Land and environment consultants

Bushfire management plan

Mount Hopeful Wind Farm | Bajool | Queensland
Prepared for Neoen Australia Power Pty Ltd | 14 April 2023

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Bushfire management plan

Final V2

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Approved by Robert Janssen

Position Managing principal

Signature 

Date 14 April 2023

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Disclaimer

Notwithstanding the precautions adopted in this report, it should always be remembered that bushfires burn under a range of conditions. An element of risk, no matter how small always remains, and although AS 3959-2018 is designed to improve the performance of such buildings, there can be no guarantee, because of the variable nature of bushfires, that any building will withstand bushfire attack on every occasion.

It should be noted that upon lodgement of a development proposal, State Government, council and/or the fire service may recommend additional construction requirements.

Although every care has been taken in the preparation of this report, Land and Environment Consultants Pty Ltd accept no responsibility resulting from the use of the information in this report.

Executive Summary

This bushfire management plan (**BMP**) has been prepared for the Mount Hopeful Wind Farm (**the Project**) which is located approximately 45 kilometres (**km**) south of Rockhampton and 65 km west of Gladstone, within the Rockhampton Regional Council and Banana Shire Council local government areas in Central Queensland. It is required for compliance with condition 18a) and b) of the State Assessment and Referral Agency (**SARA**) development permit (**the development permit**) – SARA reference 2109-24892 SDA.

The properties hosting the Project are identified as a bushfire prone area by the Queensland State Planning Policy (**SPP**) *Bushfire prone area map*, as shown in Figures 2.2-2.4. As a result, condition 18a) and b) of the development permit is seeking compliance with the SPP *Bushfire prone area overlay code* (**SPP bushfire prone area overlay code**) and *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'* (**Bushfire resilient communities**) which was prepared by the Queensland Fire and Emergency Services (**QFES**) to support the implementation of the *Natural Hazards, Risk and Resilience – State Planning Policy State Interest guidance material* (DSDMIP 2019). Although not referred to in condition 18a) and b) of the development permit; compliance with guidelines in *Wind Farms and Bushfire Operations* is also considered relevant to the construction and the operations and maintenance phases of the Project.

The Project involves the development of a wind farm that will deliver approximately 400 megawatts of power to the national grid. It will consist of:

- up to 63 wind turbine generators (**WTGs**) and hardstand areas;
- up to 10 temporary meteorology masts and 10 permanent meteorology masts;
- up to two substations and ancillary electrical infrastructure;
- up to 13 km of high voltage (275 kilovolts) overhead transmission lines;
- operations and maintenance facility which includes maintenance and storage areas containing permanent site offices, workshops, warehouses, mobile offices, lunchroom, amenities and ablutions;
- a variety of temporary infrastructure to facilitate the construction of the Project, including:
  - one construction compound;
  - a temporary worker's accommodation camp to provide for a peak construction workforce of approximately 450 people;
  - three concrete batching plants; and
  - two laydown areas;
- overhead and underground transmission lines and cables;
- up to 175 km of gravel capped roads; and
- two permanent site access points.

The site-specific bushfire hazard assessment confirmed that the Project is within a combination of medium, high and very high potential bushfire intensity areas and the 100 m wide potential impact buffer from these areas.

The SPP bushfire prone area overlay code and Bushfire resilient communities requires above ground infrastructure to be appropriately setback from bushfire and grass fire prone areas. These setbacks are referred to as asset protection zones (**APZs**). APZs were identified for above ground infrastructure based on results of radiant heat exposure assessments and compliance with the radiant heat exposure outcomes of the SPP bushfire prone area overlay code. The recommended width of APZs for the

Project range from 10-45 metres but there is potential for the refinement of the APZs through detailed design and micro-siting of the Project's above ground infrastructure.

Chapter 6 of the BMP provides the bushfire mitigation measures that must be implemented during the construction and the operations and maintenance phases of the Project. These mitigation measures include:

- Design and maintenance specifications for APZs around above ground infrastructure.
- Requirements for vegetation clearing and maintenance under overhead transmission lines.
- Requirements for vegetation clearing around cable pits.
- Design and construction specifications for vehicle access tracks.
- Design specifications for a fire-fighter water supply.
- Requirements for wayfinding signage.
- Requirements for fire danger rating signage.
- Requirements for buildings to comply with the relevant sections of the *National Construction Code–Building Code of Australia* (volume 1) and governing Queensland laws, codes and standards that apply to the building industry.
- Requirements for administrative controls which include:
  - a hot works permit system;
  - provision of fire-extinguishers;
  - information sharing with the QFES and local Rural Fire Brigades;
  - annual bushfire preparedness meetings;
  - project rules and inductions;
  - safety documentation;
  - the monitoring of fire weather conditions and the associated precautions;
  - the planning and implementation of fire-fighting near Powerlink Queensland transmission lines;
  - communication with staff and landowners about bushfire mitigation;
  - emergency response planning;
  - the development of a fire-fighter operations plan poster for the local RFBs;
  - operation of the Project in accordance with the Queensland *Electrical Safety Act 2002* and its regulations and the electrical safety codes of practice by the Electrical Safety Office of Queensland;
  - the storage and handling of hazardous chemicals away from bushfire hazard areas;
  - the shut-down of WTGs during fire-fighting operations; and
  - lighting fires.

This BMP includes a code assessment which demonstrates that with the implementation of the above listed mitigation measures, the Project complies with the SPP bushfire prone area overlay code and Bushfire resilient communities.

1 Introduction

This bushfire management plan (**BMP**) has been prepared for the Mount Hopeful Wind Farm (**the Project**) which is located approximately 45 kilometres (**km**) south of Rockhampton and 65 km west of Gladstone, within the Rockhampton Regional Council and Banana Shire Council local government areas in Central Queensland.

The Project involves 17 properties described as lot 21/RN1345, lot 24/RN34, lots 23 and 25/RN25, lot 30/RN72, lot 21/RN46, lot 2039/RAG4056, lot 1933/RAG4058, lot 2057/RAG4059, lot 15/RN1089, lot 148/DS151, lots 2345 and 2420/DT4077, lot 50/ST40144, lot 33/DT40123, lot 38/DT40131 and lot 100/SP28944 (and local road reserves). These properties have a combined area of approximately 16,758 hectares (**ha**) and are hereafter referred to as the **Study area**.

The disturbance footprint for the Project comprises of 874.5 ha of land within the Study area.

This BMP documents a site-specific bushfire hazard assessment for the disturbance footprint and identifies strategies that will mitigate the potential risk of bushfire hazards for the construction and the operations and maintenance phases of the Project. It includes:

- an introduction (this section) and description of methods and information resources used for the preparation of this BMP;
- description of the Study area and the Project;
- site-specific bushfire hazard assessment;
- identification of bushfire hazards associated with the Study area and the Project;
- radiant heat exposure assessment; and
- a plan for mitigating the potential risk of bushfire hazards.

1.1 Approvals context

On 17 June 2022, the State Assessment and Referral Agency (**SARA**) approved a development permit - material change of use for a wind farm (97 turbines) and associated ancillary infrastructure) and operation works for clearing of native vegetation (**the development permit**) – SARA reference 2109-24892 SDA.

This bushfire management plan has been prepared for compliance with condition 18a) and b) of the development permit which state (sic):

a) Prepare a Bushfire Management Plan (BMP).

b) The BMP required under part (a) of this condition must:

   i. be prepared by a suitably qualified person

   ii. be prepared in consultation with the Queensland Fire and Emergency Services (QFES)

   iii. relate to the operational phase of the wind farm and include:

      - a fire hazard analysis
      - mitigation strategies to achieve the development outcomes in Part E of the State Planning Policy July 2017 – Natural Hazards, Risk and Resilience
      - details of consultation with all host lot owners.

The Study area is identified as a bushfire prone area by the Queensland State Planning Policy (**SPP**) *Bushfire prone area map* (**SPP bushfire prone area map**). As a result, condition 18a) and b) of the development permit is seeking compliance with the SPP *Bushfire prone area overlay code* (**SPP bushfire prone area overlay code**) and *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'* (QFES 2019) (**Bushfire resilient communities**) which was prepared by the Queensland Fire and Emergency Services

(**QFES**) to support the implementation of the *Natural Hazards, Risk and Resilience – State Planning Policy State Interest guidance material* (DSDMIP 2019) (**SPP guidance material – bushfire**). Although not referred to in condition 18a) and b) of the development permit; compliance with guidelines in *Wind Farms and Bushfire Operations* (AFAC 2018) (**Wind farms and bushfire operations**) is also considered relevant to the construction and the operations and maintenance phases of the Project.

The design of the Project has been amended since the development permit was issued. The site-specific bushfire hazard assessment is based on the amended design but the BMP has been prepared to satisfy condition 18a) and b) of the development permit and demonstrates how compliance with the SPP bushfire prone area overlay code and guidelines in Wind farms and bushfire operations will be achieved during the construction and the operations and maintenance phases of the Project.

1.2 BMP review

This BMP has been prepared to address condition 18a) and b) of the development permit. Upon appointment, the construction contractor and the operations and maintenance contractor may wish to prepare their own version of this BMP to distil the matters which are specific to their contract or to include corporate documentation or procedures. Notwithstanding, this does not permit the construction contractor or operations and maintenance contractor to change or deviate from the mitigation measures specified in Chapter 6.

