Bushfire Assessment Report

Winterbourne Wind Farm

September 2022

Project Number: 21-570

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W. www.nghconsulting.com.au

E. ngh@nghconsulting.com.au

BEGA - ACT & SOUTH EAST NSW
Suite 11, 89-91 Auckland Street
(PO Box 470) Bega NSW 2550
T. (02) 6492 8333

NEWCASTLE - HUNTER & NORTH COAST
Level 1, 31-33 Beaumont Street
Hamilton NSW 2303
T. (02) 4929 2301

BRISBANE
T3, Level 7, 348 Edward Street
Brisbane QLD 4000
T. (07) 3129 7633

SYDNEY REGION
Unit 17, 21 Mary Street
Surry Hills NSW 2010
T. (02) 8202 8333

CANBERRA - NSW SE & ACT
Unit 8, 27 Yallourn Street
(PO Box 62) Fyshwick ACT 2609
T. (02) 6280 5053

WAGGA WAGGA - RIVERINA & WESTERN NSW
35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650
T. (02) 6971 9696

GOLD COAST
19a Philippine Parade
Palm Beach QLD 4221
(PO Box 466 Tugun QLD 4224)
T. (07) 3129 7633

WODONGA
Unit 2, 83 Hume Street
(PO Box 506) Wodonga VIC 3690
T. (02) 6067 2533

NSW • ACT • QLD • VIC
W. www.nghconsulting.com.au
ABN 31 124 444 622 ACN 124 444 622

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Acronyms and abbreviations

AGL	Above Ground Level
APZ	Asset Protection Zone
AS 3959-2018	Australian Standard – Construction of Buildings in Bushfire Prone Areas
BAL	Bush fire Attack Level
BCA	Building Code of Australia (National Construction Standard)
BCD	Biodiversity Conservation Division
BFEMOP	Bush Fire Emergency Management and Operations Plan, also referred to as an Emergency Response Plan
BFMC	Bush Fire Management Committee
BFRMP	Bush Fire Risk Management Plan
BFSA	Bush Fire Safety Authority
BFPL	Bush Fire Prone Land
BFPL Map	Bush Fire Prone Land Map
BPMs	Bush Fire Protection Measures
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EP&A Reg	Environmental Planning and Assessment Regulation 2000 (NSW)
ERP	Emergency Response Plan
FDI	(Forest) Fire Danger Index (also FFDI)
FRNSW	Fire and Rescue New South Wales
Ha	Hectare
IPA	Inner Protection Area

kW/m2	kilowatts per square metre (being a measure of radiant heat)
LGA	Local Government Area
O&M Compound	Operation and Maintenance Compound
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NSW RFS	New South Wales Rural Fire Service
PBP	Planning for Bush Fire Protection (2019)
RF Act	Rural Fires Act 1997 (NSW)
RF Regulation	Rural Fires Regulation 2013 (NSW)
SEARs	Secretary's Environmental Assessment Requirements
SFAZ	Strategic Fire Advantage Zone
SSD	State Significant Development
WWF	Winterbourne Wind Farm 'the Project'

Definitions

Project Area	The Project Area encompasses all properties involved with the wind farm with an approximate area of 22,285 ha
Project Boundary	For the purposes of this assessment the Development Footprint is adopted as the Project Boundary representing all project related operational assets and construction areas that could influence or be influenced by fire activity.

1. Introduction

The Winterbourne Wind Farm (WWF), referred to hereafter as the Project, involves the construction, operation and decommissioning of a wind farm with up to 119 wind turbine generators (WTG), together with associated and ancillary infrastructure. The Project is located to the north and east of Walcha in the Northern Tablelands of New South Wales (NSW).

Pursuant to clause 20 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, the Project is categorised as State Significant Development (SSD) and will be assessed under Part IV of the *Environmental Planning and Assessment Act 1979* (EP&A Act). SSD applications require the preparation of an Environmental Impact Statement (EIS).

As the Project is SSD, Section 4.41(f) precludes the Project from requiring a bush fire safety authority (BFSA) under section 100B of the *Rural Fires Act 1997*.

2. Project description

The WWF will be located in the New England North West (NENW) region of NSW, approximately 75 kilometres (km) north east of Tamworth and 32 km south of Armidale within the Walcha and Uralla Local Government Areas (LGAs). The Project Area incorporates the extent of all involved properties with an area of approximately 22,285 hectares (ha) and is at an elevation of approximately 1,100 to 1,300 metres (m) Australian Height Datum (AHD). The Project locality is identified in Figure 2-1 and the Project overview in Figure 2-2 and Figure 2-3.

The Project consists of the following key components:

- Up to 119 WTGs, each with:
    - A generating capacity of approximately 6.2 MW
    - Three blades mounted to a rotor hub (hub height of 149 m) on a nacelle above a tubular steel tower, with a blade tip height (blade length plus hub height) of up to 230 m AGL
    - A gearbox and generator assembly housed in the nacelle, and
    - Adjacent 10 m hardstand Asset Protection Zones (APZ).
- Decommissioning of four temporary meteorological monitoring masts and installation of up to two permanent meteorological monitoring masts for power testing. The permanent monitoring masts will be located close to a WTG location with a maximum height of approximately 149 m AGL, equivalent to the hub height of the installed WTGs
- Two 33/330 kV electrical substations, including control room, transformers, circuit breakers, switches and other ancillary equipment
- An operations and maintenance facility
- A battery energy storage system (BESS) of up to 100 MW / 200 MWh capacity (two hours of storage)
- Aboveground and underground 33 kV electrical reticulation and fibre optic cabling connecting the WTGs to the onsite substations (generally following site access tracks)
- A new electrical switchyard (including circuit breakers, switches and other ancillary equipment), located approximately 7 km south of Uralla and adjacent to TransGrid's 330 kV Tamworth to Armidale transmission line (Line 85)
- A 330 kV single or double circuit twin conductor overhead transmission line (transmission line) route of approximately 50 km connecting the two substations to the new switchyard
- Internal access tracks (combined total length of approximately 113 km) connecting the WTGs and associated Project infrastructure with the public road network and
- Upgrades to roads and intersections required for the delivery of oversize and overmass WTG components, transformers and associated construction-phase materials and vehicular movements.

The following temporary elements will be required during the construction phase of the Project:

- Site buildings and facilities for construction contractors / equipment, including site offices, car parking and amenities for the construction workforce
- Mobile concrete batching plant/s to supply concrete for WTG footings and substation construction works

- Earthworks for access tracks, WTG platforms and foundations, potentially including controlled blasting in certain areas
- Potential rock crushing facilities for the generation of suitable aggregates for concrete batching and/or for access track and hardstand construction
- Hardstand laydown areas for the storage of construction materials, plant, and equipment
- Up to four temporary meteorological monitoring masts. The temporary monitoring masts will be located close to a WTG location with a maximum height of approximately 149 m AGL
- External water supply and storage for concrete batching and construction activities
- The transport, storage and handling of fuels, oils and other hazardous materials for construction and operation of wind farm infrastructure
- Beneficial reuse of materials won from within the development footprint during cut and fill and WTG foundation excavation works for use in access track, hardstands and foundation material
- Establishment of APZs for temporary construction facilities.

The proposed operational life of the Project is 30 years, at which point either upgrade works will be carried out to ensure continued power generation from the existing WTGs or the Project will be decommissioned. Access roads will be retained, where this is the preference of individual landowners.

2.1. Secretary's Environmental Assessment Requirements

The NSW Department of Planning, Infrastructure and Environment (DPIE) issued the Secretary's Environmental Assessment Requirements (SEARs), relating to the Project (SSD 10471) on 17 September 2020. The SEARs incorporate input from government agencies, including local councils.

To address the general requirements of the SEARs, the EIS must include an assessment of the bushfire hazards and risks associated with development on bush fire prone land (BFPL).

The application must address bushfire hazard considerations, outlined in the SEARs and identified below:

> **Bushfire** - identify potential hazards and risks associated with bushfires / use of bush fire prone land, including:
>
> - The risks that a wind farm would cause bushfire, potential impacts on Oxley Wild Rivers National Park and identifying measures that may be required to assist fire management in the National Park
> - Any potential impacts on the aerial fighting of bushfires
> - Demonstrate compliance with Planning for Bush Fire Protection (2019).

2.2. Aims and objectives

The objective of this report is primarily to fulfil the requirements of the SEARs and in turn Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) and Section 4.15 of the EP&A Act. In accordance with the SEARs, this report identifies fire risk and mitigation actions.

The bushfire assessment has considered the Project against the following criteria:

- The SEARs dated 17 September 2020
- DPIE Wind Energy Guideline for State significant wind energy development (2016)
    - Consider potential hazards and risks associated with bushfires and the adequacy of measures to manage this risk.
- The New South Wales Rural Fire Service (NSW RFS) document Planning for Bush Fire Protection (2019), including, but not limited to:
    - Afford buildings and their occupants protection from exposure to a bushfire
    - Provide for a defendable space to be located around buildings
    - Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings
    - Ensure that appropriate operational access and egress for emergency service personnel and occupants is available
    - Provide for ongoing management and maintenance of bushfire protection measures (BPMs)
    - Ensure that utility services are adequate to meet the needs of firefighters.

Upon consideration of the above, and early consultation with fire agencies, this assessment has considered the bushfire threat that may impact the Project and the surrounding locality. In addition, consideration has been given to the application of bushfire protection measures prescribed by PBP throughout the construction, operation and decommissioning phases of the Project.

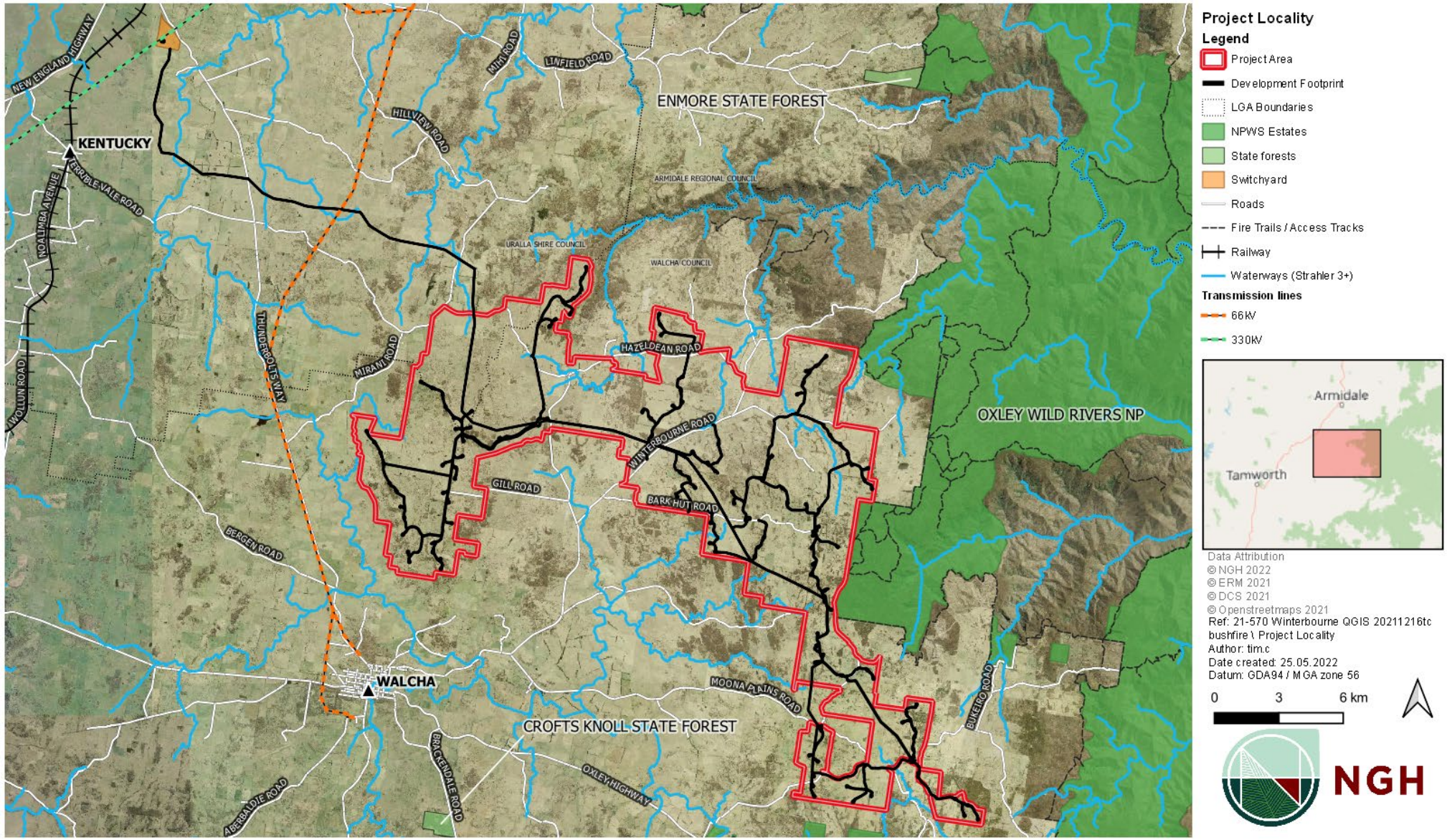

Figure 2-1 Project Locality

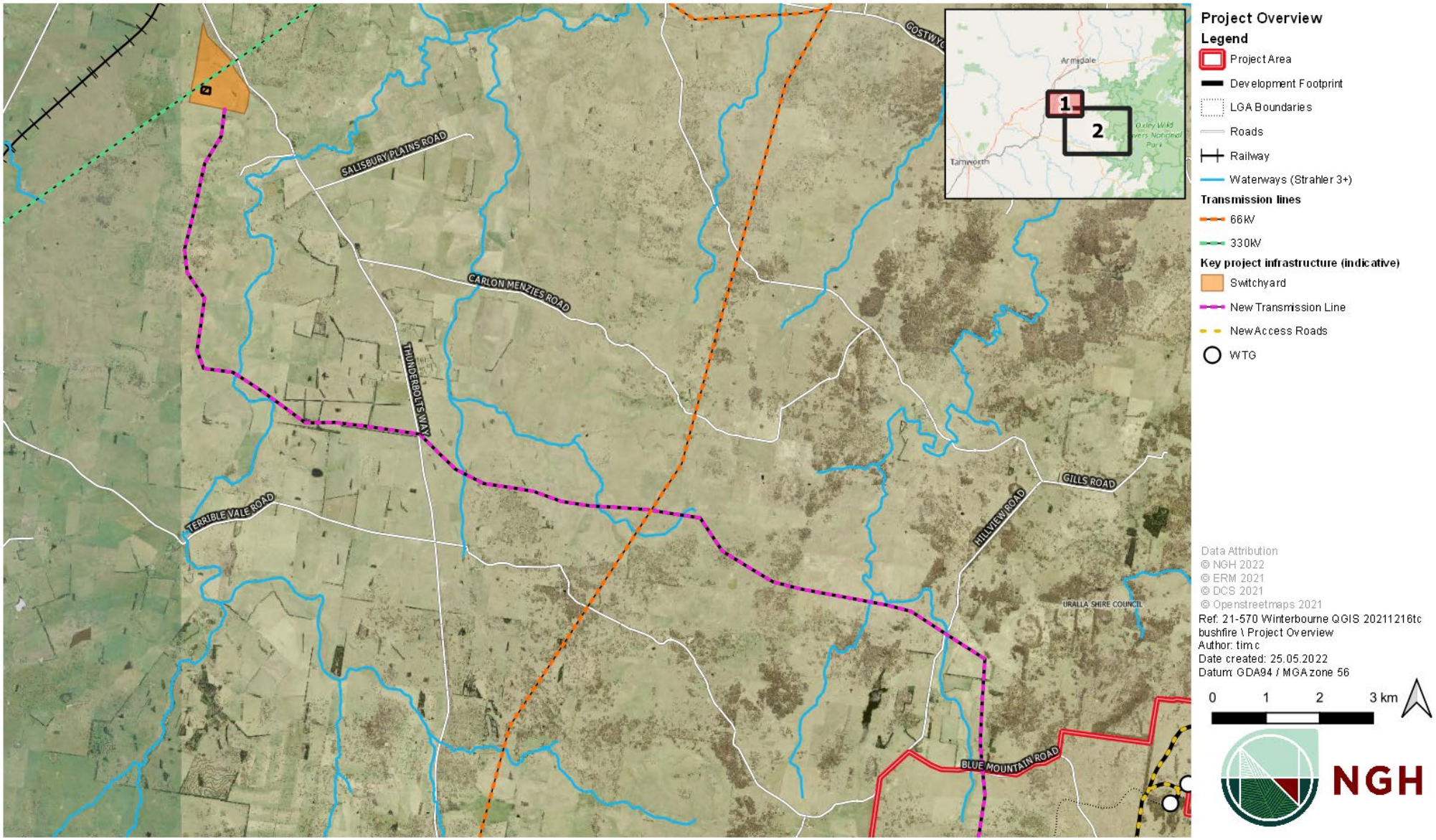

Figure 2-2 Project Overview (Map 1)

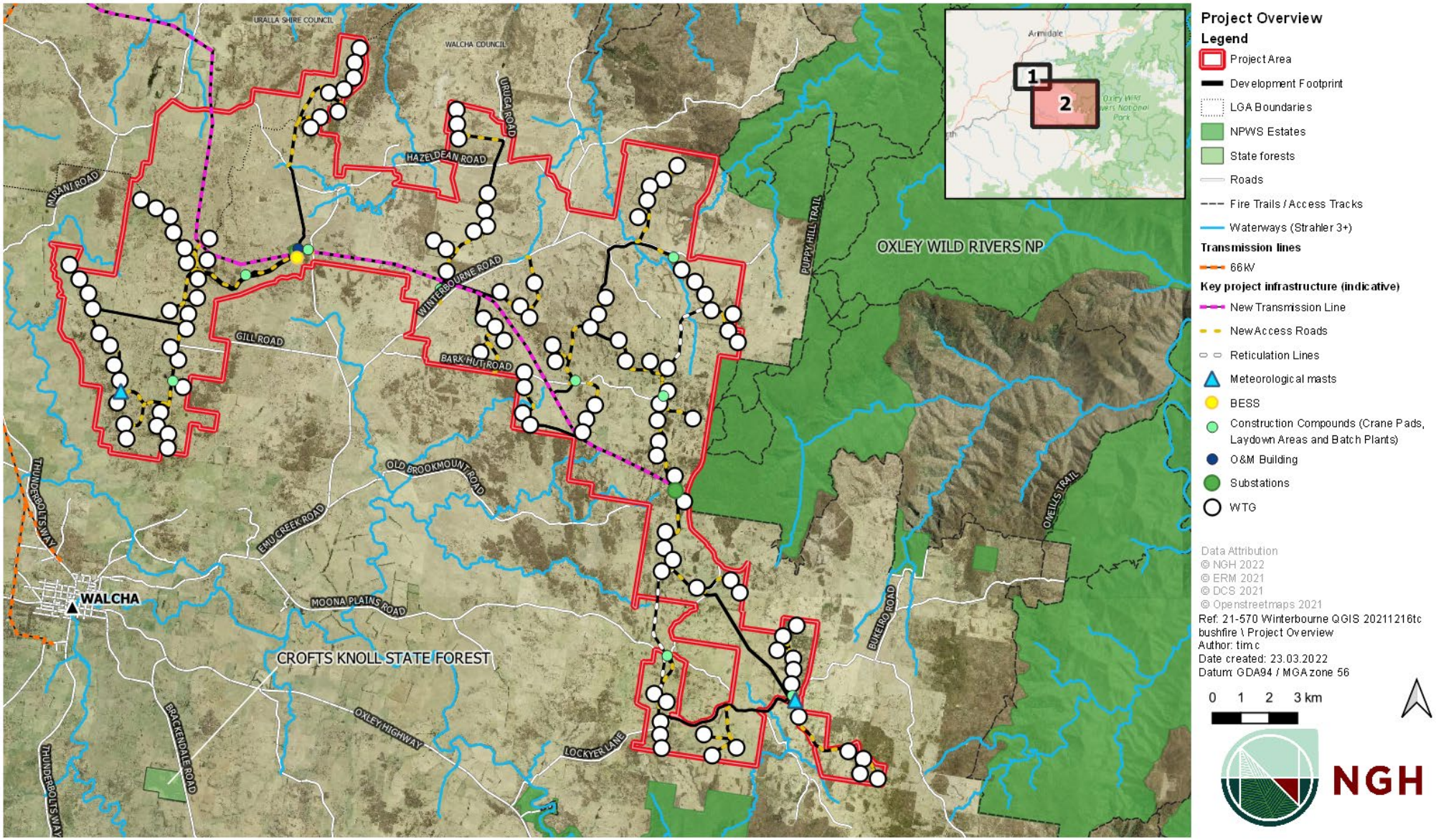

Figure 2-3 Project Overview (Map 2)

3. Planning framework

The relevant legislative requirements for development on BFPL and how they apply to this assessment are outlined below.

3.1. Environmental Planning and Assessment Act 1979

Pursuant to Clause 20 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011, the Project is categorised as SSD and will be assessed under Part IV of the EP&A Act. The Project requires consent by Section 4.12(8) of the EP&A Act.

Where a wind farm is permitted with consent, the applicant may lodge a development application (DA) with council. Where wind farms are SSD, a Development Application (DA) must be lodged with the Department of Planning, Industry and Environment (DPIE), accompanied by an Environmental Impact Statement (EIS). Schedule 2 of the EP&A Regulation specifies the form and content of EIS, as outlined within the SEARs issued for the Project, referred to in Section 2.1.

3.2. Rural Fires Act 1997

The *Rural Fires Act 1997* (RF Act) governs fire management and wildfire suppression planning between various agencies and organisations. The Bush Fire Management Committee (BMC) and Bush Fire Risk Management Plan (BFRMP) regulates identifying bushfire risk along with treatment of the risk and ongoing performance, monitoring and review processes.

The objects of the RF Act are to provide:

- For the prevention, mitigation, and suppression of bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts
- For the co-ordination of bushfire fighting and bushfire prevention throughout the State
- For the protection of persons from injury or death, and property from damage, arising from fires
- For the protection of infrastructure and environmental, economic, cultural, agricultural and community assets from damage arising from fires.

As the Project is a SSD, Section 4.41(f) precludes the Project from requiring a bushfire safety authority under section 100B of the *Rural Fires Act 1997*.

3.2.1. New England Bush Fire Risk Management Plan 2017

The Project locality falls under the New England Bush Fire Management Committee BFRMP. The aim of the BFRMP is to minimise the risk of adverse impact of bushfires on life, property and environment. To achieve this aim, the objectives of the BFRMP (NSW RFS, 2017) are to:

- Reduce the number of human-induced bushfire ignitions that cause damage to life, property and the environment
- Manage fuel to reduce the rate of spread and intensity of bushfires, while minimising environmental/ecological impacts
- Reduce the community's vulnerability to bushfires by improving its preparedness

- Effectively contain fires with a potential to cause damage to life, property and the environment.

3.3. Planning for Bush Fire Protection 2019

Planning for Bush Fire Protection (PBP) 2019 guideline, published by the NSW RFS is a planning document that applies to all development located on land classified as BFPL across the State of New South Wales.

The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment. PBP indicates that bushfire protection can be achieved through a combination of strategies, which are based on the following principles:

- Control the types of development permissible in bushfire prone areas.
- Minimise the impact of radiant heat and direct flame contact by separating development from bushfire hazards
- Minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers
- Enable appropriate access and egress for the public and firefighters
- Provide adequate water supplies for bushfire suppression operations
- Focus on property preparedness, including emergency planning and property maintenance requirements
- Facilitate the maintenance of Asset Protection Zones (APZs), fire trails, access for fire fighting and on site equipment for fire suppression.

The Project Boundary is located on land mapped by Walcha Council and Uralla Shire Council as BFPL. Although SSD does not require a BFSA, the SEARs has identified that the Project must demonstrate compliance with the PBP guideline.

PBP applies a suite of BPMs to development on BFPL, which include:

- Access
- Landscaping
- Asset protection zone
- Building construction and design
- Emergency management arrangements
- Water supply and utilities.

