Report

Preliminary Bushfire Management Plan

LOCATION: DUGALD RIVER WIND FARM

DUGALD RIVER MINE ACCESS ROAD,

CLONCURRY, QLD 4824

CLONCURRY SHIRE COUNCIL

CLIENT: ERM AUSTRALIA PTY LTD

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Version History

Version	Date	Details	Author	Reviewer
Issue A	April 2026	To accompany DA submission	AB	LW

Executive Summary

Covey Associates have prepared this Bushfire Management Plan (BMP) to support the Development Application of the proposed Dugald River Wind Farm (the Project) in Cloncurry Shire Council Local Government Area.

This BMP provides the following:

- In Sections 2, 3 and 4, documents the bushfire hazard assessment, renewable energy infrastructure hazard analysis and bushfire risk assessment for the proposed facility
- In Section 5, details the bushfire risk management strategy and mitigation measures for the proposed facility, derived from relevant Queensland bushfire planning requirements and bushfire-relevant aspects of the CFA Design Guidelines, including:
  - Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical.
  - Create sufficient separation between infrastructure from surrounding unmanaged bushfire prone vegetation by establishing suitably sized APZs to achieve nominated target radiant heat flux (RHFs) to:
    - limit radiant heat impact and prevent direct flame impingement on the renewable energy infrastructure, and
    - ensure a BESS explosion is not able to readily ignite surrounding vegetation and to improve the effectiveness of the other mitigation measures incorporated into the facility.
  - Appropriate vehicular access to the renewable energy infrastructure facility
  - Secure bushfire water supply.
  - Infrastructure design requirements to improve bushfire resilience
  - Specific requirements associated with construction and commissioning phases
  - Specific requirements associated with operational phase, or ongoing maintenance and housekeeping tasks
  - Specific bushfire emergency management considerations including emergency services familiarisation, for renewable energy infrastructure
- In Section 6 provides the compliance assessment against the following State and Local government bushfire planning requirements, underpinned by the assessment against the bushfire-relevant aspects of the CFA Design Guidelines provided in Appendix G
  - SPP - Natural hazards, risk and resilience – Bushfire.
  - State Code 23 – Wind Farm Development
  - State Code 27: Battery storage facility development
  - Cloncurry Shire Council Planning Scheme including Bushfire Hazard Overlay Code

  Note: Covey states that while the BMP does not fully comply with the CFA Design Guidelines, it is used as a practical guide for assessing bushfire risk and setting benchmarks where no other

detailed guidance is available. Any departures from the CFA guidelines are explained and justified in the BMP.

- In Section 7, lists the implementation measures required to be adopted at various stage of project construction and operation.

Abbreviations Used in Report

Abbreviation	Full Meaning	Abbreviation	Full Meaning
AEP	Annual Exceedance Probability	DRM	Dugald River Mine
AFAC	Australasian Fire Authorities Council	DTMR	Department of Transport and Main Roads
AFDRS	Australian Fire Danger Rating System	ERM	Environmental Resources Management (client)
APZ	Asset Protection Zones	FBI	Fire Behaviour Index
AS	Australian Standard	FFDI	Forest Fire Danger Index
AWS	Automatic Weather Station	GEV	Generalized Extreme Value
BAL	Bushfire Attack Level	IPCC	Intergovernmental Panel on Climate Change
BCA	Building Code of Australia	MCU	Material Change of Use
BESS	Battery Energy Storage System	NHRA	Natural Hazard Risk Assessment
BHOC	Bushfire Hazard Overlay Code	QFD	Queensland Fire Department (Previously known as QFES, see below)
BMP	Bushfire Management Plan	QFES	Queensland Fire and Emergency Services
BOM	Bureau of Meteorology	RFSQ	Rural Fire Service Queensland
BPA	Bushfire Prone Area	RHF	Radiant Heat Flux
BRC	Bushfire Resilient Communities (2019)	SEMP	Safety and Emergency Management Plan
CFA	Victorian Country Fire Authority	SPP	State Planning Policy
CSC	Cloncurry Shire Council	VHC	Vegetation Hazard Class
CSIRO	Commonwealth Scientific and Industrial Research Organisation	WF	Wind Farm
DF	Development Footprint		

Supporting Documentation		
Document	**Prepared by**	**Provided by**
Dugald River Mine – Response Guide Bushfires	*MMG Limited 2025*	ERM, 13/02/2025
Ground-truthed Regional Ecosystem Mapping	*Wulguru Technical Services 2024*	ERM, 12/02/2025
Fire Safety Study (FSS)	*RiskCon Engineering*	ERM 16/03/2026
Emergency Management Plan	*RiskCon Engineering*	ERM 16/03/2026

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1 Introduction

1.1 Scope

Environmental Resources Management Pty Ltd (ERM), on behalf of MMG Dugald River Pty Ltd (MMG), has commissioned Covey Associates Pty Ltd (Covey) to complete a Bushfire Management Plan (BMP) to support a Development Application (Material Change of Use, MCU) for the proposed Dugald River Wind Farm (WF) and Battery Energy Storage System (BESS) (the Project).

Covey have previously prepared a desktop Natural Hazard Risk Assessment (NHRA) which focused on bushfire and flooding risk relative to the development footprint (DF). The NHRA identified the potential bushfire impact to the proposed development relevant to the development type, as per relevant state codes.

This Bushfire Management Plan (BMP) has been produced to detail the required bushfire risk mitigation measures (including implementation and maintenance responsibilities) to enable compliance to be demonstrated with relevant State and Local Government policies.

1.2 Development Proposal

The Project is located adjacent to the Dugald River Mine (DRM) within the Cloncurry Shire Council (CSC) Local Government Area (LGA), approximately 60 km north-west of the Cloncurry township. The DF spans across several lots within the existing DRM operational footprint (refer to Table 1-1):

Table 1-1. Subject lots included within development area

Subject lot for which development resides	
Lot Number	**Plan Number**
92	SP353339
93	SP353339
36	AP23793

The Project is proposing the installation of the following infrastructure within the DF (refer to Figure 1-1) upon completion of development:

- 24 Wind Turbine Generators (WTGs)
- BESS yard containing
    - 66 BESS containers (total) producing up to 123 Megawatts (MW)
        - Stage 1: 18 BESS containers producing 36 MW
        - Stage 2: 48 BESS containers producing 87 MW
    - 33 Medium Voltage Power Stations (MVPS)
        - Stage 1: 9 MVPs
        - Stage 2: 24 MVPs
    - 4 switch-rooms
    - Office/control room and workshop/storage containers connected by a Dome shelter

  - Backup genset and auxiliary transformers
  - Harmonic filter enclosures
  - Internal access ways and fencing
- A new substation/switchyard collocated with the BESS yard containing:
  - 2 Transformers (220/33 kV)
  - Switchgear
  - Fencing
  - Overhead and buried powerlines
- Ancillary infrastructure including:
  - Meteorological masts
  - Internal roads
  - Firewater tank

The Project is expected to be delivered in two stages with the following infrastructure proposed in Stage 1, and the balance to be delivered in Stage 2:

- 8 Wind Turbine Generators (WTGs)
- Within the BESS yard
  - 18 BESS containers
  - 9 MVPS
  - 2 switch-rooms
  - Office/control room and workshop/storage containers connected by a Dome shelter
  - Backup genset and auxiliary transformers
  - Harmonic filter enclosures
  - Internal access ways and fencing
- 1 Transformer (220/33 kV) and associated switchgear in the substation
- Associated overhead powerlines, meteorological masts and internal roads
- Firewater tank

It is understood that the proposed WF and BESS development will operate in conjunction with the existing DRM mine operations, and once operational the following is expected:

- There will no permanent onsite staff, with attendance to the facility expected to be for periodic maintenance undertaken on a scheduled, or as needed basis.
- The facility will have 24/7 monitoring conducted onsite staff at the mine, and offsite by remote staff, with personnel able remotely manage BESS and wind turbine functionality.

In addition to the above, the following may expect to be required during construction phase), which will be temporary uses that are expected to be revegetated upon completion of construction:

- Laydown areas,
- Compound areas,
- Temporary site office,
- Concrete batching plant/s.

1.3 Site Overview

The majority of the Project (refer to Figure 1-1) is located on the Knapdale Range located to the west of the existing Dugald River Mine (DRM). Stage 2 of the Project extends north and south from the central area of the Knapdale Range with access to the northern section via the DRM Accommodation Camp, which itself is 2.25 km north-west of the mine.

The DF is oriented in a north-south direction along the Knapdale Range and is approximately 12 km in length. The majority of the DF has not been previously cleared of vegetation, which is predominately Low open eucalyptus woodlands however there are existing areas of disturbance associated with mining and exploration activities and the existing Tailings Storage Facility (TSF) for the DRM.

Existing vehicular access to the Project is via the DRM, from the Dugald River Mine Access Road which connects to Burke Developmental Road located to the east of the DF. An existing road also provides access to the Project via the DRM Accommodation Camp.

The existing DRM is serviced by a reticulated potable water line from Sunwater, which supplies water from the Ernest Henry and Lake Julius pipeline to an onsite raw water dam with a capacity of 24 ML. Additionally, the DRM and Accommodation Camp sites which have a combined capacity of 1,000,000 L of firewater, with the Accommodation Camp understood to have a 240 kL firewater tank, with a fire pump.

In addition to the existing firewater supplies above, the DRM also has the following equipment:

- two onsite fire appliances (with 2 kL capacity), and
- one mine water cart with 10 kL capacity.

The TSF is located to the north of the Knapdale Range, however, it is noted that this is unsuitable for use in firefighting due to the presence of heavy metals and a low pH.

1.4 Bushfire Planning Context

1.4.1 Technical Documents

This BMP draws on the following bushfire compliance technical references:

- The State of Queensland. (2017). State Planning Policy.
- Queensland Government. (2019). Natural hazards, risk and resilience – Bushfire. State Planning Policy – state interest guidance material.
- Queensland Government. (2021). Natural hazards, risk and resilience state interest – Bushfire. Example, planning scheme assessment benchmarks.
- Queensland Fire and Emergency Services (QFES). (2019). Bushfire Resilient Communities. Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience-Bushfire'.
- Department of State Development, Infrastructure and Planning (2025). State Code 23 – Wind Farm Development, State Development Assessment Provisions v3.5
- Department of State Development, Infrastructure and Planning (2025). Planning Guideline: State Code 23 – Wind Farm Development,
- Department of State Development, Infrastructure and Planning (2025). State Code 27: Battery storage facility development. State Development Assessment Provisions v3.5

- Department of State Development, Infrastructure and Planning (2025). Planning Guideline: State Code 27: Battery storage facility development.
- Cloncurry Shire Council Planning Scheme Version 2 (2017) including Bushfire Hazard Overlay Code
- Country Fire Authority (2023) – *Design Guidelines and Model Requirements: Renewable Energy Fire Safety*,
- Standards Australia (2018) – AS 3959:2018 *Construction of buildings in bushfire-prone areas*,

Detail on select documents is provided in the sections below.

1.4.2 SPP - Natural hazards, risk and resilience state interest – Bushfire

The State Planning Policy (SPP) is a key component of Queensland's planning system and expresses the state's interests in land use planning and development to secure a liveable, sustainable and prosperous Queensland.

The 'SPP - Natural hazards, risk and resilience state interest – Bushfire', is guidance material prepared primarily to support the implementation of the SPP and the interpretation of the *Natural hazards, risk and resilience* state interest, specifically for bushfire hazard. The guidance material addresses each of the state interest policy subparts and assessment benchmarks individually, in addition to mapping requirements. Accompanying the 'SPP - Natural hazards, risk and resilience state interest – Bushfire', is the Bushfire Resilient Communities: Technical Reference Guide (BRC), which provides technical guidance and the policy positions of Queensland Fire and Emergency Services (QFES) regarding the consideration of bushfire hazard as part of land use planning and development activities including the following:

- Outlines factors affecting bushfire hazard and potential bushfire risks and impacts
- Outlines the methodology used to prepare the statewide mapping of bushfire prone areas included in the State Planning Policy Interactive Mapping System (SPP IMS)
- Provides technical guidance on procedures for:
  - Reviewing SPP IMS bushfire prone area mapping
  - Undertaking a Bushfire Hazard Assessment (BHA) and Vegetation Hazard Class Assessment
  - Calculating asset protection zone provisions
  - Preparing a Bushfire Management Plan and Landscape Maintenance Plan
- Provides additional information to inform development conditions
- Guides the identification of suitably qualified people for assessments identified in the BRC.

1.4.3 Bushfire Prone Designation

Under the SPP – Natural Hazards, Risk and Resilience (Bushfire), a site is designated as bushfire prone if:

- 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; and/or
- If the area is shown on the State Planning Policy (SPP) Bushfire Prone Area (BPA) mapping (on the Interactive Mapping System) as a bushfire prone area.

As depicted on Figure 1-2, much the project development lots (see Table 1-1) have been identified as areas of ***Medium Potential, High Potential and Very High Potential Bushfire Intensity*** on the SPP BPA mapping, due to large tracts unmanaged woodland vegetation, typically observed in more rugged terrain (see Section 2 for more detail).

Given the development lots are designated as bushfire prone, this provides the legislative trigger to:

- Undertake a Bushfire Hazard and Risk Assessment, and
- Enforce all Building Classes to be constructed per Australian Standard (AS) 3959:2018 Construction of buildings in bushfire-prone areas (AS 3959).

1.4.4 State Development Assessment Provisions – State Codes 23 and 27

Proposals are required to respond to the following State Development Assessment Provisions, where submitting MCU development applications for facilities proposing renewable energy infrastructure:

- State Code 23 (SC 23) for wind farm developments
- State Code 27 (SC 27) for Battery Storage Facility developments

The aim of both SC 23 and SC 27 is to ensure unacceptable adverse impacts on individuals, communities and the environment do not arise because of the proposed wind farm and BESS development and assesses this through the stated purpose and a number of Performance Outcomes (PO) addressing a variety of matters, including bushfire risk management.

Covey note that while both State Code documents provide Performance Outcomes to be complied with, there are no Acceptable Solutions (or Deemed-to-Satisfy Solutions) to guide detailed design.

State Code 23 (SC 23): Wind farm developments

SC 23 requires wind farms to be resilient to natural hazards and extreme weather, with the following Performance Outcomes specifically addressing this as follows:

- ***PO10:*** *Development is located, designed, constructed and operated to be responsive to natural hazards and extreme weather events*
- ***PO11:*** *Development is constructed and operated to protect the safety of people in the event of natural hazards or extreme weather events occurring.*

The planning guideline that accompanies SC 23 also provides the following guidance:

- During assessment, a Natural Hazard Risk Assessment Report should be prepared and lodged with application to demonstrate compliance with PO10 and PO11.
- Conditions of approval will require:
  - Preparation of a detailed Bushfire Management Plan including:
    - a fire hazard analysis
    - evacuation procedures for construction workforce in the event of a bushfire emergency
    - emergency response procedures for landowners and surrounding communities
    - mitigation strategies to achieve the development outcomes in Part E of the *State Planning Policy July 2017 – Natural Hazards, Risk and Resilience.*
  - Preparation of a Safety and Emergency Management Plan (SEMP) to ensure that construction and operational workforces and surrounding community members are appropriately protected.

State Code 27 (SC 27): Battery Storage Facility developments

SC 27 requires BESS facilities to be resilient to natural hazards with the following Performance Outcomes specifically addressing this as follows:

- ***PO13:*** *Development is located and sited to avoid natural hazard areas including high erosion risk areas and bushfire prone areas.*

- ***PO14:*** *Where development cannot be located and sited to avoid natural hazard areas (e.g. Bushfire prone areas, and high erosion risk areas), demonstrate that:*
  - *there is no suitable alternative location,*
  - *infrastructure can function effectively during and after a natural hazard event, and*
  - *mitigation measures are implemented to reduce the risk to people, property and the environment to a tolerable level.*
- ***PO15:*** *Bushfire hazard is identified and risk is mitigated through strategies for vegetation management, landscape management, water supply, provision of appropriate access, identification of safe assembly or evacuation routes and establishing cleared and maintained asset protection zones around infrastructure that is wholly contained on site.*

The planning guideline that accompanies SC 27 also provides the following guidance:

- A Natural Hazard Risk Assessment (NHRA) should be prepared and lodged with an application to demonstrate compliance with PO13–PO15.
  - In addressing PO13, this assessment should demonstrate that all parts of the project layout are located outside of natural hazard areas and responsive to the risks posed by natural hazards that could affect the site.
  - In addressing PO14, demonstrate that the development is designed to address impacts from natural hazards where there is no suitable alternative location, such as resilience-focused design and operational strategies
- In addressing PO15 where the BESS is sited in a Bushfire Prone Area,
  - Preparation of a detailed Bushfire Management Plan including:
    - a bushfire hazard assessment prepared by a suitably qualified person, that identifies the level of bushfire hazard and the location of hazardous vegetation
    - details of APZ based on bushfire hazard assessment and radiant heat flux achieved at the development footprint, buildings, structure and critical infrastructure
    - location of evacuation routes and safety zones
    - fire-fighting requirements including infrastructure and water supply;
    - evacuation procedures for construction workforce in the event of a bushfire emergency
    - emergency response procedures for landowners and surrounding communities
    - mitigation strategies to achieve the development outcomes in Part E of the *State Planning Policy July 2017 – Natural Hazards, Risk and Resilience*
    - details of any sensitive land uses in proximity to the BSF development.
  - Preparation of a Safety and Emergency Management Plan (SEMP) to ensure that construction and operational workforces and surrounding community members are appropriately protected.

The timing of preparation of the BMP can be either as supporting material with the planning application and/or material that is conditioned.

1.4.5 Cloncurry Shire Council Bushfire Hazard Overlay Code

The Cloncurry Shire Council (CSC) Bushfire Hazard Overlay adopts the SPP BPA mapping, which as detailed in Section 1.4.3, designates the development lots as being bushfire prone. This designation triggers application of the CSC Bushfire Hazard Overlay Code (BHOC), which applies to all assessable development within the

mapped overlay. Its purpose is to ensure development within bushfire-prone areas minimises risk to life, property, community and the environment, does not exacerbate risk beyond acceptable levels, and contributes to effective disaster management and recovery.

1.4.6 AFAC Large-scale battery energy storage system installations Guideline

Currently the Queensland Fire Department (QFD) promote a holistic approach to the management of fire and emergency risk as BESS facilities, and have recommended consideration of the following guidance documents from the Australasian Fire and Emergency Service Authorities Council (AFAC)[1] :

- ***'Large-scale battery energy storage system installations'***
  - For large-scale BESS installations with a capacity of 2 MWh or greater, situated externally and not housed within a building.
- ***'Battery Energy Storage Systems commercial and industrial installations'***
  - industrial, commercial, neighbourhood and community BESS installations with a capacity of 200 kWh or greater within a building; or
  - 200 kWh to 2 MWh housed within external enclosures adjacent to the building.

Given the proposed development has capacity greater than 2 MWh and will be located externally, the most appropriate guidance publication is 'Large-scale battery energy storage system installations'. A summary of recommendations relevant to bushfire risk management is summarised below, noting much of this publication is related to onsite fire risk:

- That regional fire, land management and emergency management agencies are consulted in the planning and implementation of all energy infrastructure installations such as large-scale BESS.
- A site wide risk assessment should be produced and should include:
  - Assessment of bushfire exposure risk.
  - Identification of the specific measures to be implemented specific to the hazards, including but not limited to:
    - Prevention of fire spread within onsite infrastructure and across the site boundary.
    - Site access in and around the facility.
- Hazard identification to support the risk assessment requires knowledge of bushfire attack level assessment, amongst numerous other elements.
- Following the site wide risk assessment, a tailored fire safety study (FSS), with site-specific fire and explosion hazard analysis and the specification of fire safety systems and mitigation strategies to address the fire hazards, is developed for all large-scale BESS facilities.
- AFAC note that the FSS should report on whether a bushfire attack level assessment has been conducted for the site, noting the following recommendations:
  - A suitable fire trail/perimeter access and Asset Protection Zones (APZs) are maintained around the installation.
  - The distance (in metres) of the site from hazardous vegetation (vegetation hazard classes) should be developed in accordance with the methodology in AS 3959-2018 *Construction of Buildings in Bushfire Prone Areas* for the site bushfire hazard assessment.

[1] QFD advice on Renewable energies

- Potential bushfire exposure thresholds (radiant heat flux, direct flame contact and ember attack) to BESS units/modules and other structures should be considered.
  - AFAC request confirmation that the APZ widths do achieve attenuation such that exposure from bushfire does not cause ignition, glazing breakage or degradation of the BESS module structure and battery cells, leading to thermal runaway and battery fire.
  - Exposure thresholds may be guided by a regional jurisdiction and are to be justified based on the subject installation.
  - It should be noted that criteria for prevention of degradation of BESS units, modules and cells should be available from the bespoke testing conducted for the subject installation.
- The APZ should also be designed such that a fire on-site can be managed to prevent escalation off-site.
- An on-site management plan for the maintenance of fuel loads including grasses or vegetation within the installation perimeter should be detailed and implemented.

- AFAC also recommends that emergency information is provided in a secured location at the site perimeter

While the AFAC Guideline provide an overview of the process, there is little design detail to guide the BESS design with respect to bushfire risk management.

1.4.7 CFA Design Guidelines for Renewable Energy Facilities

The Victorian Country Fire Authority (CFA) has developed design guidance for renewable energy facilities in their publication *Design Guidelines and Model Requirements: Renewable Energy Facilities v4* (CFA 2025; the CFA Design Guidelines).

The CFA Design Guidelines are currently seen as the best detailed design guidance for renewable energy facilities available from a bushfire risk management perspective, and provide a comprehensive suite of design, construction, operation and emergency planning measures, that address the risk of fire within the infrastructure, but also bushfire risk to the development.

The CFA Design Guidelines is organised with a number of sections as follows, each section containing guidance in the form of 'Model Requirements' for specific renewable energy infrastructure categories wind farm, battery energy storage (BESS), solar farm and substation/electric line infrastructure:

- Fire Risk Management
- Facility Location
- Facility Design
- Facility Construction and Commissioning
- Facility Operation
- Emergency Planning

1.5 Other Relevant Documents

1.5.1 Natural Risk Hazard Assessment report

Covey has previously prepared a NHRA report (ref: 244075/ N25-0106RPT Issue C) to accompany the planning submission for the Project.

1.5.2 MMG Emergency Response Documents

MMG has a number of existing emergency management preparedness and response documents including the following:

- ***Emergency Management Plan***
  - Documents the key elements of emergency management including the functions of teams and roles involved
- ***Emergency Response Procedure***
  - Outlines the framework of the organisational responsibility and lines of communication that will be established in the event of an incident on, or near the Dugald River Mine
- ***Response Guide: Bushfire***
  - Outlines the requirements to effectively manage bushfire risks on the mining lease.
  - This working document outlines integrated prevention, preparedness, response and recovery measures, including:
    - Roles and responsibilities for bushfire emergency response,
    - DRM infrastructure/assets at risk,
    - Water supply equipment and locations (hydrants, water cart fill points)
    - Vegetation management (separation zones, firebreaks, inspection/maintenance schedules)
    - Bushfire season considerations (prescribed burning programs, fire weather information),
    - Staff training (fire awareness, extinguisher use),
    - Response procedures (detection; assessment of risk, wind, fire front behaviour, spotting, ground conditions, natural breaks, water sources),
    - Trigger Action Response Plans based on fire proximity, and
    - Internal/external communications protocols.

1.5.3 Fire Safety Study (FSS)

Riskcon have produced a Fire Safety Study (FSS) report for the Project to accompany the planning submission, focussing on the proposed BESS and substation infrastructure, in addition to relevant aspects of the existing DRM operations at the site, and has the stated purpose of:

- *Review the site operations and Dangerous Goods (DG) storage for the potential to initiate or become involved in a fire, including flammable materials which may be present at the site.*
- *Identify heat radiation impacts from potential fire sources at the site and determine the potential impacts on the surrounding areas and the fire protection system, and*
- *Review the proposed fire safety features and determine the adequacy of the fire safety systems based on the postulated fires.*

The FSS notes the following incidents were identified to have the potential to impact fire protection systems or to complicate firefighting interventions:

- *Li-ion battery fault, thermal runaway and fire.*
- *Main transformer internal arcing, oil spill, ignition and bund fire.*
- *Power conversion unit transformers, oil release, ignition and fire.*

Recommended fire protection measures derived from the FSS include:

- Provision of sufficient separation between BESS, Power Conversion Units and substation transformers to minimise opportunity of fire spread and enable onsite firefighting response
- Control of ignition sources including:
  - No smoking policy for the site with smoking only permitted in designated areas.
  - Fixed electrical equipment to be designed and installed to AS/NZS 3000:2018
  - To prevent arson, the site will have a security fence and monitored security cameras.
  - A permit to work system and risk assessment prior to starting work will be provided for each job involving the introduction of ignition sources (e.g. hot work control etc)
- Housekeeping measures including elimination of combustible vegetation in proximity to the site equipment.
- Work practices to be undertaken to reduce likelihood of an incident including:
  - Dangerous Goods identification and management
  - Placarding & signage within the site
  - Compliance with the Work Health and Safety Regulation 2011
  - Personal Protective Equipment
  - Emergency response plan and procedures
  - Bushfire Management Plan
  - Training of personnel
- Develop an Emergency Response Plan in in accordance with HIPAP No. 1 – Industry Emergency Planning Guidelines
- Maintaining a secure site reduces the likelihood either of a fire being started maliciously by intruders or by accident.
  - Access to the site will be restricted at all times and only authorised personnel will be permitted within the site.
- BESS container design:
  - The site will utilise BESS units that are UL 9540A compliant.
  - These BESS units are equipped with smoke detectors and thermal detectors to detect the early signs of a fire, which will:
    - Activate an audible fire alarm and visual fire strobes fitted on the BESS unit, and
    - Send an alarm to the Emergency Management Systems to alert site personnel to begin emergency procedures.
  - The BESS units will also be fitted with flammable gas detection to address thermal runaway risk, which will alarm and activate the ventilation system.
  - BESS units will be fitted with extraction system to ventilate flammable gases, if generated during thermal runaway
  - No specific requirement for internal fire suppression system (gas or water)
- Onsite fire water supply for onsite BESS fires as follows:
  - Minimum firewater capacity of at least 108 000 L
  - Proposing use of the existing firewater tanks at the DRM and Accommodation Village sites which have a combined capacity of 1,000,000 L.

- Firewater transport from the existing tanks to the BESS yard, would be by the mine water cart (10 kL capacity) and two onsite fire appliances (2 kL capacity), assisted by (or assisting) QFD appliances upon turnout.

- Provision of a number of portable fire extinguishers at the switchrooms and office/control room and workshop containers in the substation
- Provision of a number of nominated site entrances to the BESS yard and substations.

1.5.4 Emergency Management Plan

RiskCon Engineering have also prepared an Emergency Management Plan (EMP) for the Project, to address a number of different emergency types including bushfires (originating onsite and offsite) and onsite BESS fires. The EMP covers regular operations of the facility, and also during construction, as the construction risks differ based both on the number of peoples on site and the activities being conducted.

1.6 Purpose and Scope of this Bushfire Management Plan

The proposed development is required to demonstrate compliance with the following planning instruments:

- SPP - Natural hazards, risk and resilience – Bushfire.
- State Code 23 – Wind Farm Development
- State Code 27: Battery storage facility development
- Cloncurry Shire Council Planning Scheme including Bushfire Hazard Overlay Code

SPP - Natural hazards, risk and resilience – Bushfire and the Cloncurry Shire Council Planning Scheme BHOC are not specifically aimed at renewable energy facilities. As mentioned in Section 1.4.4, while the State Codes (namely SC23 and SC27 for this development) provide high-level Performance Outcomes to avoid unacceptable adverse impacts from renewable energy facilities on community and the environment, there is lack of detailed design guidance as how to achieve these Performance Outcomes, especially for bushfire risk management.

To address this, Covey proposes voluntary use of the CFA Design Guidelines to:

- Guide the development of the proposed bushfire risk management strategy and mitigation measures for the renewable energy infrastructure, and
- Provide a technical benchmark with which to establish that bushfire risk has been managed to appropriate level for renewable energy infrastructure, noting the following:
  - The CFA Design Guidelines are a Victorian publication, and where relevant, Queensland standards and specifications will be adopted
  - Aspects of the CFA Design Guidelines are aimed at both onsite infrastructure fires and bushfire risk management. Given the FSS has been produced for the BESS fire risk, Covey will only address the bushfire-relevant requirements of the CFA Design Guidelines, and the potential for bushfire ignition and escape from an onsite fire

Covey notes that this BMP doesn't seek to achieve strict compliance with the Model Requirements of CFA Design Guidelines, but in lieu of any other detailed design guidance, use of it to provide a framework for bushfire assessment with some technical benchmarks to inform the bushfire risk management strategy for renewable energy infrastructure. Notwithstanding, where deviations have been made from the concepts of the CFA Design Guidelines, this has been justified in this BMP.

Sections 2, 3 and **4** of this BMP document the bushfire hazard assessment, renewable energy infrastructure hazard analysis and bushfire risk assessment for the proposed facility.

Section 5 detailed the bushfire risk management strategy and mitigation measures for the proposed facility, derived from relevant Queensland bushfire planning requirements and bushfire-relevant aspects of the CFA Design Guidelines.

Section 6 provides the compliance assessment against the various State and Local government bushfire planning requirements, underpinned by the assessment against the bushfire-relevant aspects of the CFA Design Guidelines provided in Appendix G.

Section 7 lists the implementation measures required to be adopted at various stage of project construction and operation.