1.3 Method

To meet requirements of Bushfire resilient communities, the following steps were undertaken:

- review of the SPP bushfire prone area map in the SPP interactive mapping system (DSDILGP 2022) and the Queensland regional ecosystem (**RE**) map, vegetation hazard class (**VHC**) map, severe fire weather map and fire history map in the QFES online mapping system (QFES 2022) (**Catalyst**);
- a drive over the Study area and field inspection of the disturbance footprint for vegetation characteristics, current land management practices, slope and evidence of previous fires;
- consultation with landowners during the field inspection;
- site-specific bushfire hazard assessment in accordance with the method in Bushfire resilient communities;
- radiant heat exposure assessment using the Fire Protection Association of Australia *BAL calculator V4.9* (**BAL calculator**) which models the 'method 2' bushfire attack level assessment procedure in the *Australian Standard* (AS 3959-2018) *Construction of buildings in bushfire prone areas* (Standards Australia 2018); and
- identification of mitigation measures required to reduce the potential risk of bushfire hazards for the construction and the operations and maintenance phases of the Project and for compliance with the SPP bushfire prone area overlay code.

Aerial imagery of the Study area was accessed online from Google Earth to assist in validating observations and measurements made during the field inspection.

1.4 Suitably qualified person

This BMP was technically reviewed and approved by Robert Janssen who is a suitably qualified and experienced bushfire management consultant.

Robert is the managing principal at Land and Environment Consultants Pty Ltd (**LEC**) and has over 20 years of experience in bushfire planning and operations. He has prepared BMPs for residential, commercial and industrial property developments, utilities, government facilities and conservation estates.

Robert's formal qualifications as an environmental scientist and consulting experience are coupled with 10 years of experience as a nationally accredited fire-fighter with the national parks and wildlife service in New South Wales and Queensland.

2 Description of the Study area and the Project

This chapter provides a description of the Study area and the Project.

2.1 The Study area

The location of the Study area and the disturbance footprint are shown in Figure 2.1. The Study area consists of 17 properties and is approximately 16,758 ha.

Vehicle access into the Study area is via several private and public roads which connect to the Bruce Highway to the east and the Burnett Highway to the west.

The Study area is predominantly agricultural land which is mostly used for cattle grazing and some farmland cropping. However, parts of the Study area remain heavily vegetated with bushland vegetation, particularly in areas which have steep sloping land.

Powerlink Queensland high voltage overhead transmission lines run along the eastern boundary of the Study area and two meteorological masts have been erected within the Study area.

The Study area adjoins numerous conservation reserves, state forests and cattle grazing properties. All of which have large continuous areas of bushland vegetation on rugged terrain and limited vehicle access.

2.2 The Project

The Project involves the development of a wind farm that will deliver approximately 400 megawatts of power to the national grid. It will consist of:

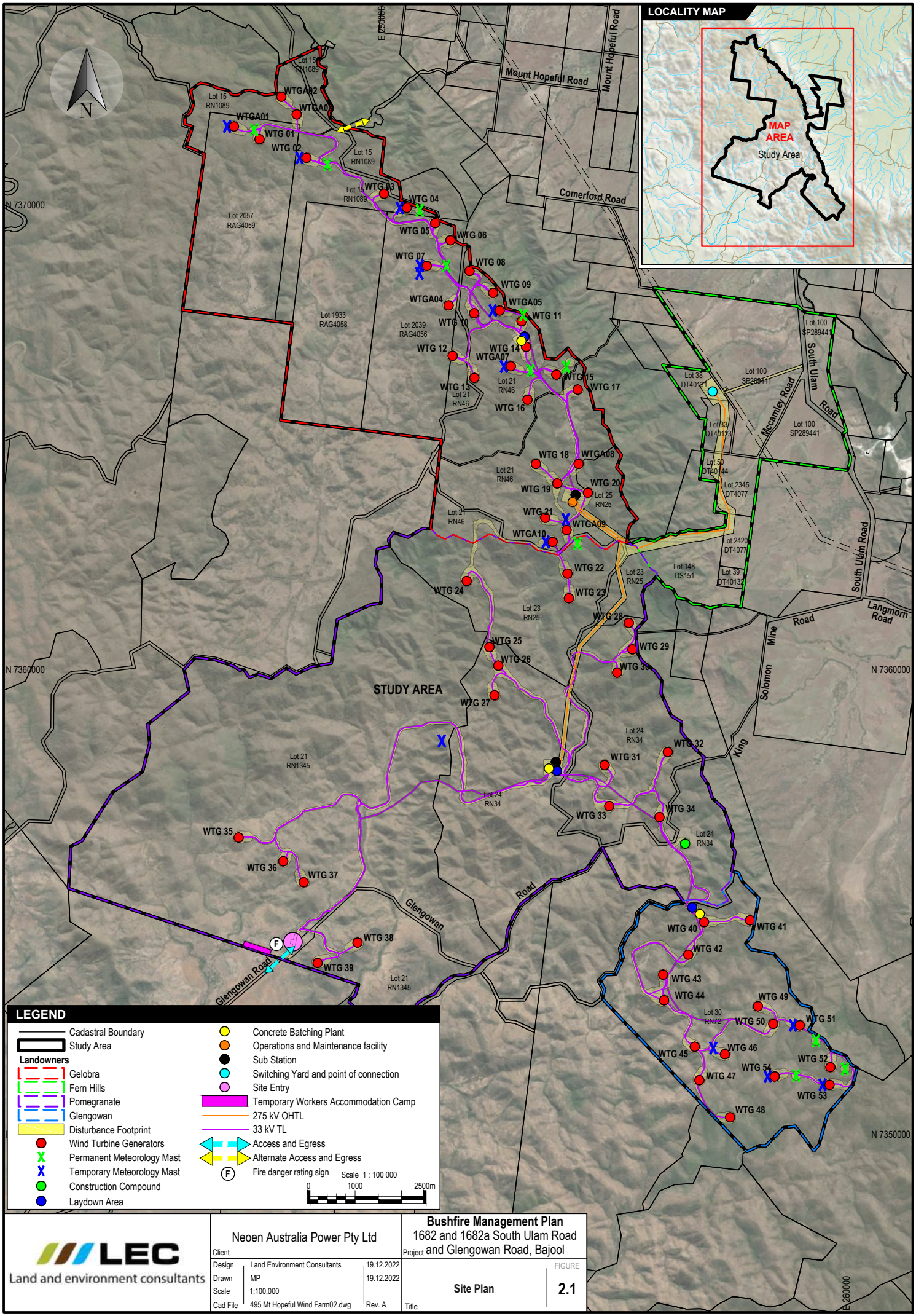
- up to 63 wind turbine generators (**WTGs**) and hardstand areas;
- up to 10 temporary meteorology masts and 10 permanent meteorology masts;
- up to two substations and ancillary electrical infrastructure;
- up to 13 km of high voltage (275 kilovolts (**kV**)) overhead transmission lines;
- operations and maintenance facility which includes maintenance and storage areas containing permanent site offices, workshops, warehouses, mobile offices, lunchroom, amenities and ablutions;
- a variety of temporary infrastructure to facilitate the construction of the Project, including:
  - one construction compound;
  - a temporary worker's accommodation camp to provide for a peak construction workforce of approximately 450 people;
  - three concrete batching plants; and
  - two laydown areas;
- overhead and underground transmission lines and cables;
- up to 175 km of gravel capped roads; and
- two permanent site access points.

2.3 SPP bushfire prone area map

The SPP bushfire prone area map for the Study area is shown in Figures 2.2-2.4. They show that the Project is located within a combination of medium, high and very high potential bushfire intensity areas and potential impact buffer areas.

Please note, the terms 'bushfire prone area' and 'bushfire hazard area' have the same meaning and are interchanged throughout this report. Both terms mean an area of vegetation which is determined

to have a potential bushfire intensity ≥ 4,000 kilowatts/metre (**kW/m**) and the land within 100 metres (**m**) of this vegetation.



LEGEND

- Cadastral Boundary
- Study Area
- **Landowners**
  - Gelobra
  - Fern Hills
  - Pomegranate
  - Glengowan
- Disturbance Footprint
- Wind Turbine Generators
- Permanent Meteorology Mast
- Temporary Meteorology Mast
- Construction Compound
- Laydown Area
- Concrete Batching Plant
- Operations and Maintenance facility
- Sub Station
- Switching Yard and point of connection
- Site Entry
- Temporary Workers Accommodation Camp
- 275 kV OHTL
- 33 kV TL
- Access and Egress
- Alternate Access and Egress
- (F) Fire danger rating sign

