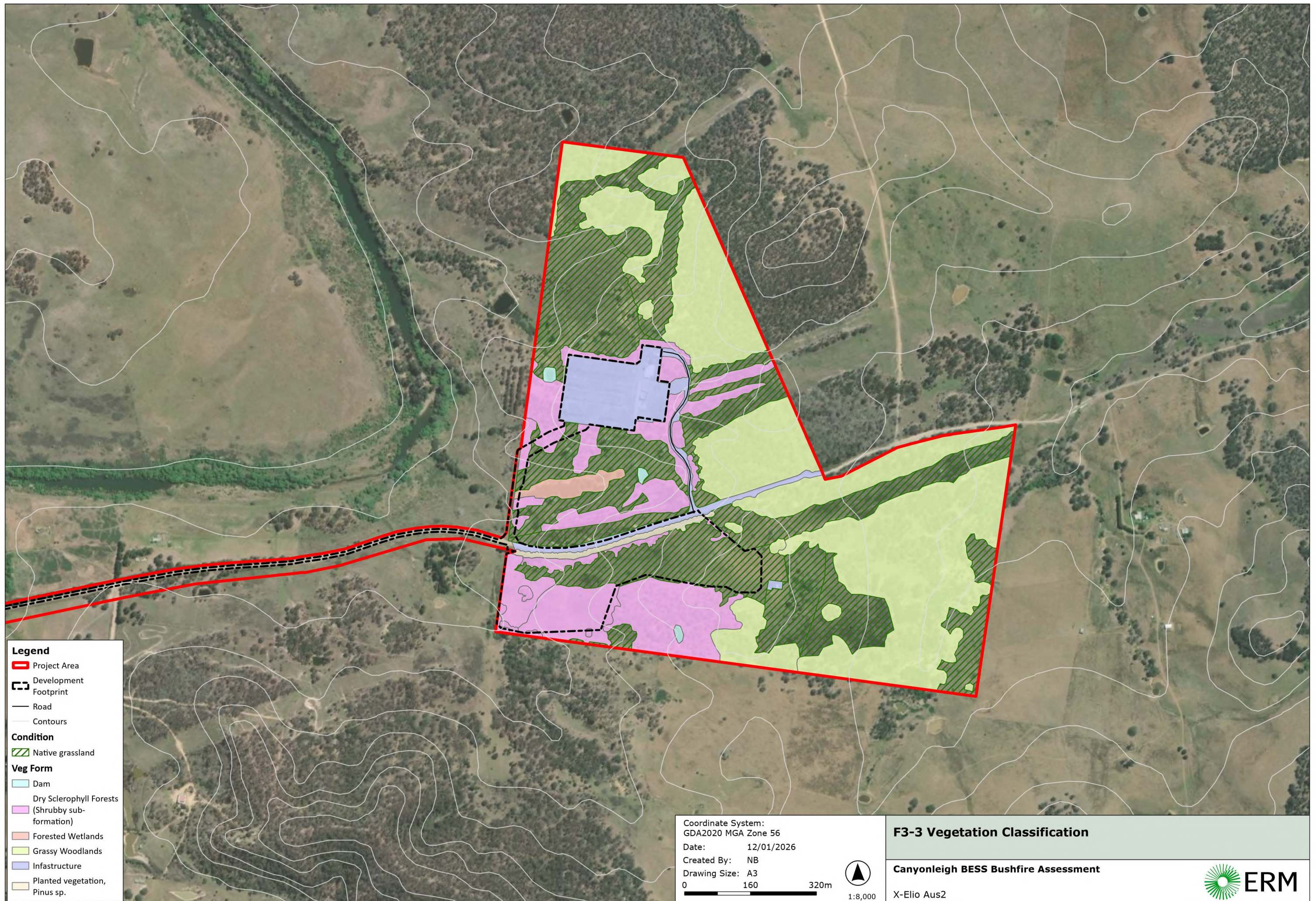
PHOTOGRAPH 2
DRY SCLEROPHYLL FORESTS (SHRUBLAND)
IN THE SOUTHERN PORTION OF THE SITE



PHOTOGRAPH 3
GRASSY WOODLAND VEGETATION WITHIN
THE EASTERN PORTION OF THE SITE



PHOTOGRAPH 4
DRY SCLEROPHYLL FORESTS (WOODLAND)
IN THE SOUTHERN PORTION OF THE SITE



3.7 INDICATIVE FIRE BEHAVIOUR

Vegetation growth can be encouraged by periods of wet weather, which can increase the amount of fuel available (e.g., grass, leaf litter, twigs, bark). When the weather is hot, the humidity low and there's been little recent rain, this vegetation dries out and becomes more flammable. A fire is more likely to start, and continue to burn, in hot, dry and windy weather.

Potential fire runs of more than 20 km extend to the north and to the south west within the adjacent woodland communities. Fuel load is dependent on several factors including the amount of rainfall in the spring period leading to abundant growth of grasses in summer as well as the stock loading which will vary across years and seasons. It is the intent of the Applicant that the vegetation fuel within the development footprint will be maintained in a low fuel state by mechanical or manual clearing methods.