1.7 Document Review

This BMP provides a point in time assessment subject to the approvals process. If the Project changes it is accepted that a revision to this BMP is required.

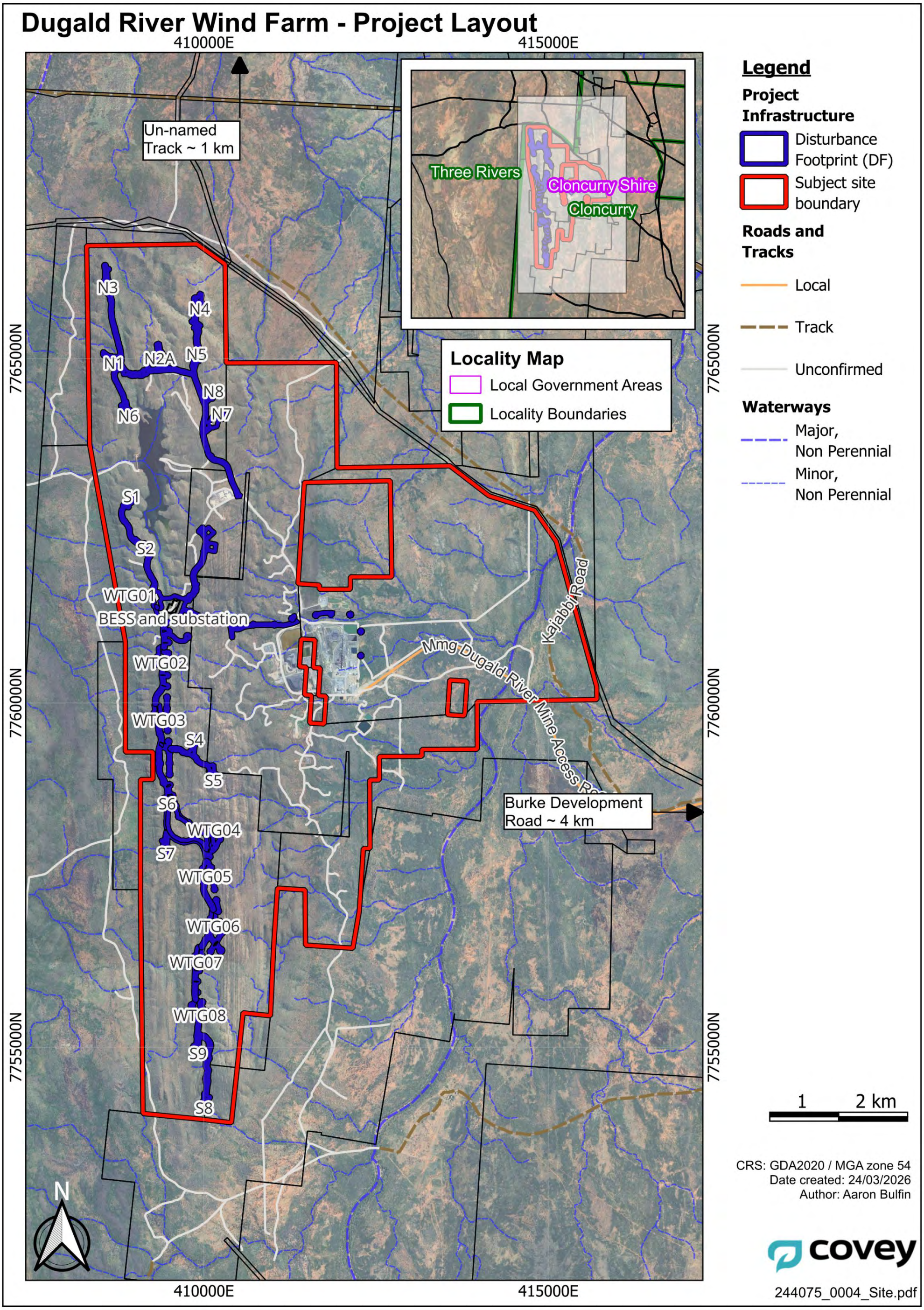


Figure 1-1. Site layout

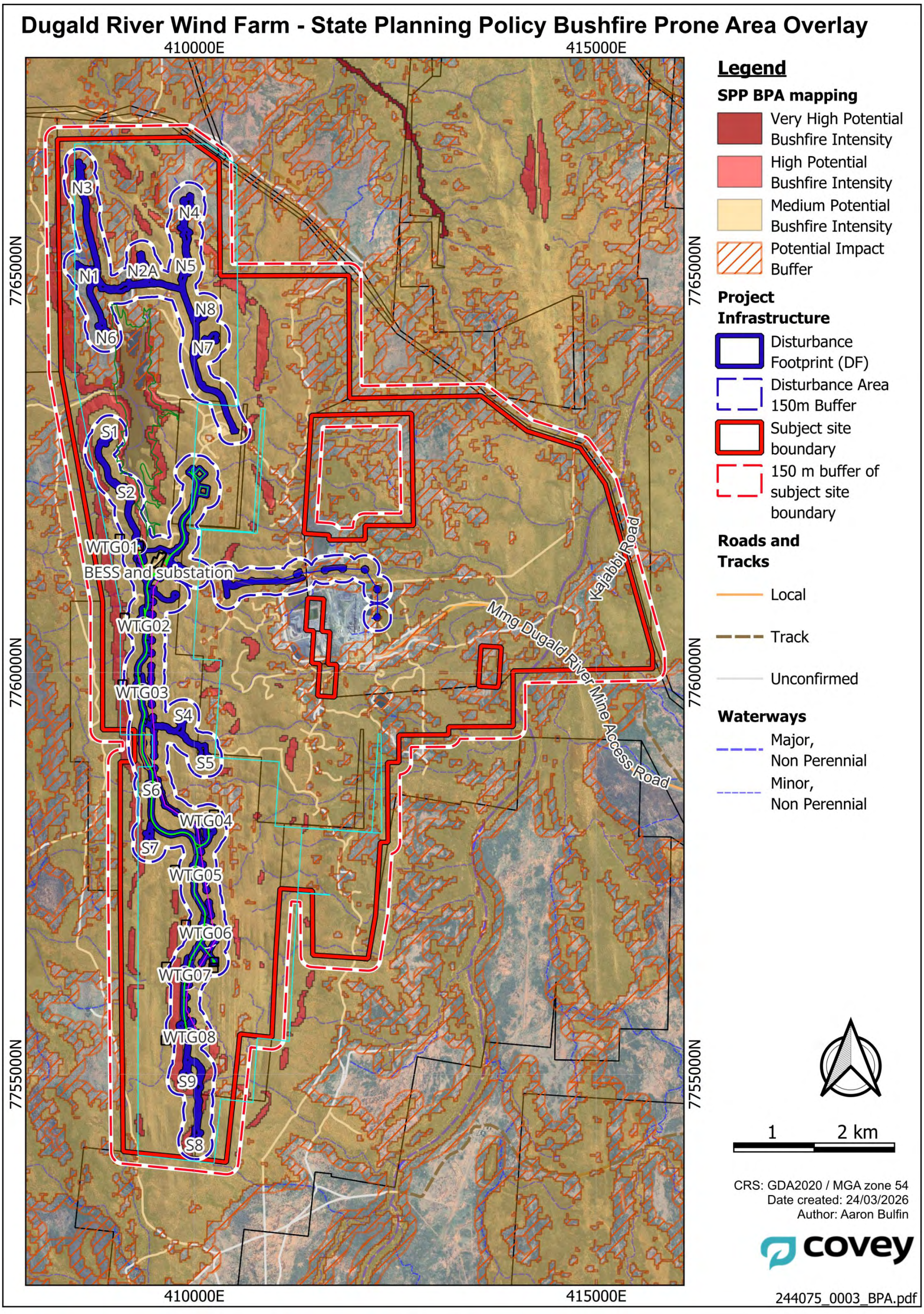


Figure 1-2. State Planning Policy Bushfire Prone Area mapping

2 Bushfire Hazard Assessment

Bushfire severity is predominantly influenced by fuel, weather, and topography; each of which can have a varying effect on bushfires and their potential behaviour, with these main influences explored in the sub-sections below.

Bushfire severity as it relates to vegetation and topography is represented on the Bushfire Prone Area mapping developed by the Local and State government, where increased severity is a result of areas of steeper terrain and vegetation with higher potential fuel loads.

The State Planning Policy (SPP) Bushfire Prone Area (BPA) mapping is based upon the Potential Fireline Intensity, as determined by the fuel, weather, and topography (Newnham, Opie and Leonard, 2017), which classifies the potential risk of a fire front impacting the area with intensity as per Table 2-1.

Table 2-1. Bushfire Prone Area categories and associated intensities (QFES, 2019a).

Bushfire Prone Area Category	Potential Fire Line Intensity	Colour Code
Low	< 4,000 kW/m	clear
Medium	4,000 – 20,000kW/m	
High	20,000 – 40,000kW/m	
Very High	> 40,000kW/m+	

The State Planning Policy Bushfire Prone Area (BPA) mapping, which has been reproduced on Figure 1-2, identifies the majority of the DF associated with the development works, is wholly within areas mapped BPA.

Given bushfires respect no boundaries, bushfire hazards and risk are better captured at a landscape scale. For this reason, Covey has:

- Analysed the potential radiant heat flux as per BRC guidelines, thus fulfilling the statutory requirements.
- Reviewed the vegetation present within a 150 m radius of the subject lots of the development, and the historical fires and fire weather observed for the local area, to provide a more thorough understanding of the landscape hazards.
- Reviewed the vegetation present within a 150 m surrounding the DF, to inform the RHF modelling for bushfire impact on the proposed infrastructure.

2.1 Fire Weather

Fire weather is often associated with meteorological conditions that can generate increased fire behaviour, making wildfire suppression efforts difficult for emergency personnel. Fire weather can be influenced by many local factors including temperature, wind, relative humidity, and drought factor, all of which are used to calculate Forest Fire Danger Index (FFDI[2]).

2.1.1 Regional weather discussion

[2] FFDI was used in this report, instead of the new Australian Fire Danger Rating System (AFDRS) and the associated Fire Behaviour Index (FBI), as the data analysed was historical. Also, FFDI values are used as input for in RHF modelling.

The Project is located within the Northwest Highlands Bioregion in Queensland. In this area, fire risk is typically linked to the occurrence of fire weather days or sequences of days of FFDI above 25, which are often characterised by temperatures above 37°C, low humidity and sustained winds (Queensland Parks and Wildlife Service, 2013).

The Northwest Highlands Bioregion is characterized by a semi-arid climate with varying annual rainfall which is influenced by the passage of tropical monsoonal systems across the Gulf of Carpentaria. Although summer wet seasons do not occur every year and the arrival and duration of monsoon seasons vary considerably, this variation greatly impacts fire weather (Queensland Parks and Wildlife Service, 2013). Annual rainfall in the region also influences fuel availability, specifically the growth and curing rates of grass. Spinifex, a dominant understorey grass within low open woodlands which are abundant across the region, has increased growth after years of above average rainfall. As such, fire regime and the occurrence of wildfires is determined largely by the interaction between seasonal rainfall and grass growth (Queensland Parks and Wildlife Service, 2013).

2.1.2 Selection of FFDI for bushfire assessment

The FFDI is based on a combination of different weather conditions known to influence the risk of dangerous bushfire conditions in Australia, including temperature, rainfall, humidity and wind speed, and serves a proxy for fire severity such as rate of spread, intensity and difficult to suppress.

In addition to being used as an input to the SPP BPA mapping for Queensland using models prepared by CSIRO, FFDI values have been calculated using extreme value analysis of weather data including projected climate change to 2050 for a 1-in-20 year return period, and included this in the BRC MapViewer as FFDI contours across the state (Queensland Fire Department and Queensland Government, 2025).

The mapped 1:20 year Recurrence Interval FFDI spatial data for Cloncurry (and the site) is **FFDI 95** (BRC Mapviewer), and Covey have adopted this as the input value for the RHF calculations

2.1.3 Historical weather analysis

Recent past weather patterns and trends was analysed for the site using data extracted from the Bureau of Meteorology (BoM) recorded from Australia's Automatic Weather Stations (AWS). Cloncurry Airport AWS (AWS 29141) is located approximately 55 km SE from the site of the development site. The AWS data was analysed for the years 2002-2025. Table 2-2 below provides the twenty-highest ranked FFDIs over the recorded period.

From the FFDI analysis, several days of elevated fire danger have occurred in Cloncurry Airport during the Autumn, Spring, and Summer months. Typically, this analysis shows that the highest ranked fire danger days are typically associated with:

- Air temperatures in the high range of (above 35°C);
- Low RH (≤15%), and relatively dry conditions (Drought Factor = 10);
- Moderate breeze[3] (>28 km/hr) under varying wind directions.

[3] Based on the Beaufort wind scale – refer to The Beaufort Wind Scale | Royal Meteorological Society for more information.

Table 2-2: Top 20 highest ranked FFDI for Cloncurry Airport AWS 2002-2025

Rank	FFDI	Date	Season	T [°C]	Dew Point [°C]	RH [%]	Wind Speed [km/hr]	Wind Cardinal Direction	KBDI	Drought Factor
1	**83.6**	18/01/2020	SUMMER	**42.5**	1.3	**9**	**33.5**	SSW	197	**10.00**
2	**83.5**	17/01/2020	SUMMER	**41.8**	6.6	**12**	**38.9**	SSW	197	**10.00**
3	**80.9**	20/10/2019	SPRING	**37**	-4.4	**7**	**37.1**	SSE	189	**10.00**
4	**79.7**	20/10/2012	SPRING	**37.8**	-3.9	**7**	**35.3**	ENE	166	**10.00**
5	**79.0**	5/11/2020	SPRING	**42.6**	1.4	**8**	**29.5**	SSE	181	**10.00**
6	**78.3**	8/01/2022	SUMMER	**41.3**	-1.4	**7**	**29.5**	SSW	174	**10.00**
7	**75.4**	8/11/2019	SPRING	**39.4**	-7.2	**5**	**27.7**	S	194	**10.00**
8	**75.0**	2/12/2006	SUMMER	**43.9**	8.2	**12**	**31.3**	S	192.24	**10.00**
9	**73.9**	5/03/2025	AUTUMN	**43.7**	3.9	**9**	**27.7**	NW	188.04	**9.72**
10	**73.4**	9/03/2008	AUTUMN	**36.3**	3.5	**14**	**44.3**	E	185.97	**10.00**
11	**73.3**	28/10/2007	SPRING	**41.4**	2.2	**9**	**29.5**	NW	197.68	**10.00**
12	**72.4**	19/01/2020	SUMMER	**42.5**	1.3	**8**	**25.9**	SSW	197	**10.00**
13	**72.1**	15/11/2006	SPRING	**37.6**	-4	**7**	**31.3**	SSW	185.58	**10.00**
14	**71.7**	5/12/2004	SUMMER	**42**	2.6	**9**	**27.7**	SSW	194.87	**10.00**
15	**71.5**	18/11/2019	SPRING	**40.1**	-4.3	**6**	**25.9**	SSE	196	**10.00**
16	**71.5**	13/01/2019	SUMMER	**40.7**	5.7	**13**	**35.3**	E	201	**10.00**
17	**70.8**	21/09/2023	SPRING	**38.1**	-0.3	**8**	**31.3**	SSE	150	**10.00**
18	**70.8**	4/12/2012	SUMMER	**41.6**	2.3	**9**	**27.7**	SE	192	**10.00**
19	**70.7**	1/11/2020	SPRING	**36.9**	-6.5	**6**	**31.3**	SW	179	**9.70**
20	**70.3**	26/01/2013	SUMMER	**42.5**	8.3	**14**	**33.5**	S	176	**10.00**

2.1.4 Fire Danger Season

In Queensland there is no declared fire season; though depending on the season, the fire danger season typically extends from August through to December (Department of National Parks, 2013). For this region the approach towards fire danger season is associated with increased temperatures, decreased rainfall, and low relative humidity (RH). Weather analysis of monthly FFDI distribution indicates that the period of the year for which dangerous fire weather occurs typically extends between August and December peaking in October (as shown in Figure 2-1.); thus, agreeing with the inferred fire danger season from the Planned Burn Guidelines

However, it should be noted that 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.

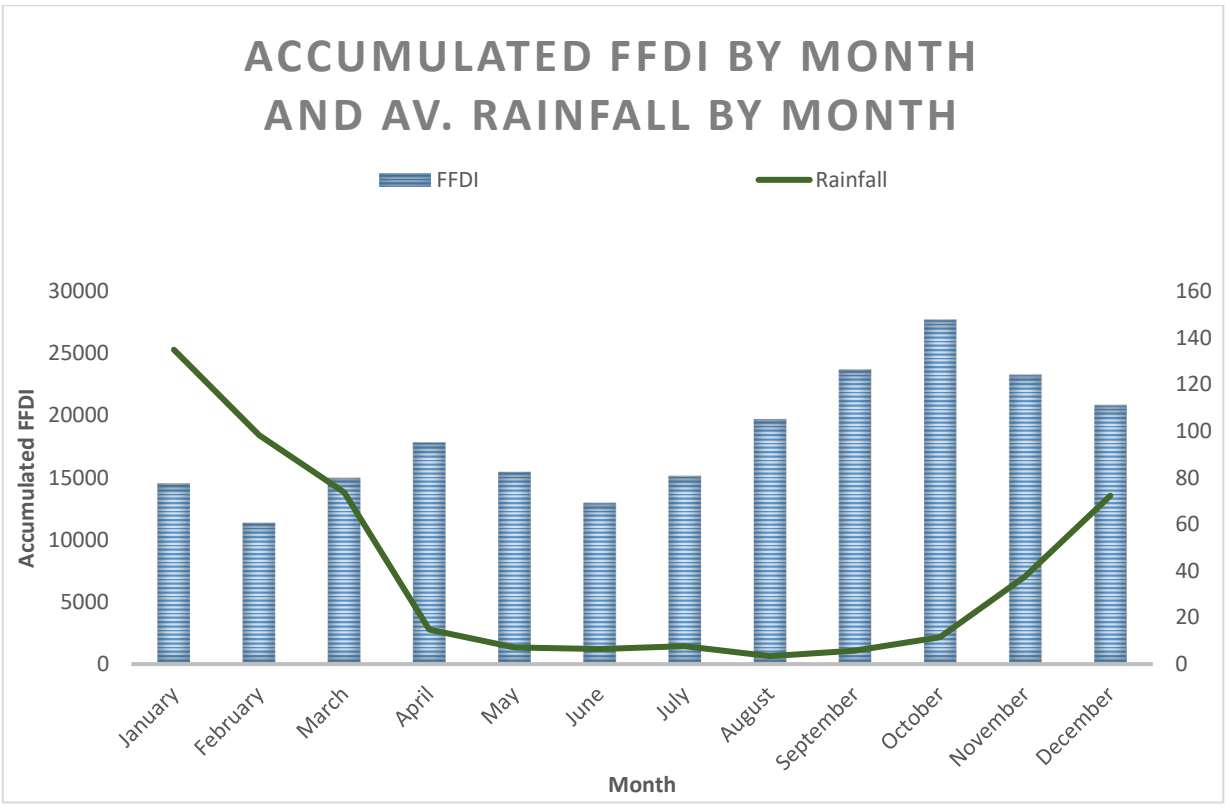


Figure 2-1: Accumulated FFDI and average rainfall by month for Cloncurry Airport AWS

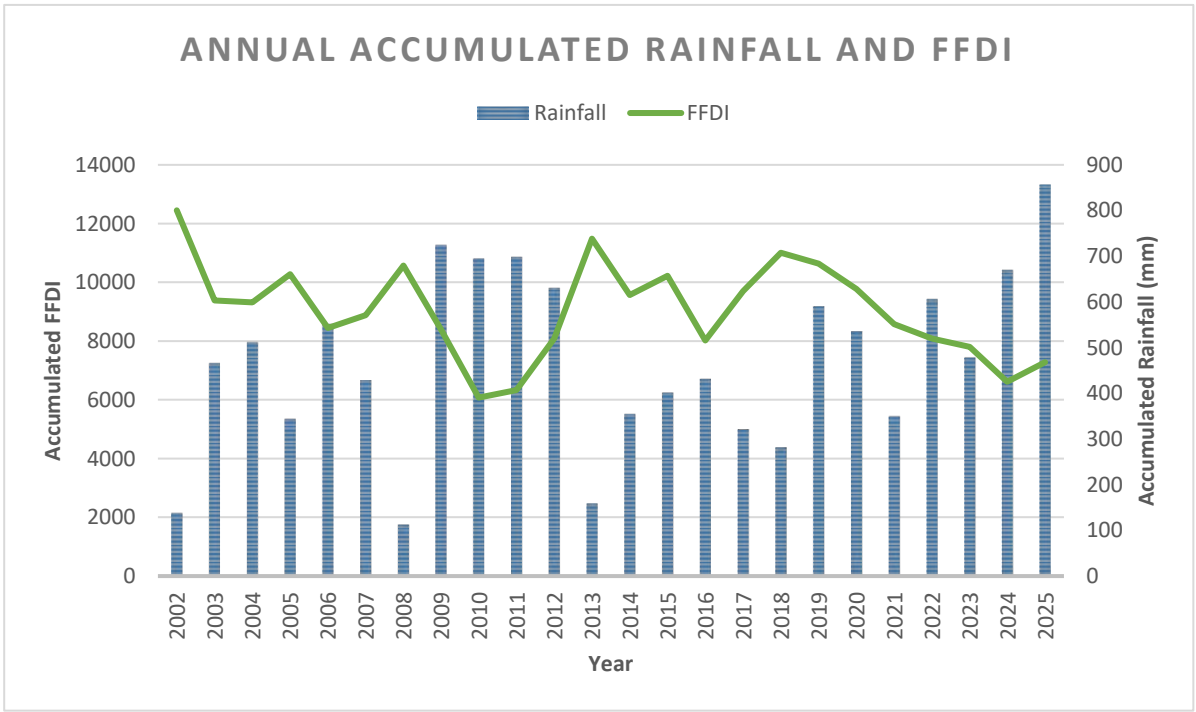


Figure 2-2. Annual Accumulated Rainfall and FFDI for Cloncurry AWS (2002-2025)

2.1.5 Climate Change Impact on FFDI

Climate change relative to the DC can be referenced in the 'Climate Change in Australia Report for Monsoonal North Cluster' developed by Commonwealth Scientific and Industrial Research Organisation (CSIRO) and BOM (Moise *et al.*, 2015). As discussed previously, monsoonal rainfall drives fuel availability in this region, where fuel dries and eventually burns after the wet season ends (Queensland Parks and Wildlife Service, 2013). The

study suggests that further south in the Monsoonal North Cluster (e.g. Mt Isa) may not observe an active monsoon each year as a result of climate change, leading to less reliable rainfall and less frequent fire activity every few years (Moise *et al.*, 2015). The key findings for projected climate change within the Monsoonal North Cluster are summarised below:

- Very high confidence in:
  - Higher temperatures, and
  - Hot and more frequent hot days.
- High confidence in:
  - Increased intensity of heavy rainfall events, though changes to drought less clear,
  - Some increase in summer and spring wind speed,
  - Increase evaporation rates and reduced soil moisture,
  - Little change in solar radiation and relative humidity throughout the year, and
  - Little changes in fire frequency, though, where a fire does occur, more extreme fire behaviour.

As detailed in Section 2.1.2, the FFDI mapping in the BRC Mapviewer analyses weather data that includes projections for climate change to 2050, and as such, allowance for climate change is already incorporated into the modelling.

2.2 Topography

The slope and topography of land beneath areas of vegetation influence the rate of spread and subsequent severity of bushfire behaviour. To ensure the slope has been considered when undertaking this risk assessment, the landforms within the subject area have been modelled using available Digital Elevation Model (DEM) data sourced from Geoscience Australia at one second resolution (Elvis - Elevation and Depth - Foundation Spatial Data) and client supplied DEM data at 1m resolution. The Project infrastructure is positioned generally at elevations between 250 – 300m above sea level, at the top of a hilly range that spans in a north-south direction within the study area as shown in Figure 2-3.

2.3 Bushfire Fuels

Fuel load and arrangement significantly impact bushfire behaviour's potential severity and scale. Fuel characteristics vary along with changes in type, density, and extent of vegetation communities and land uses. Fuel loads, especially for grass, may vary greatly depending on rainfall and, the agricultural land use.

To provide a broad context of the fuel type, fuel load, and fuel continuity across the landscape, vegetation within the 150 metres of the subject lots has been reviewed using the State mapped Vegetation Hazard Class (VHC) (QFES, 2019a) refer to Figure 2-4. The SPP only requires assessment of the 150 m of vegetation around the DF, as such, vegetation was refined within 150 m of the DF (Figure 2-5); the refinement of the VHC is based on information gathered from a combination of:

- Ground-truthed Regional Ecosystems data prepared by Wulguru Technical Services (2024) spanning 16 + years provided by ERM on 12/02/2025,
- 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 from Google Satellite verified with ERM supplied imagery 12 July 2024.

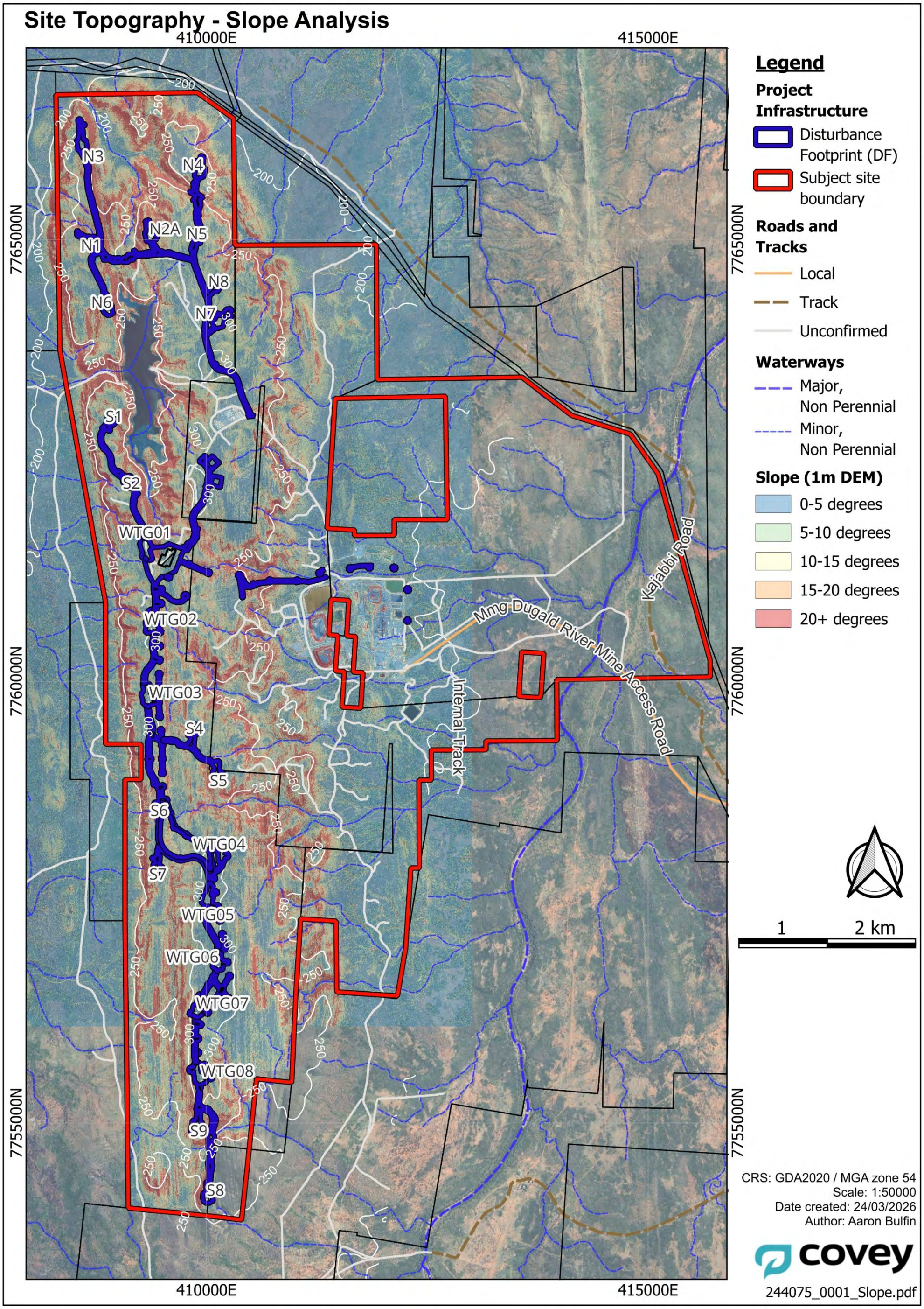


Figure 2-3. Site topography

BRC separates all surface landscape areas into three categories – Bushfire Prone, Grassfire Prone, and Low-Hazard vegetation. Bushfire Prone vegetation (VHC 16.2 19.2) dominates the project area, which aligns confidently with the BPA mapping (Figure 1-2). Whilst Low-Hazard vegetation (VHC 41.4, 42.6, 43.6) cover the a smaller portion of the project area (Figure 2-5). Table 2-3 below provides a breakdown of the fuel properties of the identified VHCs within 150 metres of the DF.

Table 2-3. Landscape vegetation within 150 meter buffer of the DF.