The Project is specifically captured under PBP, through application of Section 8.3.5 (wind and solar farms). PBP states that wind farms should be provided with adequate clearances to combustible vegetation as well as providing emergency services with access and water. As a minimum, wind farms should be provided with:

- A minimum 10 m APZ for the structures and associated buildings / infrastructure.
- The APZ must be maintained to the standard of an Inner Protection Area (IPA) for the life of the development.

3.4. Planning Secretary's Environmental Assessment Requirements (Consultation)

In accordance with the SEARs, consultation occurred with relevant authorities specific to bushfire hazard during November and December 2020. The purpose of consultation is to allow authorities the opportunity to raise concerns and / or provide input and advice. A summary of consultation is provided in Section 3.4.1 to Section 3.4.4, with Appendix A containing evidence of consultation.

3.4.1. Fire & Rescue New South Wales

NGH received a response from Fire & Rescue NSW (FRNSW) on 9 November 2020. FRNSW provided the following input:

> *FRNSW is not the designated fire authority for the area that the wind farm is situated, that being Rural Fire Service area. However, FRNSW may be called to attend any type of Hazardous materials incident that should occur on the site and also may act as the rescue agency should the accredited unit not be available.*
>
> *Once the site is established FRNSW may attend the site to determine the locations of any stored HAZMATs on site and check entry and egress points for our own reference. This information would then be stored in our computer aided dispatch system along with accurate contact numbers for after hours site manager etc.*

Response: Subject to approval, the WWF will have ongoing communication with FRNSW, particularly through the preparation of an emergency response plan. Prior to WWF becoming operational, it is recommended that FRNSW is invited to attend a site inspection to ensure that relevant personnel are familiar with the Project infrastructure, site access arrangements and location of water supplies.

3.4.2. New South Wales Rural Fire Service

NGH received a response from NSW RFS on 14 December 2020. The NSW RFS provided the following input:

> *The NSW RFS has received and reviewed your comments below and the attached documents.*
>
> *The NSW RFS previously provided NSW Planning dated 9 July 2020, with the following comment:*
>
> *"The NSW RFS has no objection to the development proceeding and supports the draft SEARs, as attached".*
>
> *As such, the NSW RFS expects the EA to incorporate bushfire risk mitigation measures as part of the development proposal.*

Response: The proposed development will incorporate bushfire protection measures as prescribed in Section 8.3.5 of PBP.

3.4.3. Biodiversity Conservation Division

NGH received a response from the Biodiversity Conservation Division (BCD) on 5 November 2020. BCD provided the following input:

> *The BCD provided detailed input to the Department's Planning and Assessment Group into the preparation of the Secretary's Environmental Assessment Requirements (SEARs) for the Winterbourne Wind Farm on 15 July 2020. We consider that the SEARs adequately outline the emergency response issues from the local NPWS perspective and have no further comments.*

Response: This Bushfire Assessment Report addresses the relevant SEARs requirements.

3.4.4. National Parks and Wildlife Service

NGH undertook consultation with local (Armidale/Walcha Branch) National Parks and Wildlife Service (NPWS) and received a response from NPWS on 23 December 2020. NPWS provided the following input:

> *Under the Rural Fires Act 1997 the NPWS is a fire authority and is responsible for controlling fires in the park and reserve and ensuring they do not cause damage to other land or property. This responsibility includes the implementation of fuel management programs. The NPWS may also assist with the control and suppression of fires adjacent to the park.*
>
> *A major source of fires in the park are fires escaping from neighbouring lands. Access to the park on the ground and in the air is paramount to fire suppression, delayed response times can be important to keeping fires small.*
>
> *Ground based operations will rely on aerial support routinely. Water bucketing and bombing aside (aerial fire fighting) helicopters will be used to map and monitor fire progression and behaviour, these things are critical to firefighter safety.*
>
> *Remote fire fighting operations will rely on helicopter insertion and extraction at the minimum but generally will also involve a component of helicopter water bucketing support. Matters that need to be addressed for fire fighting operations in isolation are how the proposal will:*
>
> - *Affect helicopter/vehicle access to the national park boundary*
> - *Not impact on the ability to conduct vehicle based and aerial fire fighting along the boundary of the national park and within the wind farm project boundary*
> - *Not create access restrictions for vehicles/helicopters to dams (water) along the boundary of the national park and within the wind farm project boundary*
> - *Not impact ferry times especially when cloud/fog restricts flying above 500m ASL. Is a flight corridor proposed through the windfarm?*
> - *Will not adversely affect helicopter insertion or extraction times for remote firefighters working within the national park.*

Response: The Project will not hinder access to Oxley Wild Rivers National Park nor static water supplies currently available within adjacent properties. The Macleay Gorges Reserves Fire Management Strategy Sheet 13 (NSW OEH, 2018) identifies several water points within the Project Area. The Project would not impact or restrict access to currently available water points.

The Project proposes construction of new access tracks and will significantly improve site access for emergency services. In addition, static water supply (in the form of non-combustible storage

tanks) will be provided within the Project Boundary and will be dedicated for use by emergency services.

No flight corridors are proposed through the Project Boundary. In the unlikely event that a fire did spread from the wind farm to surrounding properties, or is threatening assets within the National Park, the turbines would not limit aerial fire fighting capabilities on other properties in the surrounding area. Wind turbines, similarly to high voltage transmission lines, are part of the landscape and would be considered in the incident action plan, thus not resulting in any increased risk to aerial fire fighters.

To reduce the impact on operations undertaken by the NPWS, including fire operations and aerial pest operations, while maintaining pilot safety, details of WTG locations and heights are to be provided to aerial application operators, prior to construction and assist in developing procedures for such aircraft operations in the vicinity of the Project (refer to Winterbourne Wind Farm Aviation Impact Assessment v1.3 (Aviation Projects, 2022)).

3.5. NSW Planning Guidelines for Wind Farms

The NSW Planning Guidelines: Wind Farms (DPI, 2011) has been prepared in consultation with the community and energy industry to provide a regulatory framework to guide investment in wind farms across NSW, while minimising and avoiding any potential impacts on local communities.

The guidelines include matters to be considered from a hazard's perspective. Those matters specific to bushfire are identified below:

- The risk that a bushfire will damage a wind turbine if the wind farm is located in or near a bush fire prone area
- The risk that the construction and / or operation of the wind farm will create a fire that could spread to nearby areas
- The potential for the wind farm to impact on aerial fighting of bushfires
- Fire safety for workers and visitors during the construction and operation phase, ensuring there is appropriate fire fighting equipment and water supplies on site to respond to a bushfire.

A suite of BPMs are proposed to achieve the following objectives:

- Reduce the likelihood of a wind turbine being damaged by bushfire
- Manage the type, duration and timing of construction works on site, plus implement ongoing BPMs throughout the operational phase of the Project, to reduce the likelihood of a bushfire ignition occurring within the Project Boundary
- Consider and identify any risk associated with potential impacts on aerial fire fighting
- Identify and manage risk associated with workers and visitors attending site, ensuring fire fighting equipment is always present.

The Project adequately addresses the DPI (fire) hazard related guidelines, listed above. These points are further discussed in Sections 4 and 5.

4. Bushfire Risk Assessment

4.1. Existing environment

4.1.1. Bush Fire Prone Land

In accordance with Section 10.3 of the EP&A Act, the NSW Rural Fire Service Commissioner designates bush fire prone land that Council's must record on a map for land within their LGAs. As discussed in Section 3.3 the Project Boundary is mapped as containing BFPL as per the Walcha LGA and Uralla LGA bush fire prone land maps. The Project's relationship with mapped BFPL is shown in Figure 4-1 and Figure 4-2. As such, application of PBP 2019 applies, specifically Section 8.3.5 (wind and solar farms).

4.1.2. Regional Bushfire Characteristics

The New England Bush Fire Management Committee (BFMC) area is located in the northern tablelands of NSW and includes the LGAs of Armidale Regional, Uralla and Walcha. The area covered by the New England BFMC is 1,813,000 hectares and includes the land tenures outlined in Table 4-1.

Table 4-1 Location and Land Tenure (Source: NSW RFS, 2017)

Land Manager	% of BFMC area
National Parks & Wildlife Services	17.1
Forests NSW	4.03
Department of Lands	8.3
Local Government	0.17
Private	67.6
All other	2.8

The typical / average climate in the New England BFMC area is temperate to cool, characterised by warm summers with uniform rainfall generally occurring in the summer. Patches of montane climate occur at higher elevations and these are characterised by mild summers and no dry season. The bushfire season generally runs from August to March.

The New England BFRMP outlines that prevailing weather conditions associated with the bushfire season in the New England BFMC area are west to north-westerly winds, moderate to high daytime temperatures and low relative humidity (NSW RFS, 2017). Frosts in winter create low fuel moisture content and dry lightning storms can occur in the bushfire season.

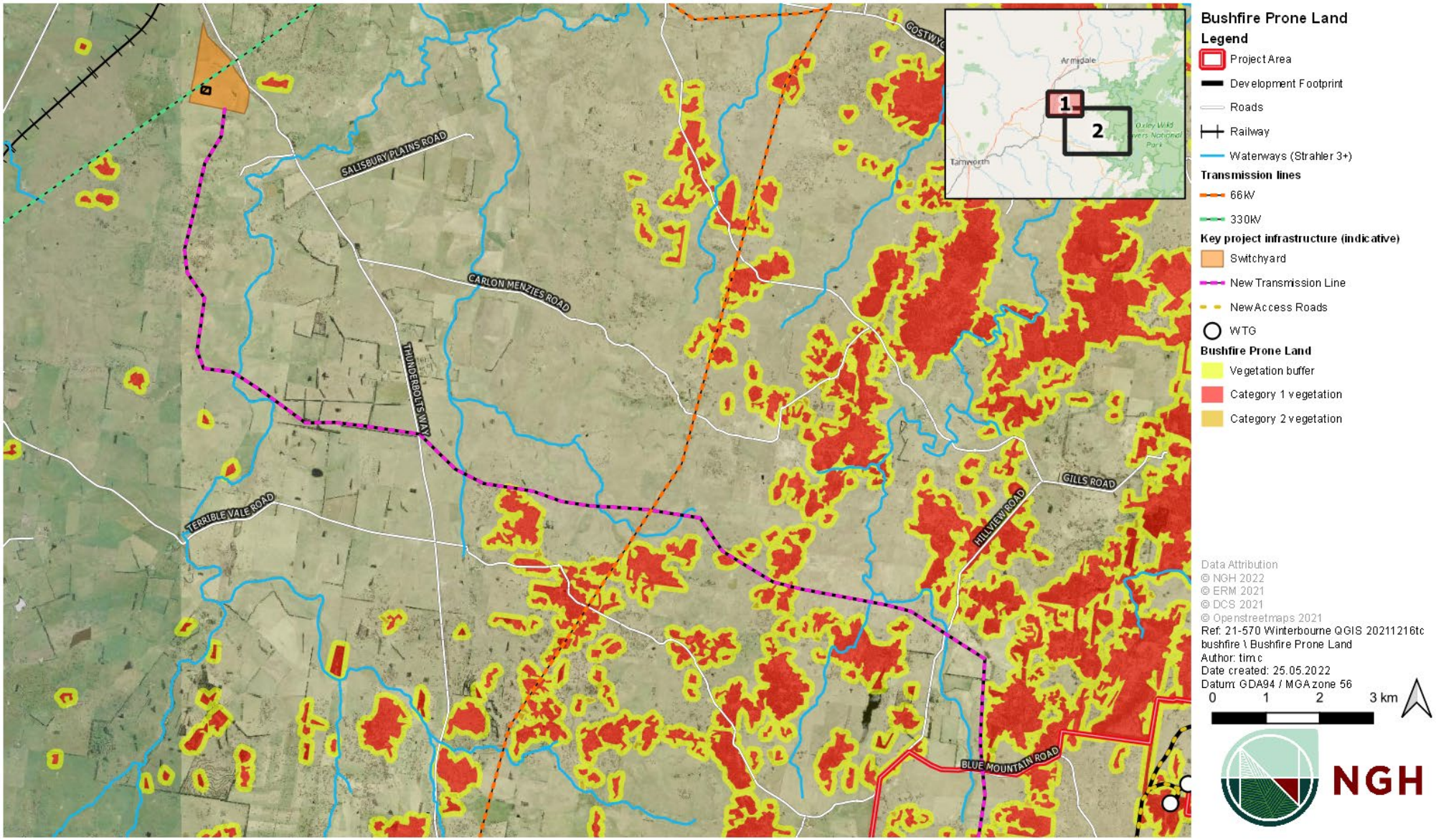

Figure 4-1 Project layout relationship with bush fire prone land map (Map 1)

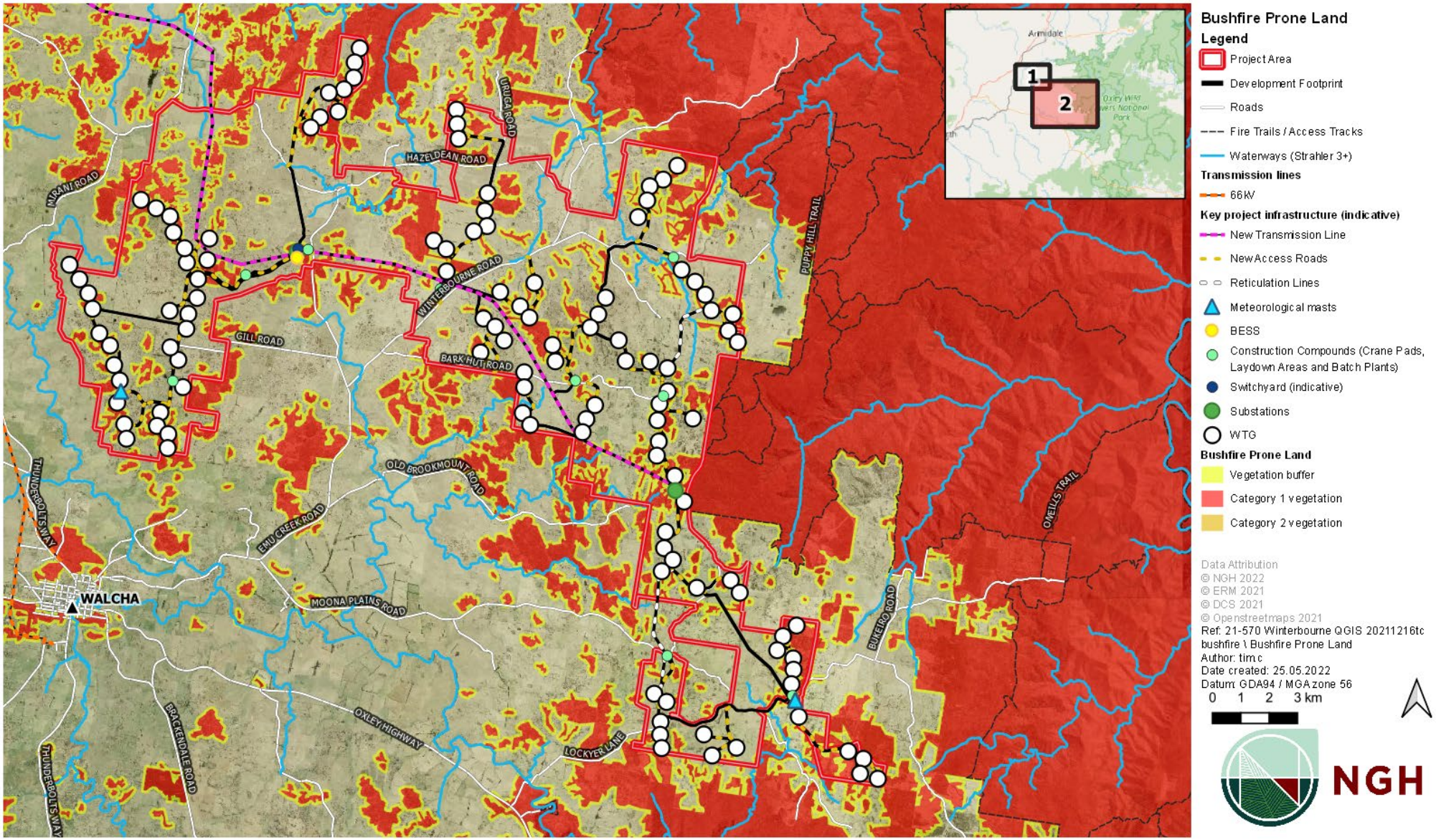

Figure 4-2 Project layout relationship with bush fire prone land map (Map 2)

4.1.3. Fire history

The New England BFRMP identifies that the New England BFMC area has on average 95 bushfires per year, where 12 on average are considered to evolve into major fire events (NSW RFS, 2017).

Appendix 4 of the BMFMP provides detailed fire frequency mapping, which includes large areas of the adjacent Oxley Wild Rivers National Park. The frequency of fire events that occur in vegetation immediately adjacent to the Project Boundary is identified as occurring at intervals of 1 to 2 years (NSW RFS, 2017). Due to the high frequency of fire events that occur immediately adjacent to the Project Boundary, the application of BPMs and the preparation of an emergency response plan is imperative.

A review of the regional fire history mapping also supports a high frequency of fires within the locality and indicates a frequency typically occurring several years apart. The most recent fire that impacted the Project Boundary is the Carrai Creek Fire which burnt 238,086 hectares between 17 October 2019 and 15 January 2020. This fire started in the in the Carrai National Park and travelled towards the Project Boundary, as shown in Figure 4-3.

The Google Earth Engine Burnt Area Map (GEEBAM) models the impact of the 2019-20 fires, categorising areas into four classes from low (unburnt canopy), medium (canopy partially burnt), high (canopy and understory completely burnt) and very high (canopy has been completely consumed). A review of the current mapping (December 2021) confirms that the vegetation adjacent to the Project Boundary, within the Oxley Wild Rivers National Park was severely impacted by bushfire during the 2019-20 fire season (refer to Figure 4-4). The location of this vegetation within the conservation area will assist in the long-term regeneration of the natural ecosystem and it is expected that high fuel loads will return across the broader regional landscape.

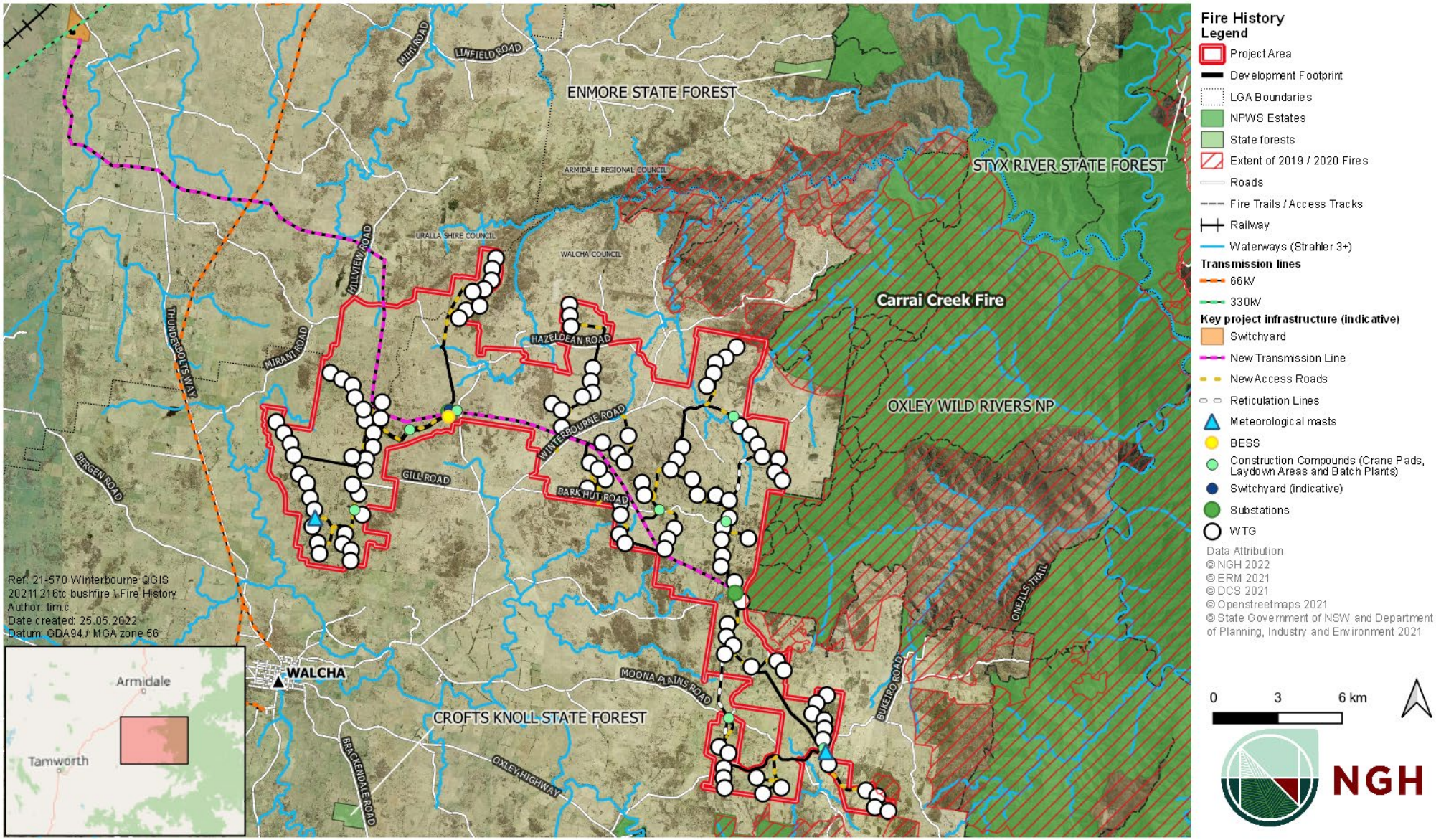

Figure 4-3 Extent of the 2019/2020 Bushfire season in context of the Project

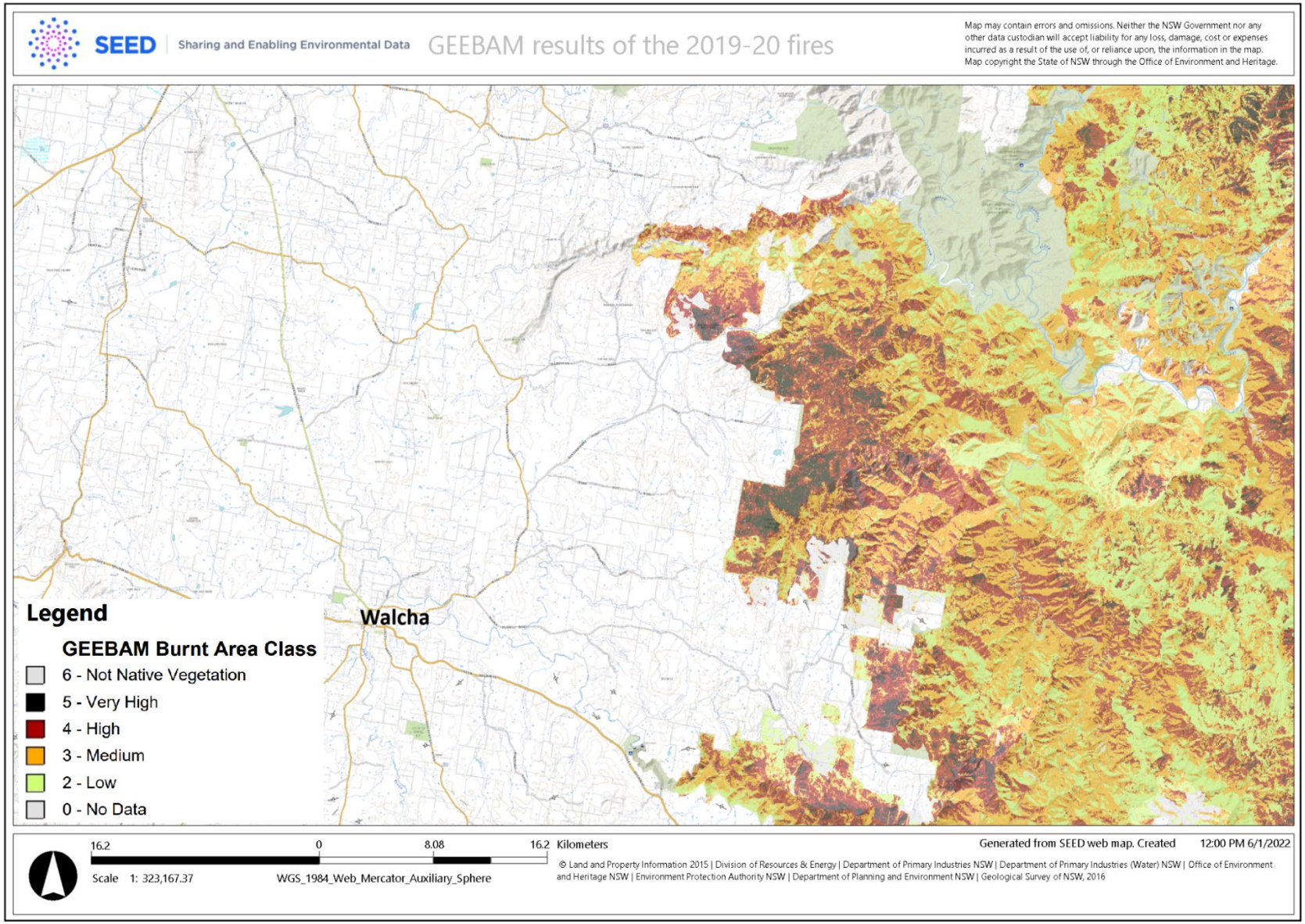

Figure 4-4 Severity of the 2019/2020 Bushfire season in context of the Project locality

4.1.4. Vegetation

The Project Boundary is currently used for agricultural purposes such as livestock grazing and is characterised by large areas of grassland and pastures with isolated remnant patches of forest and woodland vegetation. The understorey bushfire fuel loads can vary from season to season. For the purposes of identifying key bushfire hazards and risks that would most greatly influence bushfire behaviour and the risk of potential impact on the Project infrastructure, detailed vegetation mapping has been confined to the Project survey corridor only.