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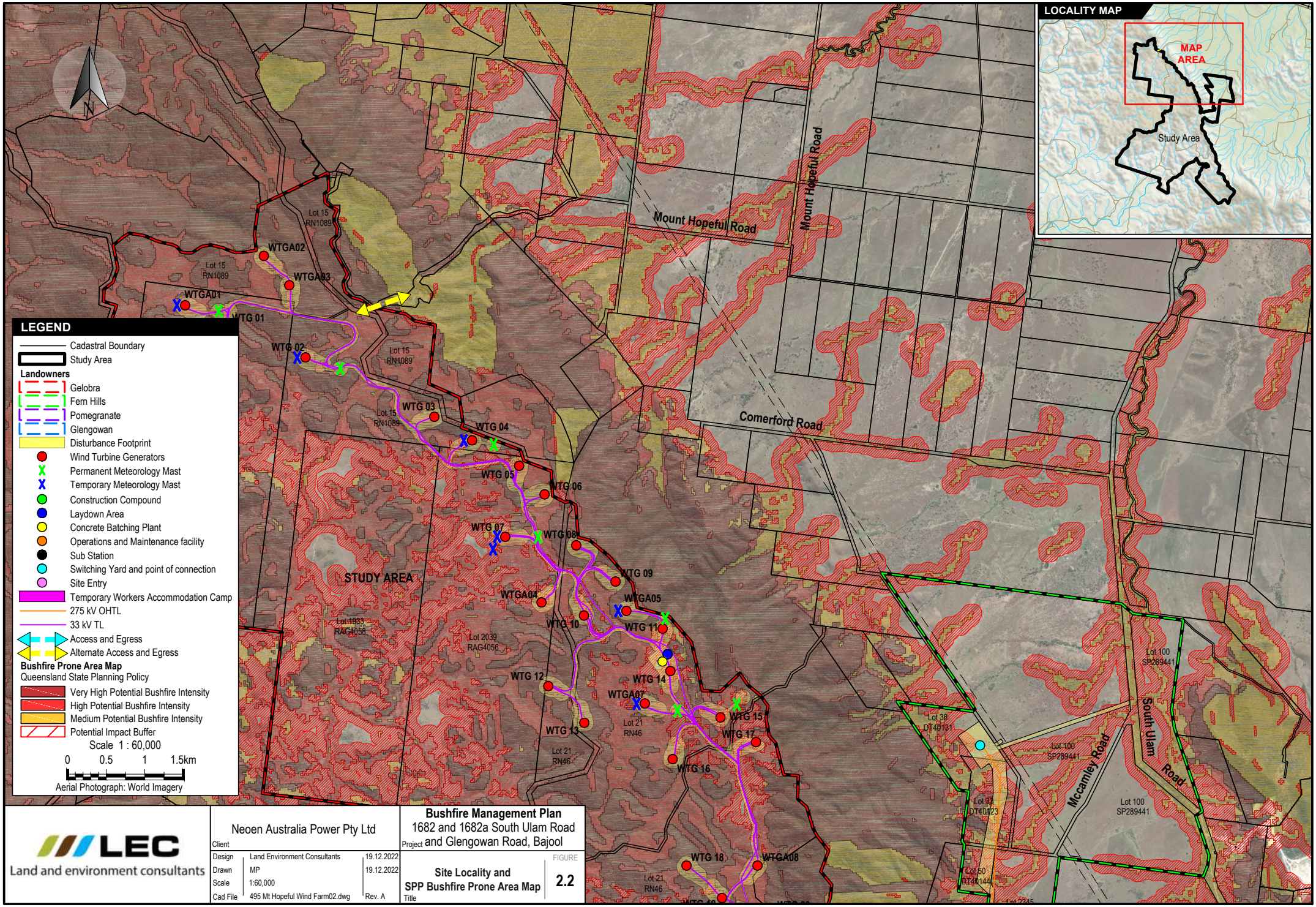
Client	Neoen Australia Power Pty Ltd	
Project	**Bushfire Management Plan** 1682 and 1682a South Ulam Road and Glengowan Road, Bajool	
Design	Land Environment Consultants	19.12.2022
Drawn	MP	19.12.2022
Scale	1:100,000	
Cad File	495 Mt Hopeful Wind Farm02.dwg	Rev. A
Title	**Site Plan**	FIGURE **2.1**



Client	Neoen Australia Power Pty Ltd	
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Drawn	MP	19.12.2022
Scale	1:60,000	
Cad File	495 Mt Hopeful Wind Farm02.dwg	Rev. A
Title	Site Locality and SPP Bushfire Prone Area Map	FIGURE 2.2

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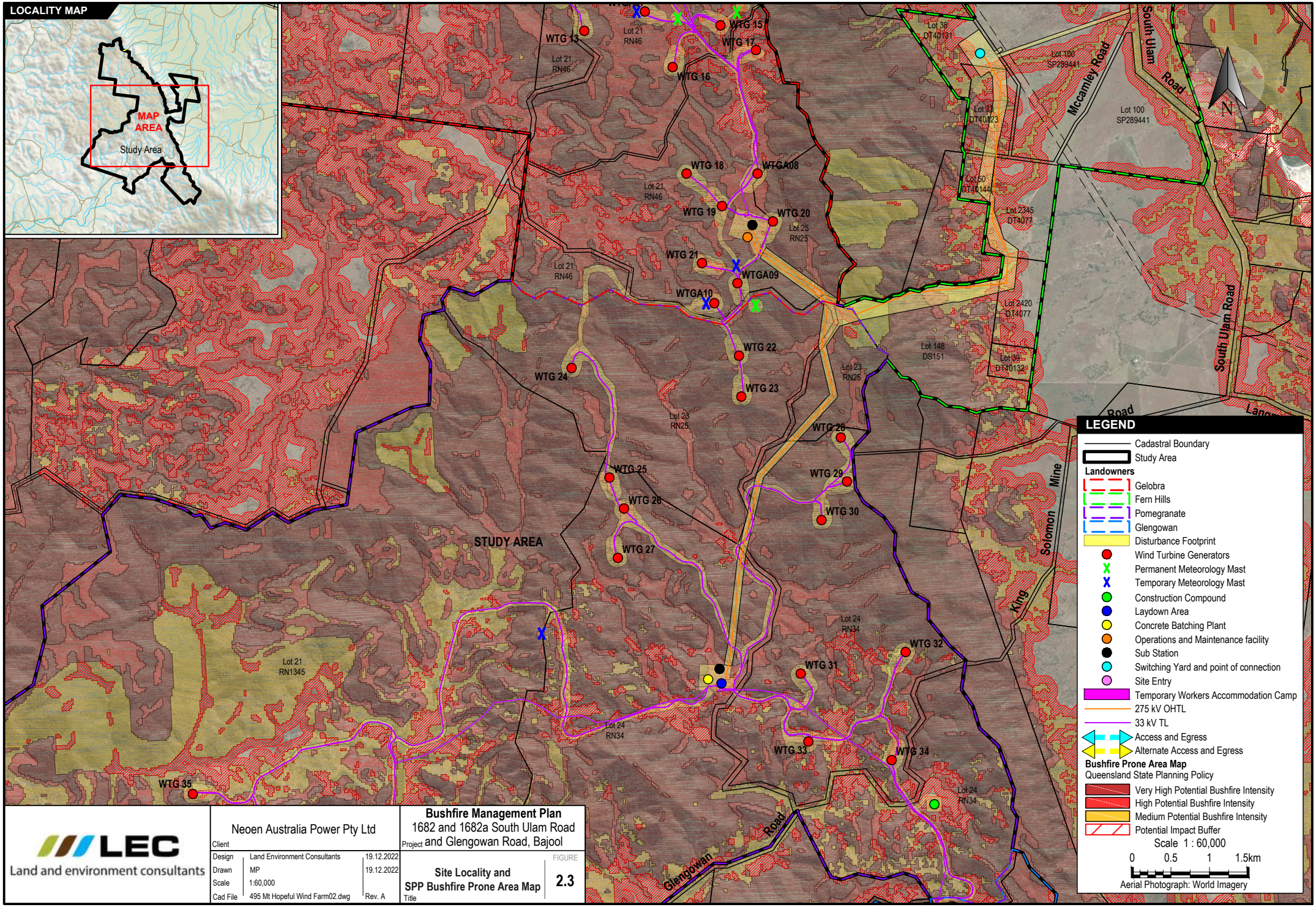

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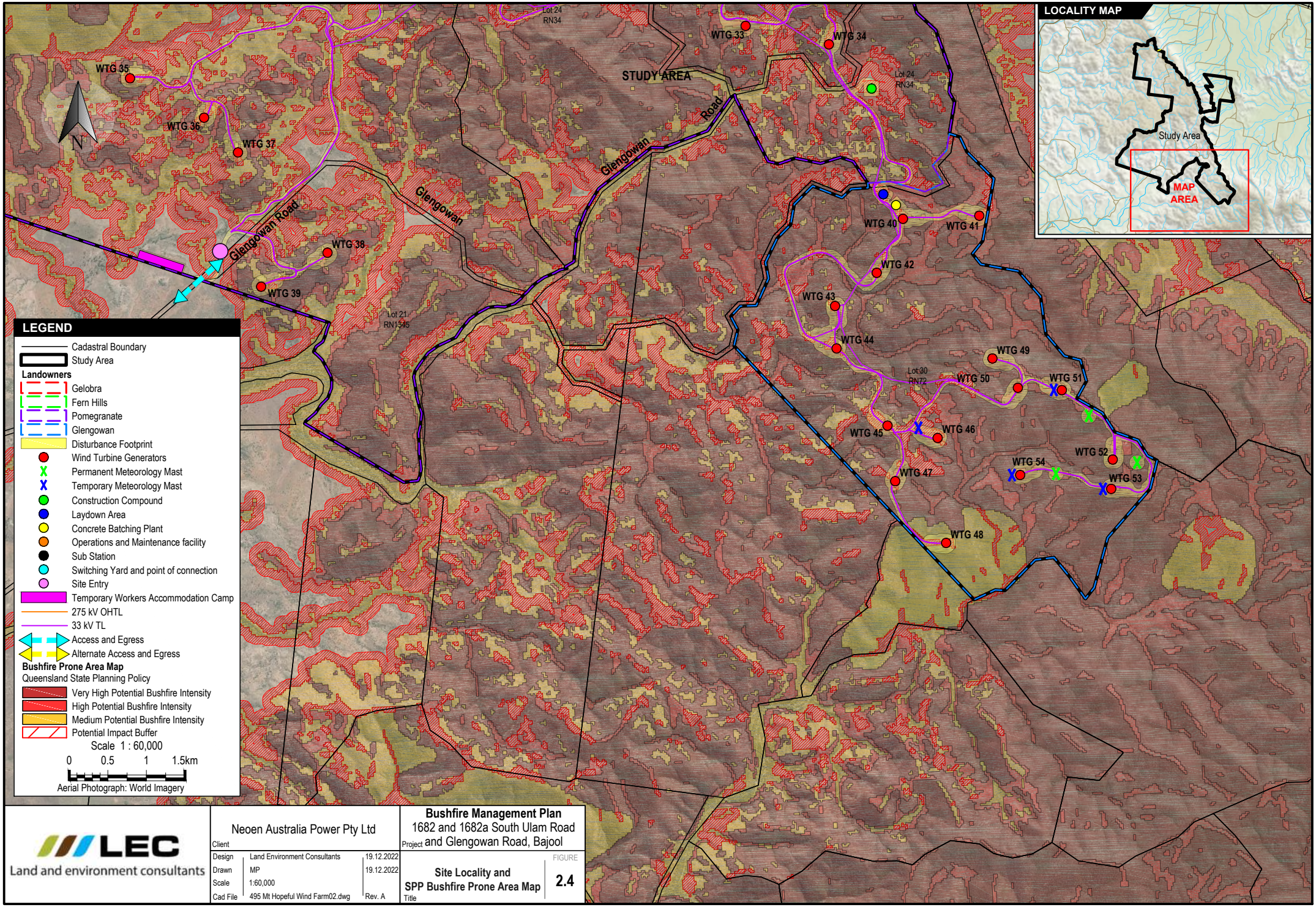
Bushfire Management Plan
Project 1682 and 1682a South Ulam Road and Glengowan Road, Bajool