VHC	Description	Vegetation Type	Surface Fuel Load (t/ha)	Total Fuel Load (t/ha)	Prone Type	Modelled (RHF)
VHC 16.2	Eucalyptus dominated woodland on drainage lines and alluvial plains	Woodlands	11.1	11.6	Bushfire	Y
VHC 19.2	Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton Box.	Woodlands	7.3	9.1	Bushfire	Y
VHC 41.4	Discontinuous low grass or tree cover	Low-Threat	2	2	Low hazard	N
VHC 42.6	Nil to very low vegetation cover.	Low-Threat	2	2	Low hazard	N
VHC 43.6	Water bodies.	Low-Threat	0	0	Low hazard	N

The VHCs mapped (QFES) within the DF and the surrounding 150 m were:

- 19.2 – Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box, or Normanton box, and
- 42.6 – Nil to very low vegetation cover.

The VHC verified (Ecological Assessment) within the DF and the surrounding 150 m were:

- VHC 16.2 – Eucalyptus dominated woodlands on drainage lines and alluvial plains,
- VHC 19.2 – Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box, or Normanton box,
- VHC 41.4 – Discontinuous low grass or tree cover,
- VHC 42.6 – Nil to very low vegetation cover, and
- VHC 43.6 – Water bodies.

Refer to Appendix A for enlarged maps of VHC within the DF.

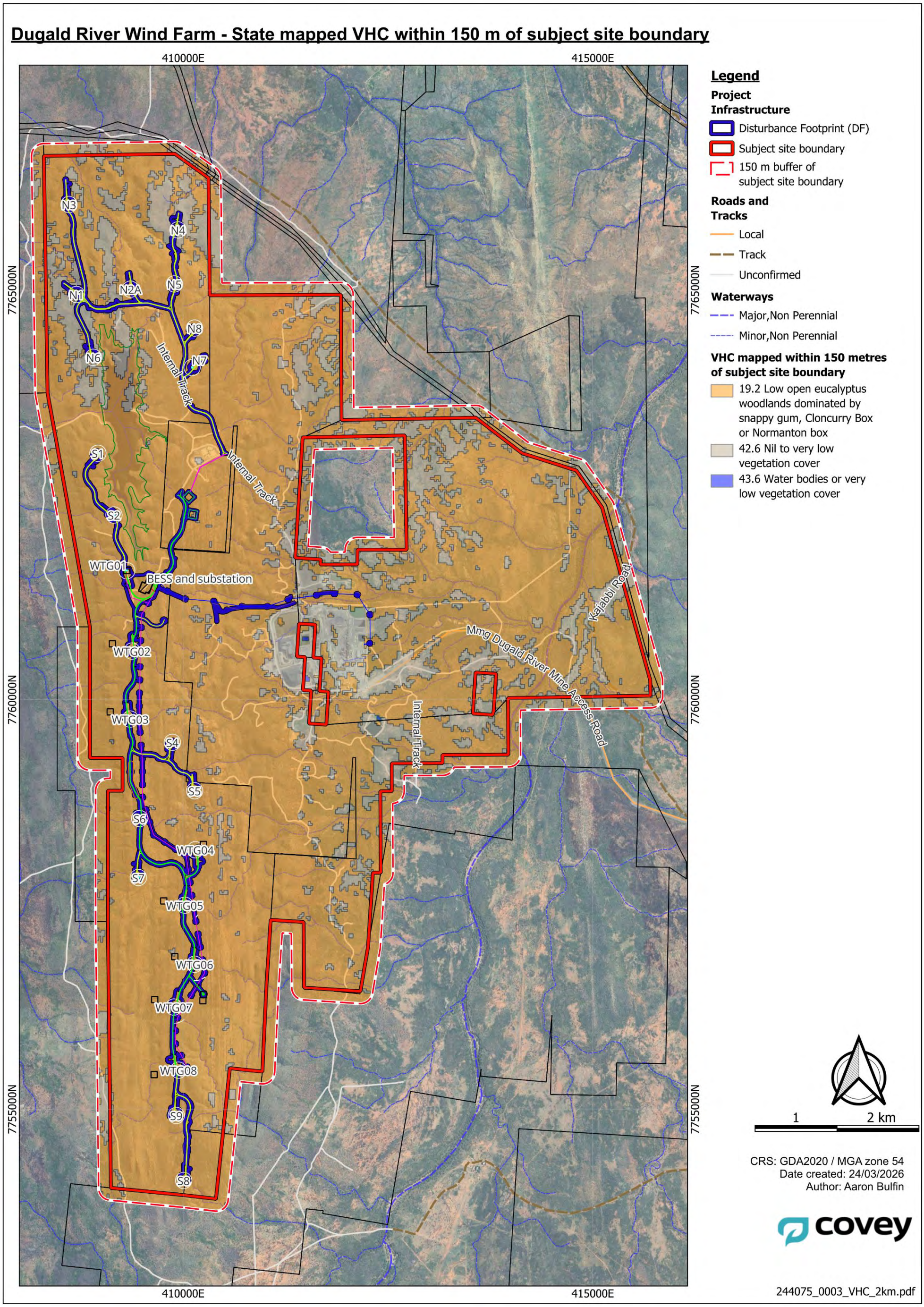


Figure 2-4. Mapped vegetation (VHC) within 150m of the subject lots – not refined

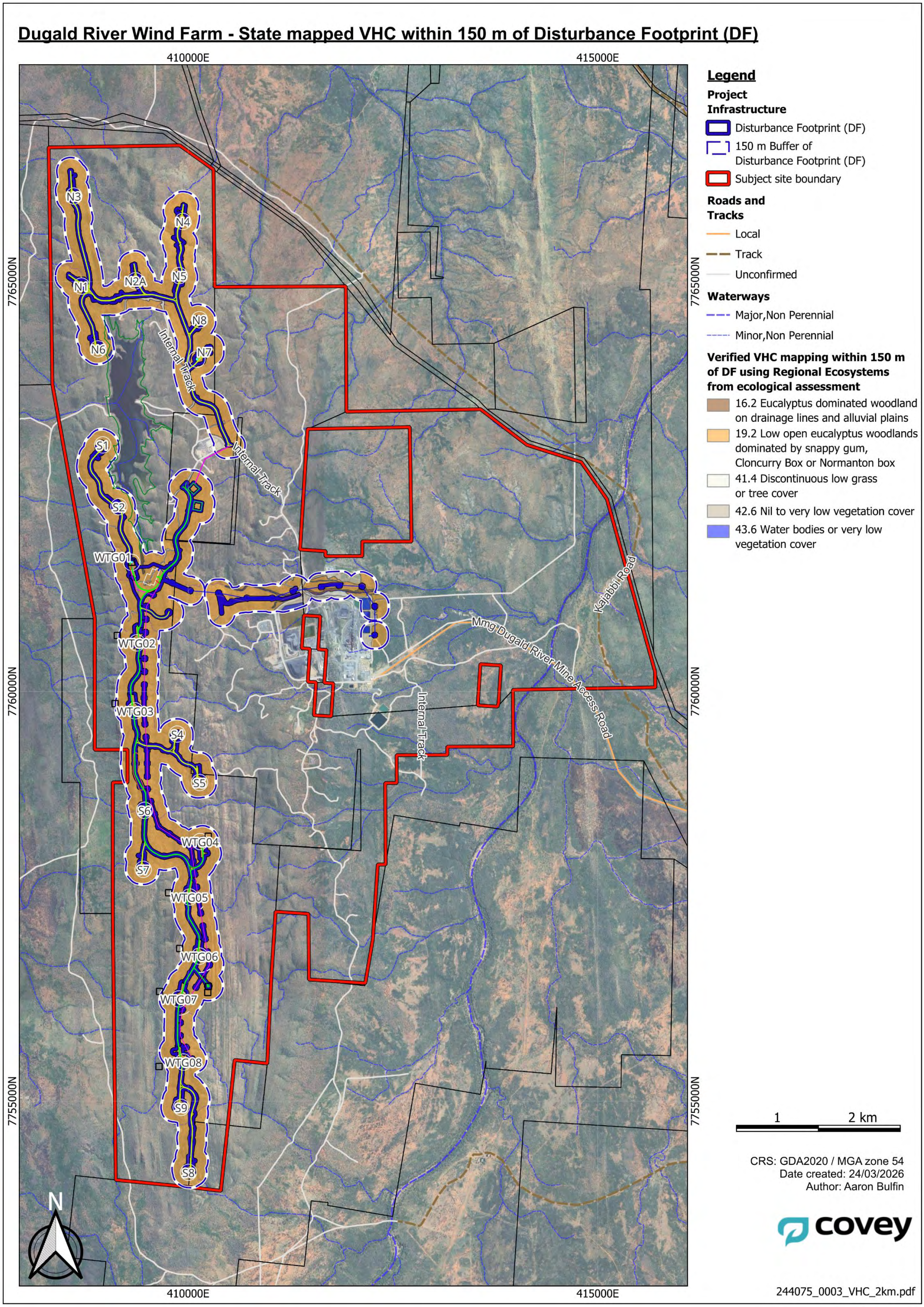


Figure 2-5. Mapped vegetation (VHC) within 150m of the DF based on site verified vegetation per data provided by ERM.

2.4 Fire Likelihood and Behaviour Discussion

Historical fire weather analysis provides some indication of the potential for large fires to develop in the future. Weather analysis indicates that these are more likely to approach the Project from a southerly wind arc. High fire intensity and flame lengths could be expected in patches of higher fuels and steep slopes. Fires in the region would typically be expected to be wind-driven within grasslands and fuel-driven in forested and wooded areas. However, as discussed, rainfall is also a key driver of fire activity within this bioregion due to its influence on grass growth within the low open woodlands that contain a hummock grass understorey. Following wet periods brought by monsoonal systems, grass can rapidly grow, leading to the accumulation of fuel, and subsequent increase in wildfire risk (Queensland Parks and Wildlife Service, 2013).

Large expanses of woodland vegetation across the site and adjoining areas represent medium and high potential bushfire intensity based on SPP Bushfire Prone Area mapping. Very high potential bushfire intensity occurs at patches of dense bushland along ridgelines adjoining the DA to the west.

Historic wildfire occurrences in the local area over the past 10 years (since 2016) have been illustrated on Figure 2-6 and Figure 2-7 based on Queensland Fire Scar mapping data, which depicts several large bushfires having occurred around the study area over this timeframe and mostly within surrounding Eucalypt woodland vegetation. Additionally, these have typically occurred within the fire season between September to December, with some occurring outside of the fire season in January to April however these may have been prescribed burns. undertaken to reduce the extent and severity of uncontrolled bushfires. Notably, more recently on 13 January 2025, a large bushfire occurred within the DF and surrounding land which threatened the infrastructure associated with the DRM (isolated and illustrated alone on Figure 2-7). Media reports outline the fire was primarily grass-fire driven and burned for approximately 3 days, with the fire front reaching around 5 – 6km, and originated to the north-east of the DRM.

A significant factor in bushfire development is the control of ignition events, with a number of potential internal and external ignition sources identified including:

- ***Potential internal bushfire ignition sources***
  - Electrical faults/failure from electrical components (including inverter or transformer failures);
  - Vegetation management (i.e., mowing) in dry conditions;
  - Ignition of vegetation from overhead transmission lines;
  - Unauthorised site access and arson;
  - Landholder activities;
  - Activities associated with the DRM (e.g. exploration drilling); and
  - Maintenance activities that may cause a spark (such as welding).
- ***Potential external bushfire ignition sources***
  - Lighting strike; and
  - External bushfire spreading via vegetation.

Given the potential to ignite a bushfire (both within and outside the development area), the existing bushfire fuels in the area, and the potential for elevated fire weather conditions, the growth and spread of large bushfires to impact the proposed development is considered a risk that requires appropriate management measures to reduce to an acceptable level.

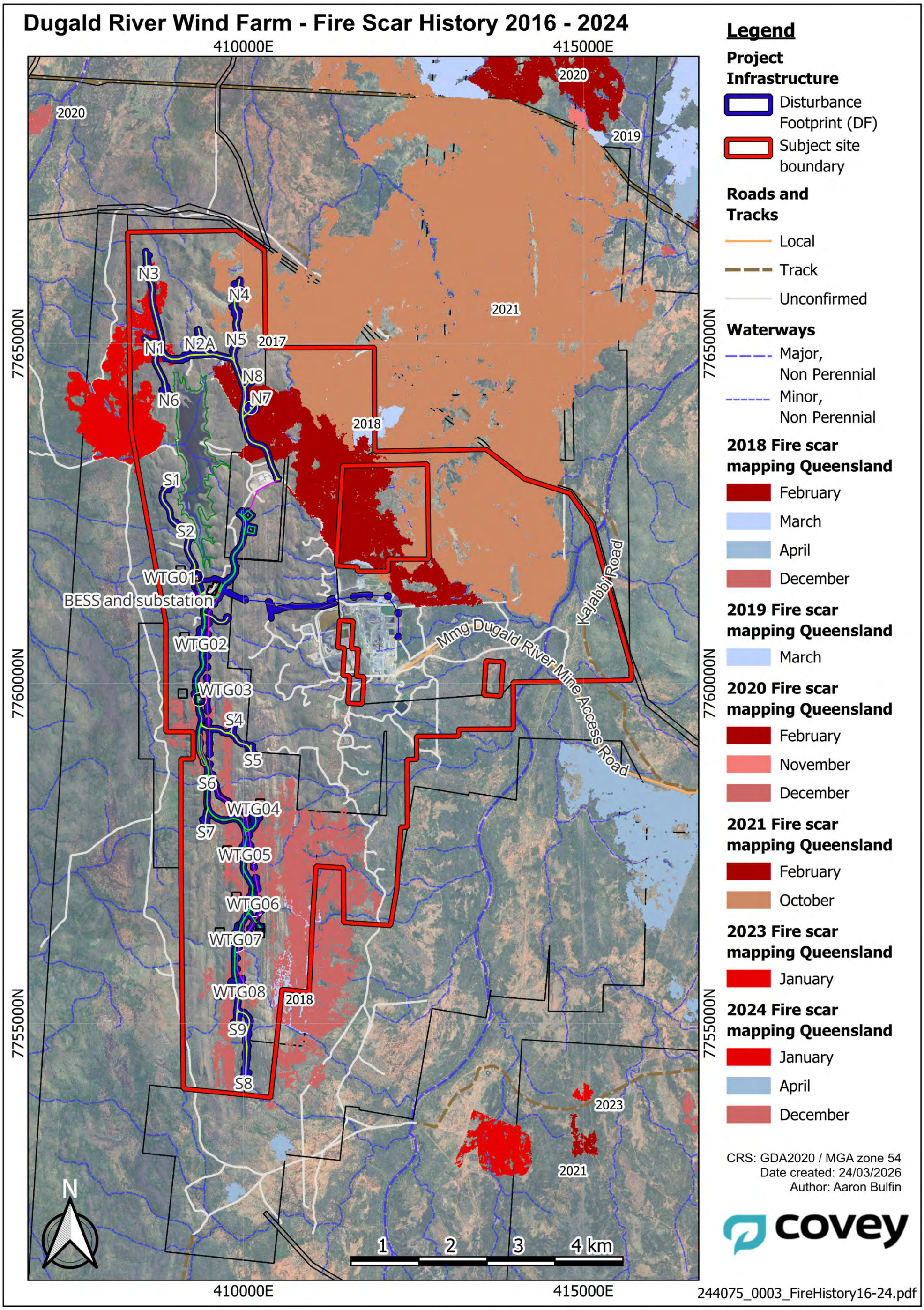


Figure 2-6. QLD fire scar history between 2015-2024 ('Queensland Fire Scars', 2024) from spatial data.

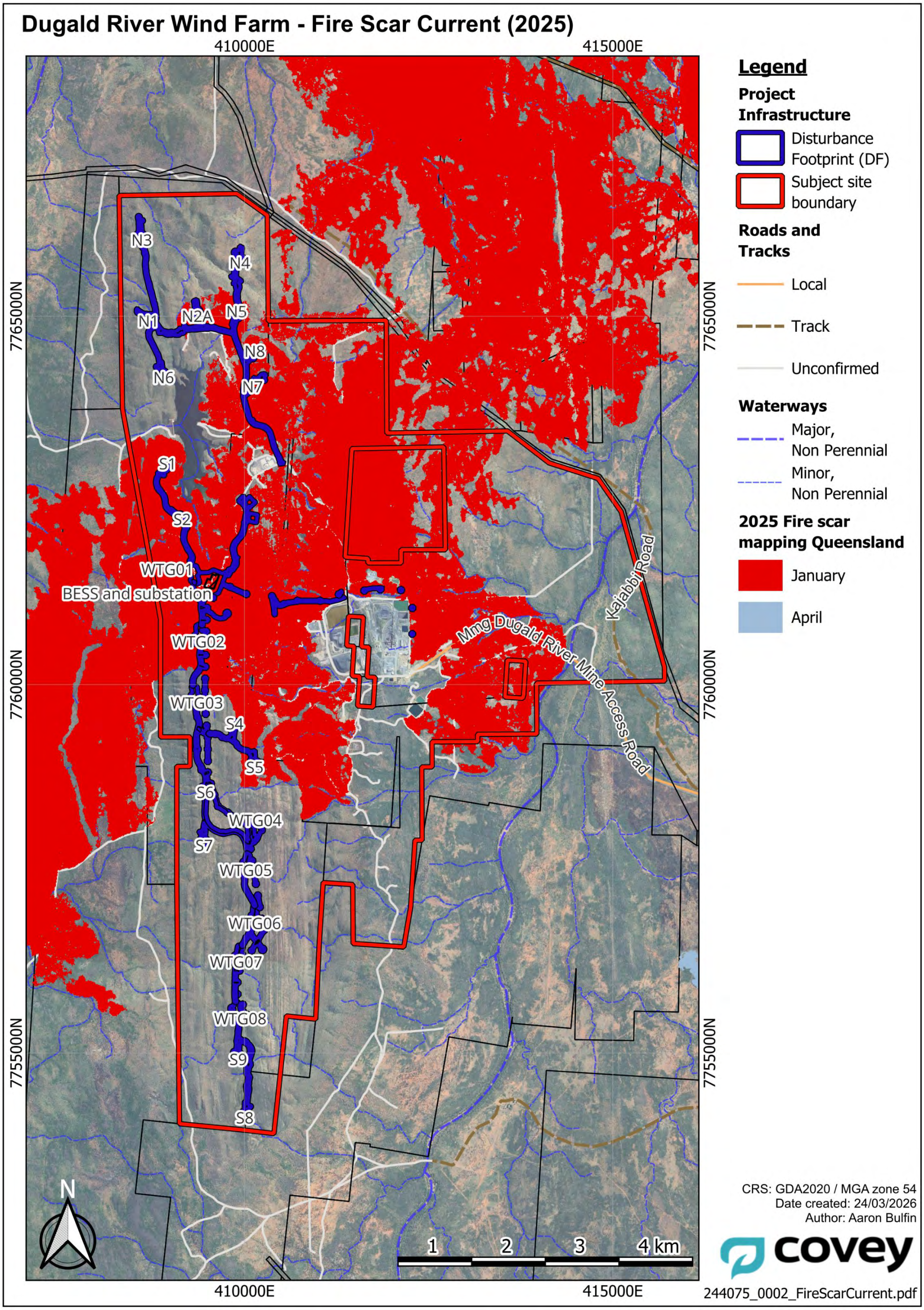


Figure 2-7. Current Fire Scar Mapping for 2025 ('Queensland Fire Scars', 2024) from spatial data.

3 Renewable Energy Assets and Hazard Analysis

3.1 Proposed Onsite Renewable Energy Assets

The proposed development is expected to include the following onsite renewable energy infrastructure:

- ***Battery Energy Storage System (BESS) Containers***
  - Expected to store up to 120 MW/240 MWh in 48 BESS containers
  - BESS are expected to be BYD models that are compliant with UL 9540 test criteria
  - The BESS containers will be a centralised BESS arrangement (i.e. not spread throughout the wind farm) within the nominated BESS yard, collocated with the substation.
- ***Wind turbine generators***
  - 24 wind turbines that are dispersed throughout the site.
  - The proposed make/model of wind turbines is still to be confirmed, with the following specifications anticipated:
    - Hub height of 130 m AGL
    - Blade width of 82.5 m AGL
    - Rotor diameter of 165 m AGL
    - Turbine tip height of 212.5 m AGL
    - Turbines are steel tower casings to ground level, with proprietary blades likely constructed with balsa wood or foam, and an outer shell of fibreglass or composite material
  - A nominal hardstand area required at each turbine location for construction and major maintenance.
- ***Substation***
  - Will contain 2 Transformers (220/33 kV) and switchgear, located in a fenced area collocated with the BESS yard.
- ***Transmission lines***
  - Above ground 33 kV distribution lines from turbines to substation
  - Above ground high voltage transmission lines to connect Project to existing transmission line.

3.1.1 Wind Turbine Component Overview

A wind turbine (also known as a wind turbine generator), is a device that converts the kinetic energy of wind into electricity. In simple terms, the turbines blades use the aerodynamic force of the wind (much like an aeroplane) to turn a rotor, which spins a generator to produce electricity, which is typically fed into the mains power network as a source of renewable energy.

The horizontal axis wind turbine generators proposed at the wind farm consist of the following elements:

- Tower
  - The tower supports the structure of the turbine
  - Constructed of steel

- Nacelle
  - The nacelle sits on top the tower, and houses the key mechanical elements: the gear box, generator, shaft and brake.
  - Typically constructed of metal, fibreglass or composite materials
- Hub
  - The turbine blades fit into the hub that is connected to the turbine's main shaft.
  - Typically of metal construction.
- Blades
  - Three blades located on top of the turbine, which connect to the turbine hub.
  - When wind flows across the blade, the air pressure on one side of the blade decreases. The difference in air pressure across the two sides of the blade creates both lift and drag. The force of the lift is stronger than the drag and this causes the rotor to spin.
  - The blade construction is generally proprietary, however typically the blade core structure mostly balsa wood or foam, with the outer shell generally fibreglass or composite material.
- Controller
  - The controller manages the starting and stopping of the turbine, usually based on wind speed (i.e. sufficient wind to start and shutting off at excessive wind speeds).
  - Contains a number of sensors and a control system, to continuously monitor wind speed, direction, turbine performance, and other vital parameters.
  - This system adjusts the blade pitch and other aspects to optimize power generation while ensuring safe operation within wind speed limits.

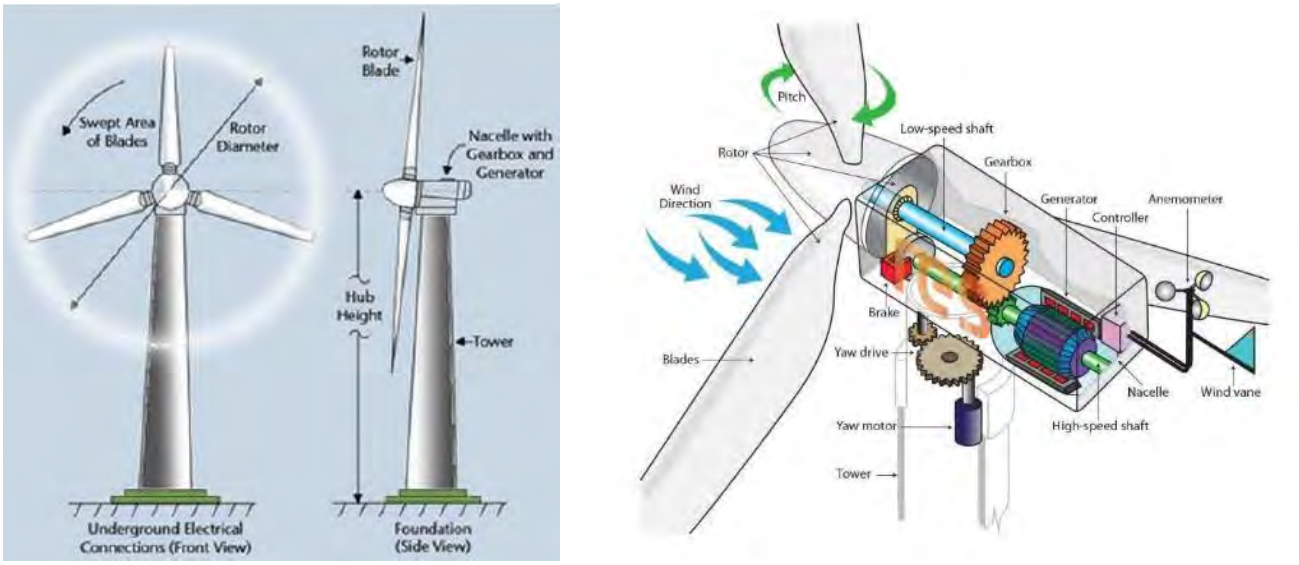


Plate 1: Wind Turbine Components

3.2 Renewable Energy Infrastructure Hazard Analysis

From a bushfire risk assessment and management perspective, the risk associated with renewable energy facilities can be distilled into two main factors:

- the potential impact of bushfire on the proposed renewable energy infrastructure (e.g. BESS containers, wind turbines), and

- the ability for significant fires to escape the renewable energy infrastructure to ignite a bushfire. The sections below review risk to, and from, the proposed renewable energy infrastructure.

3.2.1 Battery Energy Storage System (BESS) hazard review

A detailed review of the BESS hazard and risk is provided in the project FSS (RiskCon Engineering, 2026), with Covey providing the following high-level information.

BESS units are typically comprised of Lithium-ion (Li-ion) battery cells that are wired together to form modules, which have a battery management system (BMS) that prevents electrical imbalances in the battery cells, including with voltage, current and temperature. The BMS' main function is to shut down operations of the module (or system) if any of the voltage, current, or temperature changes are out of limit.

3.2.1.1 Thermal runaway in Li-ion batteries

The significant hazard posed by BESS units is primarily associated with thermal runaway occurring in the Li-ion batteries, and the fire and explosion risk that can accompany the release of flammable gases. Thermal runaway describes a process that is accelerated by increasing internal temperature, in turn releasing more energy that further increases temperature. The battery can begin to emit gases due to thermal decomposition of the electrolyte solvents, which could potentially result in fire ignition or explosion (of the flammable gas release).

There are differences between thermal runaway and conventional fires that are important to understand. A conventional fire (e.g. campfire) is sustained by a combination of fuel, heat, and oxygen, where if any one of them is removed, the fire may be extinguished (e.g. suffocating the fire to remove oxygen, applying water to cool it, or dispersing the wood to remove fuel).

Thermal runaway in a Li-ion battery differs from the conventional fire, as a Li-ion battery is consumed in thermal runaway is fuelled by an internal chemical reaction that releases heat and can continue without oxygen or a visible flame. As such, the management of thermal runaway differs from that of a conventional fire because starving a thermal runaway event of oxygen, may have little effect until the fuel is consumed. On this basis, stopping a thermal runaway event is more difficult and is generally addressed by either cooling to remove heat, or removing/dispersing the fuel.

3.2.1.2 BESS hazard summary for bushfire

The overall hazard with the BESS units, is largely associated with the potential for thermal runaway in the Li-ion batteries to produce a fire or explosion failure event.

The quick rise of the BESS industry has resulted in rapid advances in the design, construction, commissioning, operation and maintenance of this technology. Notwithstanding, there hasn't been many reported historical BESS fires or explosions, and certainly not in Australia, however when they have occurred, it is clear that they result in firefighting challenges, primarily due to the inability to easily extinguish the fires and manage flammable gases.

Similarly, there have been no recorded incidents of bushfire impact on BESS containers in Australia, so the performance of these in a bushfire is not well understood.

From a bushfire risk management perspective, the hazard related to the BESS units can be distilled to the following:

- Exacerbation of a bushfire from fire and/or explosion of the BESS's as follows:
    - A bushfire impressing significant radiant heat, or producing direct flame impingement, onto the BESS container, that could increase battery temperatures and send into thermal runaway. This could

also include the damage or destruction of supporting systems (e.g. BMS, thermal management) which might affect the ability of the BESS to maintain temperatures at required levels.

- Ember attack from a bushfire, igniting a fire within the BESS unit, that could send a battery into thermal runaway, or damage or destroy supporting systems.
- Ember attack from a bushfire igniting flammable gases from BESS with thermal runaway condition, either within the BESS or flammable gases being ventilated.

- Ignition of a bushfire as a result of a fire or explosion within the BESS, likely to be associated with thermal runaway igniting an internal fire and/or emitting flammable gases, which could result in an explosion.

3.2.2 Transformer Hazard

Similar to the BESS hazard, a detailed review of the transformer hazard and risk is provided in the project FSS (RiskCon Engineering, 2026), with Covey noting the following:

- The risk associated with transformers, relates primarily to the mineral or ester oil used in transformers (where oil-filled) for insulation and cooling, which is within a hermetically sealed steel tank that contains the transformer core surrounded with windings and connecting leads, which could potentially:
  - Become over-pressurised and rupture, releasing oil into the bund, which can be ignited (albeit with significant difficulty) to create a pool fire.
  - Be subject to electrical surge, which if all surge protection measures fail, could result in oil vaporisation and potential transformer pool fire and/or explosion.

The FSS notes that transformers have low potential for failure, and acknowledge the following fire protection measures:

- A low oil pressure switch, oil temperature monitoring and switches, gas formation detectors and a pressure surge protection
- Provision of bunding to collect insulating oil in case of leaks or tank rupture
- Transformers are designed in accordance with AS 2067 (Substations and High Voltage Installations) to minimise potential for fire ignition.
- Providing sufficient clearances to transformers to prevent propagation of fire incident, with required separation of 8 m to achieve 23 kW/m^2 and 16 m to achieve 3.0 kW/m^2.

3.2.3 Wind Turbine Risk Review

3.2.3.1 Wind Farm Fires in Australia

While there haven't been many significant fire events at wind farms in Australia (either ignited by wind turbines, or impacted by bushfire), or at least not many publicly reported, review of those reported fires does provide a useful tool to review potential risks, as well as the relevant learnings from such events. Below is a summary of several that have occurred and reported upon in the past 10 years.