Analysis of vegetation within and around the Project Boundary has been conducted by:

- Interpretation of aerial and satellite imagery to identify the location of vegetation zones.
- Review of regional vegetation community mapping
- Field survey and ground truthing of vegetation within the Project Boundary only (October 2021) to confirm the broad vegetation classification and structure that would influence bushfire behaviour.

The Project Boundary is located wholly within the New England Tablelands Bioregion and also wholly within the Walcha Plateau Sub-bioregion. It generally contains modified vegetation due to historical and ongoing agricultural practices as shown in Figure 4-5 and Figure 4-6. The vegetation types located within a 100m buffer of the Development Footprint are shown in Figure 4-7 and Figure 4-8. It is anticipated that agricultural practices will be ongoing and will continue to contribute to reduced fuel loads within the Project Boundary. While dominated by grassland and pastures, remnant patches of forest and woodland vegetation exists throughout. The isolated remnant areas of wooded vegetation do not provide a fire path to the National Park from Project infrastructure.

Vegetation within and surrounding the Project Boundary can be seen in Figure 4-7 and Figure 4-8. Areas of vegetation that would most likely influence bushfire risk to project infrastructure are categorised as:

- Hazard vegetation – comprises Northern Tableland Dry Sclerophyll Forest, New England Dry Sclerophyll Forest, New England Grassy Woodland and Grassland. The hazard type which would generally include greater fuel loads is identified as Dry Sclerophyll Forest. In accordance with Keith (2004), the vegetation will be assessed as Forest for assessment under PBP
- Non hazard vegetation – categorised as actively grazed pastures, roads, dwellings, farm buildings and maintained gardens and farm structures.

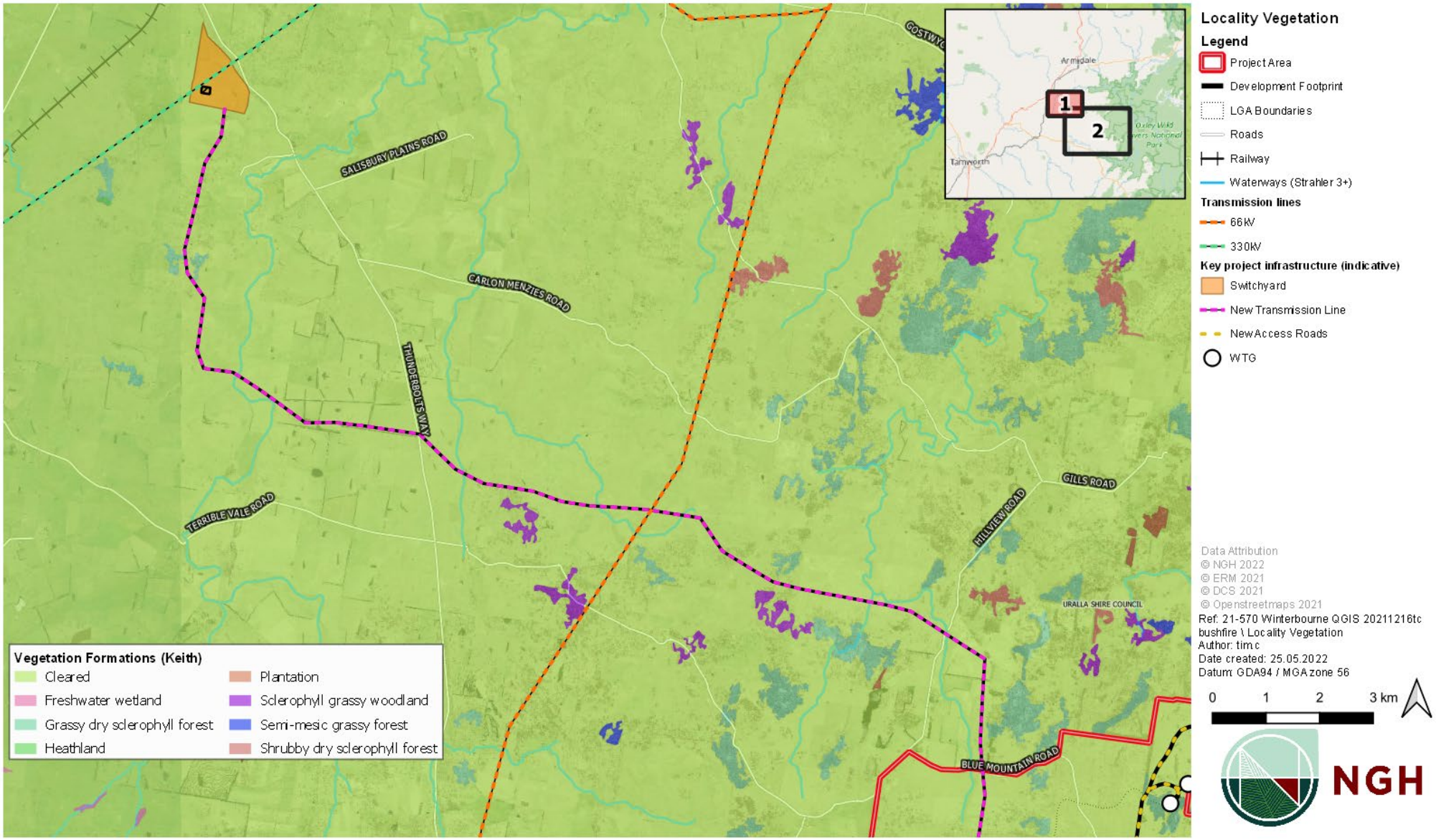

Figure 4-5 Vegetation within the project locality (Map 1)

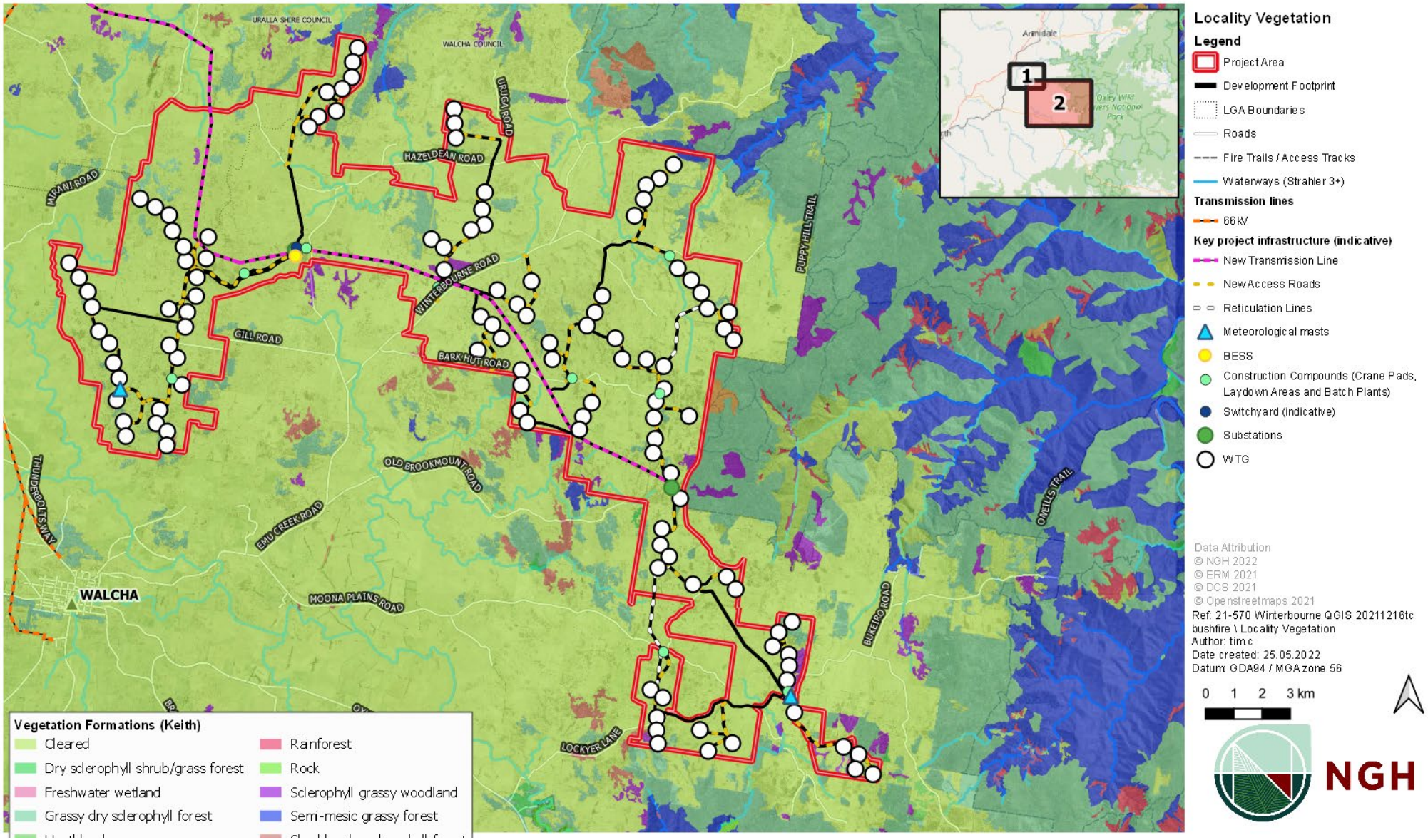

Figure 4-6 Vegetation within the project locality (Map 2)

Table 4-2 Predominant Vegetation Formations found within the Project Boundary

Predominant Vegetation (Keith, D., 2004)	Vegetation Formation (PBP)
Northern Tableland Dry Sclerophyll Forest	Forest (Dry)[1]
New England Dry Sclerophyll Forest	Forest (Dry)[1]
New England Grassy Woodland	Woodland[2]
Western Slopes Grassland	Grassland[3]

Note:

[1] Dry Sclerophyll Forest vegetation is generally categorised as being dominated by eucalypt species and having an open tree canopy (typically 10 – 30 m in height), with crowns that touch or overlap. Due to the canopy structure, most sunlight is able to penetrate, supporting the growth of a prominent understorey layer of shrubs and grasses.

[2] Woodland vegetation is often dominated by an open to spare layer of eucalypts, with the crowns rarely touching. Canopy typically ranges between 15 – 35 m in height. Ground cover includes grasses and herbs. Shrubs are sparsely distributed (if present). Woodland is usually found on flat or undulating ground.

[3] Grassland vegetation is often dominated by perennial grasses and may have a presence of broad-leaved herbs, on flat topography. A lack of woody plants of common. Plants include daises, grasses, legumes, geraniums, saltbushes and copperburrs.

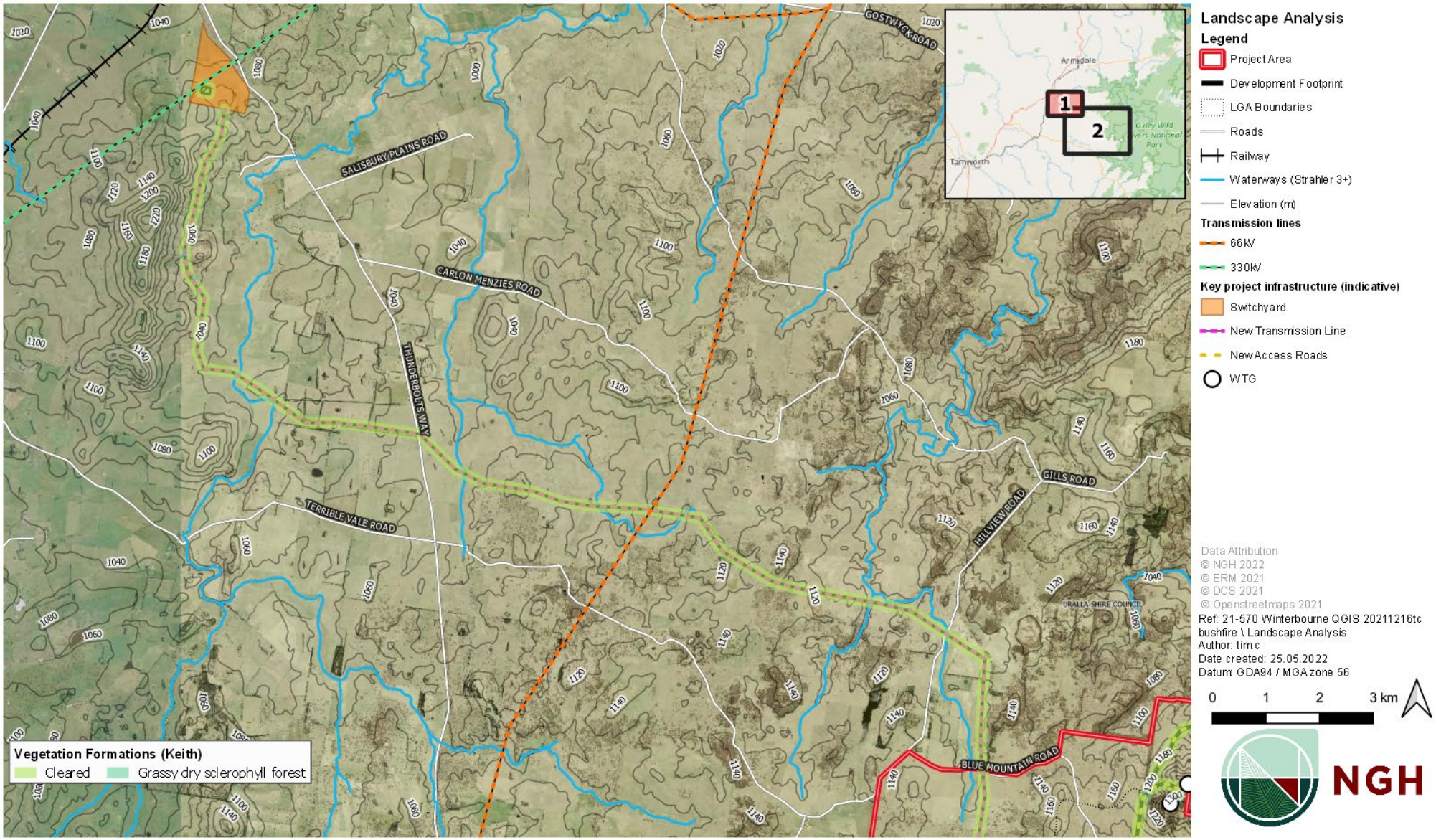

Figure 4-7 Vegetation adjacent Project Infrastructure (Map 1 of 2)

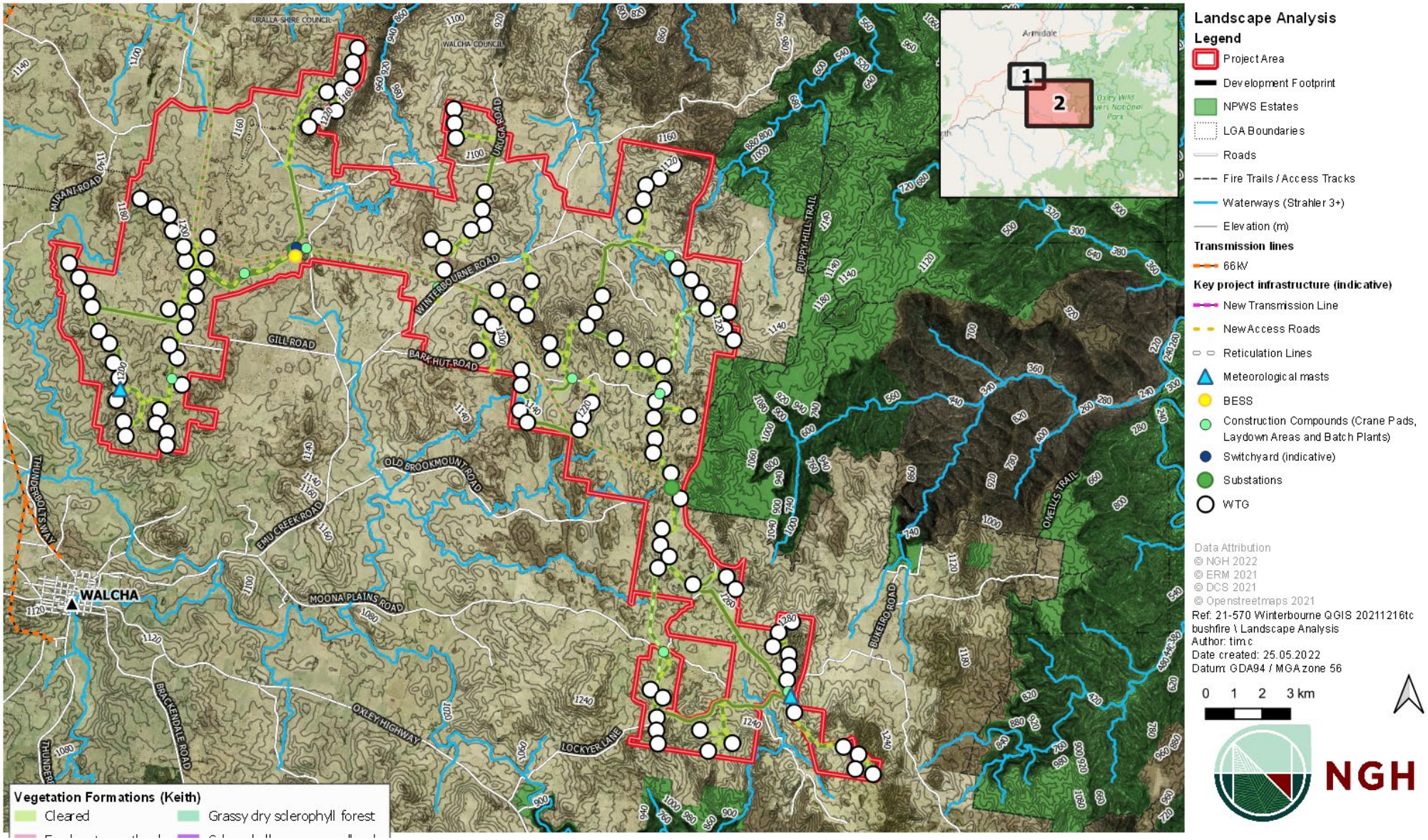

Figure 4-8 Vegetation adjacent Project Infrastructure (Map 2 of 2)

4.1.5. Fuel

The landscape within the Project Boundary is highly modified, due to long term and continued agricultural activities. Grassland vegetation presents a fuel load that could enable the rapid spread of fire, particularly in times when pastures are cured. However, it is acknowledged that grassland does not always present a hazard in agricultural areas, as vegetation may be low or non-flammable due to being too green to burn (high moisture content) or may be recently planted (not of sufficient height or structure to facilitate growth and movement of a fire).

Areas of Forest and Woodland vegetation are present, however do not represent a significant proportion of the landscape in the Project Boundary. Notwithstanding these remnants can pose an increased fire risk to those turbines that are located adjacent to wooded areas.

Corresponding fuel loads of vegetation formations (refer to Section 4.1.4) identified throughout the Project Boundary are identified below in Table 4-3, as referenced in NSW Rural Fire Service Comprehensive Vegetation Fuel Loads (NSW RFS, 2019).

Table 4-3 Fuel loads for vegetation formations

Vegetation (Keith, D., 2004)	Vegetation Formation (PBP)	Overall Fuel Load (incl. bark and canopy)
Northern Tableland Dry Sclerophyll Forest	Forest (Dry)	31.5 t/ha
New England Dry Sclerophyll Forest	Forest (Dry)	25.23 t/ha
New England Grassy Woodland	Woodland	20.2 t/ha
Western Slopes Grassland	Grassland	6.0 t/ha

4.1.6. Local topography

With reference to the vegetation formations that are present within the landscape, it is acknowledged that topography within the Project Boundary varies in altitude, ranging from 1,050 m to 1,350 m. In terms of fire risk, PBP indicates that effective slope is considered to be the slope under the vegetation which will most significantly influence the bushfire behaviour. Steeper slopes significantly increase the rate of spread of a fire throughout the landscape. A wildfire moves quickly up-slope, doubling in speed every 10 degrees of incline (SA DEW). In extreme weather conditions significant slope has the ability to generate an intense fire over a relatively short distance.

Some wooded areas within 100 m of the Development Footprint are subject to significant slope (up to 15 degrees), representing potential for high fire intensity.

PBP requires that APZs be sited outside of land with a slope greater than 18 degrees.

4.1.7. Fire behaviour

Grassland

The Project Boundary is dominated by heavily grazed pastures and the understorey bushfire fuel loads can vary from season to season. Vegetation growth is encouraged by periods of wet weather, increasing the amount of fuel available (grass, leaf litter, twigs, bark). When the weather is hot, the humidity is low and there has been little recent rain, this vegetation dries out and becomes more flammable. There would also be periods when pastures would be non-flammable because they are either fallow, too green to burn or are recently planted.

Grassfires can start and spread quickly. Grassfires tend to be less intense and produce fewer embers than bushfires, but still generate enormous amounts of radiant heat. Grassfires can also start earlier in the day than bushfires, because grass dries out more quickly when temperatures are high and humidity is low. While it is acknowledged that, under extreme weather, a fire would spread even in heavily grazed grass, and may carry a fire to, or from the Project Boundary, this assessment assumes that the pastures will be maintained in their current low hazard state by existing grazing processes.

The ignition risk within the grasslands due to wind farm related activities (when undertaken with appropriate mitigations measures) is considered low, as identified in Section 4.2.

Woodland and Forest

Forest fires behave differently to grassland fires. Areas comprising wooded vegetation contain higher fuel loads and therefore influence fire behaviour. With respect to the Project Boundary, forested areas tend to coincide with rapid changes in topography (i.e. greater than 10 degrees). As such, the forested areas of the Project Boundary are considered higher risk due to an increase in fuel load (as identified in Table 4-3) and steeper topography, which can significantly influence fire behaviour, intensity and rate of spread. However, it also noted that the wooded vegetation located within the Project Boundary is considered to be generally isolated, surrounded by areas of grassland or pastures, which (pending on the point of ignition) may restrict the ability of a fire progressing to a fully developed fire.