Site Locality and SPP Bushfire Prone Area Map
Title

FIGURE **2.3**



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Drawn	MP	19.12.2022
Scale	1:60,000	
Cad File	495 Mt Hopeful Wind Farm02.dwg	Rev. A
Title	**Site Locality and SPP Bushfire Prone Area Map**	FIGURE **2.4**

3 Bushfire hazard assessment

This chapter provides details of the desktop review, field inspection and the site-specific bushfire hazard assessment.

3.1 Severe fire weather

The severe fire weather map in Catalyst indicates the 5 % annual exceedance probability forest fire danger index (**FFDI**) for the Study area is 69. This FFDI value has been used for the potential bushfire intensity calculations in Section 3.4 and the radiant heat exposure assessment in Section 3.6.

3.2 Fire history

Fire history data in Catalyst indicates that the Study area and adjoining land regularly burns. Consultation with a landowner identified that many of the fires within and adjoining the Study area were planned burns by landowners and government agencies for bushfire fuel hazard reduction (Pers Comm. Brett McCamley).

3.3 Field inspection

A drive over the Study area and field inspection of the disturbance footprint was performed by LEC on 11-15 November 2022. Observations were recorded about current land use and management, vegetation characteristics, slope of land and evidence of previous fires.

A summary of observations made at the infrastructure areas shown in Figure 2.1 is provided in Appendix 1. Features of the infrastructure areas are shown in photographs in Appendix 2.

Most of the grassland areas within the property identified as Gelobra in Figure 2.1, were assessed based on the pre-clear RE map and corresponding VHCs. This approach was taken due to there being considerable evidence of native vegetation regrowth in previously improved parts of the property.

3.4 Potential bushfire intensity calculations

The potential bushfire intensity of infrastructure areas was determined using the Queensland Public Safety Business Agency *Potential Bushfire Intensity Calculator* (version November 2014) which is an Excel spreadsheet calculator that models the site-specific bushfire hazard assessment method in Bushfire resilient communities.

Bushfire resilient communities defines bushfire hazard classes as follows:

- very high – potential bushfire intensity > 40,000 kW/m;
- high – potential bushfire intensity 20,000-40,000 kW/m;
- medium – potential bushfire intensity 4,000-20,000 kW/m; and
- non bushfire hazard - potential bushfire intensity <4,000 kW/m.

Results of potential bushfire intensity calculations which determine the bushfire hazard class of the infrastructure areas shown in Figure 2.1 are presented in Appendix 3.

3.5 Bushfire prone areas

Results of the potential bushfire intensity calculations in Appendix 3 generally align with the SPP bushfire prone area map and confirm that the Project is within a combination of medium, high and very high potential bushfire intensity areas or the 100 m wide potential impact buffer of these areas. These results confirm that the Project must comply with the SPP bushfire prone area overlay code.

3.6 Radiant heat exposure assessment

The SPP bushfire prone area overlay code and Bushfire resilient communities requires above ground infrastructure to be appropriately setback from bushfire and grass fire prone areas. They require above ground infrastructure associated with 'community infrastructure for essential services', ie the substations and switching yard, to be setback from bushfire and grass fire prone areas by a distance which achieves a radiant heat flux level ≤ 10 kW/m^2. They also require permanent above ground infrastructure associated with 'other uses', ie the WTGs and the operations and maintenance facility, to be setback from hazardous vegetation by a distance which achieves a radiant heat flux level ≤ 29 kW/m^2. These setbacks are hereafter referred to as asset protection zones (**APZs**).

For temporary infrastructure, ie construction compound, laydown areas and concrete batching plants, and meteorology masts (both temporary and permanent), this BMP applies an alternative solution to the SPP bushfire prone area overlay code and Bushfire resilient communities and recommends an APZ with a nominal cleared width of 10 m.

APZs minimise the impact of bushfire attack on above ground infrastructure and provide a defendable space for fire-fighters to operate.

The radiant heat profile of bushfire attack on the substations, switching yard, WTGs and the operations and maintenance facility shown in Figure 2.1 was assessed using the BAL calculator.

The analysis of bushfire attack scenarios was based on VHCs observed during the field inspection, VHC mapping in Catalyst and the steepest slopes measured for VHCs during the desktop review and field inspection. Inputs used to assess the radiant heat profile of each bushfire attack scenario and results of the BAL calculator are provided in Appendix 4.

APZs were identified for substations, switching yard, WTGs and the operations and maintenance facility on results of the radiant heat exposure assessment and compliance with the radiant heat exposure outcomes of the SPP bushfire prone area overlay code. The APZs around above ground infrastructure are summarised in Table 3.1.

Table 3.1 APZs around above ground infrastructure

Width of APZ around above ground infrastructure (m)[1]						
10	**15**	**20**	**25**	**30**	**40**	**45**
WTG 14, laydown area and concrete batching plant near WTG 14, laydown area and concrete batching plant near WTG 31, construction compound near WTG 34, laydown area concrete batching plant near WTG 40, all of the permanent and temporary meteorology masts and the	WTG 31, WTG 32, WTG 33, WTG 34, WTG 35, WTG 36, WTG 37, WTG 38, WTG 39 and WTG 45	WTG 6, WTG 25, WTG 26 and WTG A10	WTG 10, WTG 11, WTG 21, WTG 42, WTG 48, WTG 51, WTG 54, WTG A03, WTG A04, WTG A07, WTG A09 and the operations and maintenance facility near WTG 20	WTG 1, WTG 2, WTG 3, WTG 5, WTG 7, WTG 8, WTG 12, WTG 13, WTG 15, WTG 16, WTG 17, WTG 18, WTG 19, WTG 24, WTG 40, WTG 44, WTG 46, WTG 49, WTG 50, WTG A01, WTG A08,	WTG 4, WTG 9, WTG 20, WTG 22, WTG 23, WTG 27, WTG 28, WTG 29, WTG 30, WTG 41, WTG 43, WTG 47, WTG 52, WTG 53, WTG A02, and WTG A05	Substation near WTG 20

Width of APZ around above ground infrastructure (m)[1]						
10	**15**	**20**	**25**	**30**	**40**	**45**
temporary worker's accommodation camp				switching yard and point of connection and substation near WTG 31		

Note 1 The locations of above ground infrastructure are shown in Figure 2.1.
2 APZs may be refined and potentially reduced through detailed design and micro-siting of the Project.

APZs are not applied to access tracks, retaining walls, earthwork embankment batters, fences, terraced walkways or above ground transmission lines. Notwithstanding, above ground transmission lines are located within a vegetation clearing which is designed to be relevant to electricity transmission and distribution networks in Queensland.

APZs are measured from the electrical infrastructure within substations and the switching yard, the external walls or supporting posts or columns of buildings and WTGs, the perimeter of laydown areas, the construction compound, concrete batching plants and the guy-wires of meteorological masts (both temporary and permanent).

4 Bushfire hazards associated with the Study area and the Project

This chapter identifies bushfire hazards associated with the Study area and the Project.

4.1 Fire danger season

The fire danger season at the Study Area starts in August, peaks in September and begins to fall in November, but will remain elevated until consistent summer rainfall occurs. Typically, the worst fire weather conditions will be experienced during the fire danger season when the wind direction is from the north or west.

An FFDI of 69, ie the 5 % annual exceedance probability FFDI for the Study area, will be associated with hot, dry and windy conditions. If a bushfire starts and takes hold under these conditions, it will be difficult to control and fast moving in large areas of grassland and bushland vegetation.

The fire danger rating (**FDR**) system provides advice about the level of bushfire threat on a day. The new national FDR system which was introduced in September 2022 is based on a new fire behaviour index system and no longer linked to FFDI values. The FDR system has four levels which are summarised below:

- moderate – most fires can be controlled;
- high – fires can be dangerous;
- extreme – fires will spread quickly and be extremely dangerous; and
- catastrophic – if a fire starts to take hold, it could result in the loss of life.

4.2 Fire history

As discussed in Section 3.2, fire history data indicates that the Study area and adjoining land regularly burns and that many of these fires were planned burns that were implemented by landowners and government agencies for bushfire fuel hazard reduction (Pers. Comm. Brett McCamley).

Based on the fire history data and consultation it is considered almost certain that the Study area will be subject to bushfires in the future, whether they be planned or unplanned.

4.3 Vegetation

The disturbance footprint will be cleared of vegetation in preparation for civil works.

APZs will be established around above ground infrastructure as specified in Table 3.1 and will be maintained for the life of the Project.

APZs will be either hardstand areas which are maintained free of weed and grass cover or grass areas which are maintained at a nominal height of < 30 centimetres (**cm**).