- ***Bulgana Green Power Hub, Victoria (May 2025)***
  - Bulgana Green Power Hub is a 204 MW wind and BESS facility located near Stawell to the north-west of Melbourne, that was constructed in 2021.
  - It is comprised of 56No. Siemens Gamesa SG 3.4-132 turbines, (initially produced in 2017 and each with 3.47 MW power rating), in addition to a 20 MW Tesla BESS system to store excess wind energy.

- On 28 May 2025, a fire ignited in one of the turbines around 9.30 pm, resulting in turnout of seven CFA units. The attending crews arranged for the operator to shut the turbine down and established safety zones around the structure, before leaving the site for the operator to monitor.
- After 3 am, the fire reignited in the turbine and crews were called back to the site, as a blade caught fire, dislodged and fell to the ground.
- The fire destroyed the nacelle of the turbine, however the CFA noted that the cause of the fire remains undetermined at the time.

- ***Cape Nelson Wind Farm, Victoria (June 2024)***
  - Cape Nelson is a 195-megawatt (MW) wind farm in the Portland area of Victoria, that was constructed in 2009 and is owned by Pacific Blue.
  - The wind turbine fire occurred at the top of the turbine at approximately 8pm and occurred in a Senvion MM82 turbine.
  - The fire destroyed the turbine and resulted in a blade falling off the turbine, and others expected to follow. Firefighters were called to the scene and allowed the turbine to burn out as there was nothing the firefighters could do to suppress the turbine fire.
  - The Fire Rescue Victoria commander noted that this was the first turbine fire in the area since wind farms started to be built around 20 years ago, and as such, weren't considered a big fire risk.
  - There were no reported injuries from the fire.
- ***Clements Gap Wind Farm, South Australia (February 2024)***
  - Clements Gap Wind Farm was one of the first in South Australia, being constructed in 2010, and had 27 of the Suzlon S88 turbines.
  - Smoke from the turbine was spotted by a maintenance crew at 8:30am, and emergency services were alerted at about 8.50am.
  - The fire destroyed the wind turbine and ignited a grassfire underneath it due to debris from the turbine. The resultant fire turbine burnt about 30 hectares of grassland, with no one injured in the incident.
    - The Country Fire Service (CFS) created an exclusion zone around the wind turbine to enable firefighters are staying on top of spot fires created by falling debris, while remaining clear from the turbine collapse zones.
  - The CFS noted that:
    - Wind turbine fires were uncommon but could occur including in South Australia the previous year.
- ***Waterloo Wind Farm, South Australia (January 2017)***
  - A bushfire started on a paddock near the Waterloo Wind Farm in South Australia. The fire quickly spread through the area due to gusty westerly and north-westerly winds and including into area the wind farm was located.
  - The exact cause of the fire was never reported but is not believed to be ignited by the Vestas wind turbines or any wind farm operations.
  - The fire burned approximately 50 hectares before it was controlled (around 2.45pm the next day), including land beneath turbines as the northern end of the wind farm.
  - There had been no reported loss of structures, but it was not clear what, if any, damage had been caused to turbines at the wind farm.
  - There were no reported injuries to any people.

- The firefighting and wind turbine actions included the following:
  - CFS deployed water bombers to fire and requested that a number of turbines be shut down.
  - CFS also made contact with the wind farm General Manager to obtain approval for decisions relating to wind farm operations as much as required, including requesting that the turbines be paused and shut down remotely by applying their brakes.
  - CFS worked to halt the fire advance with multiple runs of water bombing and ground-based firefighting, with fixed-wing water bombers able to manoeuvre through the turbines to target the grass fire and were followed by ground crew.
  - At 3.15 pm, CFS deemed it safe enough for the onsite crew to attend six of the paused wind turbines, to apply the brakes and set the blades in 'rabbit ear position', further assisting aircraft to pass through the turbines to continue water bombing.
  - The wind farm's access tracks worked as a fire break and without these the CFS believes the fire would have likely spread further, creating a much bigger incident.
  - The turbine's footings, with their clear line of site, were used by crews to coordinate air and ground crew actions.
- Firefighting continued through the afternoon and, by 6 pm, the CFS approved the re-start of the turbines located outside of the fire ground area.

3.2.3.2 Wind Farm Fire Risk

The Australasian Fire and Emergency Services Authorities Council (AFAC) released a position paper titled *Wind Farms and Bushfire Operations* (AFAC, 2018) with the expressed intent to "*provide guidance relating to planning for bushfire prevention, preparedness, response and recovery operations in and around existing and planned wind farm facilities"*. This publication rightly stated that wind power is a rapidly expanding form of renewable energy production and noted that *"…wind farms are not expected to adversely affect fire behaviour, nor create major ignitions risks"*. More specifically AFAC noted the following:

- ***Ignition caused by wind farm infrastructure or operations***
  - It is possible that turbines can malfunction and start fires within the unit.
  - The above is generally considered a low risk given appropriate protection measures, with automatic shutdown and isolation procedures are generally installed within the turbine system.
  - Operation of winches and machinery during monitoring and maintenance tasks may also lead to ignitions.
- ***Lightning risks***
  - Wind turbines can attract lightning during thunderstorms.
  - If struck by lightning, turbine towers are generally not expected to start fires as they have built-in protection mechanisms.
  - On this basis, it is possible that wind turbines may reduce the risk of bushfires caused by lightning, particularly if turbines are located on a ridge or local high point.
- ***Hazards and firefighting limitations in and around the wind farm facilities***
  - Wind farms may result in aerial firefighting limitations due to aerial obstacles created by wind turbines and meteorological monitoring towers.
    - The bushfire at the Waterloo wind farm demonstrated that if conditions are clear and wind turbines are turned off, wind turbines are clearly visible from aircraft and are not likely to constrain aerial firefighting operations (Clean Energy Council 2017).

- If wind turbines were not shut down, moving blades and wake turbulence would create significant hazards for low flying aircraft, thus the shutting down of wind turbines, in an emergency situation, is defined in wind farm emergency procedures.
- However, transmission infrastructure, meteorological towers and guy-ropes were difficult to see (Clean Energy Council 2017) and this infrastructure does have potential to limit the effectiveness of aerial firefighting operations. This can be addressed through appropriate marking of this infrastructure.

- Access and egress challenges on the ground as well as water supply issues can also create firefighting limitations, if not planned for appropriately.

- ***Bushfire spread within wind farm facilities and impacts on wind farms as critical infrastructure***
  - Wind farms are not expected to adversely affect fire behaviour in their vicinity.
  - Local wind speeds and direction are already highly variable across landscapes affected by turbulence from ridge lines, tall trees and buildings.
  - Any potential for wake turbulence from wind turbines influencing fire behaviour is expected to be controlled through the shutting down of wind turbines in a bushfire event.
  - Sufficient planning for access roads and fuel modified buffer zones will reduce the risk of wind farm ignitions spreading beyond the property and reduce the risk of external fire impacting wind farm infrastructure.

3.2.3.3 Likelihood of Wind Farm Fire

As noted by AFAC, the likelihood of turbine fires is considered to be relatively low, and while it is accepted the statistics around fire losses are based on historical estimates and incomplete datasets, the likelihood wind turbine fire per year is generally accepted to be around 1-in-2000, but potentially lower than that(Krcmar, 2020). There are varying levels of resultant damage associated with these fires, which can range from small fire events through to complete burnout of the turbine nacelle, with uncontrolled nacelle fires resulting in significant damage or total turbine loss much of the time.

3.2.3.4 Wind Farm Risk Summary

There are number of learning opportunities from the past wind farm fires, which can be used to inform the bushfire risk management strategy.

With respect to bushfires impacting the wind farm site (such as the Waterloo Wind Farm fire), AFAC noted the following:

- *The wind farm's access roads were beneficial in helping fight the bushfire on the ground and provided an effective firebreak.*
- *The wind farm's turbines did not present a hazard to aerial firefighting and the turbines were clearly visible to the pilots involved in operations. However, transmission infrastructure, transmission lines and meteorological masts were difficult to see by pilots and did pose a safety risk.*
- *To maximise air space for firefighting between the turbines, turbines should be locked in the 'Y' position.*
- *Improved communication protocols need to be in place between wind farm operators and fire and land management agencies to direct turbine shut-down procedures in an emergency situation and initiate emergency response plans.*
- *Wind farm operators should ensure that they have the capacity to respond to emergency events.*
- *Wind farm operators should ideally select turbines that can be rapidly shut down to the preferred position.*

- *Additional precautionary measures should be considered to allow for aerial identification of meteorological masts (measurement towers), guy wires and other infrastructure such as transmission lines that are not easily visible from air.*

Additionally, the Clean Energy Council also added the following comments:

- *Ensure aerial-friendly identification and markings for meteorological ("met") masts and guy wires is provided at wind farm locations.*
- *Review and update emergency management plans and protocols with a focus on:*
  - *Communications practices including advising state air-desk (who control aerial firefighting assets)*
  - *On site asset management/operations centre control procedures to pause, brake and 'lock' individual turbines*
  - *Best practice approaches to support aerial and ground-based responses*
  - *Water storage point signage, access track markings and site mapping.*
- *Ensure ongoing and regular engagement with local volunteer organisations and services.*

In addition to the comments above, the following is also noted:

- The considerable cleared areas at the base of turbines (footings and crane pads) provide useful areas for firefighting operations.
- While locking the turbines in the "Y" position is ideal, the CFS reported that the aerial operations were able to occur with the turbines "paused" which is understood to be with the turbines shutdown, but the blades not locked (i.e. turning very slowly).

With respect to turbine fires, the following is noted:

- Both the Victorian and South Australian fire services have noted that turbine fires are a low likelihood event, with very few having occurred.
- Most turbine fires have occurred in old turbines that are likely 20 years old, and which:
  - Have older technology without the and more advanced fault monitoring, detection, etc currently installed in most modern-day turbines in wind farms.
  - Likely lack nacelle suppression systems to control the fire and prevent escalation to an uncontrolled turbine failure event.
- Prevention of an uncontrolled turbine fire or failure event should be seen as the primary objective to prevent potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so.
- Early notification of local fire brigade, nearby farmers/landowners and the wind farm personnel is critical to ensure a rapid and coordinated response.

3.3 Derived Bushfire Risk Management Principles

Based on the analysis of the bushfire hazards and risk associated with renewable energy infrastructure facilities, the following are considered key bushfire risk management principles to be incorporated into the proposed development to manage bushfire risk, both to protect the renewable energy infrastructure from bushfire, and to manage the risk of bushfire ignition from infrastructure fire.

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of renewable energy facilities is based on several factors.

- Ensure suitable separation from nearby unmanaged vegetation so bushfire impact on the infrastructure is appropriately managed commensurate to anticipated bushfire behaviour, in addition to providing sufficient separation to limit fire escape from renewable energy infrastructure fires (or BESS explosion) to ignite a bushfire.
- Provision of appropriate vehicular access to the renewable energy infrastructure facility for attending firefighters, including permitting fire appliance turnaround where required.
- Provision of secure firewater supply for attending firefighters, to enable a rapid suppression response.
- Appropriate renewable energy infrastructure design and construction including (but not limited to):
    - For BESS facility
        - Ensuring ember ingress cannot result in BESS fires
    - For wind turbines
        - Ensure that the risk of uncontrolled turbine fire or failure events is mitigated, to avoid potential bushfire ignition events and enable firefighters to approach the turbine as close as safe to do so.
        - Monitoring of the operational status of the turbines, both locally onsite and remotely offsite, including any faults, with ability to remotely shutdown and de-energisation of turbine/s.
        - Provision of fire detection, alarm and suppression system to provide early warning of internal fire and automatic response.
        - Ensure all infrastructure that could potentially present a risk to pilots and aerial operations (e.g. turbines, meteorological monitoring towers etc) are recorded with relevant aviation authorities and provided with any required markers/lights etc to minimise risk during aerial firefighting operations
- Provision of mobile firefighting equipment and training for facility personnel to manage risk of onsite hot works and potentially intervene any small ignitions until fire brigade arrive.
- Ensure sufficient information regarding the facility, its hazards and emergency management procedures are available to assist any attending firefighters.
- Engage with local fire brigade during project development and commissioning process, to ensure they understand the system and be aware of its specific hazards.
- Develop an emergency management plan which comprehensively details the preparedness and response procedures for various emergencies including bushfire.

4 Bushfire Risk Assessment

The broad process for effective risk management utilised in this BMP is identified in Figure 4-1 and used under Creative Commons CC BY 4.0 from SPP 'Natural hazards, risk and resilience state interest – Bushfire' (QFES 2019a).

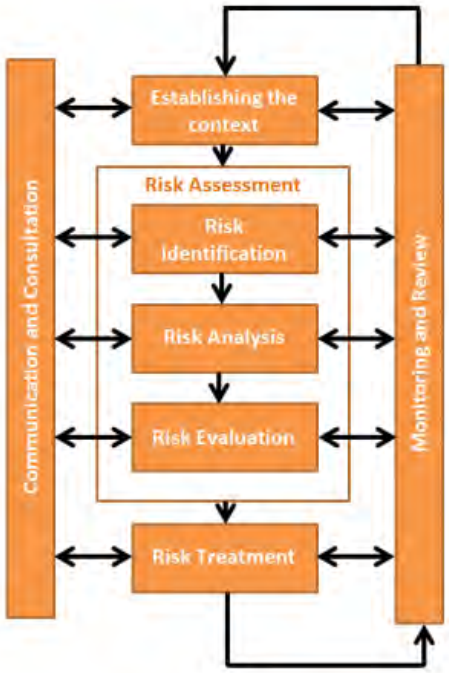


Figure 4-1. Risk management process (Queensland Government 2019; Figure 3).

4.1 Radiant Heat Flux Analysis

Bushfires present risks through flame contact, ember attack, and Radiant Heat Flux (RHF) exposure. To ensure developments are suitably placed within identified bushfire prone areas, RHF are undertaken to observe and inform sufficient setback distances. RHF calculations identify the rate at which heat transfers to a receiver from a potential fire and how the energy dissipates with increasing distance from the fire.

Subsequently the sizing of Asset Protection Zones (APZs; low fuel zones around buildings/critical infrastructure) should be informed by undertaking Radiant Heat Flux (RHF) calculations to determine the required setback distances, ensuring that the proposed infrastructure is sited as to not be impacted by unacceptable levels of RHF from potential bushfires.

4.1.1 Radiant Heat Flux Calculation Methodology and Inputs

To provide more definitive results on the potential impact of RHF on the proposed WF/BESS infrastructure, 2-D RHF calculations were undertaken in accordance with BRC, which specifies the application of Method 2 of Australian Standard (AS) 3959:2018 'Construction of buildings in bushfire-prone areas' ('AS3959'; Standards Australia 2018). The RHF calculations were undertaken using Inferno-BAL modelling software, which was developed in-house by Covey, which applies Method 2 of AS3959.

- Most inputs are default as per Method 2 AS 3959, including flame width
- For flame temperature:

- AS 3959 specifies a flame temperature input value of 1,090°K to be applied to ancillary infrastructure
- A higher flame temperature of 1,200°K is applied to developments that include *hazardous materials* as defined by the SPP (e.g. BESS).

Table 4-1. Radiant Heat Flux model assumptions – modified Method 2 of AS 3959

	Calculation Parameters	Flame Properties		Target
Situation	Default Inputs	Flame Temperature	Head Fire width	Radiant Heat Flux
WF infrastructure other than BESS (e.g. WTGs, substation, transformers buildings, switchrooms)	Emissivity: 0.95 ε Heat of Combustion: 18600 kJ/kg Relative Humidity: 25% Ambient Temperature: 308°K Transmissivity: 0.775	**1090°K**	100 m	≤29 kW/m^2
BESS Units	Emissivity: 0.95 ε Heat of Combustion: 18600 kJ/kg Relative Humidity: 25% Ambient Temperature: 308°K Transmissivity: 0.775	**1200°K**	100 m	≤10 kW/m^2

In addition to the above, other RHF modelling inputs include the following as summarised on Table 4-2:

- As per Section 2.1.2, the 5% annual exceedance probability fire weather of **FFDI 95** has been adopted
- 1-metre DEM of the existing terrain surface to derive effective slope beneath vegetation but noting that given the DEM data does not include the proposed design surface, and as such, the RHF results are indicative given the site slope may be subject to change post-development.
  - *Effective Slope* is defined as the slope under the classified vegetation which most influences the bushfire attack (per AS3959-2018).
  - *Site Slope* is the slope under the subject area, site or asset (per AS3959-2018).
  - Varied slope values have been used to account for variation in elevation across the wind farm site.
  - Further description of 'effective slope' and 'site slope' is provided in Appendix B.
- Site specific vegetation hazard classes and their associated potential fuel loads for Bushfire Prone vegetation only, determined in accordance with procedure 5.4.2 Step 2 of BRC (2019) as per Table 2-3; and
  - According to section 7.6 of the BRC, RHF and Bushfire Attack Level (BAL) are not required to be calculated for grassfire prone VHCs or low hazard VHCs (QFES, 2019b). As such, VHC 41.4, VHC 42.6 and VHC 43.6 (all low hazard) were excluded from the model and Table 4-2.
- Rate of spread models are taken from those adopted in AS 3959, relevant to the bushfire fuel types as follows:
  - Woodland vegetation
    - R = 0.0012 * FFDI * SFL as per Catchpole et al, 1998

Table 4-2. Fuel input values and rate of spread equations (per BRC and AS3959).

FFDI	Vegetation Criteria				Rate of Spread Equation
	Vegetation Class	Vegetation Type	SFL (t/ha)	TFL (t/ha)	
95	VHC 16.2	Woodland	11.1	11.6	R = 0.0012 * FFDI * SFL (Catchpole et al (1998)
95	VHC 19.2	Woodland	7.3	9.1	

Covey notes that there are limitations predicting fire weather, bushfire behaviour and conducting RHF analysis, which have been detailed in Appendix C.

4.1.2 Target Radiant Heat Flux

Four RHF values (40 kW/m^2, 29 kW/m^2, 19 kW/m^2 and 12.5 kW/m^2 @ 1090 K flame temperature) trigger specific Bushfire Attack Level (BAL) construction requirements under the Building Code of Australia, for certain building classifications, namely BAL-40, BAL-29, BAL-19 and BAL-12.5. A fifth classification also exists for buildings in areas with RHF >40 kW/m^2 where impact by direct flame impingement is almost certain, which is called BAL-FZ (flame-zone).

While the proposed infrastructure at this development are exempt from that BCA specified construction (i.e. they are not assessed as BCA building classifications), SPP guidance material (Natural Hazards, Risk and Resilience State Interest – Bushfire) recommends development footprints excluding roads (i.e. WTG, ancillary facilities such as site offices/compounds, on-site accommodation, switchboards, substations and static water supply points) to be separated from the closest assessable vegetation by a distance that achieves a RHF of 29 kW/m^2 or less. There is currently limited specific guidance regarding the target RHF for infrastructure containing hazardous materials such as the BESS units.

Notwithstanding the above, Covey notes the following:

- ***Wind Turbine Generators***
  - are constructed of non-flammable exterior materials that are highly unlikely to be ignited.
  - the likelihood of loss of life is considered very rare given that limited personnel will be present once the Project is operational. It is anticipated that personnel only onsite for periodic maintenance undertaken at a scheduled and as needed basis.
  - Based on the above, the target RHF for proposed WTG of 29 kW/m^2 or lower (at 1090 K flame temperature) is considered appropriate to comply with SPP guidance material and manage the risk of bushfire impact on the WTG.
- ***Transformers (Substation and in BESS yard)***
  - The risk to, and from, transformers is primarily related to potential for over-pressurisation of insulating oil tank resulting in rupture and subsequent pool fire.
  - Given the limited likelihood of failure, and the difficulty in igniting the insulating oil, the target RHF for proposed transformers of 29 kW/m^2 or lower (at 1090 K flame temperature) is considered appropriate.
- ***Buildings and Switch-rooms***
  - There are several buildings and switch-rooms proposed in the BESS yard.

- The target RHF for these is 29 kW/m^2 or lower (at 1090 K flame temperature), which is consistent with SPP and Cloncurry BHOC requirements.

- ***BESS Units***
  - Contain Lithium-ion (Li-ion) battery cells housed in a metal container
  - The significant hazard posed by BESS units is primarily associated with thermal runaway occurring in the Li-ion batteries, and the fire and explosion risk that can accompany the release of flammable gases. Thermal runaway describes a process that is accelerated by increasing internal temperature, in turn releasing more energy that further increases temperature.
  - While the BESS container itself normally a non-combustible container, given the risk of thermal runaway being triggered by direct flame impingement and RHF impression on the container (albeit noted that internal battery and thermal management systems will operate to prevent this), it is appropriate to provide increased separation from unmanaged classified vegetation to address the thermal runaway risk.
  - Based on the above, a target RHF to such infrastructure of 10 kW/m^2 or lower (at 1200 K flame temperature) is considered appropriate to limit potential thermal runaway, noting that the peak RHF from a forest or woodland fire is typically 60 to 90 seconds.
  - This target RHF is consistent with SPP requirements for hazardous materials and infrastructure, as well as those defined in Cloncurry BHOC.

4.1.3 Radiant Heat Flux Results

As part of the the NHRA report prepared by Covey (N25-0106 Rev C), the RHF results had been analysed to assess the potential impact of bushfires on the proposed infrastructure of the development – with the target RHF observed at each asset location of each WTGs, substation, the proposed BESS containers, and other auxiliary infrastructure.

Based upon the extent of vegetation clearing associated with the DF, there is sufficient setback distance achieved between retained vegetation and placement of proposed infrastructure. On this basis, appropriately sized Asset Protection Zones (APZs) will need to be established around the perimeter of all WTGs, BESS units and the substation, to achieve the target RHF detailed in Section 4.1.2.

This BMP will not repeat the RHF results, but instead demonstrate that suitably sized APZs can be established to ensure that the proposed infrastructure achieves the required setback to the target RHF. The minimum APZs requirements are detailed in the following section, with Figure 5-2 to Figure 5-14 illustrating APZs around relevant infrastructure to achieve the target RHF requirements.

5 Bushfire Risk Management Strategy and Mitigation Measures

Based on the guidance from the review of the bushfire and renewable energy infrastructure hazard in Sections 2 and 3, the bushfire risk analysis in Section 4, the requirements of SC23, SC27 and Cloncurry Shire Council BHOC, and underpinned by relevant Model Requirements of the CFA Design Guidelines, the following bushfire risk management strategy to manage bushfire risk to the facility, while also managing the escape of onsite infrastructure to ignite a bushfire:

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of renewable energy facilities is based on a number of factors.
- Create sufficient separation between infrastructure from surrounding unmanaged bushfire prone vegetation by establishing suitably sized APZs to achieve nominated target RHFs to:
  - limit radiant heat impact and prevent direct flame impingement on the renewable energy infrastructure, and
  - ensure a BESS explosion is not able to readily ignite surrounding vegetation and to improve the effectiveness of the other mitigation measures incorporated into the facility.
- Provision of appropriate vehicular access to the renewable energy infrastructure facility for attending firefighters
- Provision of secure firewater supply for attending firefighters.
- Incorporate any infrastructure design requirements to improve bushfire resilience
- Detail any specific requirements associated with construction and commissioning phases
- Detail any specific requirements associated with operational phase, or ongoing maintenance and housekeeping tasks
- Outline and specific bushfire emergency management considerations including emergency services familiarisation, for renewable energy infrastructure

The subsections below detail the proposed bushfire risk mitigation measures to be adopted by the project to achieve the bushfire risk management strategy, which were possible have been depicted on Figure 5-2, with a compliance assessment in Section 6 demonstrating how these measures achieve compliance with the relevant planning instruments.

5.1 Vegetation Modification and Management

The following Non-Vegetated Zone (NVZ) and Asset Protection Zones (APZ) are to be established around renewable energy infrastructure providing separation from unmanaged bushfire prone vegetation, to protect infrastructure from approaching bushfire impact, while also reducing the potential for onsite infrastructure fires to ignite a bushfire.

- NVZ/APZ around the perimeter of all renewable energy infrastructure including
  - BESS containers
  - Buildings, switch-rooms and associated infrastructure withing BESS yards
  - Transformers within substation and BESS yards
  - Wind turbines
  - Firewater tank
- Non-vegetated land within perimeter NVZ/APZ of the following:

- BESS yard
- Substation yards

Where stipulated, the NVZ/APZ must be non-vegetated, however outside this they can be either non-vegetated or managed low threat landscaping established in accordance with the APZ guidance (see Appendix D) and AS 3959 Clause 2.2.3.2 (e) and (f) (see Appendix E), however would preferably be non-vegetated where possible.

All onsite vegetation modification and management (including NVZ/APZ) is to be conducted and maintained by the Proponent for the life of the facility.

5.1.1 Vegetation Modification and Management – BESS System and associated infrastructure

Given the potential for BESS units to react to elevated temperatures, NVZ/APZ to achieve no less than BAL-10 kW/m^2 (at 1200 K flame temperature) is considered appropriate.

Based on the above, the following NVZ/APZs will be required for the BESS system:

- For Stage 1, the BESS units are to have a 35.4 m to 44.1 m wide perimeter NVZ/APZ to achieve 10 kW/m^2 or lower, consisting of the following:
  - A 10 m wide NVZ adjacent to the BESS units, that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.
  - Outside the 10 m NVZ, the remaining 25 -35 m can be either non-vegetated or otherwise comply with the APZ guidance (Appendix D) and AS 3959 Clause 2.2.3.2 (e) and (f) ((see Appendix E), with the following clarifications:
    - Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS
- For Stage 2, the BESS units are to have a 35.4 m to 98.9 m wide perimeter NVZ/APZ to achieve 10 kW/m^2 or lower, consisting of the following:
  - A 10 m wide NVZ adjacent to the BESS units, that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.
  - Outside the 10 m NVZ, the remaining 25 -89 m can be either non-vegetated or otherwise comply with the APZ guidance (Appendix D) and AS 3959 Clause 2.2.3.2 (e) and (f) ((see Appendix E), with the following clarifications:
    - Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS
- The following infrastructure is to be provided APZs as follows, noting most are likely to be addressed by the BESS APZ.:
  - Medium Voltage Power Stations – 10 m APZ, or sufficient to achieve BAL-29
  - 4 switch-rooms - 10 m APZ, or sufficient to achieve BAL-29
  - Office/control room and workshop/storage containers - 10 m APZ, or sufficient to achieve BAL-29
  - Auxiliary transformers - 10 m APZ, or sufficient to achieve BAL-29

All land within the BESS perimeter NVZ/APZ (especially within BESS yard fence), is to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.

5.1.2 Vegetation Modification and Management – Substation

In order to ensure sufficient separation is maintained between proposed substation, and surrounding unmanaged vegetation, the following NVZ/APZs will be required:

- A 10 m to 12.6 m wide perimeter NVZ/APZ to achieve BAL-29 or lower on the substation envelope.
  - Ideally the perimeter NVZ/APZs around substation should be non-combustible (constructed of concrete, mineral earth or non-combustible mulch) and free of vegetation as much as practical, or otherwise compliant with the APZ guidance in Appendix D, with no plant or equipment unless non-combustible.

Additionally, all land within the substation perimeter NVZ/APZ (i.e. with substation fence) is to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.

Similar to the BESS, the substation is to be delivered in two stages, the NVZ/APZ sizing nominated above is that required upon completion. There will need to be an intermediate NVZ/APZ provided around the Stage 1 substation extent, which is expected to be 10 m to 28.7 m wide, and which requires the same specifications as previously detailed above.

5.1.3 Vegetation Modification and Management – Wind Turbines

In order to ensure sufficient separation is maintained between proposed turbines, and unmanaged vegetation, the following APZs will be required:

- In order to achieve BAL-29 or lower on the turbines, a 10 m – 44 m wide NVZ/APZ (summarised on Table 5-1) are to be established around the base of the turbines as follows:
  - The 10 m closest to the turbine is to be established as a Non-Vegetated Zone (NVZ) is to comply with AS 3959 Clause 2.2.3.2 (e) (see Appendix E) and the standards for "firebreaks" from CFA Guidelines as follows:
    - Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.
    - Free of vegetation and obstructions at all times.
    - No combustible plant or equipment.
  - Land within the NVZ/APZ can be established as either non-vegetated land, or as managed low threat landscaping in accordance with the APZ guidance (Appendix D) and AS 3959 Clause 2.2.3.2 (e) and (f) ((see Appendix E).

All NVZ/APZ around turbines are to be established and maintained by the Proponent for the life of the facility, especially during Fire Danger Season.

Table 5-1. NVZ/APZ widths for proposed turbines

Turbines Number	NVZ/APZ width (around base of turbine
Stage 1 Turbines	
WTG 05, WTG 06	10 m
WTG 04, WTG 08	12 m

Turbines Number	NVZ/APZ width (around base of turbine
WTG 02	14 m
WTG 03	16 m
WTG 07	18 m
WTG 01	29 m
Stage 2 Turbines	
N4, S4, S8	10 m
S2	11 m
N5, N8, S7	12 m
S1	14 m
S6 N7	15 m
N1	16 m
N6	26 m
N2A	38 m
S5	39 m
N3	43 m
S9	44 m

The wind turbines are to be delivered in two stages, with the NVZ/APZ for the turbines nominated in Table 5-1 relevant for the applicable turbines at whichever stage they are delivered.