The Fire Behaviour Index (FBI) assists operational decision making and provides a scale of potential fire danger (should a fire start) based on the predicted rate of fire spread. The FBI and associated Fire Danger Ratings (FDRs) have been determined for the areas of (1) Grassland and (2) Grassy Woodland.

3.7.1 GRASSLANDS

Grassfires should not be underestimated and can start and spread quickly. It should be assumed that, under the most extreme weather, a fire would spread even in heavily grazed and exotic pastures and embers may breach any APZ.

As described by Sullivan et al. (2012), grass is a fine, high surface area to volume ratio fuel with high thermal conductivity, low density and vertical orientation, which rapidly ignites (and rapidly burns out). Grassfires are also generally more open to wind than forest fuels (Cheney S. , 2008) making them unpredictable. As described by AFAC (2022a) grass fuel load has a strong influence on flame size, flaming duration, radiation output and suppression difficulty. Grass fuel types are divided into three main fuel conditions in the Australian Fire Danger Rating System (AFDRS) system:

1. Undisturbed or natural (i.e., uncut and / or ungrazed);
2. Grazed or cut; and
3. Eaten-out or very heavily grazed grasslands.

The FBI assists operational decision making and provides a scale of potential fire danger (should a fire start) based on the predicted rate of fire spread. Based on a dominance of grazed grassland as outlined in Table 3-2 and Table 3-3, these areas of the site have a moderate bushfire danger rating.

TABLE 3-2 FIRE BEHAVIOUR INDEX, GRAZED PASTURE

Vegetation Classification	Overall Fuel Load ¹	Fire Behaviour Index ²	Fire Danger Rating ²
Native grassland (natural)	6 t/ha	15	Moderate

1. Fuel loads are expressed in tonnes per hectare as per NSW RFS – Comprehensive Vegetation Fuel Loads (NSW RFS, 2019b)
2. CSIRO Grassland Fire Spread Model available online <https://aurora.landgate.wa.gov.au/fbc/#!/csiro-grass>. Input values: grass continuity: continuous; temperature 30 °c; relative humidity 40%; windspeed at 10m height 20 km/h; curing 60%; slope 0 degrees.

TABLE 3-3 FIRE BEHAVIOUR, GRASSLAND

FBI	Fire Danger Rating ³	Fire Suppression and Containment	Potential for Impact
12-23	Moderate	Typically wind driven and rapidly spreading fires with the potential to gain size quickly. Fires typically controlled within established road networks and fuel breaks together with using direct, indirect or parallel attack suppression strategies.	Possible agricultural/pasture/crop/stock losses together with loss of rural assets such as fencing, machinery and buildings. Unattended infrastructure may be at risk.

Source: Grassland Quick Guide (AFAC, 2022a)

3.7.2 GRASSY WOODLANDS

The dominant vegetation types across the site that would influence fire behaviour are the areas of Grassy Woodlands which characterise the eastern half of the site. The presence of trees in a low density overstorey, such as in open grassy woodlands, affects fire behaviour by reducing the wind speed and driving the grass fire propagation. Depending on the tree density, the trees can contribute fuel in the form of leaf litter. The presence of trees will also increase the occurrence of short-range spotting from ignited bark fuel (AFAC, 2022b).

The grassy woodlands have a moderate FDR as shown in Table 3-4 and Table 3-5.

TABLE 3-4 FIRE BEHAVIOUR INDEX, GRASSY WOODLAND

Vegetation Classification	Overall Fuel Load ¹	Fire Behaviour Index ²	Fire Danger Rating ²
Grassy Woodlands (Southern Tablelands)	19.01 t/ha	18	Moderate

1. Fuel loads are expressed in tonnes per hectare as per NSW RFS – Comprehensive Vegetation Fuel Loads (NSW RFS, 2019b)
2. CSIRO Northern Australia Fire Spread Model available online <https://aurora.landgate.wa.gov.au/fbc/#!/csiro-northernAustralia>. Input values: temperature 30 °c; relative humidity 40%; windspeed at 10m height 20 km/h; curing 60%; slope 0 degrees.

TABLE 3-5 FIRE BEHAVIOUR, GRASSY WOODLANDS

FBI	FDR	Indicative Fire Behaviour and Fire Weather	Potential for Impact
12-23	Moderate	Wind driven, rapidly spreading fires with potential for development into large fire area/size and with the potential for short distance spotting and long flame lengths. Fires typically consume all available fuel. Increasing scorch height of tree canopy (up to 20-25 m) and char height (up to 3-4 m).	High likelihood of pasture/crop/stock loss together with loss of rural assets such as fencing, machinery and buildings. Often producing large amounts of smoke and associated carbon emissions. Visibility is likely to be limited due to smoke and dust, potentially impacting traffic management. Fires are often associated with reduced biodiversity and habitat damage including loss of food supply for native fauna and traditional owners. Stem survival < 80%.

Source: Savanna Quick Guide (AFAC, 2022b)

3.7.3 DRY SCLEROPHYLL FORESTS/WOODLAND

The dominant vegetation types across the site that would influence fire behaviour are the areas of Grassy Woodlands, although it is also noted that areas of Dry Sclerophyll Forests (Shrubby sub-formation) extend off site to the south and would also influence fire behaviour.