4.4 Bushfire management within the Study area

Neoen Australia Power Pty Ltd (**Neoen**) and the construction contractor or the operations and maintenance contractor will be responsible for bushfire management within the disturbance footprint which is leased from the landowners of the Study area. The landowners hosting the Project are responsible for bushfire management in the balance of the Study area, ie the land outside the disturbance footprint. Notwithstanding, bushfire management is a landscape issue and there will be benefits for both Neoen and landowners if they work collaboratively to manage bushfire hazards within the Study area.

4.5 Bushfire attack and the protection of above ground infrastructure

A bushfire in areas of woodland or open forest vegetation on steep slopes present the main issue for the protection of above ground infrastructure.

During fire weather conditions which correlate with the 5 % annual exceedance probability FFDI for the Study area, a bushfire in areas of woodland or open forest vegetation has potential to generate radiant heat energy up to 73,569 kW/m which in combination with steep slopes will make fire-fighting operations and access difficult. Therefore, direct attack of a fire under these fire weather conditions and the protection of infrastructure may not always be possible.

4.6 Workforce

The Project will not result in the permanent exposure of large numbers of people to bushfire hazard. It is expected that the workforce will peak during construction at 450 personnel and will be reduced to 10 full time equivalent roles during operations.

A temporary on-site construction accommodation facility will be established within the Study area for the construction phase of the Project. The construction workforce may also commute from Rockhampton (approximately 50 minute drive) or seek accommodation in local rental houses, hotels and motels in the surrounding localities and towns. The construction phase is anticipated to take between 22-28 months.

Workers employed for the operations and maintenance phase of the Project will be from the local area or accommodated in surrounding townships.

4.7 Hazardous chemicals

Storage or handling of hazardous chemicals during the construction and the operations and maintenance phases of the Project will be in accordance with *Managing risks of hazardous chemicals in the workplace – Code of Practice* (SWA 2020), applicable safety data sheets, and otherwise in accordance with the Queensland *Work Health and Safety Act 2011* and its regulations.

4.8 Access

The Project will establish an access track network that will link the Project infrastructure. Access tracks will be designed for heavy articulated vehicles and will meet the design standards for emergency vehicle access in the SPP bushfire prone area overlay code including (where required) the provision of turnaround areas on dead-end access tracks. If there are gates across access tracks, they will be at least 4 m wide.

In addition to the Project's access track network, there are numerous property access tracks which are of varying design and maintenance standards and may require restoration prior to use for bushfire management operations.

There are multiple vehicle access points into the Study area. The primary access point is via Glengowan Road on the western side of the Project and the alternate access point is via Mount Hopeful Road on the eastern side of the Project. These access points are shown in Figure 2.1.

4.9 Rural Fire Brigade resources and capability

The local Rural Fire Brigades (**RFBs**) are voluntary primary producer brigades and have limited resources to respond to a fire ignition within the Study area. They are unlikely to have any training or experience operating around electrical infrastructure, ie the substations and switching yard, and have limited capability to respond to structural fires.

Local RFB personnel may not be familiar with the layout of the Project and out of area RFBs will not be familiar with the location of the Study area, ie access roads, water points, terrain, etc.

4.10 Aerial fire-fighting operations

Meteorological masts and WTGs pose a navigation risk to pilots performing aerial fire-fighting operations.

4.11 Fire-fighter water supply

The Project will include a dedicated fire-fighter water supply tank.

There are numerous dams and creeks within the Study area. However, the standard of vehicle access to them and the reliability of their water supply is unknown and they should not be relied upon.

4.12 Warning and evacuation requirements

Queensland emergency services use a range of methods to warn the community about bushfire, severe weather and other emergencies that require preparation and action at the property level. The construction workforce and the operations and maintenance workforce will be subject to advice and warnings by Queensland emergency services via radio, online media and local community safety announcements.

A safety and emergency management plan and an evacuation plan will be prepared for the construction phase and the operations and maintenance phase of the Project. These plans will provide details of actions to be undertaken in response to a bushfire emergency. They are separate plans to this BMP.

4.13 Buildings

Offices, accommodation and worker amenities that are required for the construction phase of the Project will be demountable buildings, ie temporary buildings, that will be located in a cleared compound.

Buildings associated with the operations and maintenance facility, substations and switching yard will be designed to meet the fire resistance and safe access and egress requirements of the *National Construction Code–Building Code of Australia* (**NCC-BCA**) (volume 1) (ABCB 2019) and governing Queensland laws, codes and standards that apply to the building industry.

Fire detection and first attack fire-fighting equipment in buildings will comply with requirements in the NCC–BCA (volume 1) and any Queensland specific requirements.

5 Fire ignition risks

This chapter identifies fire ignition risks within the Study area.

5.1 Land use

The Study area consists of and adjoins freehold tenures used for agricultural purposes, ie cattle grazing and dryland cropping, and adjoins numerous conservation reserves and state forests.

The operation of equipment and machinery or hot works associated with agricultural activities could result in bushfires that impact on the Project, particularly on days with an FDR of extreme or above. In addition, landowners may light fires to burn waste or for bushfire fuel hazard reduction. Therefore, land which is used for agricultural activities within and adjoining the Study area is a potential bushfire hazard to the Project.

The custodians of the conservation reserves and state forests adjoining the Study area are also likely to light fires for bushfire fuel hazard reduction or to achieve biodiversity conservation outcomes. Therefore, these areas are also a potential bushfire hazard to the Project.

5.2 Overhead transmission lines

High voltage overhead transmission lines, ie the existing Powerlink Queensland transmission line and the proposed 275 kV transmission lines which will transverse the Study area, are susceptible to 'flashover' which can cause a fire ignition in surrounding vegetation. Fires with a flame height greater than
1 m adjacent to or under transmissions lines have the potential to:

- create electrical arcs (known as flashovers) that can endanger people, animals and objects;
- damage or destroy wires, insulators and supports of the transmission line; and
- interrupt power supply to households, business and industry.

Vegetation management under high voltage transmission lines will be in accordance with Powerlink Queensland's vegetation management specifications for high voltage transmission lines (Powerlink 2018).

Wind turbines will be connected to the substation by underground and 33 kV overhead transmission lines. The risk of a fire ignition caused by these overhead transmission lines is minor when compared to the risk profile that exists for the high voltage transmission lines. Nonetheless, vegetation management under these overhead transmission lines will be in accordance with *Energy Queensland – Vegetation Management Strategy – Version 2* (EQ 2022).

5.3 Lightning strike

A lightning strike could cause a fire in grassland or bushland vegetation within the Study area, particularly during the fire danger season, ie from late winter to early summer, when dry electrical storms most commonly occur.

The Australasian Fire and Emergency Service Authorities Council Limited suggests that it is possible that WTGs may reduce the risk of bushfires caused by lightning strikes, given that WTGs can attract lightning during thunderstorms. If struck by lightning, a WTG is not expected to start a fire as it has built-in fire protection mechanisms (AFAC 2018).

5.4 Mechanical or electrical fire

There is potential for a fire of electrical or mechanical origin to develop in WTGs, transformer kiosks, substations or the switching yard and result in a fire in grassland or bushland vegetation within the Study area. However, this situation is unlikely to occur as this infrastructure has built-in fire protection mechanisms (AFAC 2018), will be located on cleared land and will be surrounded by an APZ where vegetation is managed.

5.5 Construction activities

The use of tracked earthmoving machinery on rocky ground, vehicles driving or parking in long grass, hot works and people smoking has potential to cause a bushfire during the construction phase.

5.6 Operational activities

Similar risks may exist during the operational phase of the Project that existed during the construction phase, ie vehicles driving or parking in long grass, hot works and people smoking. However, worker numbers will be significantly reduced and access throughout the Study area will be on formed access tracks, meaning vehicle and mobile plant movement off formed access tracks will rarely occur.

6 Bushfire mitigation plan

This chapter identifies bushfire mitigation measures that must be implemented during the construction and the operations and maintenance phases of the Project.

The bushfire mitigation measures will reduce the risk of bushfire hazards to a tolerable level which in this report means compliance with outcomes of the SPP bushfire prone area overlay code.

It is the total of the mitigation measures in this chapter of the report that will reduce the risk of bushfire hazards to a tolerable level. Failure to implement all of the mitigation measures in their entirety could result in an increased level of exposure to bushfire hazards.

6.1 Asset protection zones

APZs must be established and maintained around above ground infrastructure as shown in Figures 6.1-6.3.

The width of APZs around WTGs, substations and the switching yard must comply with the minimum widths determined by the radiant heat exposure assessment in Table 3.1.

APZs must be measured from electrical infrastructure within substations and the switching yard, the external walls or supporting posts or columns of buildings and WTGs, the perimeter of laydown areas, the construction compound, concrete batching plants and the guy-wires of meteorological masts (both temporary and permanent).

APZs must be cleared of vegetation and established as a gravel hardstand area or grass area. A gravel hardstand area must be maintained free of weeds and grass cover. Where establishing a gravel hardstand area is not practical, a grass area must be established. A grass area must be maintained free of woody vegetation and with grass cover which has a height of ≤ 30 cm.

6.2 Overhead transmission lines

Overhead 275 kV high voltage transmission lines must be located, where practical, within an appropriately designed vegetation management area in accordance with Powerlink Queensland's vegetation management specifications for high voltage transmission lines (Powerlink 2018) which is illustrated in Figure 6.4 and summarised as follows:

- The area within up to 30 m of the conductor's centre line (up to 60 m where practical) is to be cleared or selectively cleared of vegetation that could grow to a height > 3.5 m.
- Specimens of *Cycas megacarpa* which are < 3.5 m in height can be retained within this area unless they are located within 6 m of the conductor shadow area.
- The area within 6 m of the conductor shadow area is to be an intensive vegetation management area – one of the 6 m wide areas is to be maintained clear of vegetation and debris for vehicle access and the other is to be maintained with vegetation at a maximum height ≤ 1 m.
- Trees adjacent to the vegetation management area are to be selectively cleared based on the Powerlink Queensland hazardous tree assessment objectives referenced in Figure 6.4.