5.1.4 Vegetation Modification and Management – Above-ground Transmission Lines

To manage the risk of potential bushfire ignition due to interaction between the transmission line and nearby vegetation, the following vegetation clearances are to be established in accordance with the Electricity Act 2002 (Queensland Government, 2002), National Electricity (Queensland) Law (Queensland Government, 1997) and Energy Networks Australia 'Vegetation Risk Management for Overhead Electricity Networks – Guideline (2018)' (Energy Networks Australia, 2018)

- Establish a managed powerline corridor as per Powerlink document 'ASM-GDL-A588593 Site Selection, Easements and Sites – Guideline v7.1' (Powerlink Queensland, 2023) including:
  - Around proposed towers (see Figure 5-1):
    - Restrict vegetation height to 1 m within the conductor shadow area plus 6 m either side.
    - Outside of this zone vegetation that could grow to a height greater than 3.5 m is to be cleared or selectively removed.

- Along the conductor lines, maintain a minimum clearance zone of:
  - 6 m on either side of the conductor lines (both vertically and horizontally), and
  - An additional 3 m clearance to accommodate for future vegetation growth along the entire span of the transmission lines.
- Easements are to have an available fuel load of less than 8 t/ha per BRC (s 9.3), and be regularly mowed and/or slashed, particularly before and during elevated fire danger periods; and
- Avoid planting incompatible species within easements such as those with stringy-bark and paperbark bark types.

- Trim or selectively remove trees and vegetation where it encroaches into the nominated clearance space

All vegetation management around transmission towers, and vegetation clearance along the lines, is to be established and maintained by the Proponent for the life of the facility, especially during Fire Danger Season.

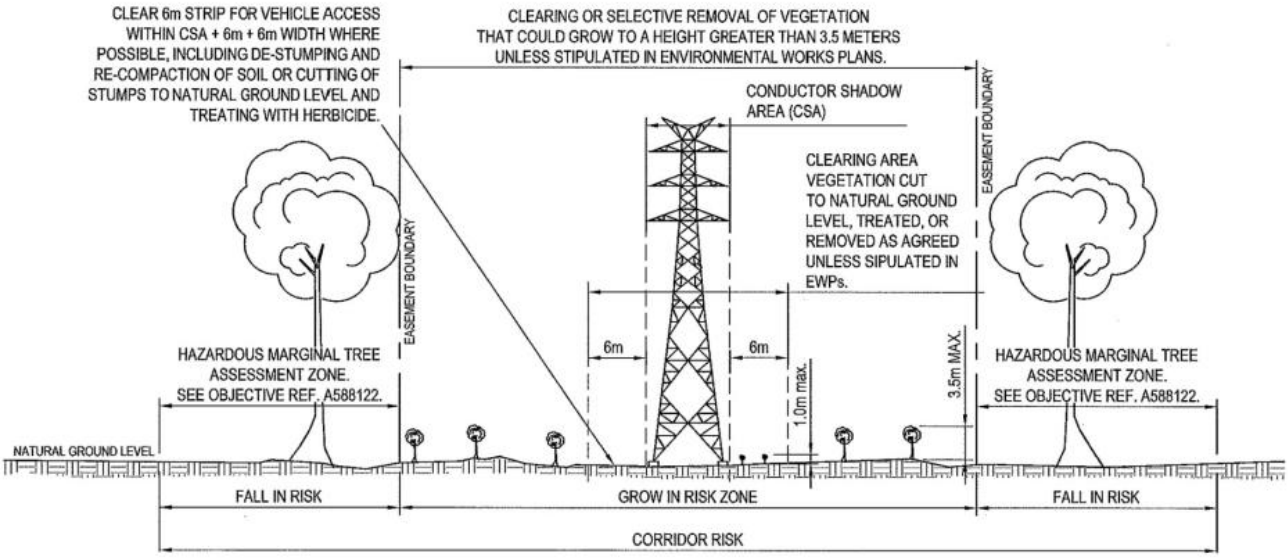


Figure 5-1. Transmission Tower Vegetation Management

5.2 Vehicular Access

- Vehicular access to all parts of the proposed facility shall be provided from the existing access roads to the mine and Accommodation Camp and are to ensure appropriate access to/from the site to the greater public road network, can be achieved during a bushfire emergency.
- Unless otherwise stipulated, all new internal roads are to comply with internal road standards (detailed in Appendix F)
- All required gates are to be as follows:
  - Provide at least 4 m clear horizontal width
  - If required to be locked, any keys are issued to QFD and any local fire brigade.
- The internal road network needs to provide vehicular access to the proposed firewater tank (required for renewable energy infrastructure), with access is to be provided to within 4 m of the tank suction point.

- The internal road network and gates (if any) are to be constructed and maintained by the Proponent in for the life of the facility.

5.2.1 Vehicular access – BESS System

- Ensure suitable vehicular access within the BESS yards at each stage, as per the following:
  - Provide sufficient vehicular access around the perimeter of the BESS containers (and other infrastructure) in the BESS yard and within the fence line.
  - All internal roads are to comply with internal road standards (detailed in Appendix F)

5.2.2 Vehicular access – Substation

- Provision of internal road access to the substation envelope, from the mine access road, is to comply with internal road standards (detailed in Appendix F).

5.2.3 Vehicular access – Wind Turbines

- Internal access roads are to be provided to each turbine as follows:
  - Comply with internal road standards (see Appendix F)
  - Driveways are to be at least 4 m wide, but if <6m wide, passing bays are to be provided every 600 m that are 6m wide x 20m long.
- A loop road or turnaround facility is to be constructed at, or around the perimeter of, the base of each turbine to enable fire appliance turnaround, as follows
  - If a turnaround facility is provided, it is to comply with the internal road standards (see Appendix F).
  - It is recommended that the turnaround be within the 10 m NVZ or at the crane pad of each turbine.
- The internal wind farm road network needs to provide vehicular access to the proposed firewater tank in the south, with compliant access is to be provided to within 4 m of the tank suction point.

5.2.4 Vehicular access – Above-ground Transmission Lines

- While there are no specific requirements for vehicular access to the transmission lines, it is recommended that any access tracks created as part of the construction of this infrastructure, is maintained for ongoing access for maintenance and firefighting purposes, the life of the facility.

5.3 Bushfire Water Supply

Given the existing firewater supplies that are currently installed at the DRM and Accommodation Camp, the bushfire water supply for the renewable energy infrastructure required for the Project is detailed below, which will also need to comply with the following:

- Any firewater tanks will also need to comply with any local requirements and the following from the CFA Design Guidelines:
  - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
  - The tank suction point must be within 4 m of a road or hardstand
- All firewater tanks are to be sited further than 10 m from infrastructure and buildings, as well as in an area of BAL-29 or lower (a 10 m wide APZ, depending on final location).
  - To ensure this is implemented, a 10 m wide NVZ/APZ around the perimeter of the tank/s

- No infrastructure or buildings are permitted in the 10 m NVZ/APZ, and all land between the tank/s and nearby infrastructure, or buildings is to be non-vegetated.

- Vehicular access to the firewater tank/s is to be via proposed internal roads.
  - Vehicular access (compliant through road or with turning head) is to be provided to within 4 m of the tank suction point.
- The location of all firewater tanks (existing and proposed), and the internal access routes to these tanks, are to be documented in the Emergency Information Book (see Section 5.8), to inform attending fire brigade personnel.
- The firewater tank/s and associated NVZ/APZs, are to be constructed and maintained for the life of the project by the Proponent.

5.3.1 Bushfire water supply – BESS and Substation

- The project FSS nominates the following firewater requirements for the BESS:
  - Minimum firewater capacity of at least 108 000 L
  - Proposes use of the existing firewater tanks at the DRM and Accommodation Village sites which have a combined capacity of 1,000,000 L.
  - Firewater transport from the existing tanks to the BESS yard, is to be by the mine water cart (10 kL capacity) and two onsite fire appliances (2 kL capacity), assisted by (or assisting) QFD appliances upon turnout.
- There is no specific firewater provisions required for the substation, however the firewater proposed for the BESS yard, will provide firewater for bushfire fighting around substation.
- Given the substantial amount of firewater required, no additional capacity is considered necessary for bushfire fighting purposes.

5.3.2 Bushfire water supply – Wind Turbine

- Firewater supply for the turbines is to be guided by the CFA Design Guidelines for wind energy facilities.
  - It is noted that other than requiring a 45 kL firewater tank at each ‘site entrance’, there is limited detail to guide sizing and location of firewater tanks, especially as there is no definition of what is considered a ‘site entrance’.
  - For the purpose of this project, the wind turbine portion of the development is considered to be a northern and southern half.
  - The northern portion of the facility is well served by the existing firewater supplies at the DRM and Accommodation Camp, with 1,000,000 L combined capacity of firewater available for use, in the general area.
  - The southern portion of the facility, where wind turbines are further from the DRM and Accommodation Camp, there is a need to provide an additional firewater tank.
- Given the above, a firewater tank is proposed in the following location around the site:
  - One (1No) 45 kL firewater tank in the southern part of the site, nominally along the internal road near turbine WTG04.
  - While the firewater tank location proposed represent the current siting approach, there remains flexibility to relocate the tank, provided there is agreement with QFD, local fire brigades and the Proponent.

- The firewater tank will comply with the standards detailed at the start of Section 5.3, including vehicular access and signage requirements.
- The firewater tank is to be sited in an area of BAL-29 or lower with a 10 m wide NVZ/APZ.

5.3.3 Existing onsite fire appliances and firewater supplies

The Proponent is to ensure all existing onsite fire appliances and firewater tanks at the existing mine and Accommodation Camp, are to be filled and available for use prior to, and during commissioning of renewable energy infrastructure.

The Proponent is also to ensure all existing onsite fire appliances and firewater tanks are maintained, filled, and otherwise fit-for-purpose at all times prior to, and during, Fire Danger Season (nominally August and December peaking in October in this location).

5.4 Renewable Energy Infrastructure Design Requirements to Improve Bushfire Resilience

The following measures are required for the proposed renewable energy infrastructure are required to improve bushfire resilience.

5.4.1 BESS System

- Ensure the following elements are included in the BESS:
  - External container is to be non-combustible material (e.g. metal).
  - Provide suitable ember protection to prevent embers from penetrating battery containers/enclosures or vulnerable parts of the container that could result in BESS fire:
    - Any penetrations are to be appropriately sealed (with non-combustible material such as mastic or mineral wool etc) or gaps/openings (>2mm) are to be screened with non-combustible (aluminium, steel, bronze) screening with maximum aperture <2mm.
    - It is noted that the BESS containers are typically IP rated to limit dust ingress, however this should serve as an additional assessment to ensure ember ingress to any part of the container will not result in catastrophic failure.
  - BESS installation is on a non-combustible surface (e.g. concrete)
  - BESS design and installation is to comply with the project FSS.

5.4.2 Wind turbines

In addition to the measures detailed above, the following are also required for the proposed turbines to manage the risk of turbine fires that could ignite a bushfire.

5.4.2.1 Turbine Separation Distance

- All wind turbines must be located no less than 300 metres apart

5.4.2.2 Automatic fire detection, alarm and suppression

- All turbines are to be fitted with an automatic fire detection and alarm to provide early warning of internal turbine fire.
- All turbines are to be fitted with a fire suppression system, to provide an automatic fire suppression response upon detection of internal turbine fire.
- Activation of fire detection and alarm system is to be monitored at all times, either by wind farm personnel locally onsite, or via remote offsite monitoring.

- A procedure to be incorporated to ensure that activation of the fire detection system results in notification being provided immediately to the following people that there is an onsite turbine fire:
  - Wind Farm or DRM personnel,
  - QFD and local fire brigades
  - Nearby landowners/ farmers (if relevant)

5.4.2.3 Operational Status Monitoring and Control of Turbines

- In addition to the fire detection, alarm and suppression systems, appropriate operational status monitoring for all turbines must be provided, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified.
  - Operational procedures are to be implemented to ensure any persistent faults or operational alarms, are addressed promptly including rapid notification of WF on-call technician or relevant DRM staff.
- Monitoring of turbine operational status is to be able to be conducted both locally onsite and remotely offsite.
- Operational control of turbines should be possible from either onsite or from offsite, to enable both local and remote turbine de-energisation and/or shutdown should any faults or failures have potential to result in a turbine fire.
  - It is expected that any fault/s resulting in operation outside tolerable limits, would have automatic fail-safe procedures to de-energisation and/or shutdown the turbine to prevent turbine fire.

5.4.2.4 Turbine Shutdown and Disconnection from Power

- In addition to turbine operation status monitoring and control detailed above, all wind turbines are to be configured to automatically shut-down in the event of turbine fire.
- Each turbine can be remotely controlled from any duly trained technician or engineer from their laptop and placed in the “Y” pattern (rabbit ears position) in a bushfire event (in consultation with QFD, relevant power providers, Australian Energy Market Operator [AEMO]).
  - This will result in the turbine blades turning very slowly (e.g. windmilling) but not generating any power nor supplying to the grid.
  - This will also reduce any turbulence (wake effect) created by the turbine, as much as possible.

5.4.2.5 Aerial Notification and Marking

- Ensure the Civil Aviation Safety Authority (CASA) is notified of all installed weather monitoring stations and turbines as part of the wind farm.
- Ensure all guy wires and monitoring towers are compliantly marked to ensure visibility to aircraft.

5.4.3 Substation

- Substation infrastructure is to be designed, constructed and maintained in accordance with the project FSS and relevant Australian Standards.

5.4.4 Above-ground Transmission Lines

- Above-ground transmission towers, poles and lines are to be designed, constructed and maintained in accordance with Queensland electrical legislation and relevant Australian Standards.

5.5 Bushfire resilient construction

- Bushfire construction provisions of the National Construction Code require that buildings comply with the AS 3959 construction requirements, in accordance with the assessed BAL under AS 3959, provided the building is a Class 1, 2, 3 or associated Class 10a building/deck, or a "certain Class 9" building.
  - The renewable energy infrastructure (BESS, turbines, substation) will not be any of the classifications nominated above, therefore in accordance with the National Construction Code, and as such, there is no statutory requirement to meet the construction requirements of AS 3959.
- As detailed in Section 5.4.1, BESS construction is to comply with the CFA Guidelines and incorporate the following:
  - Container construction is to be non-combustible material (e.g. metal).
  - Ember protection is to be provided to vulnerable parts of the BESS containers.

5.6 Construction and Commissioning

- Ensure an emergency communication system must be provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and transformers) must comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure all existing onsite fire appliances and firewater currently at the existing mine are filled and available for use prior to, and during commissioning of renewable energy infrastructure.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for Dangerous Goods as per relevant Australian Standards.
- Ensure tight ignition source control measures, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Ensure appropriate bushfire emergency management procedures are available for the construction and commissioning phase of the facility,
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the BESS containers and wind turbines.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 5.9.

5.7 Renewable Energy Infrastructure Operation, Maintenance and Housekeeping

- Ensure ongoing compliance with the endorsed BMP is achieved, especially prior to, and during, Fire Danger Season (nominally August and December peaking in October in this location). This includes all vegetation management, internal road access, fire system and firewater obligations.

- Ensure the Emergency Information Book is appropriately stored at all nominated site entrances (or main administration or other agreed location), and reviewed on an annual basis (see Section 5.8).
- Develop, implement and review the Emergency Management Plan including all preparedness, pre-emptive and response actions, as required, and ensure ongoing review (see Section 5.10 below).
- Ensure inspection, maintenance and any required repair activities are conducted by the Proponent for all renewable energy infrastructure, associated equipment, fire systems, communication systems, and vehicles at the facility, in line with relevant Australian Standards and manufacturers requirements.

5.8 Emergency Information Book

It is recommended that an Emergency Information Book (or similar approved) with any plans and emergency response information, is provided at the nominated site entrance to the facility (in a weatherproof container), or at the main administration building (or similar if agreed with QFD). The requirement for an Emergency Information Book can be removed if this information is provided in the project Emergency Management Plan, or otherwise provided, to the satisfaction of QFD.

The Emergency Information Book is intended to provide to emergency responders with a quick overview of the facility, should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following relating to bushfire response:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
  - Buildings, substations and renewable energy infrastructure (including turbines and BESS),
  - Internal driveways and surrounding public roads
  - Fire protection systems and equipment, including firewater tanks
  - Grid connections, drains and isolation valves,
  - Dangerous goods storage areas
  - Neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
  - North direction and scale
- The following wind turbine information:
  - Schematics and technical data for wind turbines, including the number installed on-site, and internal fire systems.
  - Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.
  - The shutdown and/or isolation procedures
  - Appropriate personnel contact details to verify that the turbine has been shut-down and de-energised during emergencies.
- Relevant BESS details and plans
- Details of any emergency equipment, including the type and location of fire and gas detection and suppression systems.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.

- Procedures for the management of emergencies, including offsite evacuation, shelter-in-place, containment of spills and leaks, and fire response procedures (including infrastructure/plant fires, vehicle fires, bushfire).

A review of the information contained within the facility's Emergency Information Book must be undertaken annually prior to Fire Danger Season (nominally August at this location).

5.9 Emergency Services Familiarisation

It is recommended that prior to commissioning of the facility, a familiarisation visit of the proposed facility is offered to QFD and local fire brigades, detailing the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book (see Section 5.8) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade.

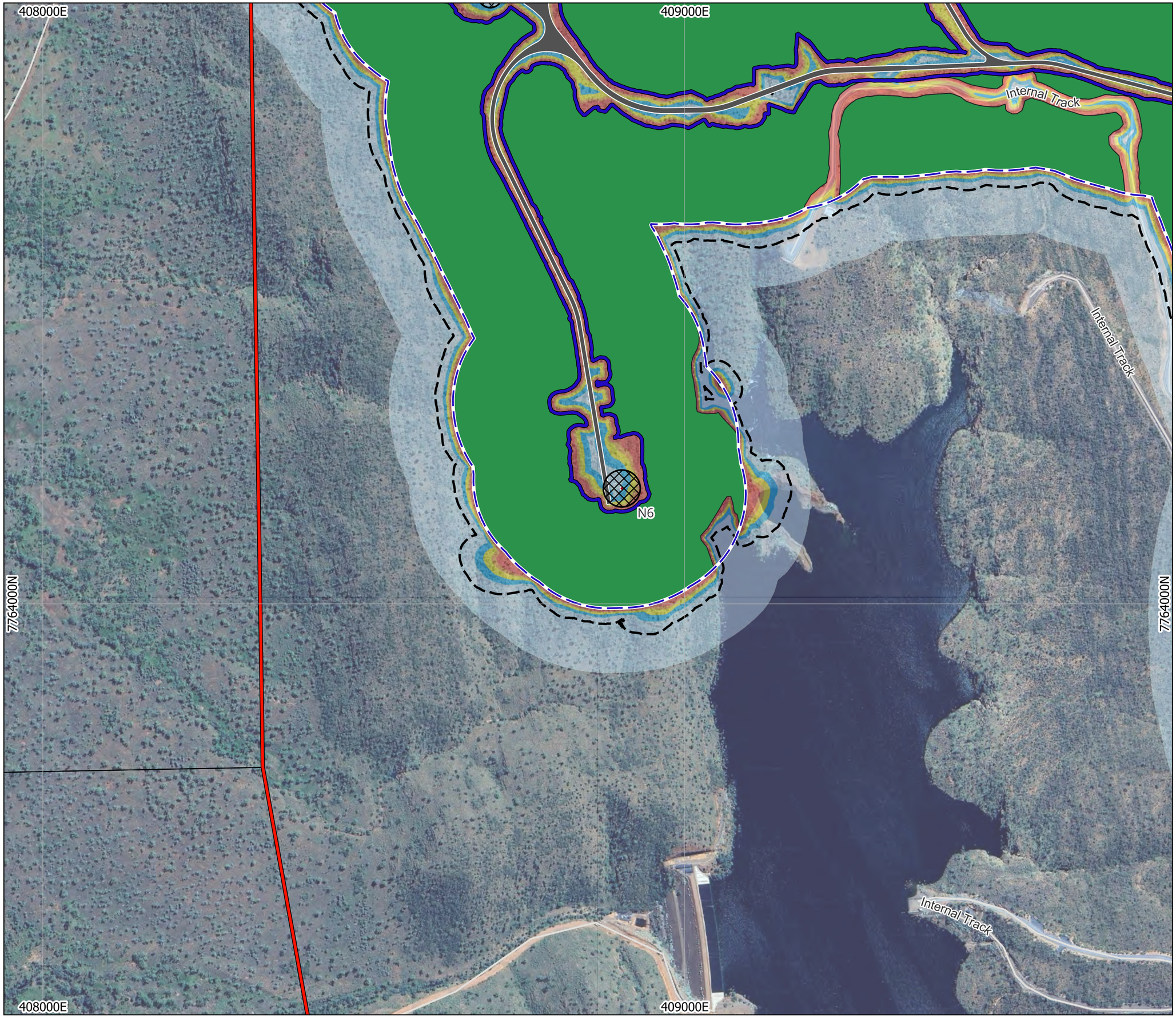
5.10 Emergency Management Plan

An Emergency Management Plan has been to be developed for the facility by others, with procedures for preparing for, and responding to, hazards to the facility, including for onsite and off-site bushfire, and various on-site fire scenarios (especially BESS fires).

While outside the scope of this BMP, it is recommended that the following for wind turbines is incorporated into the Emergency Management Plan:

- Response for a bushfire emergency is to include the following:
  - Immediately notify QFD to enable a rapid turnout
  - Prepare to conduct remote shutdown and de-energisation of turbine/s, and place turbine blades in the "Y" pattern (in consultation with QFD, AEMO and relevant agencies), should it be required.
- Response to onsite turbine fire is to include:
  - Immediately notify QFD to enable a rapid turnout, relevant onsite personnel and neigbouring landowners (if relevant)
  - Confirm shutdown and deenergise any turbine/s on fire, and any other relevant turbines
  - If safe to do so, deploy trained site personnel to conduct first attack response on any spot fires with onsite fire appliances, until QFD arrival. Site personnel are not expected to fight onsite infrastructure fires, but only limit any potential for bushfire ignition.
- The following details and plans:
  - Schematics and technical data for wind turbines, including the number installed on-site, and internal fire systems.
  - Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk.

- The shutdown and/or isolation procedures if the turbines are involved in fire or there is an approaching bushfire, and appropriate personnel contact details to verify that the turbine has been shutdown and de-energised during emergencies.



Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E

410000E

7766000N

7765000N

N1

N2A

N3

N4

N5

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 2

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E
410000E
7763000N
7762000N
S1
S2
Internal Track
Internal Track
Internal Track
Internal Track
Internal Track

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- Easement
- Compound Area Stage 1
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E

410000E

7760000N

WTG02

WTG03

S4

Internal Track

Internal Track

Internal Track

409000E

410000E

7760000N

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E
410000E
7760000N
7759000N
WTG03
S4
S5
Internal Track

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E

410000E

7758000N

7758000N

S6

S7

WTG04

WTG05

W

409000E

410000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Static Water Supply
- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

410000E

Internal Track

N8

N7

Internal Track

Internal Track

7764000N

7764000N

410000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

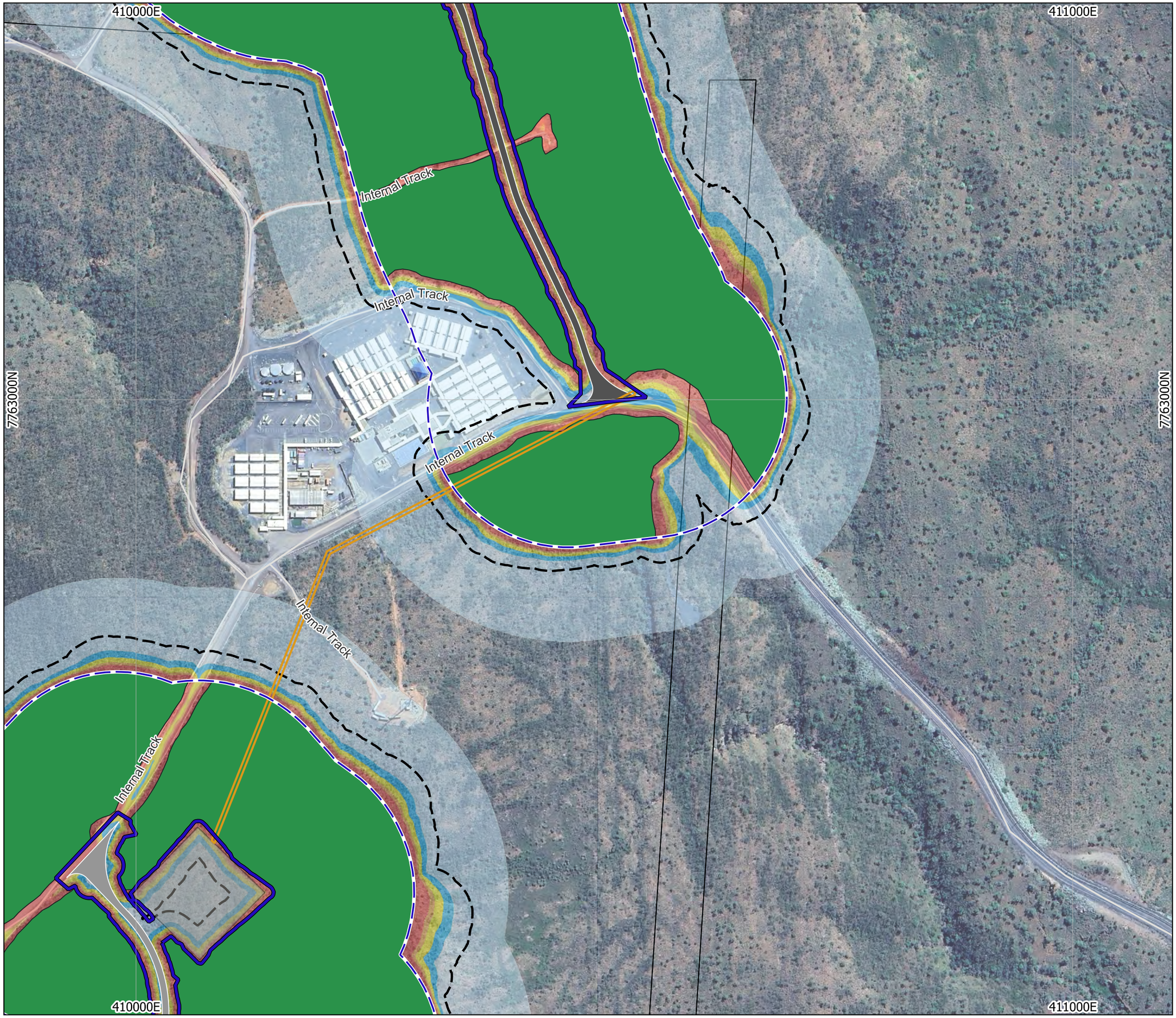
0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin



Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- Easement
- Compound Area Stage 1

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E

410000E

7761000N

Internal Track

WTG01

Internal Track

BESS and substation

Internal Track

Internal Track

409000E

410000E

7761000N

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 220 kV OHL EASEMENT
- 33 kV OHL
- Met. mast
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

412000E

413000E

7761000N

Internal Track

Mmg Dugald River Mine Access Road

412000E

413000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 220 kV OHL EASEMENT

Roads and Tracks

- Local
- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E
410000E
7757000N
7756000N
WTG06
WTG07

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 33 kV OHL
- Met. mast
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

409000E
410000E
7755000N
WTG08
S9
S8
409000E
410000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire Mitigation Measures

- Proposed Asset Protection Zones (Minimum)

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

411000E

412000E

7761000N

Internal Track

Internal Track

Internal Track

Internal Track

Internal Track

Internal Track

411000E

412000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 220 kV OHL EASEMENT

Roads and Tracks

- Unconfirmed

Classified Vegetation (clearing to extent of DF)

- Woodland

Inferno-BAL results

- Extent of BAL12.5 zone (12.5kW/m2 to 100m from vegetation)
- Extent of BAL19 zone (12.5 - 19kW/m2)
- Extent of BAL29 zone (19 - 29kW/m2)
- Extent of BAL40 zon (29 - 40kW/m2)
- Extent of BALFZ zone (within the length of flame and >40kW/m2)
- Extent of RHF10kW/m2 at 1200K

Bushfire mitigation measures

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Bushfire Mitigation Measures for BMP_0001

CRS: GDA2020 / MGA zone 54
Date created: 07/04/2026
Author: Aaron Bulfin

6 Compliance Assessment

As summarised in Section 1.6, the purpose of the BMP is to demonstrate proposed development is compliant with the bushfire requirements of various planning instruments

Also mentioned in Section 1.6, is there is lack of detailed design guidance as how to achieve compliance with these instruments, especially for bushfire risk management, and on that basis, Covey proposes voluntary use of the bushfire-related Model Requirements of the CFA Design Guidelines to provide an appropriate technical benchmark, justifying deviations where they exist.

The assessment against the CFA Design Guidelines is provided in Appendix G, and has been used to develop the bushfire risk management strategy and mitigation measures, and underpins the following compliance assessments detailed in the following tables in this section:

- SPP - Natural hazards, risk and resilience – Bushfire (see Table 6-1)
- State Code 23 – Wind Farm Development (see Table 6-2)
- State Code 27: Battery storage facility development (see Table 6-3)
- Cloncurry Shire Council Planning Scheme including Bushfire Hazard Overlay Code (see Table 6-4)

6.1 SPP - Natural hazards, risk and resilience – Compliance Assessment

Covey have conducted an assessment against the bushfire-related State Interests of SPP - Natural hazards, risk and resilience – Bushfire in Table 6-1 below.

Table 6-1. State Interest assessment against SPP - Natural hazards, risk and resilience.