The open canopy nature of dry eucalypt forests often allows for the development of an understorey layer of dominated trees, shrubs and/or herbaceous vegetation that provide vertical fuel continuity. Understorey fuels responsible for fire propagation are typically leaf litter, twigs and bark, and the finer components of the understorey herbaceous and shrub layer, which can vary from dense to almost absent depending on site conditions and time since last fire and grazing history. Candlebark and ribbon gums species contribute with aerodynamically optimum firebrands that can cause long distance spotting up to tens of kilometres, although it is virtually impossible to accurately quantify these distances (AFAC, 2022c).

A Forest Fire Danger Index (FFDI) of 100 has been used to calculate bushfire behaviour on the site based on its location within the Southern Tablelands region. The FFDI is based on the 1:50 year fire weather scenarios and is higher than most of Eastern Australia, indicating a higher fire risk for Southern Tablelands.

4. BUSHFIRE RISK FACTORS

4.1 BUSHFIRE PRONE LAND

Bushfire prone land mapping is intended to designate areas of the State that are considered to be higher bushfire risk for development control purposes. A review of the NSW RFS bushfire prone land mapping dataset (Version 5b, November 2015) (State Government of NSW and NSW Rural Fire Service, 2025) has identified the site as predominately consisting of 'Vegetation Category 3' with patches of woodland vegetation within the eastern portion identified as 'Vegetation Category 1' (refer to Figure 4-1).

Categories are defined in the Guide for Bush Fire Prone Land Mapping (NSW Rural Fire Service, 2015):

Vegetation Category 1 is considered to be the highest risk for bushfire. It is represented as red on the bushfire prone land map and has the highest combustibility and likelihood of forming fully developed fires, including heavy ember production. Vegetation Category 1 consists of forest, woodlands, heaths (tall and short), forested wetlands and timber plantations.

Vegetation Category 2 has a lower bushfire risk than Category 1 and Category 3 but higher than the excluded areas. Vegetation category 2 consists of rainforests and lower risk vegetation parcels

Vegetation Category 3 is considered to be medium bushfire risk vegetation. It is higher in bushfire risk than category 2 (and the excluded areas) but lower than Category 1. It is represented as dark orange on a Bush Fire Prone Land map. This category consists of grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands.

This bushfire prone land mapping triggers the requirement to apply the aims and objectives of the PBP 2019.

4.2 CLIMATE CHANGE AND BUSHFIRES

Eastern Australia is described as one of the most bushfire-prone areas in the world. BOM (2025), states that human induced climate change is influencing the frequency and severity of dangerous bushfire conditions in Australia and other regions of the world, influencing temperature, environmental moisture, weather patterns and fuel conditions.

While climate change might not ignite the fire, it is giving fires the chance to turn into catastrophic fires by creating warmer temperatures, increasing the amount of fuel (dried vegetation) available, and reducing water availability due to higher evaporation. In relation to fire ignition, there is some indication that human induced climate change could also influence the risk of ignitions from dry-lightning (i.e., lightning that occurs without significant rainfall).

Bushfire weather conditions in future years are projected to increase in severity for many regions. This will result in:

- An earlier start to the bushfire season;
- Reduced opportunities for fuel reduction burning;
- Management of fire risk to property, people and biodiversity will become increasingly challenging; and
- an increase in the number of extreme fire danger days.

4.3 FIRE HISTORY

The Southern Tablelands BFMC (2018) has reported that the region has on average 265 bush / grass fires per year, of which 5 on average are major fires (>20ha). Major fires occur sporadically, with about 3 in a 5-year period. Generally, Goulburn / Mulwaree has a history of major fires occurring in a cycle of 5 to 7 years.

Recent Fire Extent and Severity Mapping (FESM) and NPWS Fire History Mapping (accessed via NSW Seed) prepared by NSW RFS and DPHI, showed that no fires have occurred within the Project Boundary since 1965. The most recent fire was located 10 km southeast at Morton National Park. The fire happened in the 2019-20 'Black Summer' fire season and was categorised as extreme - full canopy consumption, this shows large fires (up to several thousand ha in size) can occur in this region.

No other wildfires have been reported within 10 km of the Site.