4.2. Risk of fire ignition and impact to assets

4.2.1. Risk of fire ignition during construction and maintenance

In the New England region, bushfires mostly occur due to escaped controlled burns, machinery (tillage, slashing, harvest), hot works (e.g. welding), lightning strikes and arson / fire setting (NSW RFS, 2017).

Earth moving equipment, power tools (e.g. welders, grinders), mowers and slashers are known for starting bushfires under conditions of high temperature, low humidity and high wind. Notwithstanding the above, works associated the construction and maintenance of the Project introduce various types of construction not traditionally found in the locality. Typical construction activities associated with the Project will include:

- Site establishment and preparation for construction - fencing, ground preparation, construction of the internal access tracks, upgrade of existing access points/intersections, preliminary civil works and drainage

- Utilities and services connections to the Project
- Foundation piling / excavations and concrete footings pours
- Installation of turbines
- Installation of underground cabling (trenching) and installation of inverter stations
- Construction of an Operation and Maintenance (O&M) compound and maintenance building
- Construction of the substation and connection switchyard
- Construction of Transmission lines
- Removal of temporary construction facilities and rehabilitation of disturbed areas.

Therefore, construction activities will be a potential source of ignition, particularly from October to March. Management of activities across the Project Boundary is important to ensure fire risk is kept to a minimum throughout the construction and decommissioning stages of the Project.

4.2.2. Risk of fire ignition during operation

The operational phase of the proposal has the following associated bushfire risks:

- Transmission line failure or contact with vegetation within clearances
- Overheating in the substation
- Overheating in the battery banks
- Grass fire ignition from vehicles and maintenance machinery
- Poor groundcover management and associated increase in fuel loads.

The operational phase of the Project has a significantly reduced risk for ignition source, as the WTGs, substations, BESS and O&M compound will be located on hardstands (compact ground and gravel base) with APZs established around the perimeter. The new access roads will be constructed of engineered fill topped with crushed stone pavement and will be approximately 5.5 metres wide (excluding shoulders and any required drainage). The APZs will include gravel surfacing to minimise the risk of fire escaping from the Project infrastructure and the risk of external fire affecting the Project infrastructure.

The risk of bushfire ignition from electrical cabling will be minimised in consideration of the requirements described in Section 5.3.3, Table 5.3c, of the PBP 2019 guidelines:

- Where practicable, electrical reticulation will be installed underground
- Where overhead, electrical reticulation is proposed as follows;
    - Lines will be installed with short pole spacing of 30 m, unless crossing gullies, gorges or riparian areas; and
    - No part of a tree will be closer to an overhead line than the distance set out in ISSC3 *Guideline for Managing Vegetation Near Power Lines*.

The project will comply with TransGrid requirements and guidelines in respect of vegetation management within the main transmission line easement.

Permanent buildings used as site offices or maintenance buildings will be constructed of low-combustibility or non-combustible materials in accordance with the National Construction Code (NCC) to reduce the risk of fire during the operational phase. In addition, engineering controls such as fire alarm, suppression systems and fire extinguishers will be used to reduce the risk of fire.

4.2.3. Key assets at risk

There are a number of dwellings within and neighbouring the Project Boundary, dispersed across the agricultural landscape. Residential dwellings on rural properties are scattered throughout the landscape and bushfire risk is an existing hazard. Notwithstanding, protection of life and property is an objective of PBP, therefore it is imperative for the Project to incorporate suitable mitigation measures to reduce the risk of fire activities.

The Walcha Township is the closest population centre to the Project.

Other assets identified within and surrounding the Project Boundary include:

- Threatened Ecological Communities and Species
- Heritage sites
- Agricultural crops
- Stock
- Fences
- Existing Infrastructure (public roads, transmission network, telecommunications)
- Proposed infrastructure (turbines, substation, internal road upgrades)
- Nearby towns and villages.

All assets identified above, including operational and maintenance components of the Project, are at risk from a bushfire that may initiate either from within the Project Boundary, or from an external fire threat. The location of these assets have been considered within this assessment and during the development of recommended mitigation measures.

4.2.4. Design mitigation measures

With regards to the risk of ignition details outlined above, the Project design includes the following suppression and mitigation measures:

1. Venting and fire containment controls incorporated into battery cabinets.
2. Remote controls are incorporated into the SCADA system; the signal and alarm would be received simultaneously
3. Automatic shutdown control would be available to automate response protocols to any potential electrical, heating, or chemical safety and hazards incidents
4. The battery and power conversion systems would be in cubicle design, manufactured of low combustible external materials
5. A building room for switch room, operational, maintenance building, would comprise a containerised infrastructure or concrete structure; a low, or non-combustible material.

4.2.5. Additional fire protection measures

The Project will incorporate the additional protection measures outlined below in order to further mitigate against the risk of ignition, and impact by landscape fire.

Table 4-4 Consideration of additional protection measures

Consideration	Recommendation
Cooling/heating	Any critical infrastructure that may be proposed, including ventilation shafts, should

Consideration	Recommendation
ventilation shafts	be screened with perforated mesh (with a maximum aperture of 2 mm) to offer protection against ember attack.
Storage of hazardous materials	Storage locations of hazardous materials should not be located adjacent the Project Boundary (i.e. adjacent hazard vegetation) within the APZ. Storage of hazardous materials should be fully enclosed in a bunded location, or otherwise located in a shielded location, such as masonry wall surroundings or prefabricated container, to reduce exposure to radiant heat and flames.
Storage of fuels and flammable liquids	Safe storage of fuels and flammable liquids is recommended, as to ensure these items to not contribute or add to a bushfire event. Materials should not be located adjacent the Project boundary (i.e. adjacent hazard vegetation) within the APZ. Storage of fuels should be fully enclosed in a bunded location, or otherwise located in a shielded location, such as masonry wall surroundings or prefabricated container, to reduce exposure to radiant heat and flames.
Consider increasing available APZs	An increase in available APZ would result in greater separation between hazard vegetation and infrastructure. As a result, this reduces the severity of bushfire attack, which improves the resilience of Project infrastructure.
Crushed gravel areas within APZ	The proposal would include crushed gravel throughout the site around the higher risk infrastructure (i.e. substation, BESS).

Bushfire and structural fire risks during operation of the Project are considered manageable subject to the control of grass fuels at the site, the appropriate maintenance of equipment, adoption of applicable best practice and technical standards and the implementation of safeguards. Potential ignition sources not associated with the Project would continue to present bushfire risks in the locality, including lightning, machinery, discarded cigarette butts from public road traffic, transmission lines and local stubble burn escapes.

In view of the likely fire hazards and risks, the proposal is not considered likely to present a substantial bushfire ignition and structural fire threat, or to represent an unacceptable hazard in the event of a bushfire affecting the site.

4.3. Potential impacts to aerial fire fighting capabilities

Fire suppression aircraft would generally operate in areas where there is no smoke and during daylight hours. Aerial fire fighting operations would treat turbine towers similar to other tall obstacles, such as high voltage transmission lines or telecommunication towers, commonly found throughout the landscape. Pilots and Air Operations Managers will assess these risks as part of routine procedures. Risks due to wake turbulence and the moving blades has been considered in the Aviation assessment, which found that WTGs are not expected to pose unacceptable risks (Aviation Projects, 2021).

As recommended by the Aviation assessment (Aviation Projects, 2021), the proponent should engage with local aerial fire fighting operators to develop procedures, which may include, for example, stopping the rotation of the wind turbine rotor blades prior to the commencement of aerial

fighting operations within the WWF area. Where possible, blades should be stopped in the "Y" position to maximise the available space for aircraft to manoeuvre.

The NSW RFS would be provided with coordinates of the final WTG layout and identification information for individual wind turbine sites, to facilitate internal fire response planning.

In the event that a fire does breach any containment lines and threatens the wind farm assets, it is possible that the windfarm infrastructure will sustain direct flame contact and that fire fighting will require aerial support. While the construction of the wind turbines may remove the ability for aerial fire fighting support (i.e. aerial waterbombing) over the turbines themselves, it is noted that the WTG towers are made from non-combustible material and do not present a significant risk. In the unlikely event that a fire did spread from the wind farm to surrounding properties, the turbines would not limit aerial fire fighting capabilities on other properties in the surrounding area.

Efforts would be concentrated on defending those assets that could contribute to widespread fire. It is therefore important that key assets such as the BESS, switching station, substation and O&M buildings have adequate defendable space on all sides. Alternate bushfire protection measures such as those prescribed by PBP, provide the Project infrastructure with an increased level of protection due to the provision of APZs, water supply and improved road access to facilitate emergency services who may attend the Project in the event of a fire. Prior to construction commencing, water supply would be provided in accessible locations (adjacent existing/retained access roads).

4.4. Potential impacts on National Park Fire Management

As identified in Section 4.3, impacts to aviation, including fire fighting aircraft, is considered low.

The Project requires internal roads to be constructed, including an upgrade of some existing public roads, and will therefore facilitate better access to the western perimeter of Oxley Wild Rivers National Park, for emergency services personnel. New roads will be all-weather access and of adequate width to enable fire-fighting vehicles to access and manoeuvre.

The New England BFRMP has mapped a Strategic Fire Advantage Zone (SFAZ) within part of Oxley Wild Rivers National Park, adjacent to the Project Boundary (refer to Appendix B). The objectives of a SFAZ are to provide strategic areas of fire protection advantage which will reduce the speed and intensity of bushfires and reduce the potential for spot fire development. As such, the zone improves the likelihood and safe use of parallel attack suppression and indirect attack to reduce the likelihood of crown fire development and / or spot fire ignition potential from within the zone.

The NPWS employ a Macleay Gorges Fire Management Strategy 2018 (NSW OEH, 2018), which details and maps fire suppression information. Sheet 13 of the Strategy identifies water points, access roads and NPWS access points (refer to Appendix C).

The Project would not require APZs that extend beyond the property boundary or rely on ongoing maintenance activities by adjacent landowners, including NPWS. Similarly, the Project would not encroach on, or impact the use of the mapped SFAZ.

5. Bushfire Protection Measures (BPMs) and proposed mitigation strategies

Bushfire Protection Measures (BPMs) are a series of controls, that when combined, aim to provide an acceptable level of protection for bushfire risk. In accordance with Section 5.3 of PBP, BPMs are provided to minimise the risk of spread of fire and take into account the increased vulnerability of site personnel.

Section 8.3.5 of PBP prescribe that wind farm developments must include minimum asset protection zones to provide a defendable space around key infrastructure, whilst providing a setback to avoid or reduce the likelihood of flame contact.

The measures considered for the proposed development have been derived from Section 5.3 of PBP (NSW RFS, 2019), and include:

- Asset Protection Zones
- Landscaping
- Access Requirements Water Supplies and Utility.

A Bush Fire Emergency Management and Operations Plan (BFEMOP), will also be prepared and implemented prior to the commencement of construction within the Project Boundary. The BFEMOP will be prepared in consultation with NSW RFS to address construction and operational matters through the application of additional BPMs, including but not limited to access, water supply and suitable storage of essential equipment.

Detailed additional requirements such as but not limited to remote monitoring and lighting technology are outside of the scope of PBP. The inclusion of these additional measures provide improved fire management outcomes.

5.1. Planning for bush fire protection measures

5.1.1. Asset Protection Zones

Intent of measures: to minimise the risk of bushfire attack and provide protection for emergency services personnel, residents and others assisting fire fighting activities.

APZ requirements will comply to the specifications of Table 7.4a of PBP as outlined in Table 5-1.

Table 5-1 Asset Protection Zones criteria (NSW RFS, 2019)

Asset Protection Zones			
Performance Criteria	**Acceptable Solutions**	**Complies**	**Comment**
The intent may be achieved where:			
• **APZs are provided commensurate with the construction of the building; and** • **A defendable space is provided.**	• an APZ is provided in accordance with Section 8.3.5.	Yes	An APZ, no less than 10 m in width will be provided, thus providing a defendable space around key infrastructure, including: ▪ WTGs (inclusive of hardstand) ▪ Switchyard ▪ Meteorological masts ▪ Substations (including any ancillary buildings or structures) ▪ Battery storage ▪ Operational and maintenance compound (including switch room, control room and storage shed), and ▪ Locations where on site water supply is available to facilitate protection of nearby buildings and/or infrastructure, or is otherwise available for use by responding emergency services. Temporary construction facilities shall also incorporate the provision of a temporary APZ, including: ▪ Main and secondary construction compound, and ▪ Concrete batching plants. An APZ will be established at the respective location of work, at the appropriate time, prior to commencement of activities, and maintained for the life of that component. Where forest / wooded vegetation is present adjacent the key infrastructure such as the BESS, switching station, substation and O&M buildings, an increased 20 m wide APZ is recommended.
• **APZs are managed and maintained to prevent the spread of a fire to the building.**	• APZs are managed in accordance with the requirements of Appendix 4 of PBP.	Yes	Management of APZ requirements will conform to Appendix 4 specifications for Inner Protection Area (IPA) standards.
• **the APZ is provided in perpetuity.** • **APZ maintenance**	• APZs are wholly within the boundaries of the	Yes	Proposed APZs will be maintained for the life of the proposed development. APZs are not located on land that exceed 18 degrees.

Asset Protection Zones			
is practical, soil stability is not compromised and the potential for crown fires is minimised.	development site. • APZ are located on lands with a slope less than 18 degrees.		The APZs will not extend beyond the property boundaries or rely on actions being undertaken by adjacent landowners. This includes the neighboring National Parks land.

An APZ is a fuel-reduced area surrounding a building or structure. An APZ is generally located between the building or structure and the bushfire hazard. An APZ provides:

- A buffer zone between a bushfire hazard and an asset
- An area of reduced bushfire fuel that allows for suppression of fire
- An area from which backburning or hazard reduction can be conducted
- An area which allows emergency services access and provides a relatively safe area for firefighters.

Understanding the value and limitations of APZ is important, as is the understanding that bushfires attack built assets by either flame contact, radiant heat or burning debris. An APZ can be used to lower or eliminate the bushfire attack from flame contact and radiant heat around the perimeter of the wind farm and all built assets, but under strong winds or during a major fire event burning debris can result in a fire breaching an APZ. Despite the limitations, the APZs would be maintained to the standard of an Inner Protection Area (IPA) for the life of the development. An IPA is located in immediate proximity to the asset and provides a defendable space consisting of minimal fuel loads. An IPA shall display characteristics (NSW RFS, 2019) that include, but are not limited to:

- A tree canopy cover of less than 15% at maturity
- A maximum 30% of the IPA may contain shrubs
- Trees should have lower limbs (up to 2 m in height) removed
- Shrubs are not to have a connection with tree canopy layer
- Shrubs should not form more than 10% ground cover
- Maintain 2 – 5 m canopy separation of trees and branches are not to overhang buildings or structures
- Combustible material storage areas and stacked flammable materials, for example, are not permitted in the IPA.

Establishment of an APZ through removal of surface and suspended layers (understorey) of forest fuel loads should not be viewed as necessitating a scorched earth approach, rather it is an alteration of the structure and fuel bed and therefore a reduction of available fuel load (Commonwealth of Australia, 2003).

5.1.2. Landscaping

Landscaping should be considered throughout the design process and further enforced throughout the construction and operational phases of the development. If landscaping or revegetation of areas within the Project Boundary are required, they must be located and designed to reduce the risk of

flame contact and radiant heat to both Project infrastructure and other key assets. A well-considered landscape design includes, but is not limited to:

- Features which increase chances for filtering of wind-driven embers or burning debris
- Reduces wind forces
- Create a discontinuous or spaces between vegetation to slow and reduce the intensity of a fire run towards a structure
- Fire retardant species must be considered
- Plant selection that does not drop large amounts of leaf litter that can act as ground fuel in the event of a bushfire.

5.2. Additional Bushfire Protection measures

Section 8.3.5 of PBP does not prescribe additional bushfire protection measures to wind farm proposals. However, as bushfire protection measures are most effective when applied in combination with each other, it is recommended that access and water supply requirements and construction standards of buildings are incorporated into the Project design. These will also form part of the BFEOMP (a post approval document) that is to be prepared and implemented in consultation with the NSW RFS prior to the commencement of any construction activities.

Property access, water supply and construction requirements are outlined below.

5.2.1. Access

Intent of measures: to provide safe operational access for emergency services personnel in suppressing a bushfire, while residents are accessing or egressing an area. The table below summarises the requirements prescribed in PBP.

Property Access and Internal Access arrangements must comply with the specifications of Table 7.4a of PBP (or otherwise, the NSW RFS Fire Trail Standards (NSW RFS, 2016), including in Appendix D, to ensure access to the Project Boundary is suitable for emergency response vehicles, as outlined in Table 5-2. These should also be included within the first stage of the construction.

Table 5-2 Property Access criteria (NSW RFS, 2019)

Access (Table 7.4a extract of PBP)			
Performance Criteria	**Acceptable Solutions**	**Complies**	**Comment**
The intent may be achieved where:			
Fire fighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	Property access roads are two-wheel drive, all-weather roads.	Can comply	Property access roads will be all weather roads.
the capacity of access roads is adequate for fire fighting vehicles.	The capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded fire fighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.	Can comply	The capacity of internal access road surfaces will be sufficient for fire fighting vehicles.

Access (Table 7.4a extract of PBP)			
there is appropriate access to water supply.	There is suitable access for a Category 1 fire appliance to within 4 m of the static water supply where no reticulated supply is available.	Can comply	Suitable access will be provided for Category 1 fire appliances within 4 m of the static water supply (where provided in non-combustible storage tanks).
fire fighting vehicles can access the building and exit the property safely	• Minimum 4 m carriageway width • In forest, woodland and heath situations, rural property roads have passing bays every 200 m that are 20 m long by 2 m wide, making a minimum trafficable width of 6 m, at the passing bay • A minimum vertical clearance of 4 m to any overhanging obstructions, including tree branches • Property access must provide a suitable turning area in accordance with Appendix 3 • Curves have a minimum inner radius of 6 m and are minimal in number to allow for rapid access and egress • The minimum distance between inner and outer curves is 6 m • The crossfall is not more than 10 degrees; maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.	Can comply	As the Project requires access road upgrades to facilitate construction of the facility, internal access roads will be provided in a standard suitable for ingress and egress of fire-fighting appliances.

5.2.2. Water & Utility services

Intent of measures: to provide adequate services of water for the protection of assets during and after the passage of a bushfire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

In accordance with Table 5.3d of PBP, a water supply no less than 20,000 litres shall be provided to improve property protection measures and/or to act as a static water supply for emergency services. This is based on refilling approximately five tanker units (4,000 litres) once each. Noting that the final requirement will be confirmed by NSW RFS prior to the commencement of construction and included within the BFEMOP.

Water supply requirements shall comply with Table 7.4a of PBP, which include, but are not limited to the following specifications.

- 65 mm Storz outlet with a ball valve is fitted to the outlet
- Ball valve and pipes are adequate for water flow and are metal
- Supply pipes from tank to ball valve have the same bore size to ensure flow volume
- A hardened ground surface for truck access is supplied within 4 m

- Above-ground tanks are manufactured from concrete or metal
- Raised tanks have their stands constructed from non-combustible material or bushfire-resisting timber (see Appendix F of AS 3959)
- Unobstructed access can be provided at all times
- Where pumps are provided, they are a minimum 5 hp or 3 kW petrol or diesel-powered pump, and are shielded against bushfire attack; any hose and reel for fire fighting connected to the pump shall be 19 mm internal diameter
- Fire hose reels are constructed in accordance with AS/NZS 1221:1997 and installed in accordance with the relevant clauses of AS 2441:2005.

At a minimum, it is recommended that a static water supply is provided at the following locations:

- Main and Secondary Compound to provide for both construction stage of the project
- Operations and Maintenance facility
- Substations
- BESS.

Farm dams are also available for water supply in the event of an emergency. However, as water availability can vary depending on the season, it is important that static water supplies are available throughout the Project area.

Electricity and Gas services, where provided within the APZ, adjacent Project infrastructure, shall comply with Table 7.4a of PBP, where practicable.

A reticulation network is also required via a combination of underground and overhead lines. Automatic detection technology will be provided to the reticulation network to provide notification of any network faults. Therefore, isolation and / or shutdown could occur in a timely manner.

5.2.3. Construction standards and design

Construction standards prescribed under AS 3959:2018 *Construction of buildings in bushfire-prone areas* do not apply to ancillary buildings within the Project Boundary. However, it is recommended that essential equipment be housed or stored so not to contribute to spreading fire to nearby vegetation. With regard to suitable storage of essential equipment, it is recommended that non-combustible structures be installed on site, or otherwise structures should incorporate basic ember protection measures to improve the buildings performance against ember attack. Basic ember protection measures could be achieved by enclosing or covering openings with a corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture of 2 mm. This could be applied to the openable portion of the windows, vents, weepholes and eaves. Weather strips, draught excluders or draught seals could be installed at the base of side hung external doors as per Australian Standard 3959-2018 Construction of Buildings in Bushfire Prone Areas. The subfloor space (if applicable) must be enclosed.

5.2.4. Remote monitoring and shutdown

In the event of a fire, the AC circuit breaker in the substation will be closed remotely by operational staff. TransGrid will also be able to shut off the supply from outside the Project Boundary if required. WTGs are fitted with a variety of control systems, which can be activated in the event of extreme weather conditions (such a high wind speeds or high temperatures), localised fire, or overheating. WTGs can also be shut down if they exceed the tolerance of their design specifications.

WWF should engage with FRNSW and NSW RFS to develop operational procedures for remote shutdown to allow for aerial fire fighting over WTGs. For example, this procedure may include stopping the rotation of the wind turbine rotor blades prior to the commencement of aerial fighting operations within the WWF area. Where possible, blades should be stopped in the 'Y' position, as this positioning allows for the maximum airspace for aircraft to manoeuvre underneath the blades and removes one of the blades as a potential obstacle. NSW RFS will be provided with co-ordinates of the final wind turbine layout and identification information for individual wind turbine sites for their internal response planning.

WWF personnel will also coordinate with FRNSW and NSW RFS to manage fire emergencies, should they occur.

The majority of power during construction will be provided by portable generators. Electricity generating infrastructure will not be tested using network electricity until commissioning at the commencement of the operation.

5.2.5. Lightning Dispersal Technology

The blades of the WTG will be fitted with a built-in lightning dispersal system, which dissipates electricity from the blades or nacelle into the ground. The risk of fire starting due to lightning strike within the Project Boundary may actually be reduced due to the presence of turbines.

5.3. Emergency response and planning

In most instances, particularly where a bushfire incident may occur, the likely first emergency response unit to attend the Project will be the NSW RFS. It is acknowledged that FRNSW may attend in instances, depending on the nature of the fire or specific hazards present.

The PBP requires that a BFEMOP be prepared prior to works commencing on site.

As detailed within Section 6, the BFEMOP will be prepared in consultation with fire authorities and should identify all relevant risks and mitigation measures associated with the construction and operation of the wind farm. PBP specifies that a BFEMOP (NSW RFS, 2019) shall include:

- Detailed measures to prevent or mitigate fires igniting
- Work that should not be carried out during total fire bans
- Availability of fire-suppression equipment, access and water
- Storage and maintenance of fuels and other flammable materials
- Notification of the local NSW RFS Fire Control Centre for any works that have the potential to ignite surrounding vegetation
- Activities proposed to be carried out during a bush-fire fire danger period to ensure weather conditions are appropriate
- Appropriate bushfire emergency management planning.

Following commissioning of the wind farm, the NSW RFS and FRNSW local representatives will be invited to an information and orientation day covering access, infrastructure, fire fighting resources on-site, fire control strategies and risks/hazards at the Project. The preparedness of local NSW RFS and FRNSW brigades will be enhanced through regular site orientation and information events. Ongoing engagement with NSW RFS and FRNSW will be undertaken to account for Project and/or staff changes.

The NSW RFS and Fire and Rescue will be provided with contact details for personnel at the WWF at the commencement of construction, on commissioning of the operational wind farm, throughout plant operations and just prior to decommissioning. A bushfire management plan will identify the location of emergency equipment within the Project Boundary during the construction and operations period. The emergency equipment will be put in place prior to the commencement of construction and will remain on site for use through the operational and decommissioning phases.