Overhead 33 kV transmission lines which connect WTGs to the Project's substations will be located within a vegetation management area in accordance with Energy Queensland's vegetation management specifications for rural area corridors (EQ 2022) which is illustrated in Figure 6.5 and summarised as follows:

- The area within 6 m of the centreline is to be selectively cleared of vegetation to form a clearance zone.

- Specimens of *Cycas megacarpa* can be retained within the clearance zone where a minimum vertical height clearance of 4 m to the conductor is achieved.
- Vegetation overhanging the conductor is to be removed.
- Trees identified with defects immediately adjacent to the clearance zone are to be removed.
- Where the transmission lines are located within a previously established enlarged clearing width this cleared width will be maintained.

Note: Full compliance with Powerlink Queensland's vegetation management specifications for high voltage transmission lines (Powerlink 2018) or Energy Queensland's vegetation management specifications for rural area corridors (EQ 2022) may not be required or practical. For example, where the conductor is suspended across a valley and it can be demonstrated that there will be an appropriate distance of separation between the conductor and the canopy of vegetation in the valley or where topography restricts the safe use of plant and equipment required to establish and maintain the vegetation management area.

6.3 Cable pits

A 1 m wide area around cable pits must be cleared of all vegetation greater than 10 cm in height.

6.4 Access and evacuation

The primary access point for the construction and the operations and maintenance phases of the Project is via the Glengowan Road on the western side of the Project and the alternate access point is via the Mount Hopeful Road on the eastern side of the Project. These access points and the access track network that will be constructed for access to the Project's infrastructure are shown in Figures 6.1-6.3.

As a minimum requirement, access tracks must meet the design specifications for category 1 fire-fighter vehicles by the New South Wales Rural Fire Service (NSW RFS 2016) which are summarised as follows:

- Width – The trafficable surface has a width of 4 m except for short constrictions to 3.5 m for no more than 30 m in length where an obstruction cannot be reasonably avoided or removed. Curves have a minimum inner radius of 6 m. The minimum distance between inner and outer curves is 6 m.
- Capacity – Trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes (**t**) and an axle load of 9 t.
- Grade and crossfall – 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 *Fire Trail Design, Construction and Maintenance Manual* (NSW DISCS 2017).
- Clearance – A minimum vertical clearance of 4 m is provided above the surface of the trafficable surface clear of obstructions.
- Passing – Capacity for passing is provided every 250 m comprising:
  - a widened trafficable surface of at least 6 m for a length of at least 20 m; or
  - a 6 m wide and 8 m long area clear of the trafficable surface with a minimum inner curve radius of 6 m and minimum outer radius of 12 m; or
  - a turnaround area is provided (as outlined below).
- Turnarounds – A turning area is provided at the termination of a trail and every 500 m and is achieved by:

  - an area clear of the trafficable surface, which is 6 m wide and 8 m deep, with a minimum inner curve radius of 6 m and minimum outer radius of 12 m; or
  - a turning circle of minimum 22 m diameter;
  - a T-junction with each terminating end of the junction being at least 10 m in length from the intersection of the roads and the inner radius of the intersection being at least 6 m; or
  - a fire trail or road intersection.
- Drainage is designed and constructed in accordance with the *Fire Trail Design, Construction and Maintenance Manual* (NSW DISCS 2017).

6.5 Fire-fighter water supply

A fire-fighter water storage tank must be installed at the operations and maintenance facility for the operations and maintenance phase of the Project. The indicative location of the fire-fighter water storage tank is shown in Figure 6.2. It must be kept full of water always and must not be used for activities other than bushfire management.

The fire-fighter water storage tank must have a minimum capacity of 20,000 litres and be made from concrete or metal and fitted with RFB fire-fighter fittings. Above ground fittings, ie valves and pipe, must be made of metal. We recommend contacting the local RFB to confirm the standard RFB fittings in use at the locality.

The fire-fighter water storage tank must have a hardstand area within 4 m of the inlet/outlet point. The hardstand area must have the load bearing capacity and dimensions suitable for a heavy rigid vehicle to park.

6.6 Wayfinding

Reflective wayfinding signage must be installed at the intersection of access tracks and identify the location of project infrastructure and the fire-fighter water storage tank.

Wayfinding signage must be based on a naming and marking convention which enhances accessibility for out of area fire-fighters. For example, marking the intersection of access tracks as A-B to indicate that it links landmark A to landmark B; landmarks used for this purpose must be identifiable on site and marked on any site mapping.

Access track marking must clearly indicate no through access tracks.

6.7 Fire danger rating sign

An FDR sign must be installed at the primary access point to the Study area, ie Glengowan Road, prior to commencing the construction phase of the Project. The FDR sign must be moved to the operations and maintenance facility prior to commencing the operations and maintenance phase of the Project. The approximate location of the FDR sign for the construction and the operations and maintenance phases of the Project are shown in Figure 6.2.

6.8 Buildings

Buildings must comply with the fire resistance and safe access and egress requirements of the NCC-BCA and governing Queensland laws, codes and standards that apply to the building industry.

Fire detection and first attack fire-fighting equipment in buildings must comply with specifications in the NCC–BCA and any Queensland specific requirements.

These matters will be dealt with in detail through the building certification and approvals process.

6.9 Meteorological masts

Meteorological masts are a potential hazard for aerial fire-fighter operations. Mitigation measures in the aviation impact assessment (if prepared) must be implemented.

Otherwise, for compliance with Wind farms and bushfire operations, the following must be undertaken:

- their location must be recorded in the tall structures database maintained by Air Services Australia/Civil Aviation Safety Authority; and
- warning lights or visible markers, ie orange balls, must be installed on meteorological masts.

6.10 Administrative controls

6.10.1 General

Hot works must be managed under a hot works permit system.

Hot works and other high fire risk activities, eg the operation of track machinery on rocky ground, must be monitored for ignitions and only performed if fire management controls are in place.

Vehicles and mobile plant and equipment must not be operated or parked in long grass, ie grass > 30 cm in height, unless fire management controls are in place.

Fire extinguishers must be made available in all work areas. Vehicles and mobile plant and equipment must be fitted with a portable fire extinguisher and ultra-high frequency (UHF) radio. Water carts/water tanks must be located adjacent to construction work areas during the fire danger season, ie from late winter until summer when significant rainfall occurs.

6.10.2 Information transfer

Prior to commencing the operations and maintenance phase of the Project, spatial data which identifies the location of access tracks and infrastructure must be provided to the QFES so that it can be uploaded into the QFES online incident management system and is readily available for bushfire emergency planning.

Neoen must consult with the QFES to determine the information and data format requirements and the specifics of the data transfer.

6.10.3 Bushfire preparedness

The construction contractor and the operations and maintenance contractor must invite the local QFES and RFBs and landowners hosting the Project to participate in an annual bushfire preparedness meeting for the Project.

The meeting will be used to familiarise QFES and RFB personnel and landowners with the Project's infrastructure, access tracks, fire-fighter water storage tank and fittings, communication procedures and safety requirements for operating within the Study area. It will also provide an opportunity to review any bushfire incidents within or adjacent to the Study area and any plans for hazard reduction burns by the landowners.

Opportunities to upgrade dams and access tracks located within the Study area must also be discussed at the preparedness meeting as these upgrades could have benefits for the Project.

The bushfire preparedness meeting also provides an opportunity to run a bushfire response training drill with the local QFES and RFBs.

6.10.4 Project rules and inductions

Access to the Study area during the construction and the operations and maintenance phases of the Project will be conditional on compliance with workers completing an induction and complying with entry rules, including rules regarding smoking.

Smoking must only be permitted in cleared areas, ie the construction compound, laydown areas, the operations and maintenance facility and WTG hardstands.

6.10.5 Safety documentation

Activities associated with the construction and the operations and maintenance phases of the Project must be governed by safety documentation, including safe work method statements. Activity specific bushfire risk management controls must be identified through the safety documentation. Where required, the safety documentation must be managed through a permit to work system which must provide an additional layer of control around bushfire risk management.

6.10.6 Monitor fire weather conditions

FDRs and fire weather warnings must be monitored daily for the construction and the operations and maintenance phases of the Project. The FDR sign must be updated daily and activities during the construction and the operations and maintenance phases of the Project managed accordingly.

FDRs for the Study area are updated daily by the QFES and can be accessed online at https://www.qfes.qld.gov.au/prepare/bushfire/fire-danger-rating - search for Capricornia district. Fire weather warnings are published online by the Bureau of Meteorology at http://www.bom.gov.au/qld/index.shtml.

Table 6.1 provides guidance on precautions for activities during the construction and the operations and maintenance phases of the project in relation to FDRs.