4.4 FIRE IGNITION

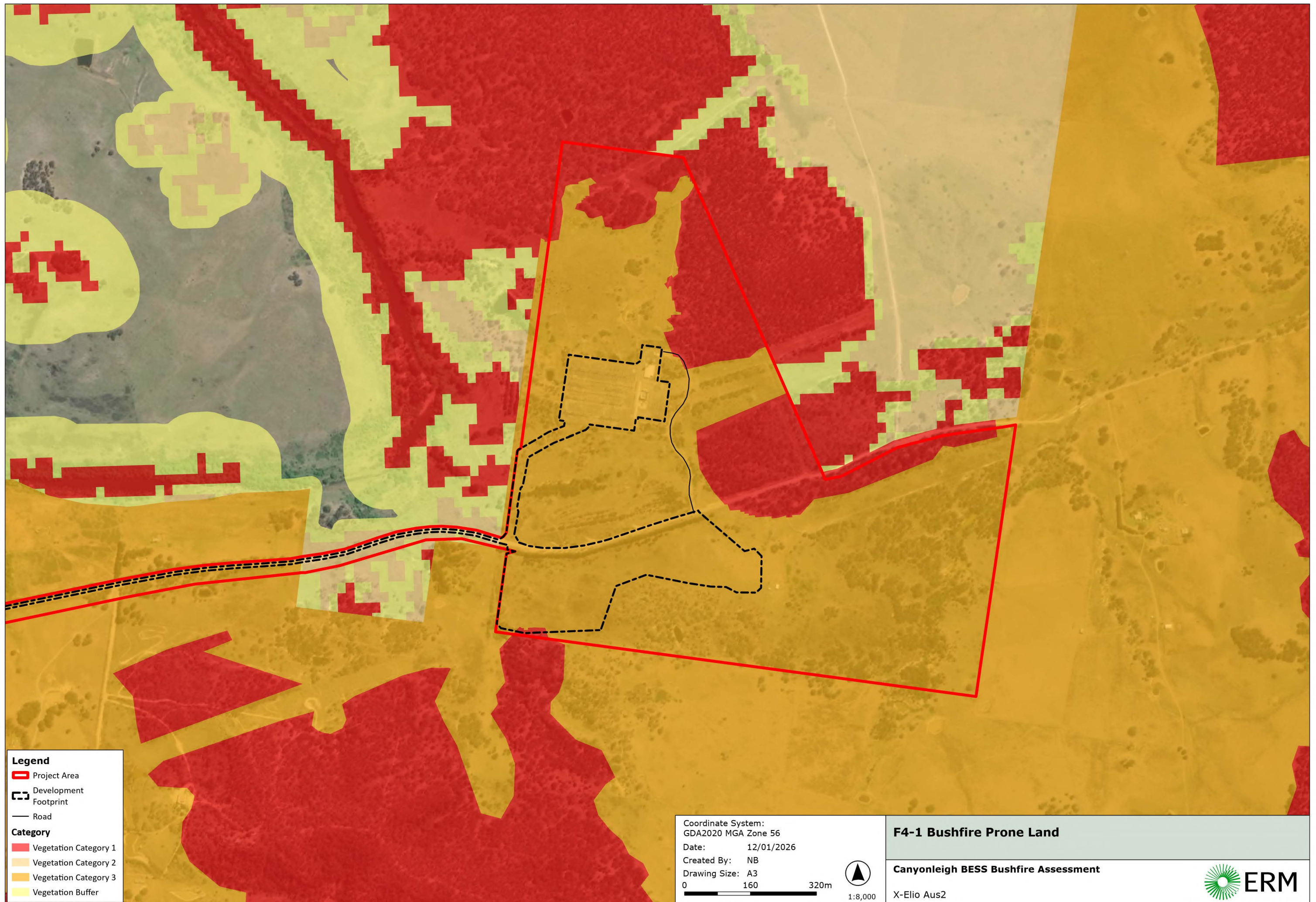
The main sources of ignition in the Southern Tablelands BFMC area are:

- Lightning
- Escapes from legal burning off
- Illegal burning off
- Human error
- Arson

Lightning is the greatest source of ignition within the area and is mainly associated with late spring and summer thunderstorm activity which is normally (but not always) accompanied by some rainfall. Escapes from legal burning are mainly in rural areas and can occur in any part of the area. These activities are mainly but not exclusively in autumn through to spring.

Ignition caused by human error covers the use of farm machinery (eg during slashing), use of motor mowers, welding, and large numbers of tourists increasing the risk of careless lighting of fires and disposal of ignition sources (e.g. cigarette butts on major highways).

Bird flashover faults on high voltage power lines can also cause bushfires when fuel conditions beneath the fault location are conducive to fire ignition and spread. This risk can be reduced by maintaining reduced fuel loads beneath transmission lines and will be the responsibility of the asset owner.



Legend

- Project Area
- Development Footprint
- Road

Category

- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3
- Vegetation Buffer

Coordinate System:
GDA2020 MGA Zone 56

Date: 12/01/2026

Created By: NB

Drawing Size: A3

0 160 320m

1:8,000

F4-1 Bushfire Prone Land

Canyonleigh BESS Bushfire Assessment

X-Elío Aus2

ERM

4.5 SUMMARY OF BUSHFIRE RISK FACTORS

The Project is situated within the Southern Tablelands region, which has a high FFDI, and has a history of large fires occurring in the area. There is a combination of grassland and woodland habitats within the site, which have been identified as bushfire prone land, and connect to other bushfire prone areas in the wider landscape. If fire ignitions were to occur within the site or in the wider landscape, the fire has the potential to spread.