5.3.1. Total Fire Bans

It is important to be aware of operations that may be carried out on days of total Fire Ban and any prohibited activities or exemptions that are notified by the Commissioner of the NSW RFS under section 99 of the *Rural Fires Act 1997*.

Under Section 63 of the *Rural Fires Act 1997* it is the responsibility of the landowner to limit the ignition and prevent the spread of fires from the property. On days declared Total Fire Ban it is prohibited to light, maintain or use a fire in the open, or carry out any activity in the open that has the potential for a fire to develop. General purpose hot works (such as welding, grinding or gas cutting or any activity that produces a spark or flame) are not to be done in the open.

Fire permits are also suspended on days of total fire ban. Permits may resume after the Total Fire Ban is lifted, as long as the permit hasn't expired. The NSW RFS Commissioner is responsible for exemptions to Total Fire Bans. These exemptions are detailed in the NSW Government Gazette each time a Total Fire Ban is declared under the *Rural Fires Act 1997* Section 99.

The Project must adhere to restrictions on Total Fire Ban or days of high fire danger during all development phases (construction, operation and decommissioning). This will be further addressed within the BFEMOP.

6. Overview of Bush Fire Emergency Management and Operational Plan

The Project is potentially exposed to existing bushfire threat in the form of grass fire and forest fire. In both instances, Project also has the potential to cause unplanned ignition of surrounding grassland and wooded vegetation. Due to the electrical hazards associated with large-scale renewable projects, there are additional health and safety considerations for the implementation of effective and appropriate risk control measures.

6.1. Objectives

The key objective of a Bushfire Emergency Management and Operational Plan (BFEMOP) is to identify the fire risks and controls associated with the Project and identify procedures that are to be implemented in case of a fire on site or in the vicinity of the Project. Specific objectives include:

- Secure the health, safety and welfare of all personnel on site
- Contain an emergency
- Protect property, plant, equipment and the environment
- Manage the recovery and resumption of normal operations.

To achieve this objective, the proponent will:

- Ensure appropriate controls and procedures are implemented during construction and operations to minimise fire risks
- Ensure appropriate measures are implemented to address the mitigation measures detailed in the bushfire assessment and associated EIS
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements.

6.2. Monitoring and review

An Emergency Response Plan (ERP) will be included as part of BFEMOP for the purpose of identifying appropriate management and maintenance of bushfire protection measures over the life of the development. The ERP should be reviewed after incidents of bushfire or other fires as well as annually at the end of each bushfire season (April through July). It is imperative that the BFEMOP be amended after the review process, particularly if it would increase the effectiveness of the plan. A monitoring and review process should include, as a minimum:

- Monitoring against the aims and objectives of the BFEMOP
- Updating the ERP based on current best practice guidelines or policy
- Assessing the risk, obligations, and management measures against any new legislative changes
- Reviewing and updating emergency procedures annually at the end of each bushfire season (April through July), and after any fire incident.

7. Conclusion

In accordance with relevant legislative requirements, this bushfire assessment report provides an assessment of the potential bushfire hazard that may impact WWF and how WWF may impact the surrounding landscape if ignition occurred in the Project Boundary. The Project is assessed in terms of its compliance with key bushfire planning legislation and referenced guidelines. It contains management and mitigation measures designed to address these obligations.

7.1. Consultation

Consultation occurred with FRNSW, NSW RFS, BCD and NPWS throughout November and December 2020 to provide authorities an opportunity to raise concerns for the WWF to consider, and/or provide input and advice into the EIS. Both NSW RFS and BCD responded with no additional requirements or advice beyond their previous input into the SEARs for the Project. FRNSW outlined that its services will generally involve hazardous materials incidents and that personnel may visit the WWF once operational to collect information for future reference.

NPWS requested additional information regarding how the proposal may affect fire fighting operations. Overall, the proposal is not considered to hinder access to the Oxley Wild Rivers National Park or static water supplies found in adjacent properties. The turbines will not limit aerial fire fighting capabilities on other properties in the surrounding area. Wind turbines, similar to high voltage transmission lines, are part of the landscape and would be considered in the incident action plan, thus not resulting in any increased risk to aerial fire fighters.

Once the Project is operational, WWF will continue to carry out consultation with relevant authorities as required. The NSW RFS and FRNSW local representatives will also be invited to an information and orientation day covering access, infrastructure, fire fighting resources on-site, fire control strategies and risks/hazards at the Project site.

7.2. Fire risk from construction, operations and decommissioning stages

Construction activities were assessed to be a potential source of ignition, with the greatest risk occurring during the bushfire season from October to March. Both construction and decommissioning activities will be managed in accordance with mitigation measures to ensure bushfire risk is kept to a minimum.

The operational phase of the WWF was assessed to have a greatly reduced risk for ignition source for the following reasons:

- Key project elements at risk of fire ignition will be located on hardstand material with established APZs around the perimeter
- The WTG towers are made from non-combustible material and do not present a significant fire risk
- Fire suppression measures would be implemented in each BESS
- Remote control and automatic shutdown procedures would be installed
- Hazardous and flammable materials would be appropriately stored in bunded locations
- The risk of fire starting due to lightning strike within the Project Boundary may actually be reduced due to the presence of turbines

- Proposed access roads will be prepared during the first stage of construction using hardstand material.

Key assets in the locality as well as operational and maintenance components of WWF are at risk from a bushfire that may initiate either from within the Project Boundary or from an external fire threat. This is noted to be an existing risk within this bushfire landscape. Due to the high frequency of fire events that occur within the region and as evidenced by recent fire events, the application of BPMs and the preparation of an BFEMOP is imperative.

7.3. Bushfire protection measures

The BPMs referenced in Section 5 will be incorporated into the Project design. As BPMs are a combination of measures that are most effective when applied in combination, it provides the wind farm, the community, areas of environmental value (Oxley Wild Rivers National Park) and emergency services personnel with a reasonable level of protection. The following BPMs will be applied:

- In accordance with Section 5.1.1, an area around all proposed critical infrastructure (i.e. turbines, substations, battery storage, meteorological masts, compounds and water supply) shall be managed for a minimum distance/radius of 10 m (to comply with Section 8.3.5 of PBP), in perpetuity as an APZ. The APZ shall be provided in the form of an Inner Protection Area, in accordance with Table 5.3a & Appendix 4 of PBP
- It is recommended that the APZ surrounding the O&M buildings, BESS, substation and switching station will include gravel surfacing to minimise the risk of fire escaping from the facilities and the risk of external fire affecting the facilities. Where these facilities are located adjacent to remnant vegetation, an increased 20 m wide APZ should be considered. If possible, the O&M buildings, BESS, substation and switching station should be located outside of the flame zone
- In accordance with Section 5.1.2 future landscaping or areas of revegetation (if compensatory planting occurs) shall be in accordance with Table 7.4a of PBP, to ensure that the provision of an APZ is not compromised
- In accordance with Section 5.2.1, Property Access and Internal Access arrangements shall be provided and maintained to the specifications of Table 7.4a of PBP or the NSW RFS Fire Trail Standards, to ensure suitable access arrangements for all emergency services
- In accordance with Section 5.2.2 a water supply no less than 20, 000 litres (stored in a non-combustible storage tank), shall be provided in accordance with Table 7.4a of PBP:
    - Non-reticulated water supply requirements shall also be provided to ensure accessibility to the static water supply is not obstructed or hindered.
- Water supply should be provided throughout the Project Boundary (with appropriate signage) at key entry points and at the location of the substation, battery storage and compounds, in an accessible position
- Electricity and Gas services, where provided within the defendable space, shall comply with Table 7.4a of PBP, where practicable
- Transmission lines will be subject to management requirements in accordance with TransGrid guidelines
- In accordance with Section 5.2.3, where buildings are to be provided on site, for long term use, it is recommended that basic ember protection measures are incorporated into the structure, in accordance with BAL-12.5 (Section 3 & 5 from AS 3959:2018) construction standards

- The proposed buildings should also comply with NSW variations introduced by Section 7.5 of PBP, where additional requirements apply to sarking, sub-floor screening, steps, ramps, landings and fascia's and bargeboards
- Lightning Dispersal Technology should be incorporated into the specifications of each WTG
- Automatic Shutdown Technology should be incorporated into the control system of each WTG.

7.4. Emergency management

In accordance with Section 5.3 a BFEMOP will outline appropriate management and maintenance of bushfire protection measures, for the life of the development. This plan should be developed in consultation with local NSW RFS or FRNSW, prior to the commencement of any construction activities.

8. References

Australian Building Codes Board. (2019). *National Construction Code, 2019, Volume Two.* Canberra.

Aviation Projects. (2021). *Winterbourne Wind Farm - Aviation Impact Assessment.*

Commonwealth of Australia. (2003). *A Nation Charred: Report on the inquiry into bushfires.*

Keith, D. (2004). *Ocean shores to desert dunes: the native vegetation of NSW and the ACT (Selected Extracts).* Department of Environment and Conservation (NSW).

NSW OEH. (2018). *Macleay Gorges Reserves Fire Management Strategy.* Retrieved from NSW DPIE: https://www.environment.nsw.gov.au/research-and-publications/publications-search/macleay-gorges-reserves-fire-management-strategy

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NSW RFS. (2017). *New England Bush Fire Management Committee, Bush Fire Risk Management Plan.*

NSW RFS. (2019). *Comprehensive Vegetation Fuel Loads.*

NSW RFS. (2019). *Planning for Bush Fire Protection – A Guide for Councils, Planners, Fire Authorities and Developers.*

NSW Rural Fire Service. (2005). *Standards for Asset Protection Zones the "Planning for Bushfire Protection Guidelines.*

NSW Rural Fire Service. (2006). *Planning for Bushfire Protection – A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.*

NSW Rural Fire Service. (n.d.). *Bush Fire Survival Plan.*

SA DEW. (n.d.). *Fire behaviour.* Retrieved from DEW: https://www.environment.sa.gov.au/topics/fire-management/fire-science/fire-behaviour

Standards Australia. (2009). *Construction of buildings in bushfire-prone Ares, AS3959, Third Edition 2009, Incorporating Amendment 1, 2 & 3.* Sydney: Standards Australia International Ltd.

Standards Australia. (2018). *Construction of buildings in bushfire-prone Ares, AS3959.* Sydney: Standards Australia International Ltd.

Advisory comments:

Notwithstanding the construction requirements assessed and the recommendations provided, the property and structure must be adequately maintained for the life of the development. This will assist in providing a reduced level of risk to the property, assets, workers and any emergency services personnel that may attend to the property.

> Quote from Planning for Bush Fire Protection (2019), 'Due to a range of limitations, the measures contained in this document do not guarantee that loss of life, injury and/or property damage will not occur during a bush fire event. Limitations of this document include, but are not limited to uncertainties in the following areas: Fire Danger Index; fuel loads; existing developments; human behavior; and maintenance.'
>
> Quote from Standards Australia (AS 3959-2018), 'Although this standard is designed to improve the performance of buildings when subjected to bushfire attack in designated bushfire-prone areas there can be no guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behavior of fire and extreme weather conditions.

Appendix A Agency Consultation

From:	Alan Bawden
To:	Brad Draper
Cc:	Margaret Kitchner
Subject:	FW: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with NSW RFS
Date:	Monday, 14 December 2020 3:04:39 PM
Attachments:	image001.png image003.jpg image002.png image006.jpg oledata.mso 20-250 Winterbourne Site Layout and NP 17092020.png SEARs Extract for Consultation.pdf
Importance:	High

Good afternoon Brad

The NSW RFS has received and reviewed your comments below and the attached documents.

The NSW RFS previous provided NSW Planning dated 9 July 2020, with the following comment

"The NSW RFS has no objection to the development proceeding and supports the draft SEARs, as attached".

As such, the NSW RFS expects the EA to incorporate bush fire risk mitigation measures as part of the development proposal.

Regards

Alan Bawden
Team Leader - Development Assessment and Planning
Planning and Environment Services (North)
NSW RURAL FIRE SERVICE
51 Moonee Street Coffs Harbour
Locked Bag 17 GRANVILLE NSW 2142
p 02 66910400 e pes@rfs.nsw.gov.au
www.rfs.nsw.gov.au **www.facebook.com/nswrfs** **www.twitter.com/nswrfs**
PREPARE.ACT.SURVIVE

From: Planning & Environment Services <CustomerService.Centre@rfs.nsw.gov.au>
Sent: Monday, 14 December 2020 2:58 PM
To: Alan Bawden <Alan.Bawden@rfs.nsw.gov.au>
Subject: FW: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with NSW RFS
Importance: High

From: Brad Draper <brad.d@nghconsulting.com.au>
Sent: Wednesday, 2 December 2020 9:37 AM
To: Records <Records@rfs.nsw.gov.au>; Planning & Environment Services <CustomerService.Centre@rfs.nsw.gov.au>

Cc: Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: RE: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with NSW RFS
Importance: High

Attention: NSW RFS

I refer to previous correspondence below, in relation to consultation for Winterbourne Wind Farm (SSD-10471).

The SEARs has identified that the proposal is to consider bushfire hazards comprising:

> ***Bushfire*** *- identify potential hazards and risks associated with bushfires / use of bushfire prone land, including:*
>
> - *the risks that a wind farm would cause bush fire, potential impacts on Oxley Wild Rivers National Park and identifying measures that may be required to assist fire management in the National Park;*
> - *any potential impacts on the aerial fighting of bush fires; and*
> - *demonstrate compliance with Planning for Bush Fire Protection 2019*

NGH has not received a response to date. Could you please confirm if NSW RFS intend on providing input or feedback for consideration by the proposal? If so, it would be appreciated if feedback could be issued by Wednesday 9th December 2020.

Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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WWW.NGHCONSULTING.COM.AU

From: Brad Draper
Sent: Friday, 6 November 2020 1:50 PM
To: records@rfs.nsw.gov.au
Cc: alan.bawden@rfs.nsw.gov.au; pes@rfs.nsw.gov.au; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: RE: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with NSW RFS
Importance: High

Attention: NSW RFS,

I refer to our correspondence below dated 14 October 2020, seeking input by NSW RFS on the proposed Winterbourne Wind Farm project. NGH allowed 21 days for consultation with authorities, which lapsed on the 4th November 2020.

NGH has not received a response to date. Could you please confirm if NSW RFS intend on providing input or feedback for consideration by the proposal?

Thank you.

Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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From: Brad Draper
Sent: Wednesday, 14 October 2020 9:48 AM
To: 'alan.bawden@rfs.nsw.gov.au' <alan.bawden@rfs.nsw.gov.au>
Cc: 'pes@rfs.nsw.gov.au' <pes@rfs.nsw.gov.au>; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with NSW RFS
Importance: High

Dear Alan,

I have directed this below correspondence to you, as the location of the project site is situated in northern NSW.

Winterbourne Wind Farm is a State Significant Development proposal. With regard to the Planning Secretary's Environmental Assessment Requirements (SEARs) dated 17 September 2020 (ref: SSD-10471 - attached), NGH is engaged to prepare the Environmental Impact Statement (EIS). During the preparation of the EIS, NGH must consult with relevant authorities.

The proposal includes:

- the construction, operation and decommissioning of a wind farm with an estimated capacity of 700 megawatts (MW), a maximum of 126-133 turbines and a maximum height of 250 metres (to blade tip); and
- ancillary infrastructure including access tracks, road upgrades, underground and overhead electricity cabling, substations, transmission lines and grid connection to the TransGrid transmission network.

The site is located Approximately 6.5 km north east of Walcha and 7 km south east of Uralla within the Walcha and Uralla Shire local government areas – please refer to the attached image (20-250 Winterbourne Site Layout and NP).

The SEARs has identified that the proposal is to consider bushfire hazards comprising:

Bushfire *- identify potential hazards and risks associated with bushfires / use of bushfire prone land, including:*

- *the risks that a wind farm would cause bush fire, potential impacts on Oxley Wild Rivers National Park and identifying measures that may be required to assist fire management in the National Park;*
- *any potential impacts on the aerial fighting of bush fires; and*
- *demonstrate compliance with Planning for Bush Fire Protection 2019*

A large emphasis in SEARs correspondence is placed on the relationship of the proposal and Oxley Wild Rivers National Park. NGH is also consulting with NSW National Parks & Wildlife Services and Fire & Rescue NSW.

At present the proposal would apply Planning for Bushfire Protection 2019, specifically the requirements outlined under Section 8.3.5 (wind and solar farms). Could you please outline any additional, or site specific requirements for this project to take into consideration?

Should you wish to provide any comments on the proposal, please respond to this email by the 4th November 2020 with your consolidated comments so that any issues raised may be considered.

Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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WWW.NGHCONSULTING.COM.AU

From:	Mathew Makeham
To:	Brad Draper
Cc:	Robert Smith; Zeina Jokadar; Dimitri Young
Subject:	RE: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation NPWS
Date:	Wednesday, 23 December 2020 1:29:48 PM
Attachments:	image001.png image002.png image003.png image005.png image006.png

---

G’day Brad

Thanks for the opportunity to comment on the Winterbourne Wind Farm. Below are our concerns that specifically relate to fire fighting within the local area.

If you have any questions please don’t hesitate to give me a call.

Thanks
Mat

Under the Rural Fires Act 1997 the NPWS is a fire authority and is responsible for controlling fires in the park and reserve and ensuring they do not cause damage to other land or property. This responsibility includes the implementation of fuel management programs. The NPWS may also assist with the control and suppression of fires adjacent to the park.

A major source of fires in the park are fires escaping from neighbouring lands. Access to the park on the ground and in the air is paramount to fire suppression, delayed response times can be important to keeping fires small.

Ground based operations will rely on aerial support routinely. Water bucketing and bombing aside (aerial firefighting) helicopters will be used to map and monitor fire progression and behaviour, these things are critical to firefighter safety.

Remote firefighting operations will rely on helicopter insertion and extraction at the minimum but generally will also involve a component of helicopter water bucketing support.

- Matters that need to be addressed for fire fighting operations in isolation are how the proposal will:
    - affect helicopter/vehicle access to the national park boundary;
    - not impact on the ability to conduct vehicle based and aerial fire fighting along the boundary of the national park and within the wind farm project boundary;
    - not create access restrictions for vehicles/helicopters to dams(water)

along the boundary of the national park and within the wind farm project boundary;
- not impact ferry times especially when cloud/fog restricts flying above 500m ASL. Is a flight corridor proposed through the windfarm?
- will not adversely affect helicopter insertion or extraction times for remote firefighters working within the national park.

From: Brad Draper <brad.d@nghconsulting.com.au>
Sent: Wednesday, 23 December 2020 11:43 AM
To: Mathew Makeham <Mathew.Makeham@environment.nsw.gov.au>
Cc: Robert Smith <Robert.Smith@environment.nsw.gov.au>; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: Re: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation NPWS

Hi Mathew,

Thank you for your prompt response. I don't have any records of a response received from Aaron.

Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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From: Mathew Makeham <Mathew.Makeham@environment.nsw.gov.au>
Sent: 23 December 2020 11:37
To: Brad Draper <brad.d@nghconsulting.com.au>; Aaron Simmon <Aaron.Simmon@environment.nsw.gov.au>
Cc: Robert Smith <Robert.Smith@environment.nsw.gov.au>; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: RE: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation NPWS

G’day Brad

I was of the understanding Aaron emailed you something last week?

Let me know if you cant find it I can follow it up for you.

Thanks
Mat

From: Brad Draper <brad.d@nghconsulting.com.au>
Sent: Wednesday, 23 December 2020 10:28 AM
To: Aaron Simmon <Aaron.Simmon@environment.nsw.gov.au>
Cc: Robert Smith <Robert.Smith@environment.nsw.gov.au>; Mathew Makeham <Mathew.Makeham@environment.nsw.gov.au>; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: RE: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation NPWS

Hi Aaron,

With regard to our recent discussion by telephone, could you please confirm whether NPWS intends on providing input or feedback relating to Oxley Wild Rivers National Park and Winterbourne Wind Farm?

Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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From: Brad Draper
Sent: Wednesday, 2 December 2020 10:05 AM
To: Aaron.Simmon@environment.nsw.gov.au
Cc: Robert.Smith@environment.nsw.gov.au; Mathew.Makeham@environment.nsw.gov.au; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation NPWS

Good morning Aaron,

I have received your details from Georgia Holmes (Aviation Projects), who has liaised with you over fire and pest operations and pilot safety matters for Winterbourne Wind Farm.

As you would be aware, Winterbourne Wind Farm is a State Significant Development proposal. With regard to the Planning Secretary's Environmental Assessment Requirements (SEARs) dated 17 September 2020 (ref: SSD-10471 - attached). NGH is engaged to prepare the Environmental Impact Statement (EIS). During the preparation of the EIS, NGH must consult with relevant authorities.

The proposal includes:

- the construction, operation and decommissioning of a wind farm with an estimated capacity of 700 megawatts (MW), a maximum of 126-133 turbines and a maximum height of 250 metres (to blade tip); and
- ancillary infrastructure including access tracks, road upgrades, underground and overhead electricity cabling, substations, transmission lines and grid connection to the TransGrid transmission network.

The site is located Approximately 6.5 km north east of Walcha and 7 km south east of Uralla within the Walcha and Uralla Shire local government areas – please refer to the attached image (20-250 Winterbourne Site Layout and NP).

The SEARs has identified that the proposal is to consider bushfire hazards comprising:

> **Bushfire** - identify potential hazards and risks associated with bushfires / use of bushfire prone land, including:
> 1. the risks that a wind farm would cause bush fire, potential impacts on Oxley Wild Rivers National Park and identifying measures that may be required to assist fire management in the National Park;
> 2. any potential impacts on the aerial fighting of bush fires; and
> 3. demonstrate compliance with Planning for Bush Fire Protection 2019

I am aware that you have previously provided comments to Aviation Projects in relation to fire operations, pest operations, where your response comprised a focus on aviation matters.

With consideration of Item 1 above, NGH seeks input from National Parks and Wildlife Service (NPWS), specific to assisting fire management in Oxley Wild Rivers National Park, from a ground operations perspective.

With SSD projects of this nature, a Bush Fire Emergency Management and Operations Plan (BFEMOP), previously referred to as a Bushfire Management and Emergency Response Plan would generally be prepared (as a post approval document) in consultation with agencies such as FRNSW & NSW RFS. NGH seeks input at this early phase in relation to the provision of emergency service response, so an overview can be referenced in the EIS and consideration given to its relationship with the development footprint.

Should you wish to provide any comments on the proposal, please respond to this email by Wednesday 23rd December 2020 with your consolidated comments so that any matters raised may be considered.

Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

From: Alan Cooper
To: Brad Draper; Wayne Zikan
Cc: Fire Safety; Zeina Jokadar
Subject: RE: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with FRNSW
Date: Monday, 9 November 2020 10:16:20 AM
Attachments: image002.png
image003.png
image008.png
image009.png
image010.png
image011.png
image012.png
image013.png
image014.jpg
image015.png
image016.png
image017.gif

Hi Brad,
I tried calling you earlier and left a message.
FRNSW is not the designated fire authority for the area that the wind farm is situated, that being Rural fire Service Area. However, FRNSW may be called to attend any type of Hazardous materials incident that should occur on the site and also may act as the recue agency should the accredited unit not be available.
Once the site is established FRNSW may attend the site to determine the locations of any stored HAZMATs on site and check entry and egress points for o own reference. This information would then be stored in our computer aided dispatch system along with accurate contact numbers for after hours site manager etc.
Happy to discuss.
Many thanks
TC

Fire and Rescue NSW

SUPERINTENDENT TOM COOPER AFSM
Zone Commander New England and North West
Regional North Zone 3 Office, Tamworth | Fire and Rescue NSW
T: 02 5732 8400 | M: 0400 440 100 (24hr)
13- 19 The Ringers Road Hillvue 2340
We acknowledge the Gomeroi/Kamilaroi people, the traditional owners of the land on which we live and work

www.fire.nsw.gov.au

From: Brad Draper <brad.d@nghconsulting.com.au>
Sent: Friday, 6 November 2020 1:51 PM
To: Wayne Zikan <Wayne.Zikan@fire.nsw.gov.au>
Cc: Alan Cooper <Alan.Cooper@fire.nsw.gov.au>; Fire Safety <FireSafety@fire.nsw.gov.au>; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: RE: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with FRNSW
Importance: High

Hi Wayne,
I refer to our correspondence below dated 14 October 2020, seeking input by FRNSW on the proposed Winterbourne Wind Farm project. NGH allowed 21 days for consultation with authorities, which lapsed on the 4th November 2020.
NGH has not received a response to date. Could you please confirm if FRNSW intend on providing input or feedback for consideration by the proposal?
Thank you.
Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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WWW.NGHCONSULTING.COM.AU

From: Brad Draper
Sent: Wednesday, 14 October 2020 9:47 AM
To: 'Wayne.Zikan@fire.nsw.gov.au' <Wayne.Zikan@fire.nsw.gov.au>
Cc: 'Alan.Cooper@fire.nsw.gov.au' <Alan.Cooper@fire.nsw.gov.au>; 'firesafety@fire.nsw.gov.au' <firesafety@fire.nsw.gov.au>; Zeina Jokadar <zeina.j@nghconsulting.com.au>
Subject: NGH Ref: 20-250 - Winterbourne Wind Farm - SSD Consultation with FRNSW

Importance: High

Dear Wayne,

I refer to your previous correspondence and introduction by FRNSW, dated 5 June 2020, as included below. Doug Landfear forwarded NGH a copy of the correspondence.