State Interest Policy		Compliance / Recommendations
1	Natural Hazard areas are identified including: (a) Bushfire prone areas (b) Flood hazard areas, (c) Landslide hazard areas, (d) Storm tide inundation areas, (e) Erosion prone areas.	As detailed in project NHRA and depicted on Figure 1-2 of this BMP, the majority of the development footprint, including proposed renewable energy infrastructure, has been identified within areas of ***Medium Potential***, ***High Potential*** and ***Very High Potential Bushfire Intensity*** on the SPP BPA mapping, due to large tracts unmanaged woodland vegetation, typically observed in more rugged terrain. Consideration of hazards (b) to (e) are outside the scope of this BMP, but flood hazards have been considered in the project NHRA.
2	A fit-for-purpose risk assessment is undertaken to identify and achieve an acceptable or tolerable level of risk for personal safety and property in natural hazard areas.	Based on the guidance from the review of the bushfire and renewable energy infrastructure hazard in Sections 2 and 3, the bushfire risk analysis in Section 4, the requirements of SC23, SC27 and Cloncurry Shire Council BHOC, and underpinned by relevant Model Requirements of the CFA Design Guidelines (see Appendix G), a comprehensive bushfire risk management strategy and associated mitigation measures, to manage bushfire risk to the facility including people and property, while also managing the escape of onsite infrastructure to ignite a bushfire, has been documented in Section 5 of this BMP. Emergency management measures for the proposed facility are documented in the project Emergency Management Plan.
3	Land in an erosion prone natural hazard area is not to be used for urban purposes, unless the land is located in: (a) an urban area in a planning scheme; or (b) an urban footprint identified in a regional plan.	**Not Applicable – Outside the scope of the project NHRA or this BMP**

State Interest Policy		Compliance / Recommendations
4	Development in bushfire, flood, landslide, storm tide inundation or erosion prone natural hazard areas: (a) avoids the natural hazard area; or (b) where it is not possible to avoid the natural hazard area, development mitigates the risks to people and property to an acceptable or tolerable level.	The siting of the proposed development in this location is required to be at the existing DRM site, and therefore alternative locations outside bushfire prone areas are not possible. Based on the guidance from the review of the bushfire and renewable energy infrastructure hazard in Sections 2 and 3, the bushfire risk analysis in Section 4, the requirements of SC23, SC27 and Cloncurry Shire Council BHOC, and underpinned by relevant Model Requirements of the CFA Design Guidelines (see Appendix G), a comprehensive bushfire risk management strategy and associated mitigation measures, to manage bushfire risk to the facility including people and property, while also managing the escape of onsite infrastructure to ignite a bushfire, has been documented in Section 5 of this BMP. Emergency management measures for the proposed facility are documented in the project Emergency Management Plan.
5	Development in natural hazard areas: (a) supports, and does not hinder disaster management capacity and capabilities, (a) directly, indirectly and cumulatively avoids an increase in the exposure or severity of the natural hazard and the potential for damage on the site or to other properties, (b) avoids risks to public safety and the environment from the location of the storage of hazardous materials and the release of these materials as a result of a natural hazard maintains or enhances the protective function of landforms and vegetation that can mitigate risks associated with the natural hazard.	The proposed bushfire mitigation measures detailed in Section 5 of this BMP include: • Provision of appropriate separation from unmanaged vegetation to limit bushfire impact on proposed development, in addition to a number of bushfire resilience design measures. • Establishes appropriate vehicular access across the site to all proposed infrastructure • Utilises significant existing onsite firewater supplies and fire appliances for bushfire fighting purposes, which is supplemented by an additional firewater tank is the more remote southern portion of the site • In addition to the Emergency Management Plan for the facility, proposes a number of emergency management procedures for the wind turbines. The proposal is also supported by a Fire Safety Study addressing the onsite fire risk associated with the BESS and substation part of the facility. Given the above:

State Interest Policy		Compliance / Recommendations
		• The proposed bushfire risk management strategy supports disaster management capacity and capabilities, by reducing burden on emergency services personnel through minimisation of bushfire impact (or spread) and improvement of onsite vehicular access and firewater supplies. • Avoids an increase in the exposure and severity of bushfire hazard through provision of appropriate separation from unmanaged vegetation to limit bushfire impact on proposed infrastructure, while preventing escape of onsite fire events to ignite a bushfire. Additionally, a number of fire protection measures are proposed to infrastructure to improve bushfire resilience, and to enable early onsite fire detection and suppression. • Similarly to the point above, the proposed separation from unmanaged vegetation, as well as fire protection measures, vehicular access and firewater, ensures that the BESS containers are well protected from bushfire impact, and not considered likely to exacerbate a bushfire, not ignite a bushfire in the unlikely event of an onsite BESS fire.
6	Community infrastructure is located and designed to maintain the required level of functionality during and immediately after a natural hazard event.	**Not Applicable – No community infrastructure is proposed as part of this development**
7	Coastal protection work in an erosion prone area is undertaken only as a last resort where coastal erosion or inundation presents an imminent threat to public safety or existing buildings and structures, and all of the following apply: (a) The building or structure cannot reasonably be relocated or abandoned. (b) Any erosion control structure is located as far landward as practicable and on the lot containing the property to the maximum extent reasonable. Any increase in coastal hazard risk for adjacent areas from the coastal protection work is mitigated.	**Not Applicable – Outside the scope of the project NHRA or this BMP**
8	Erosion prone areas within a coastal management district:	**Not Applicable – Outside the scope of the project NHRA or this BMP**

State Interest Policy		Compliance / Recommendations
	Development does not occur unless the development cannot feasibly be located elsewhere and is: (a) coastal-dependent development; or (b) temporary, readily relocatable or able to be abandoned development; or (c) essential community infrastructure; or (d) minor development of an existing permanent building or structure that cannot be relocated or abandoned.	
9	*Erosion prone areas within a coastal management district:* Development permitted in policy 8 above, mitigates the risks to people and property to an acceptable or tolerable level.	**Not Applicable – Outside the scope of the project NHRA or this BMP**

6.2 State Code 23 (Wind Farms) – Compliance Assessment

Covey have conducted an assessment against the bushfire-related Performance Outcomes of SC23 in Table 6-2, omitting the following on the basis that they don't specifically relate to management of bushfire risk and therefore outside the scope of this BMP, and assumed to be addressed in other relevant reporting (as required):

- PO1 to PO4 (Protected wildlife and associated habitats and areas of high ecological value)
- PO5 (Agricultural Land)
- PO6 (Natural Drainage Patterns)
- PO7 to PO9 (Protecting water quality and erosion control)
- PO12 and PO13 (Acoustic Amenity)
- PO14 (Electromagnetic Interference)
- PO15 (Shadow Flicker)
- PO16 (Social Impacts)
- PO17 (Areas identified by state or local government planning instruments as having high scenic amenity)

- PO18 to PO21 (Transport Networks)
- PO22 and PO23 (Aviation safety, integrity and efficiency)
- PO24 to PO27 (Decommissioning)

Table 6-2. State Code 23 (Wind Farm) Assessment Criteria – Bushfire Only

Performance Outcomes	Response
Natural hazards and extreme weather events	
PO10 Development is located, designed, constructed and operated to be responsive to natural hazards and extreme weather events	As detailed in project NHRA and depicted on Figure 1-2 of this BMP, the majority of the development footprint, including proposed renewable energy infrastructure, has been identified within areas of ***Medium Potential***, ***High Potential*** and ***Very High Potential Bushfire Intensity*** on the SPP BPA mapping, due to large tracts unmanaged woodland vegetation, typically observed in more rugged terrain. The siting of the proposed development in this location is required to be at the existing DRM site, and therefore alternative locations outside bushfire prone areas are not possible. Based on the guidance from the review of the bushfire and renewable energy infrastructure hazard in Sections 2 and 3, the bushfire risk analysis in Section 4, the requirements of SC23, SC27 and Cloncurry Shire Council BHOC, and underpinned by relevant Model Requirements of the CFA Design Guidelines (see Appendix G), a comprehensive bushfire risk management strategy and associated mitigation measures, to manage bushfire risk to the facility including people and property, while also managing the escape of onsite infrastructure to ignite a bushfire, has been documented in Section 5 of this BMP.
PO11 Development is constructed and operated to protect the safety of people in the event of natural hazards or extreme weather events occurring.	

6.3 State Code 27 (BESS/BSF) – Compliance Assessment

Covey have conducted an assessment against the bushfire-related Performance Outcomes of SC23 in Table 6-3, omitting the following on the basis that they don't specifically relate to management of bushfire risk and therefore outside the scope of this BMP, and assumed to be addressed in other relevant reporting (as required):

- PO1 (Areas of high ecological value and associated wildlife habitats)
- PO2 to PO4 (Risk Mitigation)

- PO5 to PO 7 (Incident Response)
- PO8 (Social Impacts)
- PO9 and PO12 (Agricultural Land)
- PO16 to PO19 (Protecting Water Quality and Erosion Control)
- PO20 to PO21 (Acoustic Amenity and Vibration)
- PO22 (Visual Impact)
- PO23 (Lighting)
- PO24 to PO28 (Transport Networks)
- PO29 and PO30 (Infrastructure)
- PO31 to PO35 (Decommissioning)

Table 6-3. State Code 27 (BESS Facilities) Assessment Criteria – Bushfire Only

Performance Outcomes	Response
Risk mitigation	
PO2 Development is designed, sited and constructed to ensure that risks from physical hazards, chemical hazards and battery failure hazards are avoided and/or mitigated with respect to: • **human health** and **safety;** and • the built and natural **environment**.	The project Fire Safety Study is the key document for reviewing the onsite fire risk associated with the BESS and substation part of the facility, and which addresses most of PO2, PO3 and PO4. Regarding potential bushfire impact, Section 5 of this BMP details the following proposed bushfire mitigation measures: • Provision of appropriate separation from unmanaged vegetation to limit bushfire impact on proposed BESS infrastructure, in addition to a number of bushfire resilience design measures (e.g. ember protection). • Establishes appropriate vehicular access to the BESS infrastructure Given the above measures, the proposed BESS facility will be protected from bushfire primarily: • Through provision of appropriate separation from unmanaged vegetation to limit bushfire impact on proposed BESS infrastructure, which also serves to prevent escape of onsite fire events to ignite a bushfire.
PO3 Development mitigates the risks of fire, explosion and thermal runaway from battery storage infrastructure.	
PO4 Development is designed to ensure fire and thermal events can be contained and isolated to prevent escalation and propagation to other developments and uses on and offsite.	

Performance Outcomes	Response
	• A number of fire protection measures are proposed to the BESS infrastructure to improve bushfire resilience, and to enable early onsite fire detection and suppression. • The proposed separation from unmanaged vegetation, as well as fire protection measures, vehicular access and firewater, ensures that the BESS containers are well protected from bushfire impact, and not considered likely to exacerbate a bushfire, not ignite a bushfire in the unlikely event of an onsite BESS fire.
Incident response	
PO5 Development is designed to facilitate effective and efficient emergency service access and response in the event of a fire, bushfire (including cleared fire fighting areas at the interface of hazardous vegetation), explosion, contamination leak or any other incident requiring an emergency service response.	The project Fire Safety Study and Emergency Management Plan is the key documents for reviewing the required fire protection measures (including fire water) and onsite incident response for the proposed BESS infrastructure. Regarding potential bushfire impact, Section 5 of this BMP details the following proposed bushfire mitigation measures: • Provision of appropriate separation from unmanaged vegetation to limit bushfire impact on proposed BESS infrastructure, which includes a 10 m wide non-vegetated zone at the external perimeter interface • Vehicular access around the perimeter of the BESS containers to support a bushfire fighting response.
PO6 The development: • provides appropriate fire detection, monitoring and notification to the site operator; and • ensures the electrical safety of the facility, in the event of an incident requiring emergency response.	
PO7 Development demonstrates that there is capacity to provide a reliable, sustainable and fit-for-purpose water supply.	
Natural hazards	
PO13 Development is located and sited to avoid **natural hazard** areas including **high erosion risk** areas and **bushfire prone areas.**	As detailed in project NHRA and depicted on Figure 1-2 of this BMP, the majority of the development footprint, including proposed renewable energy infrastructure, has been identified within areas of ***Medium Potential***, ***High Potential*** and ***Very High Potential Bushfire Intensity*** on the SPP BPA mapping, due to large tracts unmanaged woodland vegetation, typically observed in more rugged terrain.
PO14 Where development cannot be located and sited to avoid **natural hazard** areas (e.g. **Bushfire prone areas**, and **high erosion risk** areas), demonstrate that:	The siting of the proposed development in this location is required to be at the existing DRM site, and therefore alternative locations outside bushfire prone areas are not possible.

Performance Outcomes	Response
• there is no suitable alternative location; • infrastructure can function effectively during and after a **natural hazard** event; and • mitigation measures are implemented to reduce the risk to people, property and the **environment** to a tolerable level.	Based on the guidance from the review of the bushfire and renewable energy infrastructure hazard in Sections 2 and 3, the bushfire risk analysis in Section 4, the requirements of SC23, SC27 and Cloncurry Shire Council BHOC, and underpinned by relevant Model Requirements of the CFA Design Guidelines (see Appendix G), a comprehensive bushfire risk management strategy and associated mitigation measures, to manage bushfire risk to the facility including people and property, while also managing the escape of onsite infrastructure to ignite a bushfire, has been documented in Section 5 of this BMP.
PO15 Bushfire hazard is identified and risk is mitigated through strategies for vegetation management, landscape management, water supply, provision of appropriate access, identification of safe assembly or evacuation routes and establishing cleared and maintained asset protection zones around infrastructure that is wholly contained on site.	The proposed bushfire mitigation measures detailed in Section 5 of this BMP include: • Provision of appropriate separation from unmanaged vegetation (through nominated APZs located entirely within the site) to limit bushfire impact on proposed development, in addition to a number of bushfire resilience design measures. • Establishes appropriate vehicular access across the site to all proposed infrastructure • Utilises significant existing onsite firewater supplies and fire appliances for bushfire fighting purposes, which is supplemented by an additional firewater tank is the more remote southern portion of the site • In addition to the Emergency Management Plan for the facility, proposes a number of emergency management procedures for the wind turbines.

6.4 Cloncurry Shire Council: Bushfire Hazard Overlay Code – Compliance Assessment

Covey have conducted an assessment against the bushfire-related Performance Outcomes and Acceptable Outcomes of the Cloncurry Shire Council Planning Scheme Bushfire Hazard Overlay Code (from Assessment Benchmarks for Assessable Development in Table 7.2.2.3-1) in Table 6-4 below.

Table 6-4. Bushfire Hazard Overlay Code s7.2.2.3 Assessment Benchmarks for Assessable Development (Table 7.2.2.3-1) Cloncurry Shire Council

Performance Outcomes	Acceptable Outcomes	Solutions
Siting and design of development		

Performance Outcomes	Acceptable Outcomes	Solutions
PO1 Development maintains the safety of people and property by avoiding land within a bushfire hazard area (bushfire prone area).	**AO1.1** Development is located on land that is not subject to land within a bushfire hazard area (bushfire prone area). **OR** **AO1.2** Where development is located on land within a bushfire hazard area (bushfire prone area) (except for single dwellings on existing lots), it must comply with a Bushfire Management Plan prepared for the premises.	**Complies with AO1.2** As detailed in project NHRA and depicted on Figure 1-2 of this BMP, the majority of the development footprint, including proposed renewable energy infrastructure, has been identified within areas of ***Medium Potential***, ***High Potential*** and ***Very High Potential Bushfire Intensity*** on the SPP BPA mapping. The siting of the proposed development in this location is required to be at the existing DRM site, and therefore alternative locations outside bushfire prone areas are not possible. This BMP has been prepared to detail the mitigation strategy and measures required to be implemented into the proposed facility to appropriately manage the bushfire risk.
PO2 A vulnerable use is not established or materially intensified within a bushfire hazard area (bushfire prone area) unless there is an overriding need or other exceptional circumstances. Note: Vulnerable uses are those involving: (1) The accomodation or congregation of vulnerable sectors of the community such as child care centres, community care centre, educational establishments, detention facilities, hospitals, rooming accomodation, retirement facilities or residential care facilities; or (2) The provision of essential services including community uses, emergency services, utility installation,	**AO2.1** Vulnerable uses are not established or expanded.	**Not applicable to this planning application as no vulnerable use is proposed**

Performance Outcomes	Acceptable Outcomes	Solutions
telecommunications facility, substations and major electricity infrastructure.		
PO3 Where reconfiguration of a lot is undertaken a formed, all weather access fire trail is provided between the hazardous vegetation and either the lot boundary or building envelope, and is readily accessible at all times for the type of fire fighting vehicles servicing the area. Editors's Note: A fire trail will not be required where it would not serve a practical fire management purpose.	**AO3.1** Lot boundaries are separated from hazardous vegetation by a public road or fire trail which has: (1) a reserve or easement width of at least 20m; (2) a minimum trafficable (cleared and formed) width of 4m capable of accomodating a 15 tonne vehicle and which is at least 6m clear of vegetation; (3) no cut or fill embankments or retaining walls adjacent to the 4m wide trafficable path; (4) a minimum of 4.8m vertical clearance; (5) turning areas for fire-fighting applicances in accordance with Qld Fire and Emergency Services' fire Hydrant and Vehicle Access Guidelines; (6) a maximum gradient of 12.5%; (7) a crossfall of no greater than 10 degrees; (8) drainage and erosion control devices in accordance with the standards prescribed in a planning scheme policy; (9) vehicular access at each end which is connected to the public road network; (10) designated fire trail signage; (11) if used, has gates locked with a system authorised by Qld Fire and Emergency Services; and (12) if a fire trail, has an access easement that is granted in facour of council and Qld Fire and Emergency Services.	**Not applicable to this planning application as no reconfiguration of a lot is proposed**

Performance Outcomes	Acceptable Outcomes	Solutions
PO4 Where material change of use occurs the development is located and designed to ensure proposed buildings or building envelopes achieve a radiant heat flux level at any point of the building envelope respectively, of: (1) 10 kW/m^2 where involving a vulnerable use; or (2) 29 kW/m^2 otherwise. The radiant heat flux level is achieved by separation unless this is not practically achievable. Editor's note: The radiant heat levels and separation distances are to be established in accordance with Method 2 set out in AS3959-2009.	**AO4.1** Buildings or building envelopes are separated from hazardous vegetation by a distance that; (1) achieves a radient heat flux level of at any point on the building or envelope respectively, of 10 kW/m^2 for a vulnerable use or 29 kW/m^2 otherwise; and (2) is contained wholly within the development site. Editor's note: Where a separation distance is proposed to be achieved by utilising existing cleared developed areas external to the site certainly must be established (through tenure or other means) that the land will remain cleared of hazardous vegetation. For staged developments, temporary separation distances, perimeter roads or fire trails may be absorbed as part of subsequent stages. Editor's note: The achievement of a cleared separation distance may not be acheivable where other provisions within the planning scheme require protection of certain ecological, slope, visual or character features or functions.	**Complies with AO4.1** The only buildings proposed as part of the facility are the office/control room and workshop/storage containers, and the switch-rooms, at the BESS yard. All are to have a 10 m APZ established around their perimeter (based on current locations) such that they are sited in areas of 29 kW/m^2 or lower. Each APZ is to be wholly located within the development site.
Emergency Evacuation Access		
PO5 For development that will result in multiple buildings or lots, roads and access are designed to mitigate against bushfire hazard by ensuring adequate routes for: (a) fire-fighting and other emergency vehicles; and (b) the evacuation of people in the event of an emergency.	**AO5.1** Residential lots are designed so that their size and shape allow for efficient emergency access to buildings for fire-fighting appliances (e.g. by avoiding long narrow lots with long access drives to buildings). **AO5.2** Firebreaks are provided by a perimeter road that:	**Complies with AO5.6** This BMP has been prepared to detail the mitigation strategy and measures required to be implemented into the proposed facility to appropriately manage the bushfire risk. The BMP nominates the following with respect to onsite vehicular access:

Performance Outcomes	Acceptable Outcomes	Solutions
	(a) separates lots from areas of bushfire hazard; (b) has a minimum cleared width of 20 metres; (c) has a formed road width of 4m; and (d) complies with road standards as outlined in PSP3 Operational Works and Services. **AO5.3** Fire maintenance trails are located as close as possible to the boundaries of the lots and the adjoining bushland hazard, and: (a) have a minimum width of 6m; (b) have a formed width and gradient, and erosion control devices in accordance with Section 9.4.6 – Operational works and services code; (c) have a maximum gradient of 1 in 8 (12.5%); (d) are constructed and maintained to prevent erosion, provide adequate drainage and provide continuous access for fire fighting vehicles; (e) provide passing bays and turning areas for fire-fighting appliances; and (f) are either located on public land or within an access easement that is granted in favour of Cloncurry Shire Council and the QFRS (Queensland Fire and Rescue Service). **AO5.4** Vehicular access is provided along and at each end of the fire break to existing fire maintenance trails or roads. **AO5.5**	• Provide sufficient vehicular access around the perimeter of the BESS containers (and other infrastructure) in the BESS yard and within the fence line. • Internal access roads are to be provided to each turbine and the associated firewater tank • All internal roads are to comply with internal road standards (detailed in Appendix F), and unless configured as a loop road, have a turnaround facility. The internal road specifications detailed in Appendix F are consistent with the requirements of AO5.3, which will be sufficient for emergency services access, and offsite egress, in a bushfire emergency.

Performance Outcomes	Acceptable Outcomes	Solutions
	The development includes sufficient cleared breaks of 6m minimum width in retained bushland within the development (e.g. creek corridors and retained vegetation), to allow burning of sections and access for bushfire response. **AO5.6** Where development is located on land within a bushfire hazard area (bushfire prone area) (except for single dwellings on existing lots), development complies with a Bushfire Management Plan for the premises.	
Hazardous Materials		
PO6 Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on the manufacture or storage of hazardous materials in bulk.	**AO6.1** Development complies with a Bushfire Management Plan for the premises.	**Complies with AO6.1** This BMP has been prepared to detail the mitigation strategy and measures required to be implemented into the proposed facility to appropriately manage the bushfire risk. The BMP nominates the following with respect to onsite storage of hazardous materials in bulk (which is the BESS containers): • Establish a 35 m to 98 m wide NVZ/APZ around the perimeter of the BESS containers to achieve 10 kW/m^2 or less at the containers. The first 10 m of the NVZ/APZ is to be non-vegetated. • Ensuring all land within the BESS perimeter NVZ/APZ (especially within BESS yard fence) is non-vegetated. • BESS container design is to be in accordance with all requirements of the project FSS.

Performance Outcomes	Acceptable Outcomes	Solutions
		• Additionally, suitable ember protection is to be provided (if required) to prevent embers from penetrating battery containers/enclosures or vulnerable parts of the container that could result in BESS fire. Given the above, a significant level of separation from the bushfire hazard, and improvement in bushfire resilience has been provided from the measures detailed in the BMP, such that bushfire impact on the stored hazardous goods should not be detrimental to public safety or the environment.
Community Infrastructure and Essential services		
PO7 Essential services infrastructure within a site (including electricity, gas, water supply, wastewater and telecommunications), maintains its function during and immediately after bushfire events.	**AO7.1** Essential services infrastructure is located on land that is not subject to land within a bushfire hazard area (bushfire prone area).	**Not Applicable**
Water Supply		
PO8 Development provides an adequate and accessible water supply for fire-fighting purposes.	**AO8.1** Development involving new or existing buildings with a gross floor area greater than 50 m^2 on each lot has: (a) a reliable reticulated water supply that has sufficient flow and pressure characteristics for firefighting purposes at all times (minimum pressure and flow is 10 litres a second at 200 kPa); **OR**	**Complies with AO8.1** This BMP has been prepared to detail the mitigation strategy and measures required to be implemented into the proposed facility to appropriately manage the bushfire risk. The BMP nominates the following with respect to fire-fighting water supply: • Firewater requirements for the BESS and substation

Performance Outcomes	Acceptable Outcomes	Solutions
	(b) an on-site water storage of not less than 5,000 litres (e.g. accessible dam or tank with fire brigade tank fittings, swimming pool) for fire-fighting purposes which is: (i) fireproof; (ii) fitted with fire brigade tank fittings; (iii) accessible for fire fighting vehicles; and (iv) connected to a pump that is independent of mains electricity supply.	have been established in the project FSS, and include use of the existing 1,000,000 L firewater supply at the mine and Accommodation Camp, in conjunction with the onsite fire appliances. o Given the substantial amount of firewater required, no additional capacity is considered necessary for bushfire fighting purposes. • The bushfire water supply for the wind turbines has been determined through application of the relevant requirements of CFA Design Guidelines as follows: o The northern portion of the facility is well served by the existing firewater supplies at the DRM and Accommodation Camp, which are relatively nearby. o The southern portion of the facility, where wind turbines are further from the DRM and Accommodation Camp, will require an additional 45 kL firewater tank, sited in BAL-29 or lower. Given the above, the only buildings onsite are within the BESS yard, and the existing static firewater supplies exceed the 5,000 L requirement for compliance with AO8.1(b). Other than the requirement for buildings, there is considered to be sufficient onsite bushfire water supply (existing and proposed tanks) for the proposed renewable energy infrastructure.

7 Implementation and Management of Bushfire Mitigation Measures

Implementation of the BMP applies to the Proponent to ensure bushfire mitigation measures are adopted and implemented on an ongoing basis. A bushfire responsibilities table is provided in Table 7-1 to drive implementation of all bushfire management works associated with this project.

Table 7-1. Bushfire Management Plan Implementation Measures

No	Implementation Action
Proponent - prior to commissioning	
1A	Establish Asset Protection Zones (APZ) and Non-vegetated Zones (NVZ) across the facility for the following, in accordance with the dimensions and standards detailed in Section 5.1 of this BMP: The construction of the facility is to be staged, and as such, establishing the NVZ/APZs will need to accommodate the staging, especially the proposed Stage 1 and 2 of the BESS.
1B	Construct the internal roads to the proposed BESS, substation envelope, wind turbines and associated firewater tank/s, in accordance with the dimensions and standards detailed in Section 0 of this BMP. Where required, construct the site entrance gates to the standards stated in the BMP, and ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to QFD and local fire brigade.
1C	Install the static firewater tank for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.3 of this BMP, and relevant Australian Standards.
1D	Ensure all existing fire appliances and firewater the facility are maintained, filled and fit-for-purpose in accordance with the requirements detailed in Section 5.3.3 of the BMP.
1E	Incorporate all the renewable energy infrastructure design requirements detailed in Sections 5.4 and 5.5 of this BMP.
1F	Incorporate all the renewable energy infrastructure construction, installation and commissioning requirements detailed in Section 5.6 of this BMP.
1G	Ensure any facility operation, maintenance and housekeeping requirements are in place prior to operation (as applicable), as detailed in Section 5.7 of this BMP.
1H	Prepare the Emergency Information Book in accordance with the requirements of Section 5.8 of this BMP (unless otherwise provided to satisfaction of QFD).
1I	Conduct the emergency services familiarisation site visit, in accordance with the requirements of Section 5.9 of this BMP.
1J	Finalise the site Emergency Management Plan, incorporating the recommendations, detailed in Section 5.10 of this BMP
Proponent – Ongoing (for life of facility)	
2A	Maintain the Asset Protection Zones (APZ) and Non-vegetated Zones (NVZ) across the facility for the following, in accordance with the dimensions and standards detailed in Section 5.1 of this BMP.
2B	Maintain internal roads to the proposed BESS, substation envelope, wind turbines and associated firewater tank/s, in accordance with the dimensions and standards detailed in Section 0 of this BMP.

No	Implementation Action
2C	Maintain the static firewater tank for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.3 of this BMP, and relevant Australian Standards.
2D	Ensure all existing fire appliances and firewater the facility are maintained, filled and fit-for-purpose in accordance with the requirements detailed in Section 5.3.3 of the BMP. Ensure the water and fuel tanks remain filled at all times, especially during times of elevated fire danger.
2E	Maintain all renewable energy infrastructure in accordance with the requirements detailed in Sections 5.4 and 5.5 of this BMP.
2F	Ensure ongoing compliance with facility operation, maintenance and housekeeping requirements, as detailed in Section 5.7 of this BMP.
2G	Review, and if required update, the Emergency Information Book in accordance with the requirements of Section 5.8 of this BMP.
2H	Continue regular emergency services familiarisation site visit, in accordance with the requirements of Section 5.9 of this BMP.
2I	Conduct ongoing review of the project Bushfire Management Plan (BMP), to ensure it still accurately reflects the risks posed by the development.