The potential sources of ignition resulting from the construction and decommissioning of the project include:

- Construction equipment including bulldozers, excavators and vegetation removal machinery, using slashers and mulching machines. These activities can produce sparks when steel blades encounter rock, with the potential to ignite surrounding vegetation.
- Motor vehicle exhaust systems and diesel-powered trucks with pollution control devices have the potential to emit burning diesel particles and ignite grassland and woodland ground fuels.
- Hot works such as welding and grinding can produce sparks resulting in an extreme level of risk of ignition for cured vegetation.
- Electrical equipment faults create a high level of risk of ignition of vegetation.
- Inappropriate storage of chemicals has the potential to cause a chemical fire or explosion. Failure to clean up a spill can also lead to fire; and
- Arson

The potential sources of ignition of bushfires resulting from the operation of the project include:

- Landscape hazards, such as bushfire/grass fire ignition from fire within the facility, or external ignition of site infrastructure from embers, radiant heat and flame contact.
- Potential fire spread and limited emergency response due to proximity of batteries to each other, on-site infrastructure and vegetation (including screening vegetation).

Electrical hazards including battery fires and transformer fires are addressed separately as part of the PHA and the Applicant commits to undertaking a FSS in accordance with the Hazardous Industry Planning Advisory Paper No 2 (2011) following project approval. Additional provisions may be required in accordance with E1D17 and E2D21 of the National Construction Code (2022).

5. MITIGATION STRATEGIES

Bushfire mitigation measures have been developed for construction, operational and decommissioning phases of the project, based on guidance from NSW RFS guidelines, PBP (2019), electrical network industry sources and best practice design guidelines prepared by the CFA (2022). Adoption of these measures is expected to reduce, to an acceptable level, both the risk of bushfire ignition by construction and / or operation of the assets and the risk that bushfires in the landscape pose to the assets.

Consideration is given to whether the proposed development will result in people congregating in large numbers. The operation of the Canyonleigh BESS is considered to be a low intensity use in terms of the number of people on site at any one time, with only five permanent staff during the operational phase. However, there could be up to 100 FTE staff on site at any one-time during construction over a period of up to 18 months. Although the construction period does not pertain to the expected end use of the site, the number of people who could be within the site at one time warrants consideration in terms of providing adequate defensible space and access / egress as the first stage of construction.

Mitigation will be a combination of complementary strategies, all of which are required to provide the best possible protection outcome for the project and the community. In terms of design principles, in order to minimise risk, the BESS layout will be designed to:

- Provide a defensible space around infrastructure; and
- Ensure that appropriate access, egress and maneuverability is provided for first responders.

5.1 ASSET PROTECTION ZONE

Essential equipment should be designed and housed in such a way as to minimise the impact of bushfires on the capabilities of the infrastructure during bushfire emergencies. It should also be designed and maintained so that it will not serve as a bushfire risk to surrounding bush (NSW RFS, 2019) and an area of defensible space, also referred to as an APZ should be provided around the assets.

Understanding the value and limitations of APZ is important, as is the understanding that bushfires attack built-assets by either flame contact, radiant heat or burning debris. An APZ can be used to lower or eliminate the bushfire attack from flame contact and radiant heat around the built assets, but under strong winds or during a major fire event burning debris can result in a fire breaching an APZ.

Based on the current project layout, consideration should be given to a minimum APZ of 12 m – 24 m to achieve a Bushfire Attack Level (BAL) 29 or 17m to 33m to achieve a BAL 19 (in accordance with Table A1.12.5 of PBP 2019). These distances will be refined based on the final project design and the siting of the buildings within the landscape.

Radiant heat flux exposure and the corresponding BAL are described in PBP (2019) and are reproduced in Table 5-1 below.

TABLE 5-1 RADIANT HEAT FLUX EXPOSURE AND THE CORRESPONDING BUSHFIRE ATTACK LEVEL

Heat flux exposure	Description	AS 3959 construction level
N/A	Minimal attack from radiant heat and flame due to the distance of the building from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements.	BAL-LOW
≤12.5	Attack by burning debris is significant with radiant heat (not greater than 12.5 kW/m ²). Radiant heat is unlikely to threaten building elements (such as unscreened glass). Specific construction requirements for ember protection and accumulation of debris are warranted.	BAL-12.5
>12.5 ≤19	Attack by burning debris is significant with radiant heat flux (not greater than 19kW/m ²) threatening some building elements (such as screened glass). Specific construction requirements for embers and radiant heat are warranted.	BAL-19
>19 ≤29	Attack by burning debris is significant and radiant heat flux (not greater than 29 kW/m ²) threatens building integrity. Specific construction requirements for ember and higher levels of radiant heat are warranted. Some flame contact is possible.	BAL-29
>29 ≤40	Radiant heat flux and potential flame contact could threaten building integrity.	BAL-40
>40	Significant radiant heat and significantly higher likelihood of flame contact from the fire front will threaten building integrity and result in significant risk to residents.	BAL-FZ

Source: Table A1.7 of PBP 2019

TABLE 5-2 MINIMUM DISTANCES FOR APZS, FFDI 100 AREAS

Direction	Slope	Vegetation Classification	Minimum APZ (m)		
			BAL 12.5	BAL-19	BAL-29
North	>0 to 5 degrees downslope	Planted <i>Pinus</i> sp. ¹	29 - < 100	21 - < 29	14 - < 21
East	>0 to 5 degrees downslope	Grassland	25 - < 50	17 - < 25	12 - < 17
South	Upslope	Dry Sclerophyll Forests/Woodland	45 - < 100	33 - < 45	24 - < 33
West	>0 to 5 degrees downslope	Grassy Woodland	32 - < 100	23 - < 32	16 - < 23

Source: Adapted from Table A1.12.5 of PBP (2019)

1. As per Section A1.11.1, the narrow strip of roadside vegetation is less than 1 ha in area and bounded to the north by Canyonleigh Road. These remnants are considered a low hazard and APZ setbacks are the same as for rainforests.