Table 6.1 FDR activity guidelines

FDR	Fire danger guidance	Operational guidance
Moderate	Plan and prepare. Most fires can be controlled. Stay up to date and be ready to act if there is a fire.	Maintain APZs. Access tracks are checked and maintained clear of obstacles. Fire extinguishers are checked and are operational. Fire-fighter water storage tanks are full and plumbing is checked and is operational. During construction - inspect any mulched piles of cleared vegetation for signs of combustion. Hot works are performed in accordance with a hot works permit. Continue to monitor FDR conditions and update the FDR notice boards to indicate the FDR.
High	Be ready to act. Fires can be dangerous. Decide what you will do if a fire starts.	As for moderate FDR. Construction and operational activities that may cause accidental ignitions, eg slashing and machine/vehicle operation in long grass,

FDR	Fire danger guidance	Operational guidance
	There is a heightened risk. Be alert for fires in your area. If a fire starts, avoid bushfire prone areas.	require a spotter and water cart to be present onsite. Hot works require additional approval from the construction contractor and the operations and maintenance contractor or delegate and will occur under a permit to work system.
Extreme	Fires will spread quickly and will be extremely dangerous. Make sure the Project is fire ready. If a fire starts, take immediate action.	As for high FDR. Fire weather warnings and restrictions imposed by the QFES must be observed. Construction and operational activities that may cause accidental ignitions, eg slashing and machine operation in long grass, are not permitted. Hot works must not occur in outdoor areas. Surveillance for fire ignitions and smoke plumes within and adjoining the site. Pre-start briefing to include a reminder of bushfire controls above.
Catastrophic	Do not enter bushfire prone areas. If a fire starts, it will potentially be life threatening. These are the most dangerous conditions for a fire. Stay safe by going to a safer location early. Buildings may not withstand fires in these conditions.	As for extreme FDR. Fire weather warnings and restrictions imposed by the QFES must be observed. No construction activities are permitted (other than administrative activities which occur indoors). No operational or maintenance activities are permitted (other than administrative activities which occur indoors).

6.10.7 Powerlink Queensland transmission lines

Fire-fighting operations near the high voltage overhead transmission lines must be planned and implemented in accordance with the *National Guidelines on Electrical Safety for Emergency Service Personnel* (ENA DOC 008-2006) and the carrier's instructions.

6.10.8 Communications planning

Neoen must ensure the following is in place by the time construction commences:

- all relevant staff are aware of the mitigation measures in this BMP;
- an emergency contact number is available online and is attended to at all times by trained staff;
- contingency communication systems are in place for the onsite representative of the construction contractor and the operations and maintenance contractor in case of failed telephone communication attempts;
- communication with the landowners hosting the Project to ensure that access to the Study area is not constrained for the local QFES and RFBs; and
- a mechanism to provide periodical updates to the landowners hosting the Project and the local QFES and RFBs as the Project is progressively built.

6.10.9 Emergency response planning

A separate emergency response plan must be prepared by the construction contractor for the construction phase of the Project and by the operations contractor for the operational phase of the Project.

The emergency response plan must include procedures to be followed in the event of a bushfire warning by the QFES and a bushfire within properties hosting the Project. It must also identify the location of safe assembly/evacuation areas and the access routes to these areas.

With regards to bushfire, a safe assembly or evacuation area must have a gravel or similar hardstand surface and must not be located in areas identified as medium, high and very high potential bushfire intensity or potential impact buffer in Figures 2.2-2.4.

In the event of a fire ignition that cannot be safely extinguished with available resources, ie a bushfire, the following procedure must be followed:

1. Contact the QFES via a 000 call.
2. Notify property owners hosting the Project of the fire ignition.
3. Evacuate personnel and contractors to a safe assembly/evacuation area and account for all personnel and contractors.
4. Meet the QFES and provide information relevant to the bushfire emergency.
5. Resume construction or operations and maintenance works when advised by the QFES that it is safe to do so.

6.10.10 Fire-fighter operations plan

Prior to the operations and maintenance phase of the Project, a fire-fighter operations plan must be prepared for the site and provided to the local RFBs. It must be in the format of a poster plan that can be rolled out and used in the field.

The fire-fighter operations plan must identify (as a minimum) the location of infrastructure, access tracks, water points and reference wayfinding signage. It must also include contact and communications information, instructions for operating around electrical infrastructure and operational guidelines for fire control.

6.10.11 Electrical safety

The Project must be operated in compliance with the Queensland *Electrical Safety Act 2002* and its regulations and the electrical safety codes of practice by the Electrical Safety Office of Queensland (ESO 2020a, ESO 2020b and ESO 2021).

Electrical equipment installed to support the operation and maintenance phase of the Project must be regularly inspected in accordance with the manufacturer's guidance (where this applies) or in accordance with industry best practice.

6.10.12 Hazardous chemicals

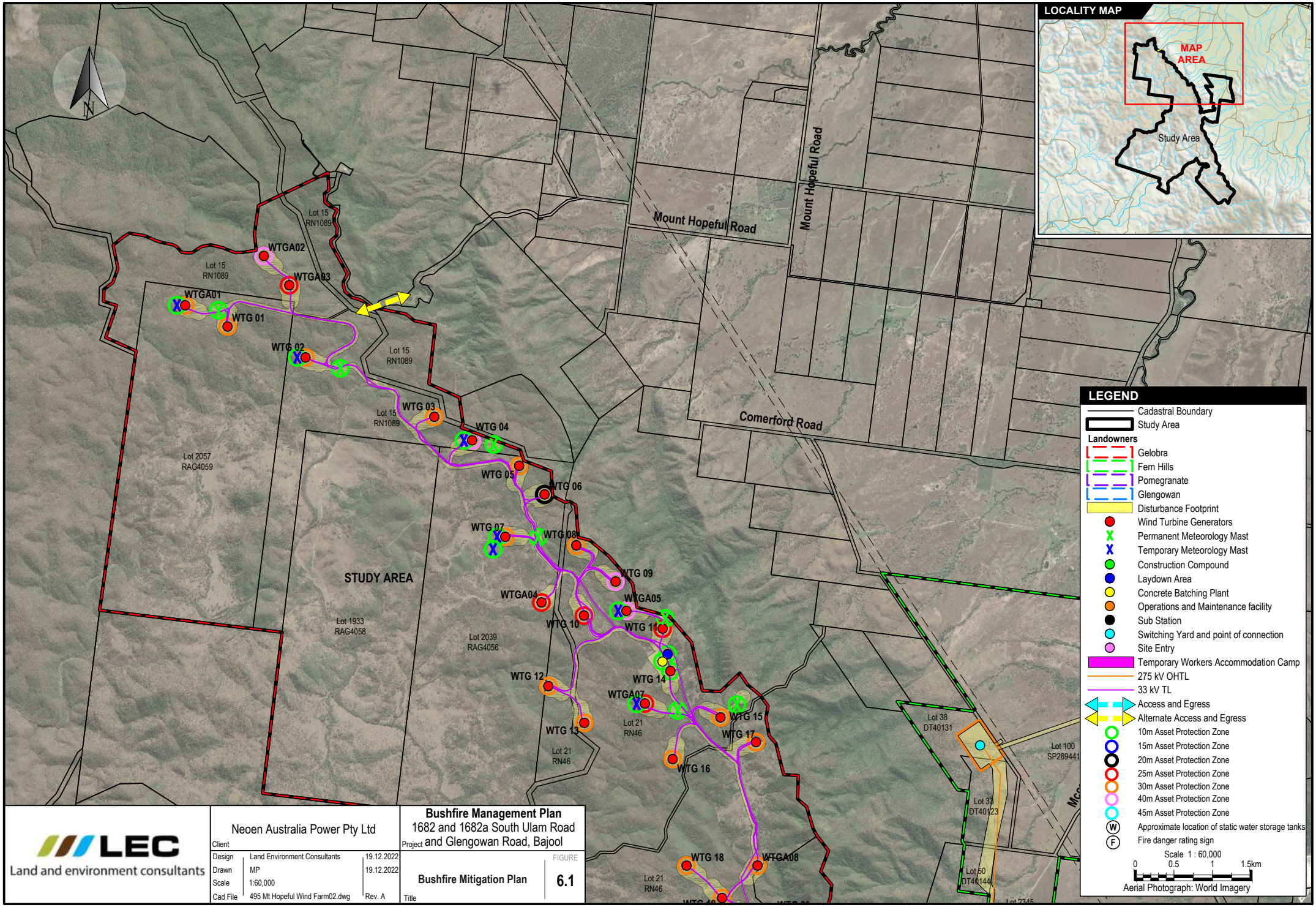
Storage or handling of hazardous chemicals during the construction and the operations and maintenance phases of the Project must not occur in vegetated areas and must be in accordance with *Managing risks of hazardous chemicals in the workplace – Code of Practice* (SWA 2020), applicable safety data sheets, and otherwise in accordance with Queensland *Work Health and Safety Act 2011* and its regulations.

6.10.13 Shut down

The WTGs must be locked in a static position if advised by the QFES that aerial fire-fighting operations are to be undertaken within the properties hosting the Project. Protocols for the operations and maintenance phase of the Project must be explicit about what party has the authority to lock WTGs in a static position.

6.10.14 Lighting fires

Lighting fires is prohibited within the Study area (unless requested by the QFES or RFB in response to a bushfire emergency, eg backburning containment lines to protect infrastructure).