8 References

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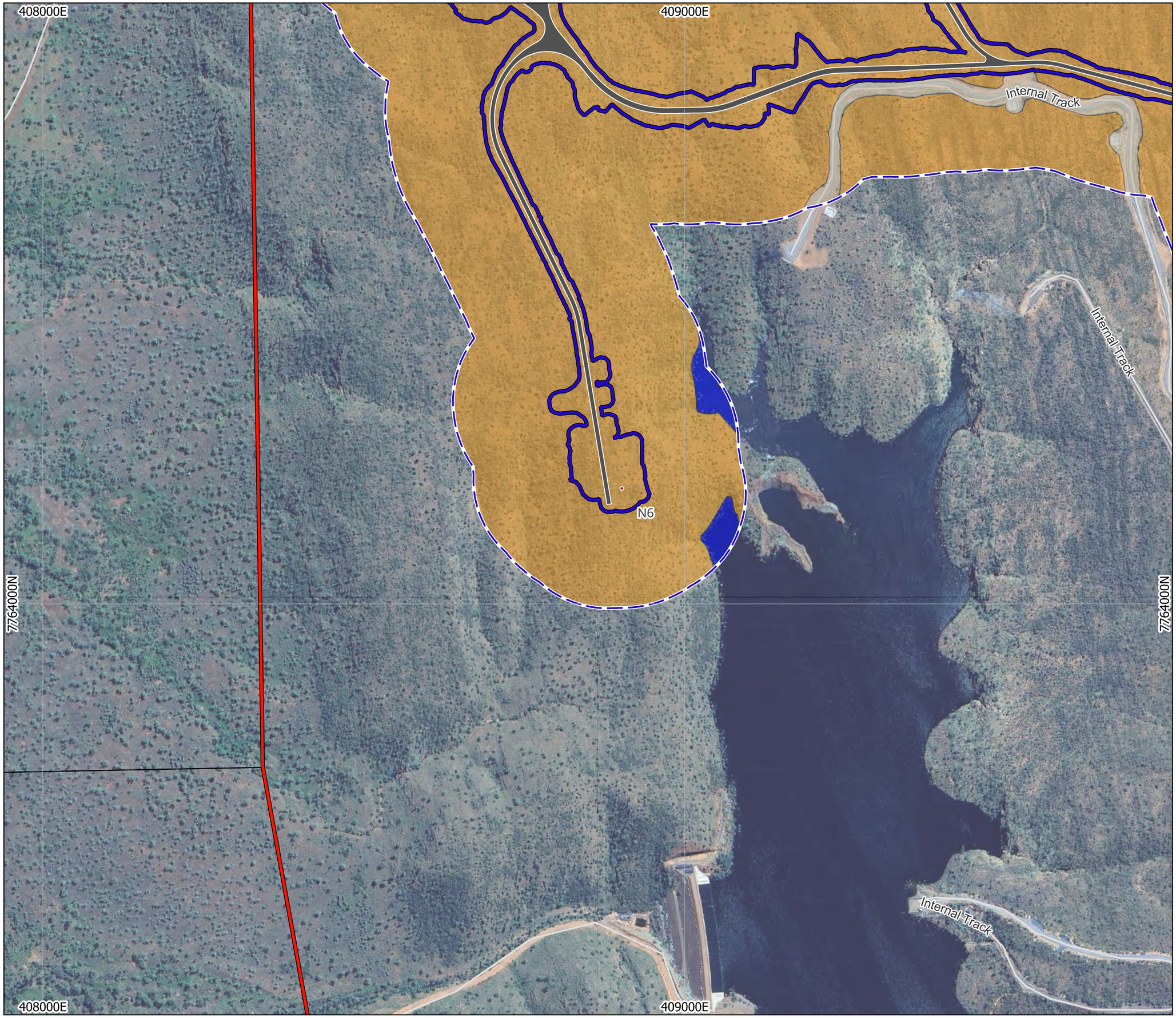
APPENDIX A: DETAILED MAPS OF VEGETATION HAZARD CLASS WITHIN 150 M OF DUGALD RIVER WIND FARM



Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 42.6 Nil to very low vegetation cover
- 43.6 Water bodies or very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E
410000E
7766000N
7765000N
N3
N4
N1
N2A
N5

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 2

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E
410000E
7763000N
7762000N
S1
S2
Internal Track
Internal Track
Internal Track
Internal Track
Internal Track

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- Easement
- Compound Area Stage 1
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 16.2 Eucalyptus dominated woodland on drainage lines and alluvial plains
- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 42.6 Nil to very low vegetation cover
- 43.6 Water bodies or very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E

410000E

7760000N

WTG02

WTG03

S4

Internal Track

Internal Track

Internal Track

409000E

410000E

7760000N

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 42.6 Nil to very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E
410000E
7760000N
7759000N
WTG03
S4
S5
Internal Track

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E

410000E

7758000N

7758000N

S6

S7

WTG04

WTG05

409000E

410000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 42.6 Nil to very low vegetation cover
- 43.6 Water bodies or very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

410000E

411000E

7763000N

Internal Track

Internal Track

Internal Track

Internal Track

Internal Track

410000E

411000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- Easement
- Compound Area Stage 1

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 41.4 Discontinuous low grass or tree cover
- 42.6 Nil to very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E

410000E

7761000N

Internal Track

WTG01

Internal Track

BESS and substation

Internal Track

Internal Track

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 220 kV OHL EASEMENT
- 33 kV OHL
- Met. mast
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 16.2 Eucalyptus dominated woodland on drainage lines and alluvial plains
- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 42.6 Nil to very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

412000E

413000E

7761000N

Internal Track

Mmg Dugald River Mine Access Road

412000E

413000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 220 kV OHL EASEMENT

Roads and Tracks

- Local
- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 16.2 Eucalyptus dominated woodland on drainage lines and alluvial plains
- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 41.4 Discontinuous low grass or tree cover
- 42.6 Nil to very low vegetation cover
- 43.6 Water bodies or very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E
410000E
7757000N
7756000N
WTG06
WTG07

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 33 kV OHL
- Met. mast
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

409000E
410000E
WTG08
S9
S8
7755000N
7755000N
409000E
410000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 33 kV OHL
- Wind Turbine Generator (tower base 5.5m dia.)

Internal road

- Stage 1
- Stage 2

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

411000E

412000E

7761000N

Internal Track

Internal Track

Internal Track

Internal Track

Internal Track

Internal Track

411000E

412000E

Legend

Project extent information

- Subject site boundary
- Disturbance Footprint (DF)
- 150 m Buffer of Disturbance Footprint (DF)

Infrastructure

Other infrastructure

- 220 kV OHL
- 220 kV OHL EASEMENT

Roads and Tracks

- Unconfirmed

Verified VHC mapping within 150 m of DF using Regional Ecosystems from ecological assessment

- 16.2 Eucalyptus dominated woodland on drainage lines and alluvial plains
- 19.2 Low open eucalyptus woodlands dominated by snappy gum, Cloncurry Box or Normanton box
- 41.4 Discontinuous low grass or tree cover
- 42.6 Nil to very low vegetation cover
- 43.6 Water bodies or very low vegetation cover

NHRA VHC detailed mapping

Dugald River Mine Wind Farm Project

0 100 200 m

N

covey

Revised VHC mapping for NHRA_0001

CRS: GDA2020 / MGA zone 54
Date created: 01/04/2026
Author: Aaron Bulfin

APPENDIX B: EFFECTIVE AND SITE SLOPE DEFINITIONS

Topography can influence the rate of spread and flame parameters of bushfires, therefore effecting the potential Radiant Heat Flux (RHF). Method 2 of AS3959 requires the input of two specific slope values to determine the RHF; these are:

- Effective slope – the slope under the classified vegetation that most influences the bushfire attack; and
- Site slope – the slope of the land between the classified vegetation and the proposed infrastructure.

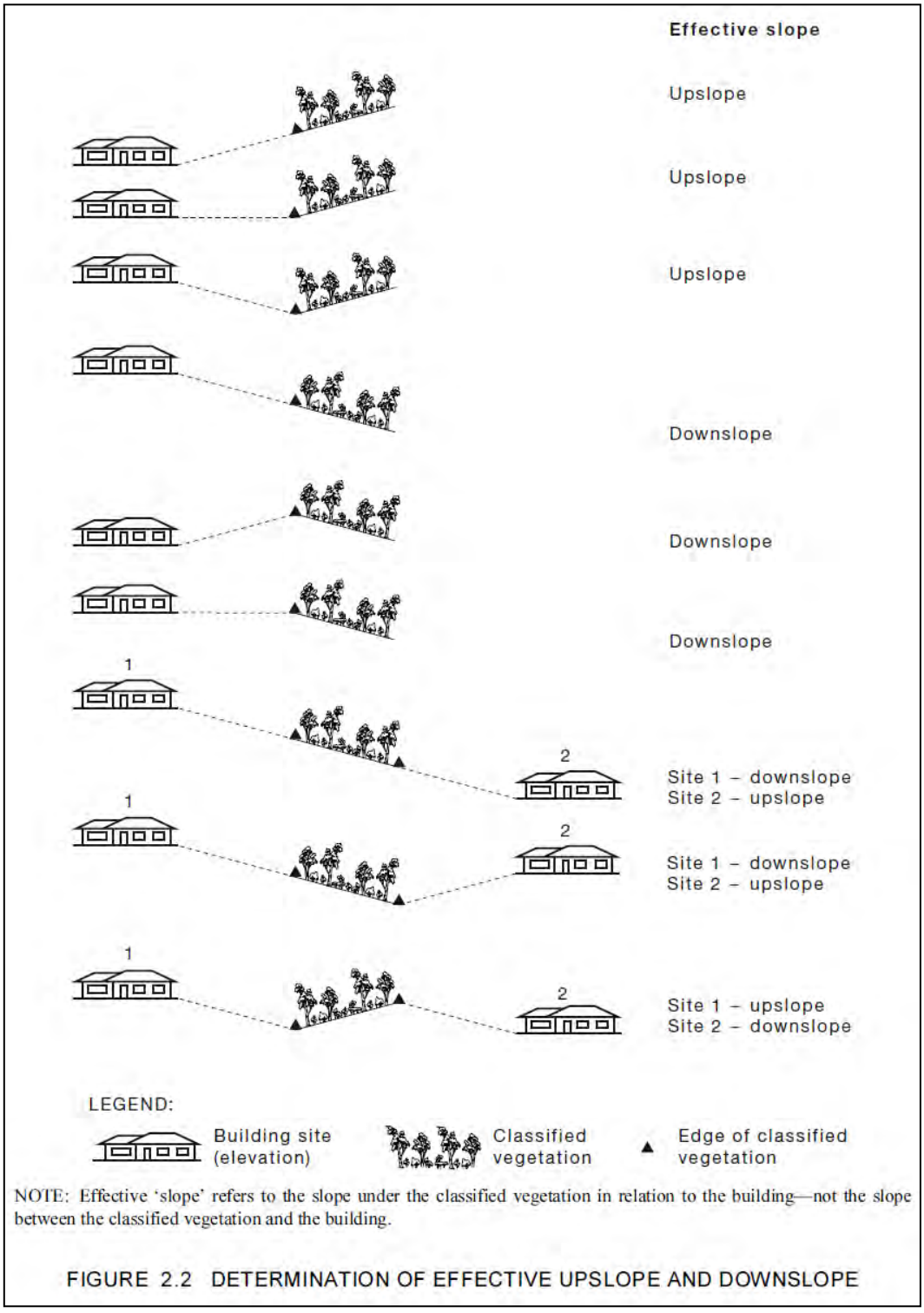
The site slope can affect the view factor, and therefore the results of the RHF impact on the infrastructure. The effective slope input influences the RHF calculations the most, therefore the determination of this slope becomes more critical. The slopes are categorised as 'upslope' or 'downslope' which is dependent upon the position of the building or infrastructure in relation to the classified vegetation (Australian Standards 2018):

- Downslope – If the land beneath the classified vegetation slopes downward from the edge closest to the infrastructure, it is regarded as 'downslope'—even if the terrain between the infrastructure and the vegetation edge varies in gradient; and
- Upslope – If the terrain beneath the classified vegetation rises from the edge closest to the infrastructure, it is classified as 'upslope,' regardless of how the ground slopes between the infrastructure and that vegetation edge.

The slope value inputs are reported in units of degrees, the input value of the effective slope is capped at 30 degrees downslope, and site slope is capped at 20 degrees regardless of slope category. The reason for these slope caps is that convective heat release in bushfires is no longer negligible in understanding the heat flux exposure on the infrastructure (Australian Standards 2018).

Plate 2 overleaf aims to provide clarity for determining the category of the effective slopes and whether the slope value used represents is an input value of up to 30 degrees (downslope) or 0-degrees (for all upslope scenarios).

The slope input values should be determined by site assessment, and the appropriate slope value can be adopted to determine the required setback distance to be applied between the classified vegetation and the infrastructure.



NOTE: Effective 'slope' refers to the slope under the classified vegetation in relation to the building—not the slope between the classified vegetation and the building.

FIGURE 2.2 DETERMINATION OF EFFECTIVE UPSLOPE AND DOWNSLOPE

Plate 2 - Visual aid for determining Slope Category *(Source: Australian Standards 2018)***.**

APPENDIX C: LIMITATIONS OF STUDY

Fire weather and bushfire behaviour are, by nature, difficult to predict with certainty, and as such limitations exist when predicting bushfires and designing for bushfire mitigation. The following limitations are noted:

- Fuel loads are based on State dataset and not site-specific fuel measurements,
- The assessment is primarily desktop-based and relies on various data inputs, some of which may be outdated.
- Fire behaviour at high fire danger ratings and under the influence of fire-induced winds driven by strong convection rates may become erratic beyond the bounds of prediction models (Cruz *et al.*, 2012), and
- Human-induced Climate Change may exacerbate fire behaviour and affect vegetation structure and floristics in different ways than those assumed in this study (Dowdy, 2018).

Also, the radiant heat modelling methodology:

- Assumes an omni-directional head-fire approaching the asset, however days of elevated fire weather tend to be from specific directions.
    - In this case, southerly wind signatures are typically associated with hazardous fire weather days, therefore large wildfires are likely to be approaching the development from those directions,
- Adopts older iterations of fire rate of spread models (per statutory standards such as AS 3959).
    - Most of these were formulated based on experiments undertaken in Victoria, in areas with fuel loads and structures vastly different from the ones for the study area. It is therefore hard to determine how accurately these models predict local fire behaviour, and
- Disregards interaction between weather parameters with topography and fuels, such as:
    - Rainfall and its interaction with fuels. For example, high rainfalls lead to increased vegetation growth and hence fuel loading. Different vegetation communities also dry out at varying rates, with grasslands curing faster than forests. This leads to fuel availability differentials after wet periods, and
    - Wind and its interaction with topography. Winds tend to channel and create eddies in high rugosity areas, such as hills, valleys, and slopes, leading to local conditions that can be significantly different from predicted prevailing wind directions and speeds. This in turn may lead to 'unpredictable' fire behaviour within those areas.
- Assumes that fuels are contiguous, with standard VHC fuel loading, and without land management treatments (e.g., grazing) being accounted for.
    - As such, the calculations are likely to be a snapshot in time rather than providing an overview of the potential outcomes of a wildfire impact.
- Does not accurately quantify potential fire intensities, nor can it identify likely fire paths that are likely to be experienced within the study area.
    - If the above parameters are to be investigated Covey recommends undertaking a dynamic and/or probabilistic bushfire behaviour analysis.

APPENDIX D: ASSET PROTECTION ZONE STANDARDS

Intent of Guidance

The following guidance is provided to inform the Proponent, landscape designers and future landowners of the broad vegetation modification and management expectations to establish Asset Protection Zones (APZ's) around nominated buildings, structures and infrastructure.

The BRC notes that Bushfire Management Plans are to detail proposed bushfire measures including the "*landscape design and management, and vegetation management including fuel management areas/zones"*, and while it provides further information on various low threat vegetation landscaping concepts, there is only limited specific design guidance.

AS 3959 Clause 2.2.3.2 (f) provides the following definition for excludable low threat vegetation on basis of modification and management:

> *Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and wind breaks.*
>
> *Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of bushfire attack (recognisable as short-cropped grass for example, to a nominal height of 100 mm)*
>
> *A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of trees.*

While flammability, moisture content and fuel load are specifically noted by AS 3959 as factors for assessing vegetation as being low threat, the examples provided also highlight that fuel structure/arrangement and ongoing management are also critical factors.

While AS 3959 Clause 2.2.3.2 provides a number of examples of potential low threat vegetation exclusions (including geometrical arrangements of unmanaged vegetation in (a), (b), (c) and (d)), there is little detailed guidance for designing and establishing an APZ.

Given the above, Covey Associates have used the following publications to produce this APZ guidance material:

- BRC
- AS 3959 Clause 2.2.3.2
- NSW Standards for Asset Protection Zones
- WA Asset Protection Zone Standards
- CFA Landscaping book

What is an Asset Protection Zone

An APZ is a fuel reduced area established and maintained around the perimeter of a building or structure, to provide:

- a buffer zone between a bushfire hazard (unmanaged vegetation) and a building or structure;
- an area of reduced bushfire fuel that allows suppression of fire;

- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and land-owners to defend their property.

The APZ should increase the likelihood that the building or structure will survive a bushfire, by providing a defendable space, and reducing the potential for direct flame contact, radiant heat exposure and ember attack.

While potential bushfire fuels should be minimised and appropriately fragmented within an APZ to avoid providing a path for the transfer of fire to the building or structure either from the ground level or through the tree canopy, it is noted that an APZ should not be seen as an area entirely cleared of vegetation (unless otherwise stated in the bushfire reporting), but as a strategically designed space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building or structures resilience to bushfire. Also, trees and plants can provide some bushfire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns, while some ground cover is generally required to prevent soil erosion.

Designing an Asset Protection Zone

The width and extent of the APZ has been nominated in the bushfire reporting, and is based on the interfacing unmanaged vegetation and effective slope (slope beneath that vegetation), in addition to the target radiant heat flux required at the building or structure. Covey note that should these deviate from the assumptions made in this report, that this should be brought to our attention to review whether the nominated APZ dimensions and extent are still valid.

The core design concepts for landscaping within APZs should include the following:

- Creation of defendable space immediately surrounding the building or structure
  - This gives the best chance of survival, provide unhindered access to the perimeter of the asset, and support firefighting activities.
  - Achieved primarily through priority use of non-combustible paths and driveways adjacent to the building or structure, and limiting vegetation to managed grasses or low groundcovers.
  - Typically APZ design is tightly controlled near the building or structure, with planting of vegetation increasing as you move farther away.
- Break up fuel continuity to reduce or prevent bushfire spread to the building or structure, and provide resistance to fire ignition and spread from ember attack.
  - Achieved mostly through creation of lateral and vertical discontinuity through the landscaping profile (e.g. separation of tree canopies from each other and the building or structure; underpruning trees; separation of scrub/shrub clumps; separation of garden beds with non-combustible elements etc).
- Careful selection, siting and maintenance of vegetation, especially trees and scrub/shrubs
  - Trees can be useful during a bushfire to achieve the following, provided they are selected carefully, properly maintained and located a safe distance from the building
    - reduce wind speed

    - filter embers and
    - absorb radiant heat
  - While all vegetation can burn, some are more resistant than others such that plant flammability is also another key consideration
  - It is important to consider the plant density and final structure and form of plants in their mature state.
- Removal of flammable materials and objects from around the building or structure
- Ongoing maintenance is critical to the ongoing performance of the APZ for the life of the building or structure.

Further detail regarding the vegetation modification and management required to achieve the concepts detailed above, is provided in the subsections below.

Covey also make the following additional comments:

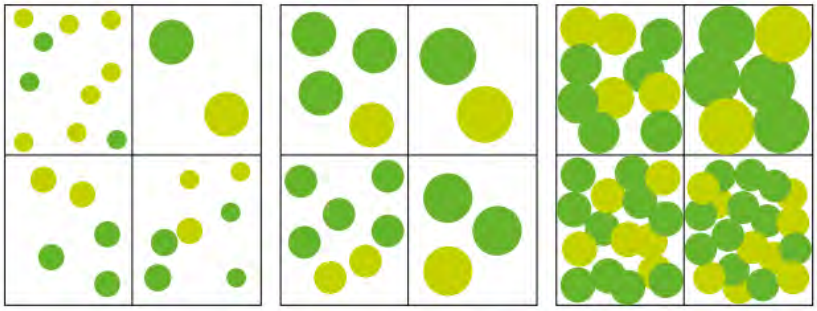
- In addition to use of managed vegetation within the nominated APZs, low threat vegetation can also be established through use of geometrically isolated patches/clumps of unmanaged vegetation such as the exclusions provided in AS 3959 Clauses 2.2.3.2 (a), (b), (c) and (d), however these are rarely achievable within an APZ, and would require review by a Covey bushfire practitioner prior to implementation.
- Prior to implementation of the APZ, especially the removal of any vegetation, the Proponent or landowner should ensure that all required planning, environmental or heritage approvals have been secured ahead of any onsite works.

Asset Protection Zone Technical Guidance

Vegetation modification and management within an APZ should provide defendable space and be maintained to a low threat state, in perpetuity, in accordance with the requirements outlined below.

Asset Protection Zone Technical Guidance
• **Trees* (approximately > 6 metres in height)** o Trunks at maturity should be a minimum distance of six (6) metres from all elevations of the building, and no less than their anticipated mature height. o Branches at maturity, should not touch or overhang within two (2) metres to five (5) metres of a building, structure or powerlines. o Lower branches and loose bark should be removed to a height of two (2) metres above the ground and/or surface vegetation. o Canopy cover within the APZ should be <15 percent of the total APZ area. o Tree canopies at maturity should be two (2) metres to five (5) metres apart to avoid forming a continuous canopy. ▪ Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 percent and are not connected to the tree canopy outside the APZ. o Tree selection should give preference to smooth barked and evergreen trees

Asset Protection Zone Technical Guidance

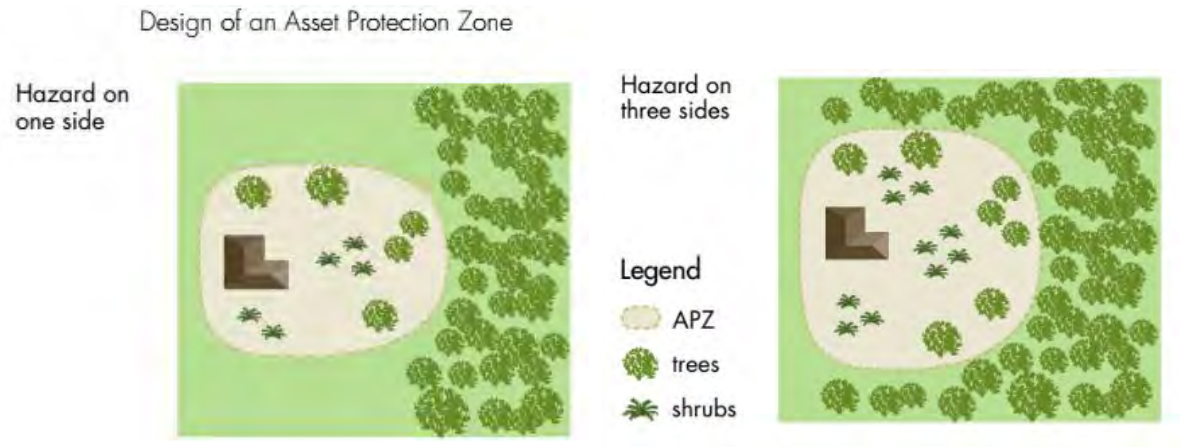


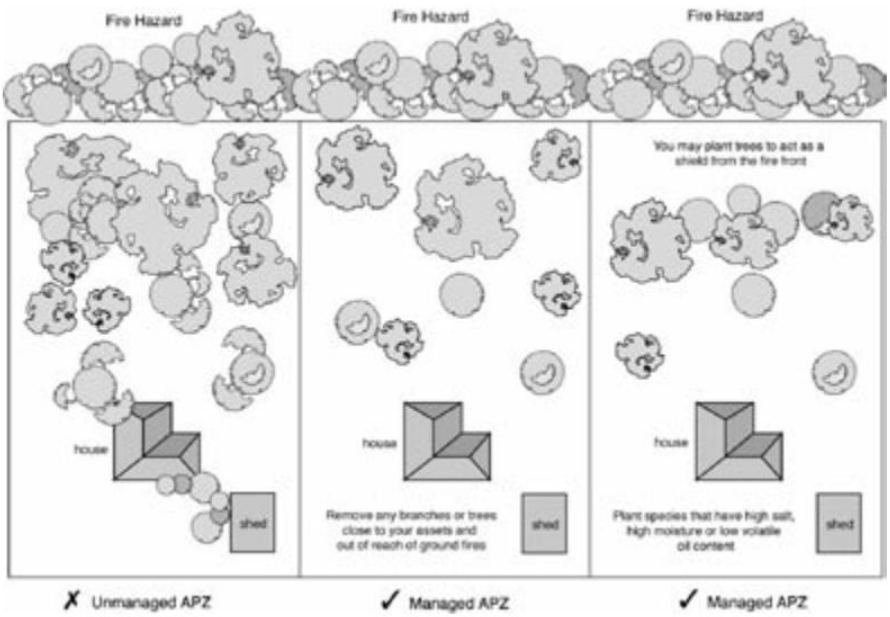
- **<u>Shrub* and Scrub* (approximately 0.5 metres to 6 metres in height)</u>**
  - Should not be located under trees
  - Should ideally be configured into well separated clumps designed to break the progress of fire toward the building or structure
  - Should constitute no more than 10 percent of the APZ area
  - Should not be located within two (2) metres of buildings or structures, and at least twice the mature height of the vegetation from any exposed window or door or other vulnerable elements.
  - Shrub and scrub >6 metres in height are to be treated as trees.
- **<u>Ground covers (approximately <0.5 metres in height)</u>**
  - Can be planted under trees but must be regularly maintained to remove dead plant material, as prescribed in 'Fine fuel load' (see below).
  - Can be located within two (2) metres of a building or structure, but three metres from windows or doors or other vulnerable elements if >100 millimetres in height.
  - Ground covers >0.5 metres in height are to be treated as shrubs
- **<u>Grass</u>**
  - Grass should be maintained at a height of 100 millimetres or less, at all times.
  - All leaves, debris, dead vegetation and combustible fuels are to be regularly removed
  - Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
- **<u>Fine Fuel load (<6 mm in thickness)</u>**
  - Fine fuel includes grass, leaves, bark and twigs less than six (6) millimetres in diameter, that ignite readily, burn rapidly when dry, and can increase the intensity of a fire.
  - Includes the combustible, dead or dry vegetation matter on the ground, near ground, or elevated.
  - Should be managed and removed on a regular basis to be maintained as low threat vegetation.
  - Should be maintained at, on average <4 tonnes per hectare (or 400 gm/m^2).
  - Mulches should be non-combustible such as stone, gravel, shells, rock or crushed mineral earth or wood mulch > five (5) millimetres in thickness.
    - Very fine or light mulch (such as shredded pine bark, pine needles, or poplar woodchips) less than five (5) millimetres in diameter should be avoided.
    - It is recommended that wood mulch is used in garden beds or areas where the moisture level is higher by regular irrigation, and these areas are separated with non-combustible elements, such as pathways and open spaces.
- **<u>Defendable Space</u>**
  - Within three (3) metres of each wall or supporting post of a building or structure, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.

Asset Protection Zone Technical Guidance

- **LPG Cylinders**
  - Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one (1) metre from vulnerable parts of a building.
  - The pressure relief valve should point away from the house.
  - No flammable material within six (6) metres from the front of the valve.
  - Must sit on a firm, level and non-combustible base and be secured to a solid structure.
- **Fences within the APZ**
  - Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959)
- **Use of non-combustible materials**
  - Where possible, advantage should be taken to site existing or proposed non-combustible elements should be sited within the APZ to break up fuel continuity and potentially offer radiant heat shielding.
  - Incorporation of landscaping features, such as masonry feature walls, can provide barriers to wind, radiant heat and embers. These features can include noise walls.
  - This could include paths and driveways, swimming pools, dams, tennis courts etc, to break up fuel continuity.
  - Strategic positioning non-combustible water tanks (or similar fully non-combustible structures) could act as a radiant heat barrier.
- **Removal of other materials**
  - Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

** Plant flammability should be considered – refer to Plant Selection section below.*





Plant Selection and Flammability

When designing landscaping within an APZ, it is important to consider the type of plant species and their flammability, as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others, and there are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- **Fire resistant** – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- **Fire-retardant** – plants that can absorb more of the heat of the approaching bushfire without burning, compared to more flammable plants.
- **Fire wise** – plants that have been identified and selected based on their low flammability properties and linked to maintenance advice and planting location within a garden.

Given the above, plant species selection within the APZ should consider the following characteristics:

- minimise leaf litter drop to reduce the accumulation of surface fuel (e.g. persistent leaf litter) and associated ongoing maintenance.
- have attributes which reduce the ease of combustion, minimise contribution to potential fuel load or act as a potential barrier, reducing the rate of fire spread. Examples could include:
    - grow in a predicted structure, shape and height;
    - are open and loose branching with leaves that are thinly spread;
    - have a coarse texture and low surface-area-to-volume ratio;
    - have wide, flat, and thick or succulent leaves;

- trees that have bark attached tightly to their trunk or have smooth bark (i.e. avoid loose, fibrous or stringy bark);
- do not produce or hold large amounts of fine dead material in their crowns

- low-flammability species (e.g. appropriate local natives) that are also adapted to local conditions, enhance habitat values for wildlife, and will not become (or introduce) noxious or environmental weed species to the area.
    - The table below detailed the characteristics of low flammability species and the effect of plant attributes on their performance in bushfire situations.