The specifications recommended for the APZ are as follows:

- All APZ are to be managed as an Inner Protection Zone (IPA) for the life of the development, as outlined within Appendix 4 of PBP (2019) and NSW RFS Standards for Asset Protection Zones;
- APZ will not extend beyond the property boundary or rely on actions being undertaken by adjacent landowners;
- The APZ can include the access roads and carparks;
- No trees and shrubs planted within the APZ; and
- Where possible, increase the distance between the trees and the APZ

5.2 ACCESS ROADS AND ROAD NETWORK

The Project will be accessed via three site access points, located on Canyonleigh Road, as shown in Figure 1-2.

The access points will be constructed as the first stage of development and the final design of access roads will enable access and egress for personnel attempting to leave the area while emergency service personnel are arriving to undertake firefighting operations. The internal roads will provide adequate access to the site, including the BESS units, for emergency vehicle access.

Site access points and internal roads will be maintained for the life of the Project and include appropriate signs. All access roads will be upgraded to provide sufficient width and other dimensions to ensure safe unobstructed access and allow firefighting crews to operate equipment around the vehicle. As a minimum, and to enable access for RFS, all roads will be maintained to the minimum standards, as outlined within the NSW RFS Fire Trail Standards. This includes:

- the trafficable surface has a width of 4 m;
- trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of nine tonnes;
- a minimum vertical clearance of 4 m is provided above the surface of the trafficable surface clear of obstructions;
- capacity for passing is provided every 250 m; and
- a turning area is provided at the termination of a trail and every 500 m.

Where practicable, site vehicles during the construction phase will have diesel engines and / or will use the site access roads (if available) to minimise the likelihood of igniting dry grass.

5.3 WATER STORAGE

Water is essential for firefighting. The amount and reliability of water is critical when considering development during both the construction and operation of the facility. Appropriate fire-fighting equipment will be held on site to respond to any fires that may occur. This equipment will include:

- All buildings and site vehicles will be fitted with portable fire extinguishers; and
- All areas where 'Hot Works' are being conducted will have the number and type of fire extinguishers, water sources and or fire blankets in accordance with the Hot Work Permit issued for the work.

A dedicated water supply with appropriate access is required at the site to assist in the event of a fire and at least one tank will be located at each of the site entrance points. In accordance with the requirement of PBP (2019) the designated water supply points allow for the following measures:

- 65 millimetres (mm) Storz outlet with a ball valve is fitted to the outlet;
- A hardened ground surface for truck access is supplied within 4 m;
- Unobstructed access can be provided at all times;
- A vehicle turning circle with a radius of 12.5 m;
- Water access points are to be marked by appropriate signage; and
- Any static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.

The final list of fire suppression equipment and water storage requirements will be confirmed in consultation with NSW RFS and FRNSW following project approval and detailed design. The most appropriate locations and number of tanks required will need to be identified in response to the final BESS design.

5.4 TRANSMISSION LINES

For the safe operation of the transmission line, certain activities will be restricted within the easement, such as planting and growing trees, the construction of buildings, or erection of antennae or masts. While it has not been confirmed how the easement will be formally registered, for the purposes of this bushfire risk assessment, key responsibilities and management measures will be applied and are the responsibility of the asset owner.

5.5 BESS CONSTRUCTION

Human induced climate change is influencing the frequency and severity of dangerous bushfire conditions in Australia, including an earlier start to the bushfire season with dangerous weather conditions occurring significantly earlier in spring than they used to. The following measures are recommended to be implemented during the entire period of construction:

- The APZ and access roads will be constructed prior to the installation of the BESS or related infrastructure;
- Fire detection and suppression systems should be installed at the earliest stage of construction for BESS infrastructure.
- Ensure appropriate bunding in areas where there is potential for flammable fuels and oils to leak and create bushfires or other environmental risks;
- Install appropriate signs to assist emergency response crews determine the location of infrastructure;
- Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to;
- Adhere to restrictions on TOBAN or days of high fire danger;
- Suitable firefighting equipment (specific requirements to be confirmed in consultation with NSW RFS) is present onsite;
- Carry fire extinguishers or firefighting equipment in vehicles;
- Carry emergency communications equipment;

- Where practicable, site vehicles during the construction phase will have diesel engines and/or will use the site access roads (if available) to minimise the likelihood of igniting dry grass;
- Restrict smoking to prescribed areas, and provide suitable ash and butt disposal facilities;
- All plant, vehicles and earth moving machinery are cleaned of any accumulated flammable material (e.g., vegetation);
- On days when High fire danger or worse is forecast, the “fires near me” app is to be checked regularly for the occurrence of any fires likely to threaten the site; and
- On days of Extreme or Catastrophic fire danger, access to the site should be limited to essential works only.