Winterbourne Wind Farm is a State Significant Development proposal. With regard to the Planning Secretary's Environmental Assessment Requirements (SEARs) dated 17 September 2020 (ref: SSD-10471 - attached), NGH is engaged to prepare the Environmental Impact Statement (EIS). During the preparation of the EIS, NGH must consult with relevant authorities.

The proposal includes:

- the construction, operation and decommissioning of a wind farm with an estimated capacity of 700 megawatts (MW), a maximum of 126-133 turbines and a maximum height of 250 metres (to blade tip); and
- ancillary infrastructure including access tracks, road upgrades, underground and overhead electricity cabling, substations, transmission lines and grid connection to the TransGrid transmission network.

The site is located Approximately 6.5 km north east of Walcha and 7 km south east of Uralla within the Walcha and Uralla Shire local government areas – please refer to the attached image (20-250 Winterbourne Site Layout and NP).

The SEARs has identified that the proposal is to consider bushfire hazards comprising:

> ***Bushfire*** *- identify potential hazards and risks associated with bushfires / use of bushfire prone land, including:*
>
> - *the risks that a wind farm would cause bush fire, potential impacts on Oxley Wild Rivers National Park and identifying measures that may be required to assist fire management in the National Park;*
> - *any potential impacts on the aerial fighting of bush fires; and*
> - *demonstrate compliance with Planning for Bush Fire Protection 2019*

With SSD projects of this nature, a Bush Fire Emergency Management and Operations Plan (BFEMOP), previously referred to as a Bushfire Management and Emergency Response Plan would generally be prepared (as a post approval document) in consultation with relevant agencies (such as FRNSW & NSW RFS). NGH seeks your input at this early phase in relation to the provision of emergency service response, so an overview can be referenced in the EIS and consideration given to its relationship with the development footprint.

NGH is also consulting with the NSW Rural Fire Service and NSW National Parks and Wildlife Service in relation to hazards and risks associated with bushfires.

Should you wish to provide any comments on the proposal, please respond to this email by the 4th November 2020 with your consolidated comments so that any issues raised may be considered.

Regards,

BRAD DRAPER
SENIOR PLANNER & BUSHFIRE CONSULTANT
B.UrbRegPlan, RPIA, G.Cert.BushProt, FPAA BPAD
T. 02 4929 2301 **D.** 02 49173977 **M.** 0409 375 965
E. brad.d@nghconsulting.com.au
Unit 2, 54 Hudson St
Hamilton NSW 2303

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WWW.NGHCONSULTING.COM.AU

From: Doug Landfear
Sent: Friday, June 5, 2020 3:42 PM
To: Wayne Zikan <Wayne.Zikan@fire.nsw.gov.au>
Cc: Alan Cooper <Alan.Cooper@fire.nsw.gov.au>; Elyse Wise (einws@vestas.com) <einws@vestas.com>
Subject: RE: Winterbourne Wind Farm

Hi Wayne

Thank you very much for your email. It is good to make the connection with you and Alan.

We will get in touch to discuss emergency services as we further progress development, and of course will introduce the relevant construction/operation teams down the track.

Look forward to working with and learning from you.

Kind regards

Doug

Doug Landfear
Project Director
Vestas Asia Pacific
+61 436 927 806
dglla@vestas.com

From: Wayne Zikan <Wayne.Zikan@fire.nsw.gov.au>
Sent: Friday, June 5, 2020 3:29 PM
To: Doug Landfear <dglla@vestas.com>
Cc: Alan Cooper <Alan.Cooper@fire.nsw.gov.au>
Subject: Winterbourne Wind Farm

Hi Doug
I am writing on behalf of Superintendent Tom Cooper who is responsible for Fire and Rescue NSW operations int the area that covers the Windbourne Wind Farm.
We have received your letter sent to Commissioner Baxter and wish to introduce ourselves as the contact for FRNSW in relation to the wind farm.
FRNSW is the combat agency (lead agency) for hazardous materials incidents in NSW and also provide firefighting and rescue services. We have a Primary Rescue unit based in Uralla.
We would like to be involved in any relevant discussions around the provision of emergency service response to the site both during development and when finally operating.
This would provide the opportunity to share information that may benefit your employees and assets, and also our emergency responders.
We look forward to working with you and your team.
Regards

Fire & Rescue NSW

M: 0408 621 207
E: wayne.zikan @fire.nsw.gov.au
www.fire.nsw.gov.au

INSPECTOR WAYNE ZIKAN
DUTY COMMANDER PEEL 2
REGION NORTH 3

Appendix B New England BFRMP SFAZ

New England BFMC Bush Fire Risk Management Plan 2014

Central East - Map Display Area

Map 4 of 5

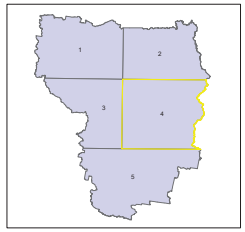
DRAFT

This Bush Fire Risk Management Plan (BFRMP) has been prepared by the New England Bush Fire Management Committee (BFMC) pursuant to section 52 of the *Rural Fires Act 1997*.

The **aim** of this BFRMP is to reduce the adverse impact of bush fires on life, property and the environment.

The **objectives** of this BFRMP are to:
- reduce the number of human-induced bush fire ignitions that cause damage to life, property or the environment;
- manage fuel to reduce the spread and intensity of bush fires while minimising environmental/ecological impacts;
- reduce the community's vulnerability to bush fires by improving its preparedness; and
- effectively contain fires with a potential to cause damage to life, property and the environment.

This map forms part of the BFRMP for the New England BFMC, covering the local government area(s) of Armidale Dumaresq, Guyra, Uralla and Walcha. It should be viewed in conjunction with the accompanying BFRMP document which provides further details on the BFMC area, the assets assessed and the risk assessment process used.



Review
Under the *Rural Fires Act 1997* this plan must be reviewed and updated within each successive five year period following the constitution of the BFMC. The New England BFMC will also review this plan as necessary. This may be triggered by a range of circumstances, including but not limited to:
- changes to the BFMC area, organisational reponsibilities or legislation;
- changes to the bush fire risk in the area; or
- following a major fire event.

Assets
This BFRMP identifies the assets that are considered by the New England BFMC and community to be at risk from bush fires, assesses the bush fire risk to each asset and assigns treatments designed to mitigate the risk. Assets in the BFMC area identified as requiring treatments are listed in the assets table. Other assets within the BFMC area that were assessed as not requiring treatments within the life of this plan are listed in the appendix to the BFRMP document. The Map Ref number "NA" denotes non-spatial assets.

Treatments
Specific treatments assigned to assets in the New England area are listed in the treatments table and linked to the assets which they are designed to protect. Standard BFMC wide treatments (i.e. not linked to a specific asset) which occur on an ongoing basis within the BFMC area are:
- reviewing the bush fire prone land map;
- ensuring developments in the bush fire prone land comply with Planning for Bush Fire Protection;
- using the Local Environment Plan/s (LEPs) to control development in areas with a bush fire risk;
- varying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods
- prosecution of arsonists/offenders
- investigation of bush fire cause;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a SS2 Operations Coordination Plan;

Note on LMZ: All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMZ for this risk management plan. For areas identified by an LMZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression	Zone
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of **Direct Attack** suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document *Standards for Asset Protection Zones*.
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development. To aid containment of wildfires to existing management boudnaries.	To improve the likelihood and safe use of: **Parallel Attack** suppression strategies within the zone, and/or **Indirect Attack** (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone. and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependant upon: - Topography - Aspect - Spotting propensity - Location of adjacent fire breaks - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in area where APZs or SFAZs are not appropriate.	As per the land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land management, e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependant on size of fire sensitive area requiring protection.

Disclaimer
The New England BFMC makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances.

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Authorized by ..... of New England BFMC.
Date created: Wednesday, 8 October 2014

BFRR version 2.1.23.0

Assets

Map Ref	Asset name	Asset type	Subtype	Risk level	Priority	Treatment
NA	Yooroonah Tank Barrier	Cultural	Non	Extreme	1A	T7;3
1	Bark Hut	Cultural	Non	Extreme	1A	T45
310	East Kunderang Homestead & Precinct	Human	Other	Extreme	1A	T10;45
355	Aboriginal Site	Cultural	Aboriginal	Extreme	1A	T3
356	Aboriginal Site	Cultural	Aboriginal	Extreme	1A	T3
372	Aboriginal Site	Cultural	Aboriginal	Extreme	1A	T3
374	Aboriginal Site	Cultural	Aboriginal	Extreme	1A	T3
428	Threatened Flora	Environment	Endangered	Extreme	1A	T3
368	Aboriginal Site	Cultural	Aboriginal	Extreme	1B	T3
9	Carrai Plateau	Human	Residential	Extreme	1C	T3;12;21
30	Middle Yards Hut	Cultural	Non	Extreme	1C	T45
31	Green Gully Hut and Stock Yards	Cultural	Non	Extreme	1C	T45
33	Front Tableland Hut and Stock Yards	Cultural	Non	Extreme	1C	T45
35	Left Hand Hut	Cultural	Non	Extreme	1C	T45
36	Tin Hut	Cultural	Non	Extreme	1C	T45
39	Halls Peak Camp Ground	Economic	Tourist and	Extreme	1C	T45
230	Armidale Plantation	Economic	Commercial	Extreme	1C	(1)
373	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T3
403	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T48
404	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T48
405	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T3
408	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T3
409	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T3
431	Threatened Flora	Environment	Endangered	Extreme	1C	T3
438	Threatened Flora	Environment	Endangered	Extreme	1C	T3
439	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
440	Threatened Flora	Environment	Endangered	Extreme	1C	T3
14	Thalgarrah Field Studies Centre	Human	Special Fire	Very High	2A	T43
60	Dangars Falls Visitor Facilities	Economic	Tourist and	Very High	2A	T45
61	Gara Gorge Visitor Facilities	Economic	Tourist and	Very High	2A	T45
62	Gara River Hydro-Electric Scheme	Cultural	Non	Very High	2A	T45
64	Hillgrove	Human	Residential	Very High	2A	T27;37
72	Chandler Public School	Human	Special Fire	Very High	2A	T22;42
232	Wollomombi Visitor Facilities	Economic	Tourist and	Very High	2A	T45
406	Aboriginal Site	Cultural	Aboriginal	Very High	2A	T3
NA	Dog Fence Walcha	Economic	Agricultural	Very High	2C	T28
NA	Dog Fence Dorrigo	Economic	Agricultural	Very High	2C	T28
65	Stockr Peak Communications Tower	Economic	Infrastructure	Very High	2C	T14
169	Riverside Camp Ground	Economic	Tourist and	Very High	2C	T45
299	Daisy Plains Huts	Economic	Tourist and	Very High	2C	T45;10
357	Aboriginal Site	Cultural	Aboriginal	Very High	2C	T3
497	Threatened Flora	Environment	Vulnerable	Very High	2C	T3
498	Threatened Flora	Environment	Vulnerable	Very High	2C	T3
502	Threatened Flora	Environment	Vulnerable	Very High	2C	T48
503	Threatened Flora	Environment	Vulnerable	Very High	2C	T48
504	Threatened Flora	Environment	Vulnerable	Very High	2C	T3
505	Threatened Flora	Environment	Endangered	Very High	2C	T3
507	Threatened Flora	Environment	Endangered	Very High	2C	T3
508	Threatened Flora	Environment	Endangered	Very High	2C	T3
510	Threatened Flora	Environment	Endangered	Very High	2C	T3
512	Threatened Flora	Environment	Endangered	Very High	2C	T3
513	Threatened Flora	Environment	Vulnerable	Very High	2C	T3
282	NSP - Hillgrove Sportsground &	Human	Other	Low	NA	T1

(1);T15;16;17;18;19

Inset map 1. Hillgrove

Treatments

ID	Treatment strategy	Action	Agencies (Support)
T3	Other	Implement Reserve Fire Management Strategy	OEH
T7	Hazard Reduction	Inspect & Maintain APZ	OEH
T10	Property Planning	Activate Emergency Evacuation Plan	OEH
T45	Other	Implement Reserve Fire Management Strategy	OEH
T48	Other	Manage in accordance with Operational	FCNSW
T21	Preparedness	Undertake Pre-incident Planning	RFS
T12	Preparedness	Inspect & Maintain Fire Trails	OEH
T15	Hazard Reduction	Conduct Prescribed Burning as Required	FCNSW
T16	Ignition Management	Implement Control of Plant Operations	FCNSW
T17	Preparedness	Inspect and Maintain Fire Trails	FCNSW
T18	Preparedness	Conduct Fire Detection Activities	FCNSW
T19	Hazard Reduction	Implement Third Party Grazing Permits	FCNSW
T14	Hazard Reduction	Inspect & Maintain APZ	Private (OEH, RFS)
T22	Community Education	Conduct School Visit	RFS
T27	Property Planning	Develop and Implement Community Protection	RFS
T37	Preparedness	Inspect and Maintain Fire Trails	TI CL
T42	Preparedness	Undertake Pre-incident Planning	RFS
T43	Preparedness	Undertake Pre-incident Planning	RFS
T28	Preparedness	Undertake Trail Maintenance	OEH, Private
T1	Hazard Reduction	Maintain Fuels in accordance with Guidelines	LGA (RFS)

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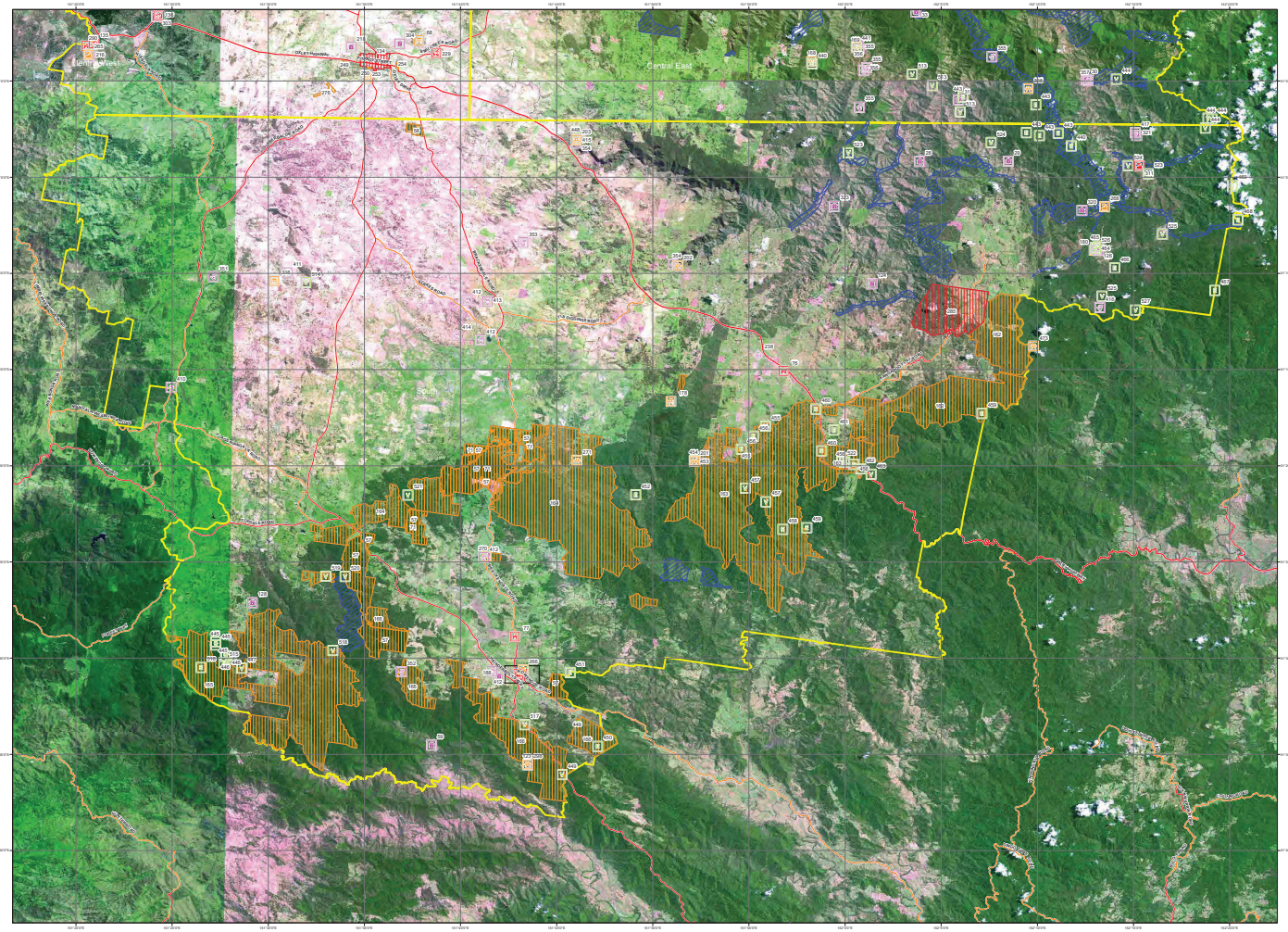
Assets
- Human - Residential
- Human - Other
- Special Fire Protection
- Economic - Agricultural
- Economic - Commercial
- Economic - Infrastructure
- Economic - Tourism and Recreational
- Economic - Mines
- Commercial Forests
- Drinking Water Catchments
- Environmental - Locally Important
- Environmental - Vulnerable (Species)
- Environmental - Endagered (Species)
- Cultural - Aboriginal Heritage
- Cultural -Other
- Cultural - Non Indigenous

Bush Fire Management Zones
- Fire Exclusion Zone (FEZ)
- Asset Protection Zone (APZ)
- Land Management Zone (LMZ)
- Strategic Fire Advantage Zone (SFAZ)

Base Data Layers
- Major Roads Sealed
- Major Roads Unsealed
- Secondary Road Sealed
- Secondary Road Unsealed
- Local Road Sealed
- Local Road Unsealed
- Local Road Unspecified
- 4WD Track Unspecified
- Path
- Heavy Rail
- Light Rail
- Heavy Rail Siding
- Drainage Perennial
- Drainage Non Perennial
- Hydro-Line Perennial
- Hydro-Line Non Perennial
- Contour (100m)
- Contour (10m)
- Map Display Area
- Local Government Area
- Crown Land
- State Forests
- National Park

*Note – Some base data layers may not be displayed on map



Assets

Map Ref	Asset name	Asset type	Subtype	Risk level	Priority	Treatment
285	Yarrowitch Estate	Human	Residential	Extreme	1A	T4;5;6
311	Youdales Hut & Stock Yards	Human	Other	Extreme	1A	T45
352	Aboriginal Site	Cultural	Aboriginal	Extreme	1A	T48
464	Threatened Flora	Environment	Endangered	Extreme	1A	T3
468	Threatened Flora	Environment	Endangered	Extreme	1A	T3
320	Youdales Mill Hut	Cultural	Non	Extreme	1B	T46
321	Youdales Mine Hut	Cultural	Non	Extreme	1B	T46
323	Deep Gully Hut	Cultural	Non	Extreme	1B	T45
268	Cedar Creek Complex	Economic	Commercial	Extreme	1C	T45
416	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T3
417	Aboriginal Site	Cultural	Aboriginal	Extreme	1C	T3
440	Threatened Flora	Environment	Endangered	Extreme	1C	T3
445	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
446	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
447	Threatened Flora	Environment	Vulnerable	Extreme	1C	T48
449	Threatened Flora	Environment	Vulnerable	Extreme	1C	T48
453	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
454	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
455	Threatened Flora	Environment	Vulnerable	Extreme	1C	T48
457	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
460	Threatened Fauna	Environment	Endangered	Extreme	1C	T48
462	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
463	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
465	Threatened Flora	Environment	Vulnerable	Extreme	1C	T3
466	Threatened Flora	Environment	Endangered	Extreme	1C	T3
469	Threatened Flora	Environment	Endangered	Extreme	1C	T3
28	Yarrowitch River Hut and Stock Yards	Cultural	Non	Very High	2A	T45
29	Colwells Hut and Stock Yards	Cultural	Non	Very High	2A	T45
57	Nowendoc Plantations	Economic	Commercial	Very High	2A	(1)
58	Croft Knoll Plantation	Economic	Commercial	Very High	2A	(2)
59	Christies Hut	Cultural	Non	Very High	2A	T45
71	Riamukka Plantation	Economic	Commercial	Very High	2A	(3)
76	Yarrowitch Public School	Human	Special Fire	Very High	2A	T22;42
77	Nowendoc Public School	Human	Special Fire	Very High	2A	T47;43
354	Aboriginal Site	Cultural	Aboriginal	Very High	2B	T3
NA	Dog Fence Walcha	Economic	Agricultural	Very High	2C	T28
515	Threatened Flora	Environment	Endangered	Very High	2C	T3
517	Threatened Flora	Environment	Vulnerable	Very High	2C	T48
518	Threatened Flora	Environment	Vulnerable	Very High	2C	T48
522	Threatened Flora	Environment	Vulnerable	Very High	2C	T48
524	Threatened Flora	Environment	Vulnerable	Very High	2C	T3
525	Threatened Flora	Environment	Vulnerable	Very High	2C	T3
283	NSP - Nowendoc Memorial Hall	Human	Other	Low	NA	T1

(1)T15;16;17;18;19

(2)T15;16;17;18;19

(3)T15;16;17;18;19

Inset map 1. Nowendoc

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Assets

- Human - Residential
- Human - Other
- Special Fire Protection
- Economic - Agricultural
- Economic - Commercial
- Economic - Infrastructure
- Economic - Tourism and Recreational
- Economic - Mines
- Commercial Forests
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- Contour (100m)
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- Map Display Area
- Local Government Area
- Crown Land
- State Forests
- National Park

*Note – Some base data layers may not be displayed on map

Treatments

ID	Treatment strategy	Action	Agencies (Support)
T3	Other	Implement Reserve Fire Management Strategy	OEH
T4	Community Education	Deliver Resource Folders	RFS
T5	Preparedness	Inspect & Maintain Fire Trails	RFS
T6	Preparedness	Undertake Pre-incident Planning	RFS
T45	Other	Implement Reserve Fire Management Strategy	OEH
T48	Other	Manage in accordance with Operational	FCNSW
T46	Other	Implement Reserve Fire Management Strategy	OEH
T15	Hazard Reduction	Conduct Prescribed Burning as Required	FCNSW
T16	Ignition Management	Implement Control of Plant Operations	FCNSW
T17	Preparedness	Inspect and Maintain Fire Trails	FCNSW
T18	Preparedness	Conduct Fire Detection Activities	FCNSW
T19	Hazard Reduction	Implement Third Party Grazing Permits	FCNSW
T22	Community Education	Conduct School Visit	RFS
T42	Preparedness	Undertake Pre-incident Planning	RFS
T43	Preparedness	Undertake Pre-incident Planning	RFS
T47	Community Education	Conduct School Visit	RFS
T28	Preparedness	Undertake Trail Maintenance	OEH, Private
T1	Hazard Reduction	Maintain Fuels in accordance with Guidelines	LGA (RFS)

New England BFMC Bush Fire Risk Management Plan 2014

South - Map Display Area

Map 5 of 5

This Bush Fire Risk Management Plan (BFRMP) has been prepared by the New England Bush Fire Management Committee (BFMC) pursuant to section 52 of the *Rural Fires Act 1997*.