Plant attribute	Effect	Design measure
Foliage moisture content	Leaves with higher moisture content retard ignition and slow the rate of combustion	Select species with high leaf moisture content (e.g. rainforest species, succulents and semi-succulents)
Foliage volatile oil content	Foliage with higher volatile oil content ignite more readily and enhance ignition of surrounding vegetation, even though volatile oils themselves do not contribute significantly to total radiant heat	Select species with lower volatile oil content[68, 69]
Foliage mineral content	Foliage with higher mineral content tend to be less flammable (e.g. Amyema spp mistletoes)	Species selection should favour species with higher leaf mineral content
Leaf fineness	The ratio of area-to-volume of leaves is one of the main factors affecting ease of ignition and intensity of burning. Finer leaves (greater area to volume ratio) tend to ignite and burn more easily than broader leaves	Species selection should favour broad-leafed species
Density of foliage and continuity of plant form	Species with continuous, denser foliage can act as a barrier to wind-borne embers and radiant heat; however, increased density can increase flammability. Species with open branching and low foliage density are less effective as a barrier, though can be less flammable	Select species on a case-by-case basis

Plant attribute	Effect	Design measure
Height of lowest foliage	Shrub and tree species with persistent low height foliage are more likely to be ignited by surface fires, allowing the spread of fires into the canopy above	Species selection should favour species which can be maintained or pruned to reduce persistent, near-ground foliage
Size of plant (volume and spread)	The effect of plant size varies according to volume or spread. Species with a greater spread tend to be more effective as a barrier to the diffusion of radiant heat than narrower trees with the same volume. Species with a greater volume can result in increased ember attack, radiation and flame if ignited. For example, narrow columnar trees are less effective as a barrier than wider trees with the same overall volume	Species selection should ensure plant size (volume and spread) does not increase ignition likelihood
Dead foliage on plant	Persistent dead leaves and woody twigs increase flammability	Species selection should favour species which have a low volume of persistent dead leaves and woody material or can be maintained or pruned to reduce persistent, dead leaves and woody material
Bark texture	Loose, flaky, stringy, papery or ribbon-like bark contribute to ladder fuels which: • can contribute to destructive crown fires • act as a potential source of flame, radiant heat and ember attack	Avoid species with persistent loose, flaky, stringy, papery or ribbon-like bark. Species selection should favour smooth-barked and tightly-held bark species
Potential available surface fuel	The availability of surface fuel is a function of volume (quantity) and fineness. The fireline intensity increases in proportion to available fine fuel quantity. Fine fuel includes dead fallen material such as leaves, bark, twigs and branches up to 6mm in diameter (forest) and grass greater than 5cm in height (grasslands). Coarse fuel ignites less readily but may burn for longer	Species selection should favour species which do not contribute significantly to persistent, fine ground fuel

Figure 20: Characteristics of low flammability species and effect on performance in bushfire situations. Source: *Ramsay, GC, and Rudolph, L1 (2003), Landscape and building design for bushfire areas. (Same as footnote 67)*

Ongoing Maintenance of Asset Protection Zone

All vegetation will continue to develop throughout time through growing, shedding and dying. Ongoing maintenance of APZ landscaping around buildings and structures is critical to ensure that the managed low threat vegetation minimises bushfire impact, as per its original design, for the life of the building.

While ongoing maintenance of an APZ might be enforced through a condition of planning approval, it is a requirement of this bushfire report that the APZ is maintained in accordance with these guidance standards and the final approved landscaping design, in perpetuity or for the life of the building or structure.

In addition to regular maintenance of an APZ, further bushfire protection can be provided by:

- ensuring gutters are free from vegetation
- installing gutter guards or plugs
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps
- trimming and removing dead plants or leaf litter
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank

Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. Embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building.

Best practice recommends objects within the APZ are moved away from the building prior to any bushfire event.

Objects may include, but are not limited to:

- door mats
- outdoor furniture
- potted plants
- shade sails or umbrellas
- plastic garbage bins
- firewood stacks
- flammable sculptures
- playground equipment and children's toys.

APPENDIX E: AS 3959 CLAUSES 2.2.3.2 (E) AND (F) – LOW THREAT VEGETATION

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

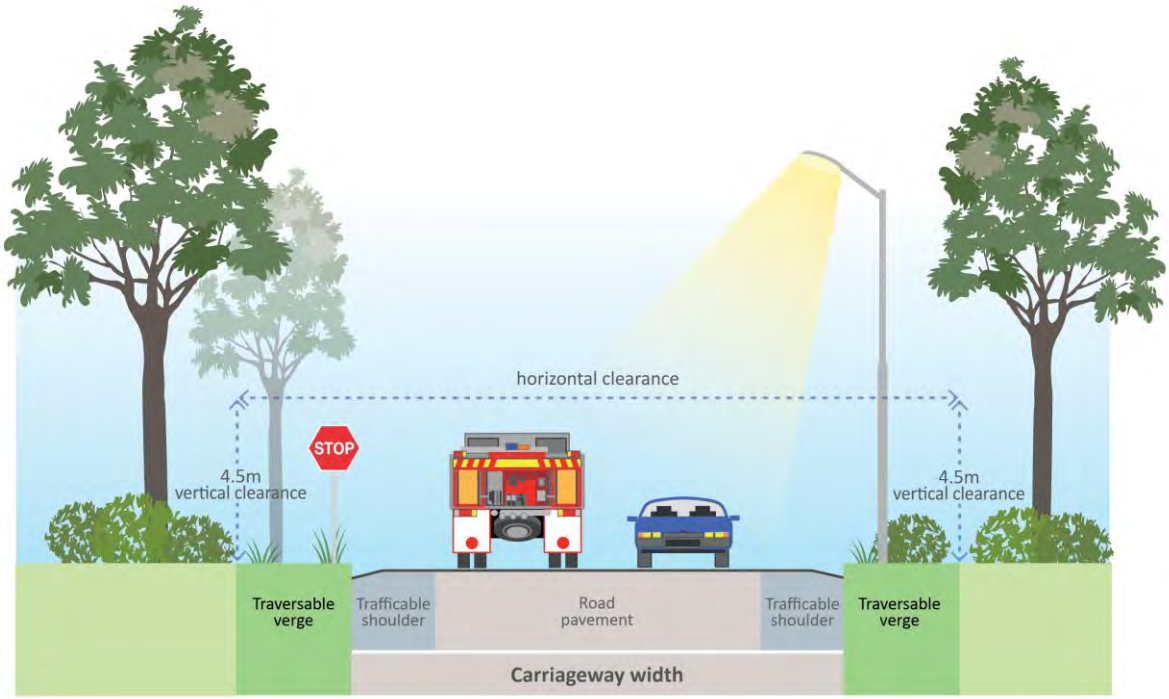
APPENDIX F: VEHICULAR ACCESS STANDARDS

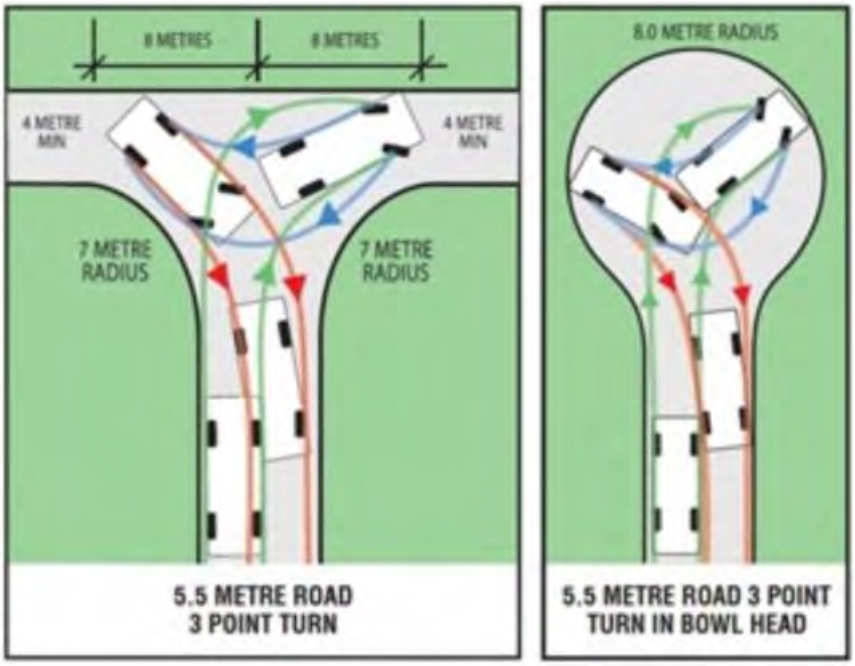
Internal Road Specifications

Unless otherwise stated in the bushfire reporting, the following is considered the minimum standards for internal access roads to buildings or infrastructure.

Road Characteristic	Technical Requirement	Notes
Minimum trafficable surface width	4 m wide	All-weather surface to the road and trafficable shoulders, clear and formed, that can be travelled upon by vehicles at the posted speed. An all-weather surface doesn't need to be sealed, and can be compacted gravel surface (or similar pervious material).
Minimum horizontal clearance width	6 m wide	The minimum width of overall road including trafficable surface, shoulders and traversable verge, to provide clearance from vegetation and other obstructions, such that it doesn't restrict vehicular movement in the event of an emergency.
Minimum vertical clearance height	4.8 m high	The minimum vertical height required to provide clearance from vegetation and other obstructions, such that it doesn't restrict vehicular movement in the event of an emergency.
Minimum weight capacity	15 tonnes	Applies to the trafficable surface construction, including all bridges or culverts on the site and access route.
Maximum road gradient	12.5% (7.1° or 1:8 slope)	
Maximum road crossfall	17.5% (10° or 1:5.5 slope)	
Turnaround facility	• 16 m diameter turning circle (cul-de-sac head), or • 16 m long by 4 m wide hammerhead with 7 m inner radius of road curve	See figure below from QFD 'Fire Hydrant and Vehicle Access Guidelines'. Typically a turnaround facility is only required for dead-end or no-through roads, not configured as a loop road.
Passing Bays	• Every 200 metres (unless otherwise stated) • Minimum length of 20 m • Minimum additional trafficable surface width of 2 m	If the trafficable surface width is 4 m, the combined width of the passing bay and constructed internal road to be a minimum 6 m
Gates	• Minimum width of 4 m • If locked, should be with common key system suitable for use with QFD and local fire brigade/s	

Road Characteristic	Technical Requirement	Notes
Drainage and erosion control	Are to be constructed and maintained to prevent erosion, provide adequate drainage and provide continuous access for fire fighting vehicles	





Turning Examples

APPENDIX G: ASSESSMENT AGAINST BUSHFIRE-RELATED MODEL REQUIREMENTS OF CFA DESIGN GUIDELINES

CFA Guideline Section	Requirement	Type	Development Response
Section 4: Facility Location	***Landscape Risk to Facility*** • An assessment that considers: o The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	***All Facilities***	• The focus on addressing landscape risk of bushfire to the facility, is primarily through the provision of the following: o NVZ and APZs around renewable energy infrastructure to reduce bushfire impact to moderate or low levels, depending on resilience of the infrastructure. ▪ The sizing of the NVZ and APZ is commensurate with the surrounding bushfire hazard (i.e. increasing in width to provide more separation from the hazard where it presents greater potential for significant bushfire behaviour). ▪ Given the turbines are non-combustible materials at their base, a BAL-29 APZ has been established around the perimeter of each turbine base, and being no less than 10 m wide as per the CFA Guidelines. A similar APZ philosophy has been provided for the substation. ▪ To address the potential for bushfire to impress sufficient temperatures to initial thermal runaway on the BESS containers, the APZ has been increased to achieve 10 kW/m^2 or less at the containers. o Vehicular access and firewater requirements for the renewable energy infrastructure have been determined through application of the CFA Guidelines and provide significant resources for attending firefighters to fight bushfires both within the wind farm site: ▪ The internal driveway network enables attending firefighters to access all proposed turbines, the BESS yard and the substation in a bushfire emergency, while also improving access throughout the wind farm site in general. ▪ The internal driveways and crane pads also provide significant cleared areas within the wind farm site, which may also be useful in controlling bushfire spread. ▪ The existing onsite firewater supplies provide a significant quantity of firewater for attending firefighters to refill appliances without extended travel time, .other than the turbines proposed in the southern portion of the site, where an additional firewater tank is proposed. o All turbines will automatically shut-down upon detection of fire (i.e. turbine detecting fire will shut-down) o During a bushfire emergency, all turbines can be remotely shut-down from offsite, to prevent exacerbating bushfire behaviour and also to limit risk to aerial firefighting appliances and enable them to move around the wind farm, as much as possible. o All turbines, monitoring towers are registered with CASA and compliantly marked, to manage risk to aerial firefighting appliances and enable them to move around the wind farm in a bushfire emergency. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
	Facility Risk to Landscape • As assessment that considers the following and details how the proposal will reduce risks on site to an acceptable level: o The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets.	***All Facilities***	• As detailed in Section 3 based on historical occurrences in Australia, there appears to be a relatively low likelihood of wind turbine, BESS or transformer fires. • The focus on addressing risk to the landscape is primarily through limiting the chance of: o BESS and transformer fires, which is addressed in the project FSS o Uncontrolled turbine fire through the provision of the following: ▪ Operational status monitoring, fault monitoring etc, to ensure that any electrical or equipment shorts, faults or failures with the potential to ignite or propagate fire are rapidly identified, controlled and relevant personnel notified. ▪ Fire detection and alarm systems to ensure early notification to Wind Farm and/or DRM personnel and QFD/local fire brigade and enable early turnout. ▪ Automatic fire suppression system in the nacelle to prevent any ignition events from becoming uncontrolled turbine fires. • The above is supplemented by the provision of NVZ/APZ which act to limit the opportunity for escape of onsite fires to ignite a bushfire.

CFA Guideline Section	Requirement	Type	Development Response
			• Ensuring appropriate onsite response capabilities, through: o Provision of an Emergency Information Book to assist firefighter when turning out, aided by QFD/local brigade familiarisation both prior to facility operation and regularly throughout operation as required. o Provision of internal vehicular access and firewater supplies suitable for attending firefighters o Ensuring existing onsite fire appliances and firewater at the mine and Accommodation Camp are maintained, filled and otherwise fit-for-purpose, to enable a rapid response by onsite Wind Farm and/or DRM personnel to address any spot fires until firefighter turnout. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
Section 4: Facility Design	***Non-Vegetated Zones (NVZ) and Asset Protection Zones (NVZ)*** • The provision of NVZ and/or APZ: o Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite. o Of a width of at least 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure • A NVZ must be: o Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. o Free of vegetation and obstructions at all times. o No plant or equipment of any kind is to be stored in fire breaks. *Additional Requirements for Wind Facilities* • The provision of NVZ (and APZ if required) is not required around the perimeter of the wind energy facility, but must be established around the base of each wind turbine. • Where wind turbines are sited in high-risk environments, additional vegetation management must be considered, with the implementation of an additional reduced-fuel zone recommended around the base of wind turbines, abutting the fire break. The reduced fuel zone may be: o No less than 20m, or o To the envelope of the wind turbine blades. *Additional Requirements for BESS* • The provision of a NVZ and/or APZ around battery energy storage systems and related infrastructure. *Additional Requirements for Substations* • Substations should be surfaced to eliminate all vegetation including grasses. *Additional Requirements for Electric Lines* • The vegetation clearance requirements for electric lines is to be based on relevant state legislation and requirements. • Vegetation management within any electric line easement must ensure that falling trees would not impact the transmission lines, towers and associated infrastructure	***All Facilities*** ***Wind Facilities*** ***BESS*** ***Substation*** ***Electric Lines***	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Design Guidelines and detailed in Section 5.1 of this BMP. o Establish the following NVZ/APZ at the BESS and Substation yards ▪ Around the perimeter of the BESS containers to achieve 10 kW/m^2 or less at the containers. ▪ Around the substation transformers, MVPS, auxillary transformers, switchrooms, office/control room and workshop/storage containers to achieve RHF impact to 29 kW/m^2 or less. ▪ Ensuring all land within the BESS and substation perimeter NVZ/APZ (especially within BESS yard fence) is non-vegetated. o Establishing of a 10 m NVZ around every turbine base, with the addition of an APZ outside the NVZ where required to limit RHF impact to 29 kW/m^2 or less. o Establishing an APZ around the proposed firewater tank to achieve BAL-29 or lower. o Establishing APZ around the base of the transmission towers and vegetation clearance zones along the transmission lines. o No perimeter NVZ has been provided for the wind farm, as permitted by the CFA Guidelines. • These vegetation modification and management requirements have been incorporated into Section 5.1 of this BMP, which are to be maintained for the life of the facility. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
	Emergency Vehicle Access • Construction of a minimum four (4) metre perimeter road within the perimeter fire break. • Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g., no compacted earth). • Constructed roads should: o Be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for	***All Facilities*** ***Wind Facilities*** ***BESS***	• Vehicular access requirements for the renewable energy infrastructure have been determined through application of relevant portions of the Cloncurry BHOC and CFA Design Guidelines and detailed in Section 0 of this BMP. o Compliant internal driveway access is to be provided to each turbine and associated firewater tank, including turnaround facility. o Internal access within the BESS compound (Stages 1 and 2) is to be in accordance with the project FSS, with perimeter access provided around the BESS containers for bushfire fighting purposes.

CFA Guideline Section	Requirement	Type	Development Response
	the width of the formed road surface. o Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated. o Otherwise comply with the relevant Queensland internal road specifications o Ensure any fencing along access routes allows for width of fire trucks. • Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure. • The provision of at least two (2) but preferably more access points to each part of the facility. *Additional Requirements for Wind Facilities* • Construction of a four (4) metre perimeter road is not required for wind energy facilities, however, suitable emergency vehicle access is required to each turbine and building on-site. • Constructed roads developed during the construction phase of facilities must be maintained post-commissioning and throughout the operational life of the facility, to allow access to each turbine for maintenance and emergency management purposes. *Additional Requirements for BESS* • The provision of at least two access points into each section where battery energy storage systems are located.		o The specifications are to comply with those in Appendix F, with the only deviation being that if the internal wind farm driveways are less than 6 m wide, passing bays will be provided every 600 m (6 m wide x 20 m long) in accordance with the CFA Design Guidelines. • ***Based on the above, the proposed internal roads, supplemented by the use of existing mine roads and entrances, is considered sufficient to provide a flexible vehicular access network to, and within the proposed facility, for emergency services use in a bushfire emergency***
	Firefighting Water Supply • Water access points must be clearly identifiable and unobstructed to ensure efficient access. • Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the CFA Design Guidelines: o The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. o An external water level indicator must be provided to the tank and be visible from the hardstand area. o Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. o Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s). • The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours. • The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure • The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection (or approved alternative), sized to comply with the required suction hydraulic performance. o The hard-suction point must be protected from mechanical damage where necessary. o The hard-suction point must be positioned within four (4) metres to a road or hardstand area and provide a clear access for emergency services personnel. • An all-weather road access and hardstand, compliant with relevant Queensland requirements and at least 6 m wide and 8 m long, must be provided to the hard-suction point. o The road access and hardstand must be kept clear at all times. • Where the access road has one entrance, a 16 metre diameter turning circle must be provided at the tank.	***All Facilities*** ***Wind Facilities*** ***BESS***	• Firewater requirements for the BESS and substation have been established in the project FSS, and include use of the existing firewater supply and fire appliances at the mine and Accommodation Camp as detailed in Section 5.3.1. o Given the substantial amount of firewater required, no additional capacity is considered necessary for bushfire fighting purposes. • The bushfire water supply for the wind turbines has been determined through application of the relevant requirements of CFA Design Guidelines and detailed in Section 5.3.2. o The northern portion of the facility is well served by the existing firewater supplies at the DRM and Accommodation Camp, which are relatively nearby. o The southern portion of the facility, where wind turbines are further from the DRM and Accommodation Camp, will require an additional 45 kL firewater tank, sited in BAL-29 or lower. o These firewater tanks will comply with relevant Australian Standards (including AS 2419.1) and supplemented by some requirements from the CFA Design Guidelines: o Rather than siting the tanks at the wind farm site entrances, the existing firewater supplies are at known locations within the mine and Accommodation Camp, which are essentially along the mine access road that provides entry to the facility from the public road network. While not at a site entrance, the new firewater tank is strategically positioned to access turbines located in the southern part of the facility, with allowance made to review and relocate the tank should their be mutual agreement between the Proponent and QFD and local fire brigades o To ensure attending fire brigade personnel are aware of the available onsite resources, the location of all firewater tanks (existing and proposed), and the internal access routes to these tanks, are to be documented in the Emergency Information Book. • ***Based on the above, all requirements with the CFA Design Guidelines have been met, other than the siting of the firewater tank away from the site entrance in the southern part of the facility, however the Emergency Information Book will clearly indicate the location of the firewater tanks available for bushfire fighting in the development.***

CFA Guideline Section	Requirement	Type	Development Response
	Additional Requirements for Wind Facilities • Fire water storage tanks of at least 45,000L effective capacity are to be provided at each site entrance. • Additional fire water storage tanks of at least 45,000L effective are to be incorporated in facility design.		
	Fire Detection and Suppression Equipment • For on-site buildings and structures, according to the requirements of the National Construction Code. • For storages of Dangerous Goods, according to the requirements of any Australian Standards for the storage and handling of Dangerous Goods. • For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. • In all vehicles and heavy equipment, each vehicle must carry at least a nine (9)-litre water stored pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.	***All Facilities***	***National Construction Code (NCC) compliance*** • No buildings are proposed as part of the development. • If new buildings are proposed as part of the facility, they would be required to comply with the: o Fire detection and suppression requirements of the NCC. o Bushfire construction requirements of the NCC, noting this on applies to Class 1, 2, 3, associated 10a and "certain" Class 9 buildings, which are unlikely at a facility of this nature. ***Dangerous Goods compliance*** • It is understood that no significant quantities are proposed at the facility outside of the BESS (which is addressed through the project FSS). • Notwithstanding, should significant quantities of dangerous goods be stored or handled onsite in the future: o These will need to comply with all relevant Dangerous Goods legislation, codes and standards o They should be reviewed by a bushfire practitioner to ensure they are appropriately sited and protected from bushfire impact. ***Portable fire extinguishers*** • Portable fire extinguishers are to be provided in accordance with project FSS requirements at the BESS yard. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
	Design Specific to Facility Type *Additional Requirements for Wind Facilities* • As wind energy facilities pose hazards for aerial firefighting operations in certain weather and terrain conditions, the following design requirements are to be incorporated: o Wind turbines are located no less than 300 metres apart. o Provision of automatic shut-down, and the ability for wind turbines to be completely disconnected from the power supply in the event of fire. o Notification of installed weather monitoring stations to the Civil Aviation Safety Authority (CASA). o Marking of all guy wires and monitoring towers. • Nacelles are to be equipped with automatic fire detection, alarm, and fire suppression systems. *Additional Requirements for BESS* • Facility design that incorporates: o A NVZ and/or APZ around the battery energy storage system and related infrastructure, of a width of no less than 10m (or greater where determined). ▪ NVZ must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. ▪ The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping. o A layout of site infrastructure that:	***Wind Facilities*** ***BESS***	***Turbine Siting*** • The wind turbines will all be located further than 300 m from each other. ***Turbine Automatic Shutdown and Disconnection*** • Wind turbines will be automatically shut-down in the event of turbine fire, with the ability to be completely disconnected from the power supply. • There will also be ability to shut-down the turbines (either locally onsite or remotely from offsite) in a bushfire event if required ***Installed Weather Monitoring Station Notification*** • While outside the scope of this bushfire risk management plan, it is noted that the Proponent will advise CASA of all-weather monitoring stations installed as part of the proposed development ***Marking Guy Wires and Monitoring Towers*** • While outside the scope of this bushfire risk management plan, it is noted that the Proponent will mark all guy wires and monitoring towers installed as part of the proposed development. ***Turbine Fire Systems*** • All turbines are to be fitted with fire detection, alarm and suppression system to provide early warning of

CFA Guideline Section	Requirement	Type	Development Response
	▪ Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. • Battery energy storage systems must be: o Installed on a non-combustible surface. o Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures o Provided with suitable access roads for emergency services vehicles.		internal fire and automatic response • Activation of fire detection systems will be locally and remotely monitored at all times • Incorporate measures into the project Emergency Management Plan for wind turbines, for bushfires and onsite turbine fires, that include rapidly notifying QFD, shutdown and de-energisation of turbine/s, and place turbine blades in the "Y" pattern (in bushfire emergency), as required. ***BESS Bushfire Resilience*** • All BESS containers are to be installed on non-combustible surfaces, provided with a perimeter NVZ/APZ, and provided with protection to prevent ember ingress into battery containers/enclosures or vulnerable parts of the container, that could result in BESS fire, as detailed in Sections 5.4.1 and 5.5 of this BMP. • Perimeter access is to be provided around the perimeter of the BESS containers, suitable for emergency services vehicles. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
Section 6: Facility Operation	***Bushfire and Grassfire*** • If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan. *Additional Guidance from CFA Guidelines* • Your facility may be at-risk of bushfire if it is: o Located in an area close to or amongst dense or open bush, unmanaged grassland, near coastal scrub, or at an urban fringe. o Identified as being in a Designated Bushfire Prone Area. • Address bushfire prevention and preparedness activities	***All Facilities***	• Bushfire prevention and preparedness actions for the renewable energy infrastructure has been determined through application of the CFA Design Guidelines and documented in Section 5 of this BMP. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
	Vegetation Management • Facility operators must undertake the following measures during the nominated bushfire season (as per Local Government firebreak notice): o Grass must be maintained at or below 100mm in height during the nominated bushfire season. o Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. o Restrictions and guidance must be adhered to during the nominated bushfire season, days of High (and above) fire danger and declared Total Fire Ban days *Additional Requirements for BESS* • Containers/enclosures and infrastructure for battery energy storage systems must be maintained to be clear of vegetation, including grass, for at least 10 m on all sides (or greater where determined).	***All Facilities*** ***BESS***	• Vegetation modification and management requirements for the renewable energy infrastructure has been determined through application of the CFA Design Guidelines, including 10 m NVZ around BESS containers, and detailed in Section 5.1 of this BMP. • Compliance with restrictions and guidance on days of elevated Fire Danger Rating, and Total Fire Ban days is addressed in the project Emergency Management Plan. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
	Facility and System Monitoring • Appropriate monitoring for facility infrastructure must be provided, to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.	***All Facilities*** ***BESS***	• Any requirements for facility or system monitoring relating to the BESS and substation is addressed in the project FSS. • The proposed wind turbines are to be remotely monitored, both locally onsite and remotely offsite, with the following emergency response procedures included in the bushfire emergency management arrangements (documented in Section 5.4.2 of the BMP): o Turbine fire detection and suppression systems will be remotely monitored at all times, and upon activation, the response procedure is to include immediate notification to QFD, site personnel, and local landowners (if required) of potential onsite turbine fire. o The wind turbine will be automatically shut-down in the event of turbine fire, with the ability to be de-energised remotely if required (in consultation with QFD, AEMO, any relevant agencies).

CFA Guideline Section	Requirement	Type	Development Response
			• ***Based on the above, all requirements with the CFA Guidelines have been met.***
	Maintenance and Housekeeping • Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. • Maintenance must be in line with any relevant Australian Standards, the manufacturer's requirements. • Site-wide housekeeping inspections must be conducted regularly at facility. If your facility is at-risk of bushfire, site-wide bushfire preparedness housekeeping inspections must be conducted at least three months, and again one month, prior to the Fire Danger Period.	***All Facilities***	• The bushfire related siting, design, construction and maintenance requirements for the renewable infrastructure, has been determined through application of the CFA Design Guidelines and documented in this BMP, including specific requirements during the operation phase relating to maintenance and housekeeping in Section 5.7. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
Section 7: Emergency Planning	***Emergency Plan (Operational)*** • An Emergency Plan must be developed for the operational phase, specific to the facility, before development starts. *Additional Guidance from CFA Guidelines* • An Emergency Plan (EP) details the arrangements for managing emergencies, including the facility details, structures, procedures, resources and training. EP's must be specific to the infrastructure, operations and location of facilities, and informed by a sound risk management process. • The EP should address the following for each hazard: o Emergency Response Procedures (including evacuation or onsite shelter-in-place as required) o Personnel Training o Emergency Exercises • The EP is a 'living document' that must be regularly reviewed to ensure their currency and effectiveness. *Additional Requirements for Wind Facilities* • Any EP for a Wind Energy Facility must include: o Emergency procedures for fires within, and in the vicinity of, wind turbines. o Details of any triggers or circumstances for ceasing operation of wind turbines or shutting down the facility, such as on Extreme or above days or approach of bushfire/grassfire to the facility. o Maximum (safe) operational wind speed and temperature conditions and operating procedures to limit fire risk. o This information must also be provided within the facility's Emergency Information Book. o Wherever possible, rotors are to be stopped into a 'Y' pattern during emergencies	***All Facilities*** ***Wind Facilities*** ***BESS***	• An Emergency Management Plan has been to be developed for the facility by others, with procedures for preparing for, and responding to, hazards to the facility, including for onsite and off-site bushfire, and various on-site fire scenarios (especially BESS fires). • The BMP, has recommended that several response procedures for turbine fires and bushfire impact on turbines, is incorporated into the Emergency Management Plan, as summarised in Section 5.10 of this BMP • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***
Section 8. Provision of Emergency Information	***Developing an Emergency Information Book*** • An Emergency Information Book must be developed and available to emergency responders, and include the following: o A description of the premises, its infrastructure and operations. o Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems, substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. o A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. o Procedures for the management of emergencies, including evacuation, shelter-in-place (for	***All Facilities***	• The Emergency Information Book, and emergency service familiarisation process for the renewable energy infrastructure, has been determined through application of the CFA Guidelines and detailed in Sections 5.8 and 5.9 of this BMP. • If the information is provided in the project Emergency Management Plan to the satisfaction of QFD, this may also suffice. • ***Based on the above, all requirements with the CFA Design Guidelines have been met.***

CFA Guideline Section	Requirement	Type	Development Response
	facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire) o Details of emergency equipment, including the type and location of gas detectors. o Up-to-date contact details for site personnel, regulatory authorities and site neighbours. o Safety Data Sheets (SDS) for dangerous goods stored on-site. • Emergency Information Books must be located weatherproof container, at each vehicle entrance the facility • Prior to commissioning of the facility, a familiarisation visit and explanation of emergency procedures is to be offered to local fire brigades and other emergency services. o A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade. o A review of the information contained within the facility's Emergency Information Book must be undertaken prior to commencement of bushfire season annually.