5.6 BESS OPERATION

5.6.1 FUEL REDUCTION

It is recommended that vegetation fuels throughout the BESS and surrounding site, are maintained in a minimal condition by grazing, or with additional slashing or mowing if required. This will minimise the radiant heat exposure to BESS components and reduce the risk of a fire spreading beyond the BESS. If grazing or slashing is not possible, other lower risk ground cover should be considered e.g., gravel or a non-curing ground cover and/or a very low above ground biomass.

5.6.2 DAYS OF HIGH OR WORSE FIRE DANGER

Fire Danger Ratings give you an indication of the consequences of a fire if one was to start. The higher the fire danger, the more dangerous the conditions. These forecasts are updated daily during the fire danger season and are available on the NSW RFS website (<http://www.rfs.nsw.gov.au/fire-information/fdr-and-tobans>) and the BOM website (<http://www.bom.gov.au/nsw/forecasts/fire-danger-ratings.shtml>).

To reduce the risk of fires damaging or destroying life, property and the environment, the NSW RFS Commissioner may also declare a TOBAN. In a TOBAN no fire may be lit in the open and all fire permits are suspended. No general-purpose welding, grinding, soldering or gas cutting can be done in the open. Fire permits are also suspended on days of TOBAN. Permits may resume after the TOBAN is lifted, as long as the permit has not expired. The NSW RFS Commissioner is responsible for exemptions to TOBAN. These exemptions are detailed in the NSW Government Gazette each time a TOBAN is declared under the RF Act section 99.

5.6.3 EMERGENCY MANAGEMENT AND OPERATIONS PLAN

An Emergency Management and Operations Plan (EMOP) should be prepared with consideration of Australian Standard/ISO 31000 Risk management principles and guidelines and Australian Standard 3745: Planning for emergencies in facilities. The EMOP should be prepared for the BESS that provides the following:

- A site plan showing infrastructure, site access from Canyonleigh Road and the internal road layout;
- Control and coordination arrangements for emergency response (e.g., triggers, evacuation procedures, emergency assembly areas and procedures for response to hazards);
- Construction of APZs and their continued maintenance;

- Location of all fire control advantages within the site (e.g., access road, gates, water points);
- Agreed roles and responsibilities of onsite personnel (e.g., equipment isolation, liaison, evacuation management);
- Up-to-date contact details including alternative telephone of site personnel and any relevant offsite personnel who could provide technical support during an emergency, including a 24/7 contact;
- A manifest (and safety data sheets) for any battery, diesel or other dangerous goods storage/handling, including the class identification, quantity, type (bulk or packaged) and location. Appropriate material (including absorbent, neutralisers, equipment and personal protective equipment) for the clean-up of spills is to be provided and available onsite;
- Fire reporting and response to formal emergency alerts;
- Activation of water spray/foam systems and any other response/protection measures; and
- Any other risk control measures required to be followed by firefighters.

Two copies of the EMOP should be permanently stored in a prominent 'Emergency Information Cabinet' to be located at each vehicle entrance point, external to any security fence or locked gate, and a copy provided to local emergency responders. Two copies of the EMOP will also be stored within the operations facilities and one at the local NSW RFS Brigade office.

The Emergency Information Cabinets will be clearly visible, installed at a height of 1.2 m - 1.5 m and accessible by all emergency services.

A schedule for ongoing site familiarisation to account for changing personnel, site infrastructure and hazards should be developed in conjunction with NSW RFS.

5.7 CUMULATIVE IMPACTS

The proximity of multiple construction and/or operational projects provides an opportunity for potential cumulative impacts. The cumulative impacts related to bushfire mitigation are as follows:

- Volunteer fire-fighter workload – Response call outs should not significantly increase because the ignition risk will be very low. There will, however, be an ongoing requirement for briefing on the EMOP.
- Construction stage transport and road use – The bushfire mitigation will add a small percentage to the total construction traffic and road use.
- Ongoing operations – There would not be any cumulative operational impacts although it is noted that the proximity of multiple construction and/or operational projects may exceed the current capacity of local fire fighting resources. This will need to be addressed in consultation with NSW RFS.

The proximity of multiple projects actively managing fire risk could assist in management responses and may create a positive cumulative impact, in comparison with existing conditions. In consultation with key stakeholders, the preparation of the EMOP will consider the most current information available regarding fire risk from and to surrounding land uses.

6. CONCLUSION

Detailed mitigation measures have been developed to meet the relevant provisions outlined in PBP 2019 and to ensure that the BESS development does not present any increased risk of widespread fire across the landscape. These mitigation measures will be applied for the life of the Project and have been summarised in Table 6-1.