The **aim** of this BFRMP is to reduce the adverse impact of bush fires on life, property and the environment.

The **objectives** of this BFRMP are to:
- reduce the number of human-induced bush fire ignitions that cause damage to life, property or the environment;
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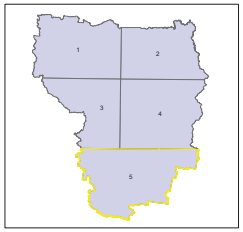
- effectively contain fires with a potential to cause damage to life, property and the environment.

This map forms part of the BFRMP for the New England BFMC, covering the local government area(s) of Armidale Dumaresq, Guyra, Uralla and Walcha. It should be viewed in conjunction with the accompanying BFRMP document which provides further details on the BFMC area, the assets assessed and the risk assessment process used.



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- ensuring developments in the bush fire prone land comply with Planning for Bush Fire Protection;
- using the Local Environment Plan/s (LEPs) to control development in areas with a bush fire risk;
- varying the standard bush fire danger period as required;
- requiring permits during bush fire danger periods
- prosecution of arsonists/offenders;
- investigation of bush fire cause;
- normal fire suppression activities;
- assessing and managing compliance with strategic fire-fighting resource allocation management systems;
- preparation of a SS2 Operations Coordination Plan;

Note on LMZ: All areas not specifically mapped as an APZ, SFAZ or FEZ are considered as LMZ for this risk management plan. For areas identified by an LMZ polygon on the map, please refer to the BFRMP document for the specific land management objectives.

Zone	Purpose	Suppression	Zone
Asset Protection Zone	To protect human life, property and highly valued public assets and values.	To enable the safe use of **Direct Attack** suppression strategies within the zone. To minimise bush fire impacts on undefended assets.	As per RFS document *Standards for Asset Protection Zones*.
Strategic Fire Advantage Zone	To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development. To aid containment of wildfires to existing management boudnaries.	To improve the likelihood and safe use of: **Parallel Attack** suppression strategies within the zone, and/or **Indirect Attack** (back burning) in high to very high fire weather conditions within the zone. To reduce the likelihood of: Crown fire development within the zone. and/or Spot fire ignition potential from the zone.	Zone width related to suppression objectives and dependant upon: - Topography - Aspect - Spotting propensity - Location of adjacent fire breaks - Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities reach minimum fire thresholds within this plan. Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.
Land Management Zone	To meet relevant land management objectives in area where APZs or SFAZs are not appropriate.	As per the land management and fire protection objectives of the responsible land management agency. To reduce the likelihood of spread of fires. To undertake mosaic burning.	As appropriate to achieve land management, e.g. heritage and/or fire protection e.g. broad scale mosaic burning objectives.
Fire Exclusion Zone	To exclude bush fires.	N/A	Variable dependant on size of fire sensitive area requiring protection.

Disclaimer
The New England BFMC makes every effort to ensure the quality of the information available on this map. Before relying on the information on this map, users should carefully evaluate its accuracy, completeness and relevance for their purposes, and should obtain any appropriate professional advice relevant to their particular circumstances.

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Date created: Wednesday, 8 October 2014

BFRR version 2.1.23.0

Appendix C NPWS Macleay Gorges Fire Management Strategy (Sheet 13)

Office of Environment & Heritage
NSW National Parks & Wildlife Service

Northern Inland Branch
Macleay Gorges Reserves
Fire Management Strategy (External) 2018

Mapsheets 13 - 18

This strategy should be used in conjunction with aerial photography and field reconnaissance during incidents and the development of incident action plans.

This strategy is a relevant Plan under Section 38 (4) and Section 44 (3) of Rural Fires Act 1997.

The NSW National Parks and Wildlife Service is part of the Office of Environment & Heritage.
Published by the Office of Environment & Heritage (NSW)
Contact: Northern Inland Branch, PO Box 402 Armidale NSW 2350 Ph: 02 6776 0000

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Map Details

Datum: Geocentric Datum of Australia (GDA) 1994 | Projection: UTM Map Grid of Australia (MGA) Zone 56

Noted scales are true when printed on A0 size paper.

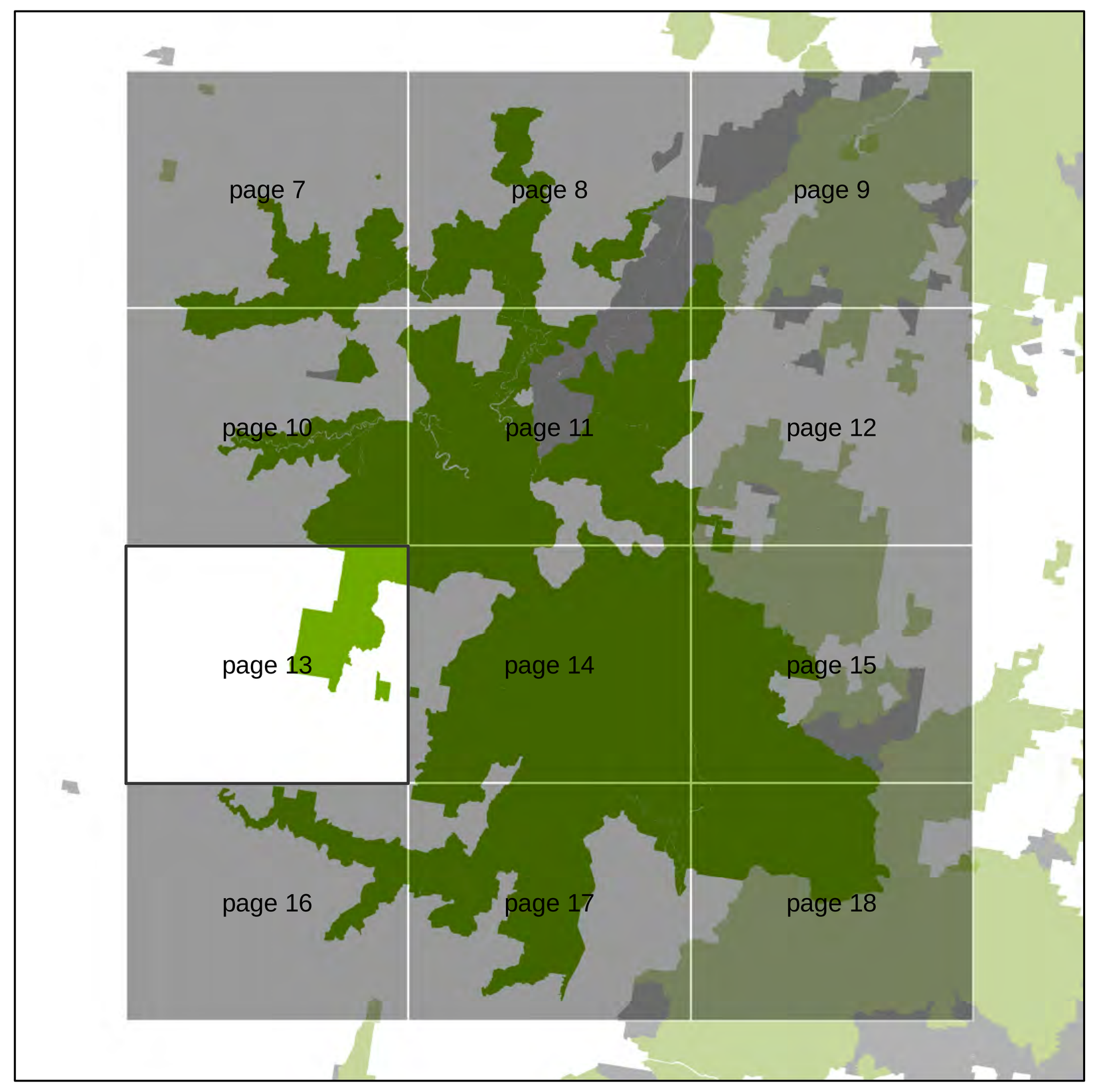
OWRNP RFMS Legend - Mapsheet No 13

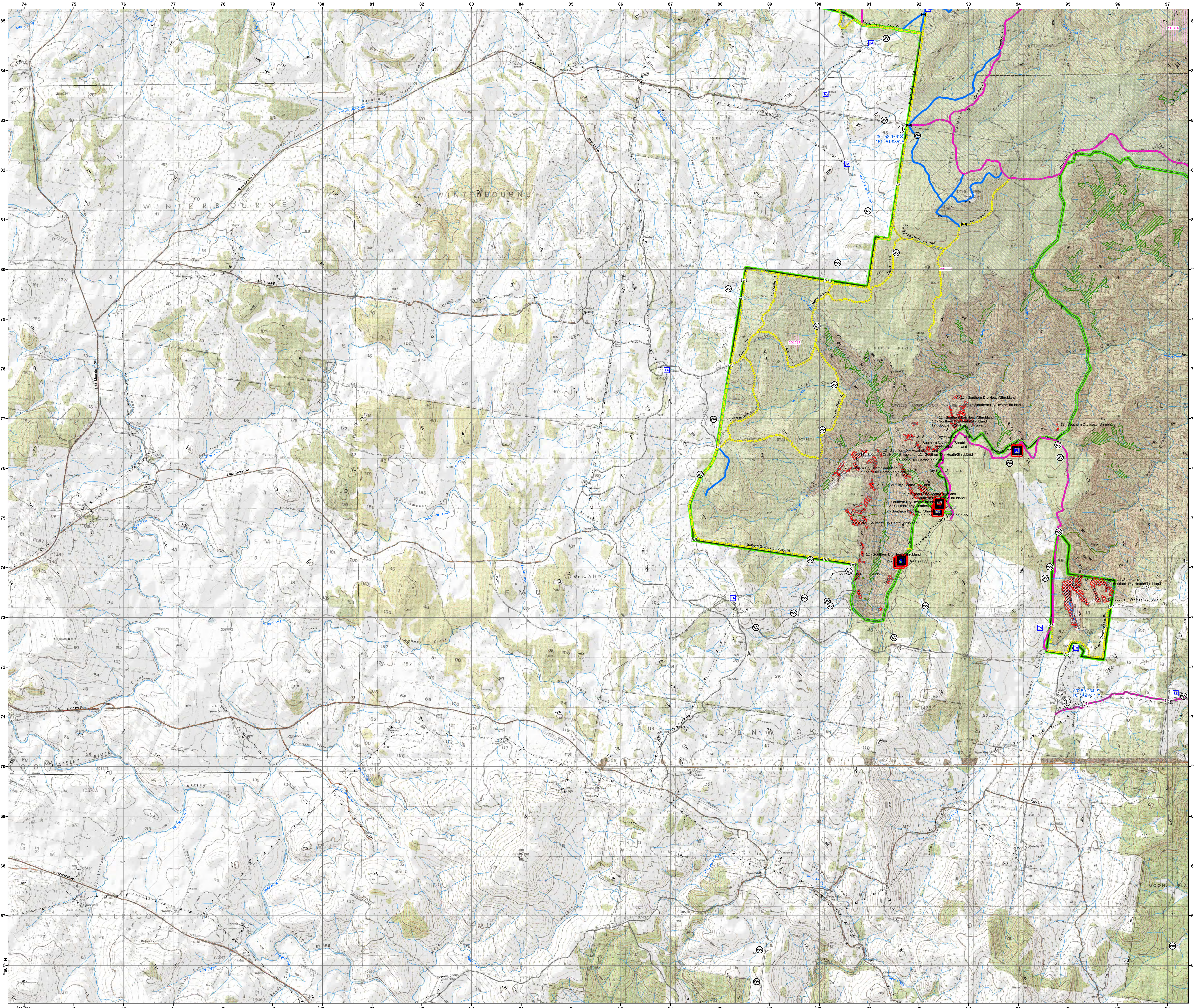
Lookout
- OnGround Lookout
- Viewing Platform
- Chemical Exclusion Frogs
- Historic Sites Requiring Protection OWRNP
- Threatened Property That May Require Protection

Threatened Flora Requiring Protection

Protection
- Heavy machinery exclusion where possible
- Protect from fire where possible
- Protect from fire and heavy machinery where possible
- Protect from fire and heavy plant where possible
- Protect from fire and heavy plant where possible
- Protect communities from fire and heavy plant where possible
- Tantoon Tea Tree Wet Heath
- Gorge Wattle Dry Heath / Shrubland
- Southern Dry Heath / Shrubland
- Carrai Plateau Dry Heath / Shrubland
- Ignimbrite Dry Heath / Shrubland on Rocky Outcrops
- Rainforest
- Gate NPWS * Assume all gates locked
- Gate non NPWS
- Heli Landing Site
- Helipad
- Mine Shaft
- Quarry
- Caution
- Vantage Point
- Water Point H & V
- Water Point Helicopter
- Water Point Vehicle
- Communications Tower
- Fire Tower
- Camping Area
- Day Use Area
- Water Point H & V
- Water Point Helicopter
- Water Point Vehicle
- Walking Tracks
- Powerlines
- Rivers and Creeks
- Contour 50m Interval
- Unclassified
- Essential - Cat 1
- Essential - Cat 7
- Essential - Cat 9
- Important - Cat 1
- Important - Cat 7
- Important - Cat 9
- Dormant
- 201112
- 201213
- 201314
- 201415
- 201516
- Declared Wilderness
- Forestry Plantations
- Macleay Gorges Reserves
- NP Purchased not Gazetted
- Other National Park
- Lands Vested in the Minister
- State Forest

Operational Guidelines – Natural, Cultural, Park Users and Neighbours	
Resource	**Guidelines**
ALL FMM 4.2.7	• Brief all personnel involved in containment line construction &/or vehicle based fire suppression operations, on site locations and the required management strategies appropriate to the site type.
Aboriginal Cultural Heritage Site Management	• **Aboriginal sites have been categorised with the following protective actions if possible in the event of a fire.** • **AH1** - As far as possible, protect site from fire. Do not cut down trees. • **AH2** - As far as possible, protect site from fire. Avoid all ground disturbance including the use of earthmoving machinery, hand-tool line construction and driving over sites. Avoid water bombing which may cause ground disturbance. • **AH3** - Avoid all ground disturbance. Avoid water bombing. Site may be burnt by bushfire, back-burn or prescribed burn without damage.
Historic Heritage Management	• **There are no heritage sites on this map sheet that require protection.**
Threatened Fauna Management	• **There are no threatened fauna issues on this map sheet that require protective actions in the event of fire.** • As far as possible, protect large and hollow-bearing trees. Avoid high intensity fires that consume canopies and fallen logs. • Where practicable, protect habitat areas and trees from the fire if the effects of the resulting fire frequency, season &/or intensity will have a significant or unknown impact. • Surfactants may be used except where location is within 50m of a watercourse, dam or swamp. All existing threatened frog records are displayed as an exclusion zone (50m exclusion of surfactants and other fire suppression chemicals).
Threatened Flora Management	• **The following threatened flora are known to occur on this map sheet. Undertake protective actions as described below if possible.** **Common Name or Flora Community** — **Protective Action Required** Callistemon (newly described species) — Caution with machine use on eastern side of upper Rowleys Creek Gorge along boundary trails. Where possible limit fire. Rowleys Creek Mint Bush ('new species') — Avoid use of machines. Protect from direct fire if possible. Southern Dry Heath / Shrubland — Exclude fire and machine use where possible • As far as possible, avoid inter-fire intervals of <10 years where these species are known to occur. If possible avoid the use of earth moving machinery in locations where these species are known to occur. If possible avoid the use of retardant in locations where these species are known to occur. • Where possible, protect old growth habitat trees. • Surfactants may be used except where location is within 50m of a watercourse, dam or swamp.
Threatened Property	• No threatened property issues • If possible, strengthen APZ areas around park assets prior to the arrival of wildfire and if possible defend them from fire. • Where possible, property owners with assets at risk from a wildfire event should be kept informed regarding the progress of the fire.
Smoke Management	• No Smoke Management Issues identified
Visitor Management	• No visitor management issues identified.
WARNINGS	• No specific warnings





Appendix D NSW RFS Fire Trail Standards

NSW GOVERNMENT

NSW RURAL FIRE SERVICE

NSW RFS
FIRE TRAIL STANDARDS

Contents

STATEMENT

NSW RFS FIRE TRAIL STANDARD 2016 V1.0, PRINTED 2016, 2018
NSW RFS FIRE TRAIL STANDARD 2016, V1.1, PRINTED JUNE 2019.
INCLUDES CORRECTION TO LAT/LONG FORMAT FROM 'DDM' TO 'DD' FORMAT.

1. Introduction

1.1 Background

Bush fires have been a natural part of the landscape for many thousands of years. As communities have developed and properties and towns have been established, the risk of bush fires impacting on communities has increased. Throughout NSW there are approximately 1.3 million properties on bush fire prone land.

Firefighters rely on public roads, trails and other tracks on public and private land to access the landscape to prevent and contain bush fires. Fire trails exist for the purpose of providing access to respond to bush fires, and it is critical to identify and maintain an effective network of accessible trails.

Historically, decisions regarding the establishment and maintenance of fire trails have rested with land managers guided by a cooperative framework established by the NSW Bush Fire Coordinating Committee (BFCC). A need for a different approach was identified to achieve a more consistent and strategic outcome across both public and private lands.

The NSW Government is establishing a more integrated and strategic network of fire trails and access arrangements to improve accessibility for firefighters during bush fires and hazard reduction burns.

Amendments to the *Rural Fires Act 1997*, through the *Rural Fires Amendment (Fire Trails) Act 2016,* provide a legislative basis for the establishment and maintenance of the enhanced network of fire trails.

The *Rural Fires Amendment (Fire Trails) Act 2016* provides for the NSW RFS Commissioner to make *Fire Trail Standards* that (without limitation) may set out:

- classification, length, width, gradient, signage, construction standards and maintenance of fire trails, and
- the structure and form of Fire Access and Fire Trail (FAFT) plans and Treatment Registers prepared by local Bush Fire Management Committees (BFMC).

1.2 Purpose

This document constitutes the *Fire Trail Standards* made by the NSW RFS Commissioner pursuant to section 62K of the *Rural Fires Act 1997*.

These Standards establish the requirements to achieve an integrated and strategic fire access and fire trail network. The Standards set out design and construction requirements for identified fire trails in NSW, and prescribe the structure of the FAFT plan and associated Treatment Registers to be prepared by BFMCs.

The Standards are to be used by organisations across NSW responsible for undertaking fire access and fire trail planning, and land managers responsible for the design, construction and maintenance of fire trails.

A suite of documents developed by the NSW RFS Commissioner and the NSW BFCC provide supplementary guidance and direction to land managers to assist in the design, construction and maintenance of fire trails on their land, and BFMCs involved in fire trail planning and the preparation of FAFT plans. These include:

- FAFT workshop presentation
- FAFT Plan Instructions
- Maps
- List of current fire trails
- Treatment Register (populated with BFMC fire trails)
- Trail ranking and prioritisation tool.

1.3. Aim

The aim of the Standards is to facilitate the planning and implementation of an integrated and strategic network of fire trails.

1.4 Objectives

The objectives of the Standards are:

- To provide a process to identify an integrated and strategic network of fire trails for the protection of the community and its assets, including environmental and social values;
- To establish a network of strategic fire trails which meet minimum standards and allow standard off- road capable firefighting vehicles to safely and effectively traverse the landscape;
- To ensure fire trails enable a vehicle to be driven safely along the trail without damage to the vehicle due to overhanging vegetation, built structures, rough trail surface or other physical impediments;
- To ensure fire trails are of an expected standard that is known and understood by firefighters, can be readily identified including in limited visibility conditions, and are available when required; and,
- To provide a sustainable fire trail network that meets operational requirements, minimises adverse impacts on the environment, and delivers value for money.

1.5 Assumptions

The Standards have been prepared on the basis of the following assumptions:

- The fire trail network will be used by suitably trained and competent firefighters capable of operating in the expected physical environment.
- Firefighting vehicles will meet NSW RFS standard specifications and be driven by licensed and competent drivers in accordance with local procedures.

1.6 Limitations

The Standards have been prepared with regard to the following limitations:

- Fire trails provided for in the Standards are for the purposes of bush fire suppression and other fire management purposes. While it is recognised that fire trails may also be used for other purposes (including other land management and commercial purposes, forming a part of fire breaks, fire containment lines and the like), such uses do not fall within the scope of these Standards.
- While fire trails will be built to a consistent acceptable standard in consideration of operational needs, the safety of firefighters cannot be guaranteed given variability in topography, weather and fire conditions.
- The design and construction standards specified in the Standards cater for standard off-road capable firefighting vehicles currently used in NSW.
- The implementation of a new standard is often challenging and subject to available funding and priorities. The NSW RFS Commissioner and the BFCC acknowledge that a cooperative and incremental approach in implementing this Standard will be required over several years, and the effectiveness of the Standard will be continually monitored to ensure it meets the intent of the legislation.

1.7 Definitions

Expressions defined in 62J of the *Rural Fires Act 1997* apply to the Standards. Definitions are per the NSW RFS Dictionary and apply to the Standards except where otherwise defined in section 62J of the Act. Key terms relevant to the Standards are included below for reference:

Designated fire trail	A fire trail identified by the NSW RFS Commissioner that must be upgraded or established to meet the Standards.
Certified fire trail	A fire trail that has been certified as compliant with the *Fire Trail Standards*.
Registered fire trail	A fire trail, regardless of tenure, that has been certified to meet these Standards and is placed on the Public Register.
Strategic fire trail	A fire trail on any tenure identified by a BFMC during the FAFT planning process, or by the NSW RFS Commissioner, to be of significant value in the suppression or management of fire within the landscape. These trails are placed on the Treatment Register approved by the NSW RFS Commissioner and subsequently designated. These may include multi- purpose trails.
Tactical fire trail	A fire trail on any tenure identified by a BFMC during the FAFT planning process, or by the NSW RFS Commissioner, that should remain open to support the prevention and suppression of fire. These may include multi-purpose trails.
Private land	means that is not public land (section 62J).
Public land	means managed land, unoccupied Crown Land, or land owned or occupied by a public authority. A public authority responsible for any particular land is taken to be occupier of the land for this Part (section 62J).

1.8 What is a fire trail for the purpose of these Standards?

There are a range of access ways across the landscape available for use by firefighters. These include public roads, tracks and trails or other roads used for land management, asset management or recreational purposes.

The purpose of these Standards is to define a network of fire trails for vehicular use identified through the processes established by the Act and deemed necessary for the protection of the community and its assets. These vehicular trails will be identified at a local level by the BFMC and recorded in a FAFT plan and the Treatment Register, or by the NSW RFS Commissioner. The NSW RFS Commissioner may provide guidance relating to the factors to be considered in this process.

While the Standards are principally concerned with fire trails designated and registered under provisions of the Act, it is recognised that other fire trails and access ways will continue to exist and serve an important role in bush fire suppression and fire management. These other fire trails will also be informed by the Standards. All fire trails and access ways will be identified as part of the overall fire access network captured in the FAFT planning process.

1.9 Performance-based approach

The Standards adopt a performance-based approach which allows for flexibility and innovation in the design of fire trails having regard to site-specific opportunities and constraints.

The performance criteria must be satisfied for registered fire trails, and should be achieved for other fire trails. Performance criteria are set out for each requirement and the outcome that needs to be achieved. Meeting the performance criteria is essential to maintain the safety and operational performance of firefighting resources. Compliance with the performance criteria can be achieved in one of two ways:

2. **Acceptable solution** – Acceptable solutions have been specified for each performance criteria and are 'deemed to satisfy'. Materials, components, design factors, and construction methods may be included which, if used, will result in compliance with the performance criteria. It is expected that designated and registered fire trails on the whole will fall into this category; or,
3. **Performance solution** – A performance solution may be proposed where constraints mean compliance with the acceptable solution is not practicable, and it is demonstrated that it otherwise achieves the performance criteria.