TABLE 6-1 SUMMARY OF RECOMMENDED MITIGATION MEASURES AND ACTIONS

Mitigation Strategy	Section of Report	Action	Timing
APZ	5.1	A minimum 12 m-24 m APZ is to be established around the perimeter of the BESS and on all sides of the associated infrastructure. Essential equipment should be designed and maintained so that it will not serve as a bushfire risk to surrounding property. All APZ are to be managed as an IPA as outlined within Appendix 4 of PBP 2019, and NSW RFS 'Standards for Asset Protection Zones'. APZ will not extend beyond the property boundary or rely on actions being undertaken by adjacent landowners.	The APZ will be constructed as the first stage of development and maintained for the life of the Project.
Access Roads	5.2	Access to the site during construction and operations is expected via the regional council road network, with three access points off Canyonleigh Road. All roads will be maintained to the minimum standards as outlined within the NSW RFS Fire Trail Standards (RFS, 2023). All access roads must be maintained and kept free of parked vehicles or other obstructions.	Constructed as the first stage of development and maintained for the life of the Project.
Water storage	5.3	A dedicated water supply with appropriate access is required at the site to assist in the event of a fire. The final list of fire suppression equipment and water storage requirements will be confirmed in consultation with NSW RFS and FRNSW following project approval and detailed design. The most appropriate locations and number of tanks required will need to be identified in response to the final BESS design.	During Construction and maintained for life of the Project

Mitigation Strategy	Section of Report	Action	Timing
Transmission lines	5.4	For the safe operation of the transmission line, certain activities will be restricted within the easement such as planting and growing trees, construction of buildings, or erection of antennae or masts. While it has not been confirmed how the easement will be formally registered, for the purposes of this bushfire risk assessment, key responsibilities and management measures will be applied and are the responsibility of the asset owner.	Maintained for life of the Project.
Construction Phase	5.5	The following measures are recommended to be implemented during the entire period of construction: • The APZ and access roads will be constructed prior to the installation of the BESS or related infrastructure; • Fire detection and suppression systems should be installed at the earliest stage of construction for BESS infrastructure. • Ensure appropriate bunding in areas where there is potential for flammable fuels and oils to leak and create bushfires or other environmental risks; • Install appropriate signs to assist emergency response crews determine the location of infrastructure; • Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to; • Adhere to restrictions on TOBAN or days of high fire danger; • Carry emergency communications equipment; • Restrict smoking to prescribed areas, and provide suitable ash and butt disposal facilities; • All plant, vehicles and earth moving machinery are cleaned of any accumulated flammable material (e.g., vegetation); • On days of Extreme or Catastrophic fire danger, access to the site should be limited to essential works only.	During construction and maintained for life of the Project
Operation Phase	5.6	Vegetation fuels throughout the BESS are to be maintained in a minimal condition by grazing, or with additional slashing or mowing if required. A Bushfire Emergency Management and Operations Plan will be prepared with consideration of Australian Standard/ISO 31000 Risk management principles and guidelines and Australian Standard 3745:	For the life of the Project

Mitigation Strategy	Section of Report	Action	Timing
		Planning for emergencies in facilities. That provides the following • A site plan showing infrastructure, site access and the internal road layout; • Control and coordination arrangements for emergency response; • Hazard reduction strategies; • Fire suppression equipment details; • Location of all fire control advantages and APZ; • Flammable materials storage requirements; • Minimum evacuation zone distances • Fire reporting and response to formal emergency alerts; and • Any other risk control measures required to be followed by firefighters.	

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APPENDIX A COMPLIANCE WITH THE OBJECTIVES
OF PLANNING FOR BUSHFIRE
PROTECTION GUIDELINES



COMPLIANCE WITH THE OBJECTIVES OF PLANNING FOR BUSHFIRE PROTECTION 2019

Objective	Comment	Can comply
Objectives of Chapter 1 (Part 1.1)		
Afford buildings and their occupants protection from exposure to a bush fire;	A <i>minimum</i> separation distance of 12m-24m is to be established around the perimeter of the BESS to achieve a BAL 29 (in accordance with Table A1.12.5 of PBP 2019). These distances will be refined based on the final project design and the siting of the buildings within the landscape. APZ will not extend beyond the property boundary or rely on actions being undertaken by adjacent landowners.	☒ Yes ☐ No
Provide for a defensible space to be located around buildings;	A <i>minimum</i> separation distance of 12m-24m is to be established around the perimeter of the BESS to achieve a BAL 29 (in accordance with Table A1.12.5 of PBP 2019). These distances will be refined based on the final project design and the siting of the buildings within the landscape.	☒ Yes ☐ No
Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;	A <i>minimum</i> separation distance of 12m-24m is to be established around the perimeter of the BESS to achieve a BAL 29 (in accordance with Table A1.12.5 of PBP 2019). These distances will be refined based on the final project design and the siting of the buildings within the landscape.	☒ Yes ☐ No
Ensure that appropriate operational access and egress for emergency service personnel and occupants is available;	Access to the site is proposed from Canyonleigh Road, via Brayton Road / Hume Highway. There are three access points off Canyonleigh Road. At least four internal roads are to be used for access within the site. The layout of the internal access tracks is subject to further detailed design and will facilitate the safe construction and operation of the Project.	☒ Yes ☐ No
Provide for ongoing management and maintenance of BPMs; and	Normal property maintenance and ongoing grazing will ensure that bush fire protection measures are maintained. A Bush Fire Emergency Management and Operations Plan will be developed prior construction.	☒ Yes ☐ No
Ensure that utility services are adequate to meet the needs of firefighters	Normal property maintenance will ensure that bush fire protection measures including the provision of adequate water supply are maintained. The final water storage requirements will be confirmed in consultation with NSW RFS and FRNSW following project approval and detailed design.	☒ Yes ☐ No



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