The process of demonstrating compliance, including where a performance solution is proposed, is outlined in Chapter 3.

1.10 Environmental approvals

Fire trail works are required to be undertaken in accordance with applicable environmental and other regulatory requirements. A range of environment approval mechanisms exist for fire trails, these include:

- Bush Fire Hazard Reduction Certificate issued in accordance with the Bush Fire Environmental Assessment Code;
- Review of Environmental Factors (REF) under Part 5 of the *Environmental Planning and Assessment Act 1979*;
- Assessment in accordance with the Infrastructure State Environmental Planning Policy (ISEPP); or
- Any other relevant environmental approval methods.

The following applies to the Bush Fire Environmental Assessment Code.

The Bush Fire Environmental Assessment Code 2017* (the *"Code"*) provides a streamlined environmental assessment process for mechanical and burning methods for undertaking bush fire hazard reduction work, including fire trails.

For the purposes of clause 3.8 of the Code, the Code applies to the following works, provided the works are to bring the fire trail into closer compliance with an acceptable solution set out in, or performance solution approved in accordance with, the design and construction requirements set out in Chapter 2 and the work is in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual* issued by the NSW RFS Commissioner:

- a designated fire trail;
- a registered fire trail;
- a fire trail that constitutes part of the fire trail network within a FAFT plan approved for the area;
- a fire trail shown on the BFMC's fire trail layer and categorised as 'essential' or 'important' as at 1 August 2017 where there is no FAFT plan approved for the area; or
- an existing fire trail identified as a treatment in an approved Bush Fire Risk Management Plan where there is no FAFT plan approved for the area.

For the purposes of clause 3.9 of the Code, the Code applies to works for a vehicular control line, where those works are in accordance with an acceptable solution set out in, or performance solution approved in accordance with, the design and construction requirements set out in Chapter 2 and *NSW RFS Fire Trail Design, Construction and Maintenance Manual* issued by the NSW RFS Commissioner.

*Note: Once approved and Gazetted.

2. Fire Trail Standards

2.1 Classification of fire trails

The Standards provide for the classification of fire trails based on the type of firefighting vehicle required to access an area. Three categories are provided:

- **Category 1**: A fire trail that can be safely traversed by a Category 1 firefighting vehicle.
- **Category 7**: A fire trail that can be safely traversed by a Category 7 firefighting vehicle.
- **Category 9**: A fire trail that can be safely traversed by a Category 9 firefighting vehicle.

Specific requirements have been developed for each category of fire trail. The specifications are based on the engineering details contained in Appendix A.

The category of each fire trail will be identified in the FAFT plan as set out in Chapter 4 and as identified by the NSW RFS Commissioner in the designation and registration of the fire trail.

2.2 Design requirements

Intent of requirements: to provide a functional, strategic network of fire trails which permits access for firefighting vehicles used in NSW in order to support fire management and bush firefighting.

2.2.1 Category 1 Fire Trails

The following performance criteria and acceptable solutions are considered industry best practice and apply to Category 1 Fire Trails:

Table 1: Category 1 Fire Trail requirements

REQUIREMENT	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
Width	The width of the trail provides for safe, reliable and unobstructed passage by a Category 1 firefighting vehicle within acceptable operational limits.	- The trafficable surface has a width of 4 metres except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed. - Curves have a minimum inner radius of 6 metres. The minimum distance between inner and outer curves is 6 metres.
Capacity	The construction and formation of the trail is trafficable under all weather conditions (other than due to flood, storm surge or snowfall) for a Category 1 firefighting vehicle.	- Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of 9 tonnes.

REQUIREMENT	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
Grade and crossfall	The vertical profile of the trail provides for traction and safe working angle within the physical operational capability of a Category 1 firefighting vehicle. *Note: This includes design that does not impede the undercarriage of a vehicle.*	› The maximum grade of a trail is not more than 15 degrees. › The crossfall of the trail surface is not more than 6 degrees. › Drainage structures, feature crossings, or other significant changes in the grade of the trail shall be in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manua*l.
Clearance	A cleared corridor is provided around the trail which permits the unobstructed passage of a Category 1 firefighting vehicle and for a working corridor either side of the vehicle to enable firefighters to exit from, and access equipment in, the vehicle.	› A minimum vertical clearance of 4 metres is provided above the surface of the trafficable surface clear of obstructions.
Passing	The trail provides for two Category 1 firefighting vehicles to pass at appropriate intervals so as to avoid unacceptable delays in operations.	› Capacity for passing is provided every 250 metres comprising: › A widened trafficable surface of at least 6 metres for a length of at least 20 metres; or › A 6 metre wide and 8 metre long area clear of the trafficable surface with a minimum inner curve radius of 6 metres and minimum outer radius of 12 metres; or › A turnaround as provided for in this table.
Turnarounds	The trail provides for a turning manoeuvre for a Category 1 firefighting vehicle to return in the direction from which it came at appropriate intervals and at the termination of a trail.	› A turning area is provided at the termination of a trail and every 500 metres and is achieved by: › An area clear of the trafficable surface 6 metres wide and 8 metres deep, with a minimum inner curve radius of 6 metres and outer minimum radius of 12 metres; or › A turning circle of minimum 22 metre diameter. › A T-junction with each terminating end of the junction being at least 10 metres in length from the intersection of the roads and the inner radius of that intersection being at least 6 metres › A fire trail or road intersection.
Drainage	The fire trail is drained effectively to manage rainfall runoff to prevent damage to the trafficable surface.	› Drainage of the trail is designed and constructed in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual*.

2.2.2 Category 7 Fire Trails

The following performance criteria and acceptable solutions are considered industry best practice and apply to Category 7 Fire Trails:

Table 2: Category 7 Fire Trail requirements

REQUIREMENT	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
Width	The width of the trail provides for safe, reliable and unobstructed passage by a Category 7 firefighting vehicle within acceptable operational limits.	› The trafficable surface has a width of 3.5 metres except for short constrictions to 3 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed. › Curves have a minimum inner radius of 5 metres. The minimum distance between inner and outer curves is 5 metres.
Capacity	The construction and formation of the trail is trafficable under all weather conditions (other than due to flood, storm surge or snowfall) for a Category 7 firefighting vehicle.	› Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 8 tonnes and an axle load of 6 tonnes.
Grade and crossfall	The vertical profile of the trail provides for traction and safe working angle within the physical operational capability of a Category 7 firefighting vehicle. ***Note**: This includes design that does not impede the undercarriage of a vehicle.*	› The maximum grade of a trail is not more than 15 degrees. › The crossfall of the carriageway is not more than 6 degrees. › Drainage structures, feature crossings, or other significant changes in the grade of the trail shall be in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual*.
Clearance	A cleared corridor is provided around the trail which permits the unobstructed passage of a Category 7 firefighting vehicle and for a working corridor either side of the vehicle to enable firefighters to exit from, and access equipment in, the vehicle.	› A minimum vertical clearance of 3.5 metres is provided above the surface of the trafficable surface clear of obstructions.

REQUIREMENT	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
Passing	The trail provides for two Category 7 firefighting vehicles to pass at appropriate intervals so as to avoid unacceptable delays in operations.	› Capacity for passing bays are provided every 250 metres comprising: › A widened trafficable surface of at least 5.5 metres for a length of at least 15 metres; or, › A 5.5 metre wide and 6 metre long area clear of the trafficable surface with a minimum inner curve radius of 5 metres and minimum outer radius of 10 metres.
Turnarounds	The trail provides for a turning manoeuvre for a Category 7 firefighting vehicle to return in the direction from which it came at appropriate intervals and at the termination of a trail.	› A turning area is provided at the termination of a trail and every 500 metres and is achieved by: › An area clear of the trafficable surface 5.5 metres wide and 6 metres deep, with a minimum inner curve radius of 5 metres and outer minimum radius of 10 metres; or › Turning circle of minimum 17 metre diameter.
Drainage	The fire trail is drained effectively to manage rainfall runoff to prevent damage to the trafficable surface.	› Drainage of the trail is designed and constructed in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual*.

2.2.3 Category 9 Fire Trails

The following performance criteria and acceptable solutions requirements are considered industry best practice and apply to Category 9 Fire Trails:

Table 3: Category 9 Fire Trail requirements

REQUIREMENT	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
Width	The width of the trail provides for safe, reliable and unobstructed passage by a Category 9 firefighting vehicle within acceptable operational limits.	› The trafficable surface has a width of 3 metres except for short constrictions to 2.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed. › Curves have a minimum inner radius of 5 metres. The minimum distance between inner and outer curves is 5 metres.
Capacity	The construction and formation of the trail is trafficable under all weather conditions (other than due to flood, storm surge or snowfall) for a Category 9 firefighting vehicle.	› Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 4 tonnes and an axle load of 2 tonnes.
Grade and crossfall	The vertical profile of the trail provides for traction and safe working angle within the physical operational capability of a Category 9 firefighting vehicle. *Note: This includes design that does not impede the undercarriage of a vehicle.*	› The maximum grade of a trail is not more than 15 degrees. › The crossfall of the trail surface is not more than 6 degrees. › Drainage structures, feature crossings, or other significant changes in the grade of the trail shall be in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual*.
Clearance	A cleared corridor is provided around the trail which permits the unobstructed passage of a Category 9 firefighting vehicle and for a working corridor either side of the vehicle to enable firefighters to exit from, and access equipment in, the vehicle.	› A minimum vertical clearance of 3 metres is provided above the surface of the trafficable surface clear of obstructions.

REQUIREMENT	PERFORMANCE CRITERIA	ACCEPTABLE SOLUTIONS
Passing	The trail provides for two Category 9 firefighting vehicles to pass at appropriate intervals so as to avoid unacceptable delays in operations.	› Capacity for passing bays are provided every 250 metres comprising: › A widened trafficable surface of at least 5 metres for a length of at least 15 metres; or, › A 5.5 metre wide and 6 metre long area clear of the trafficable surface with a minimum inner curve radius of 5 metres and minimum outer radius of 10 metres.
Turnarounds	The trail provides for a turning manoeuvre for a Category 9 firefighting vehicle to return in the direction from which it came at appropriate intervals and at the termination of a trail.	› A turning area is provided at the termination of a trail and every 500 metres and is achieved by: › An area clear of the trafficable surface 5.5 metres wide and 6 metres deep, with a minimum inner curve radius of 5 metres and outer minimum radius of 10 metres; or › Turning circle of minimum 16 metre diameter.
Drainage	The fire trail is drained effectively to manage rainfall runoff to prevent damage to the trafficable surface.	› Drainage of the trail is designed and constructed in accordance with the *NSW RFS Fire Trail Design, Construction and Maintenance Manual*.

2.3 Construction and maintenance requirements

Fire trails shall be constructed and maintained in accordance the *NSW RFS Fire Trail Design, Construction and Maintenance Manual* issued by the NSW RFS Commissioner.

2.4 Access requirements

Access to fire trails shall not be obstructed to ensure that the fire trail is available for use by firefighting services. Where access to a fire trail is controlled through the installation of a gate or other control mechanism, this shall not unreasonably restrict access to firefighters. Access by firefighters and their representatives shall only be undertaken for the purposes of firefighting and associated activities.

Inappropriate / unauthorised access is not permitted without the knowledge of the land manager.

Any gate or control mechanism installed across a trail shall be operable by a single person without assistance or machinery, and provide a clear area for the passing of a vehicle at least the width of the trafficable surface specified in the relevant acceptable solution specified in Table 1, 2 or 3. This area for passing should be provided within 100 metres of the gate.

Where any securing arrangement to a gate or other control mechanism requires the use of the key for access, the land manager must provide firefighters with access such that firefighting efforts are not hampered or delayed, to the satisfaction of the NSW RFS Commissioner.

The NSW RFS Commissioner will work with major government land managers to identify suitable and efficient access control arrangements to facilitate access to the fire trail network across tenures.

It is acknowledged that fire trails may need to be closed periodically for maintenance and repair purposes. Any periods of closure should be minimised as far as reasonably practicable and local response agencies should be made aware of the closure, intended duration of closure and reopening.

2.5 Signage requirements

Standardised signs should be installed and maintained throughout the fire trail network so that fire trails are easily identified when required for firefighting activities and fire management, including in times of limited visibility. Signs will be required for all fire trails on public land, while signs to be installed on private land will be subject to agreement with the relevant private landowner.

The NSW RFS Commissioner will supply and install standard fire trail signs or approved indicative signage where appropriate for all registered fire trails. Signage will be installed in the first instance on trails where no current signage exists. Where existing signage exists that is clear and performs the required function, it will not require replacement until the sign is no longer functional, at which time it will be replaced by NSW RFS with a sign that meets this Standard.

To maintain consistency and ensure accuracy, the NSW RFS Commissioner will gather signage requirement details from each land manager through the BFMC prior to ordering signage.

2.5.1 Standard fire trail signs

A fire trail should be clearly signposted with standard signs at each entry point to the fire trail.

Fire trail signs will be a metal blade, Class 1 reflective yellow with black lettering, and include:

- NSW RFS* Logo
- Fire trail name (including ‘F/T’ as an abbreviation for ‘fire trail’);
- Latitude and longitude reference of the location of the sign in Degrees Decimal Minutes (DD) format, and;
- The vehicle carrying capacity (1, 7 or 9) in red within red circle as displayed in Appendix B.

Lettering is to be 70mm in height, and a blade is to be no longer than 1200mm. Should a fire trail name not fit on a single blade of this length, the following options are to be considered:

1. compress lettering spacing and retain 70mm height
2. reduce lettering size and print on two lines

Where a sign is to be mounted on a centre pole, blade length may be increased to 1800mm. Signs should consider the use of an anti-graffiti coating.

An illustration of a typical standard sign for a registered fire trail is at Appendix B.

In areas where permanent signage is unsuitable such as areas of high theft or vandalism, the NSW RFS Commissioner may consider the use of temporary signage such a v-frame signage, or other design suitable for use during an incident.

**except where the sign is paid and provided by the land manager. In these circumstances, the land manager may use their logo in place of the NSW RFS.*

2.5.2 Indicative fire trail signs

In circumstances where the use of a standard fire trail sign is not considered suitable, such as on or near private property, the NSW RFS Commissioner may issue and install indicative fire trail signs.

These signs will be a metal blade, Class 1 reflective yellow, and include only the trail Vehicle Carrying Capacity (i.e. 1, 7 or 9) as shown in Appendix B. These signs should consider the use of an anti-graffiti coating.

An illustration of a typical indicative sign for a registered fire trail is at Appendix B.

2.5.3 Installation of fire trail signs on non-registered fire trails

Should a BFMC or land manager wish to install fire trail signs on non-registered fire trails, the sign should use the design in Appendix B with the following alterations:

- all lettering is to be black, including the vehicle carrying capacity
- there must be no circle around the vehicle carrying capacity.

2.5.4 No through trails

All trails with only one entry and exit point (dead ends or to hand tool lines only) must be marked as a "No Through Road". These signs to be Class 1 reflective white with black lettering 70mm in height, and are to be a single blade positioned directly under the fire trail sign.

2.5.5 Bridges

Bridges should be marked and identify load rating. These signs to be Class 1 reflective white with black lettering as per RMS standards, and are to be a single sign positioned appropriately in relation to the bridge.

2.5.6 Standard symbology and other advisory signs

In some circumstances there may be a requirement or benefit in displaying additional information on sign posts. This may include a six (6) figure grid reference.

Standard symbology, in accordance with AFAC Standards, for features considered relevant (such as Water Points, Escape Routes and Helipads) by a BFMC may be included on a Class 1 reflective white single blade. The symbology would be consistent with the colour of the standardised AFAC symbol. An example is provided in Appendix B.

Should the fire trail have any known restrictions, a separate blade shall be provided to identify the restriction. These will be a metal blade, Class 1 reflective white with black lettering.

2.5.7 Fire trail name

Fire trails shall be appropriately named in order to minimise confusion. BFMCs and land managers are required to name the fire trail prior to registration. If already known, use accepted names when formally naming a fire trail. Fire trails should not be referred to as 'unnamed', 'no name', or 'unknown'.

Nominated names should be easy to pronounce, write and spell. Avoid duplication or the use of common names in existence elsewhere within the BFMC's local area.

2.5.8 Other signs

Other signs may be required from time to time by the NSW RFS Commissioner. These may include guide posts for culverts, or signage required to indicate the location of turn-around points or helipads.

The NSW RFS will work with the other agencies to determine additional public safety information signage to be provided as part of, or in conjunction with, fire trail signs as required.

3. Assessment and compliance

Assessments will need to be undertaken at a number of points in this process to determine whether a fire trail complies with the design and construction requirements of the Standard. Assessments shall be focussed on whether the trail complies with the design and construction standards set out in Chapter 2. Where an assessment is undertaken for the purposes of submission to the NSW RFS Commissioner, the assessment will be required to be in the form specified by the NSW RFS Commissioner.

3.1 Performance solutions

Where a performance solution is proposed, the onus is on the land manager to demonstrate compliance with relevant provisions of the Standards.

Performance solutions must be assessed according to one or more of the assessment methods:

- Evidence to support that the use of a material, form of construction, or design meets the performance criteria;
- Verification methods such as a test, inspection, calculation or other method that determines whether a performance solution complies with the relevant performance criteria;
- Comparison with the acceptable solutions using expert judgement.

Performance solutions should be developed in consultation with the relevant stakeholders such as the NSW RFS, engineers, private land owners, and the BFMC before being forwarded to the NSW RFS Commissioner for approval.

3.2 Annual assessment

A public land manager shall provide to the NSW RFS Commissioner annually a statement as to the condition of each designated and registered fire trail on its land, and whether or not each of those trails meet the Standards. The statement must be made in the form as specified by the NSW RFS Commissioner.

Where a fire trail is located on private land, assessment arrangements will be determined and set out in the agreement entered into between the NSW RFS Commissioner and the landowner.

The NSW RFS may undertake inspections of fire trails on both public and private land additional to the annual assessment requirement.

An annual assessment of all other fire trails in a FAFT plan should be undertaken by the responsible agency and provided to the BFMC.

4. Planning

4.1 Fire Access and Fire Trail plan requirements

In order to provide a consistent approach to fire trail planning across NSW, the Act requires BFMCs to prepare a draft FAFT plan for their area. This must be prepared in accordance with requirements set out in these Standards and reviewed and approved by the BFCC.

The FAFT plan will supplement existing fire planning activities undertaken at the local level, such as bush fire risk management planning, and identify the appropriate means of accessing land to prevent, fight, manage or contain bush fires. The process will consider a wide range of factors that will review the adequacy of the access system for firefighting to provide access for the protection of life and property in an area.

A FAFT plan shall:

- Be prepared in accordance with instructions and be in a form specified by the NSW RFS Commissioner;
- Include all trails that form the fire trail network as envisaged in the Standards, along with other access ways; and
- Be prepared with a planning horizon of 5 years.

A FAFT plan shall comprise:

- A map showing:
  - A base layer containing all existing vehicular tracks, trails and roads;
  - The identified fire trail network comprising:
    - All strategic fire trails;
    - All tactical fire trails; and
    - Other fire access ways, such as existing roads, tracks and trails that may be of use for fire management, but do not form part of the fire trail network.
- A schedule of the identified fire trails that constitute the fire trail network detailing:
  - Name
  - Identifier
  - Category (strategic or tactical)
  - Status (registered, designated etc.)
  - Vehicle Carrying Capacity (VCC)
  - Proposed fire trails
  - Current fire trail condition
  - Responsible agency; and
  - Other matters as determined by the NSW RFS Commissioner.

4.2 Fire trail treatment register

A treatment register form should be used to set out a schedule of works for the construction and maintenance of fire trails that constitute the fire trail network.

A treatment register shall be prepared and submitted to the NSW RFS Commissioner for approval:

- Concurrently with the submission of a draft FAFT plan; and
- By 31 May each year.

A treatment register shall:

- Be prepared in accordance with the BFMC instructions and be in a format specified by the NSW RFS Commissioner; and
- Detail planned fire trail works for the nominal five year planning horizon of the FAFT plan to improve the network over time.

5. Document review

The *Fire Trail Standards* may be reviewed and amended by the NSW RFS Commissioner as required. A review must be undertaken before 30 June 2019.

Appendix A

Firefighting vehicle specifications

Category 1 Firefighting vehicle specifications

Length	8200 mm
Width	2400 mm
Mirror length	450mm
Height	3700 mm (including 600 mm for aerials)
Ground clearance	310 mm
Approach angle	35º
Departure angle	25º
Wheelbase	4700 mm
Turning circle – wall to wall	22m diameter
Weight	14200kg
Maximum axle loading	9,000kg

Category 7 Firefighting vehicle specifications

Length	6200mm
Width	2040mm
Mirror length	450mm
Height	3050mm (including 600 mm for aerials)
Ground clearance	230mm
Approach angle	35º
Departure angle	30º
Wheelbase	3395mm
Turning circle – wall to wall	17m diameter
Weight	7500kg
Maximum axle loading	5600kg

Category 9 Firefighting vehicle specifications

Length	5300mm
Width	1750mm
Mirror length	450mm
Height	2600 mm (including 600 mm for aerials)
Ground clearance	220mm
Approach angle	35º
Departure angle	30º
Wheelbase	3180mm
Turning circle – wall to wall	16m diameter
Weight	3700 kg
Maximum axle loading	2000kg

Appendix B

“Certified” Fire Trail Signage

PRIMARY FIRE TRAIL DIRECTIONAL SIGN SINGLE END-MOUNTED POST

- 200mm wide blade with Chevron
- Class 1 yellow reflective with black lettering
- Red circle and vehicle carrying capacity. Circle to be 125mm in diameter
- 70mm Lettering
- Where two lines are required, lettering height may be 60mm
- Max length 900mm
- Lat/ Long (DD format) lettering size to suit –single line
- Logo to be 115mm high

BI-DIRECTIONAL SIGN CENTRE–MOUNTED POST

- 200mm wide blade with chevron at each end
- Class 1 yellow reflective with black lettering
- Red circle and vehicle carrying capacity. Red circle to be 125mm in diameter at either end
- 70mm Lettering
- Where two lines are required, lettering height may be 60mm
- Max length 1200mm
- Lat/ Long (DD format) lettering size to suit -single line

INDICATIVE FIRE TRAIL SIGN FOR USE ON OR NEAR PRIVATE PROPERTY

- 200mm wide blade with chevron
- Class 1 yellow reflective with black lettering
- Red circle and vehicle carrying capacity. Red circle to be 125mm in diameter

“Advisory” Fire Trail Signage

AFAC SYMBOLOGY AND OTHER ADVISORY SIGNS

Attached under yellow blade

- 200mm wide blade with Chevron
- Attached under yellow blade
- 200mm blade with square end
- 70mm Lettering
- Reflective white background
- Black lettering
- AFAC symbology to be 125mm high
- Only AFAC Standard Bush Fire Symbology is to be used

AFAC BUSH FIRE SYMBOLOGY

Helipad

Staging Area

Refuge

Water Point Helicopter

Water Point

Escape Route

“Tactical” Fire Trail Signage

PRIMARY FIRE TRAIL DIRECTIONAL SIGN SINGLE END-MOUNTED POST

- 200mm wide blade with Chevron
- Class 1 yellow reflective with black lettering
- Cat number lettering to be 90mm
- 70mm Lettering
- Where two lines are required, lettering height may be 60mm
- Max length 900mm
- Lat/ Long (DD format) lettering size to suit on single line
- Logo to be 115mm high

BI-DIRECTIONAL SIGN CENTRE MOUNTED POST

- 200mm wide blade with chevron at each end
- Class 1 yellow reflective with black lettering
- Red circle and vehicle carrying capacity. Red circle to be 125mm in diameter at either end
- 70mm Lettering
- Where two lines are required, lettering height may be 60mm
- Max length 1200mm
- Lat/ Long (DD format) lettering size to suit on single line

NSW RURAL FIRE SERVICE

Postal address
NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address
NSW Rural Fire Service
4 Murray Rose Avenue
Sydney Olympic Park NSW 2127

T (02) 8741 5555
F (02) 8741 5550
www.rfs.nsw.gov.au

Social Media
www.facebook.com/nswrfs/
@NSWRFS