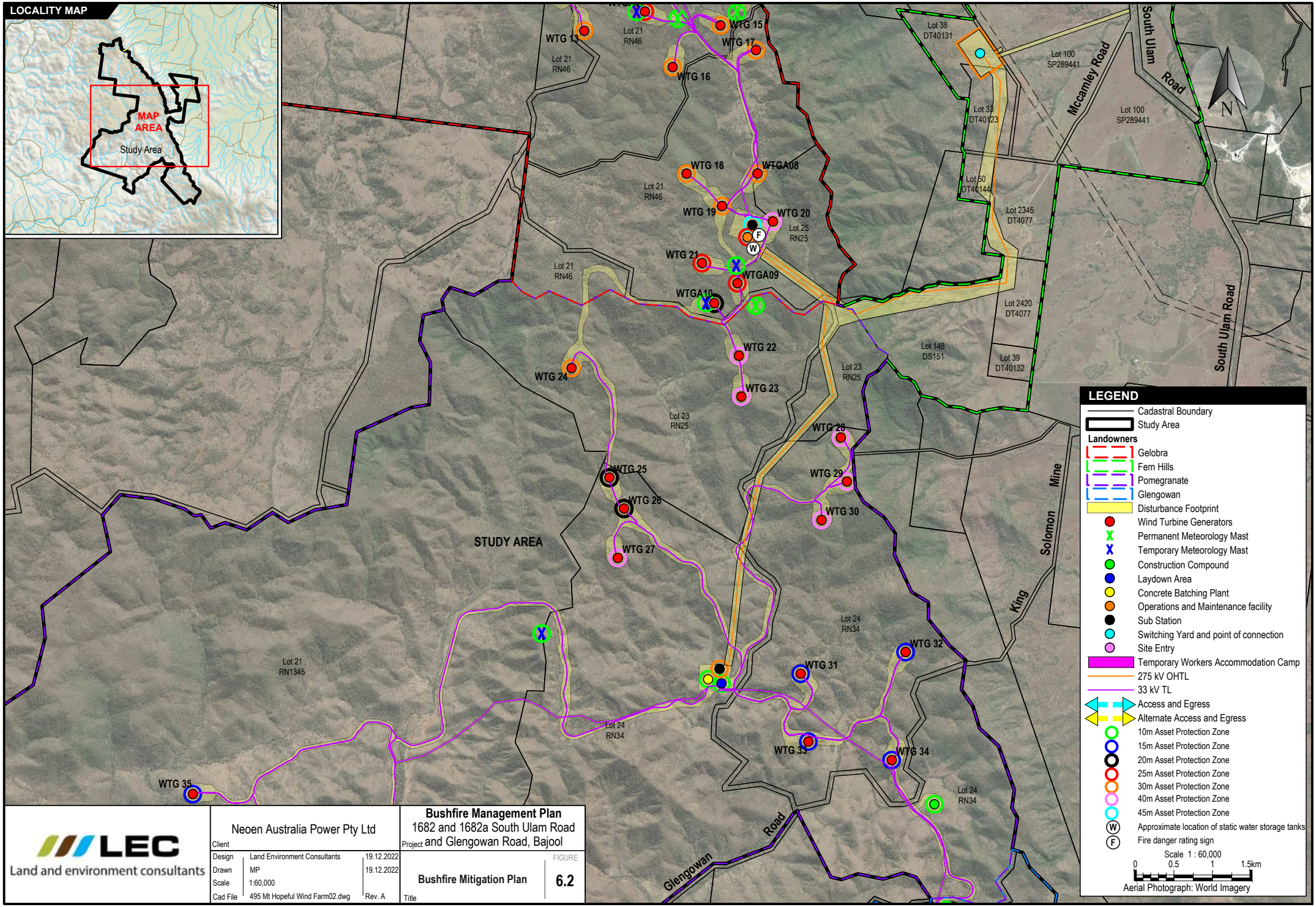
LEC
Land and environment consultants

Client	Neoen Australia Power Pty Ltd	
Design	Land Environment Consultants	19.12.2022
Drawn	MP	19.12.2022
Scale	1:60,000	
Cad File	495 Mt Hopeful Wind Farm02.dwg	Rev. A

Bushfire Management Plan
1682 and 1682a South Ulam Road and Glengowan Road, Bajool
Project

Bushfire Mitigation Plan
Title

FIGURE 6.1



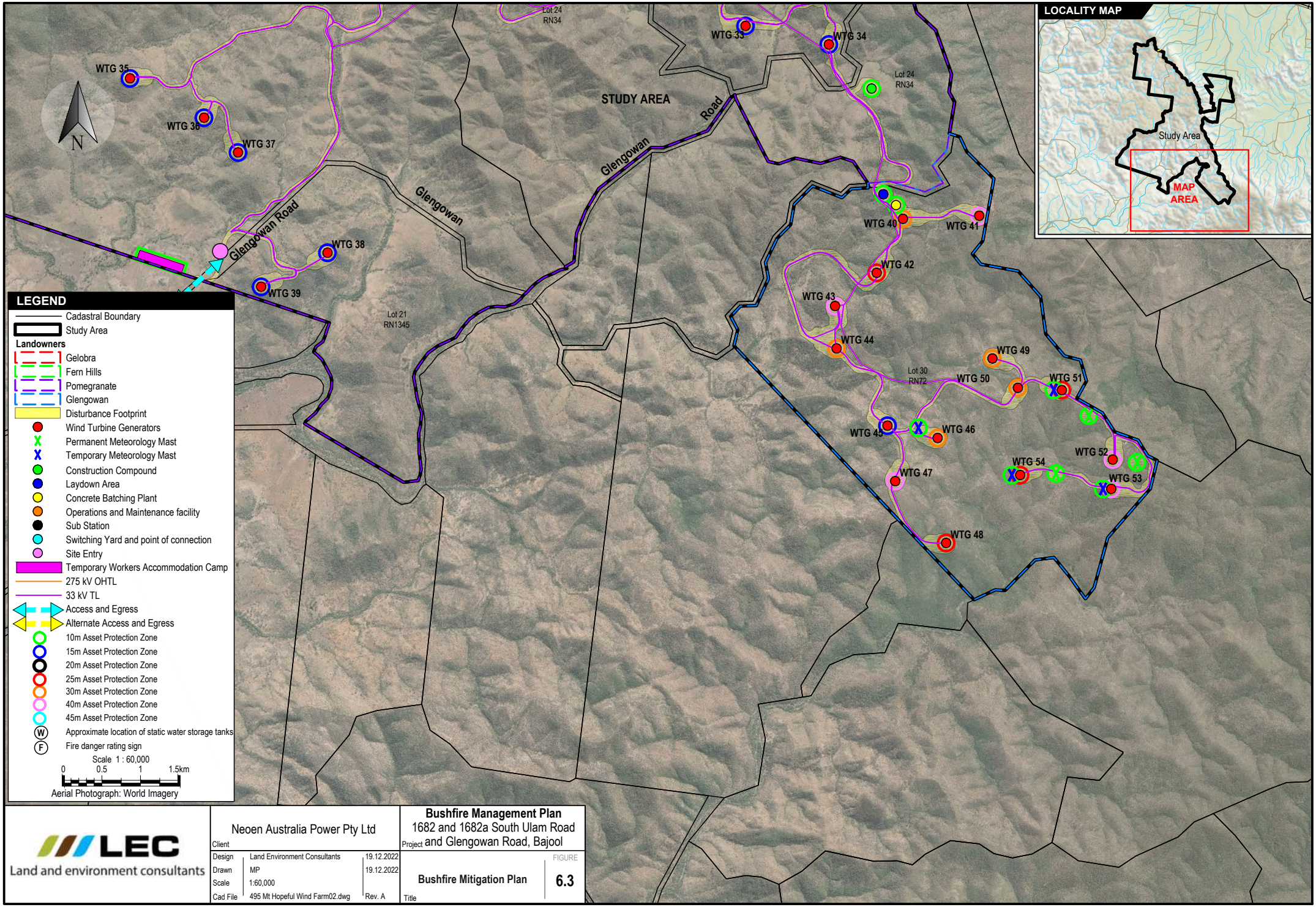
LEC Land and environment consultants

Client	Neoen Australia Power Pty Ltd	
Design	Land Environment Consultants	19.12.2022
Drawn	MP	19.12.2022
Scale	1:60,000	
Cad File	495 Mt Hopeful Wind Farm02.dwg	Rev. A

Bushfire Management Plan
1682 and 1682a South Ulam Road and Glengowan Road, Bajool
Project

Bushfire Mitigation Plan
Title

FIGURE **6.2**



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Client	Neoen Australia Power Pty Ltd	
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Scale	1:60,000	
Cad File	495 Mt Hopeful Wind Farm02.dwg	Rev. A

Bushfire Management Plan
Project 1682 and 1682a South Ulam Road and Glengowan Road, Bajool

Title **Bushfire Mitigation Plan**

FIGURE **6.3**

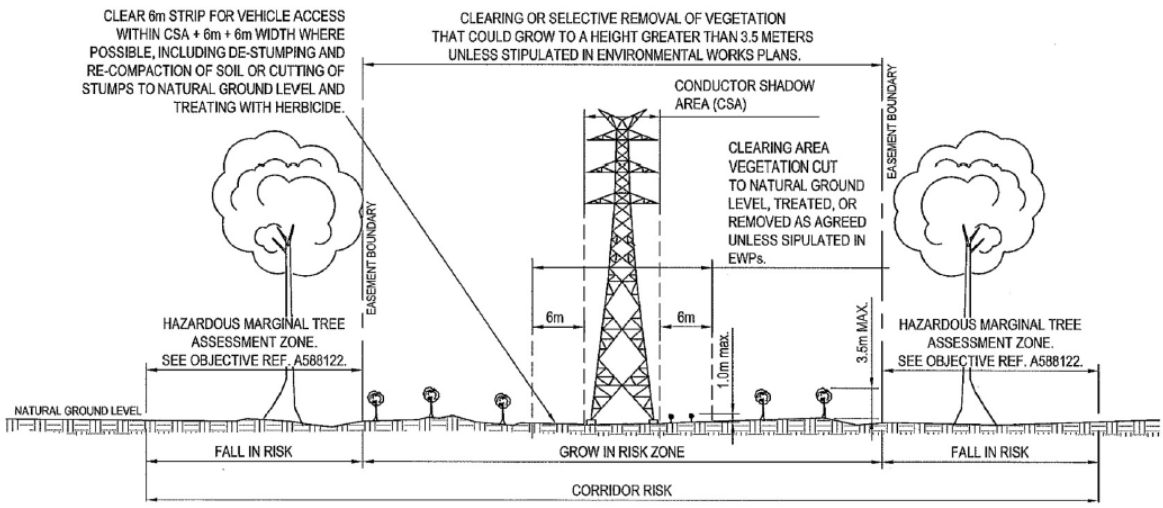

Figure 6.4 Powerlink Queensland vegetation management specifications for high voltage transmission lines

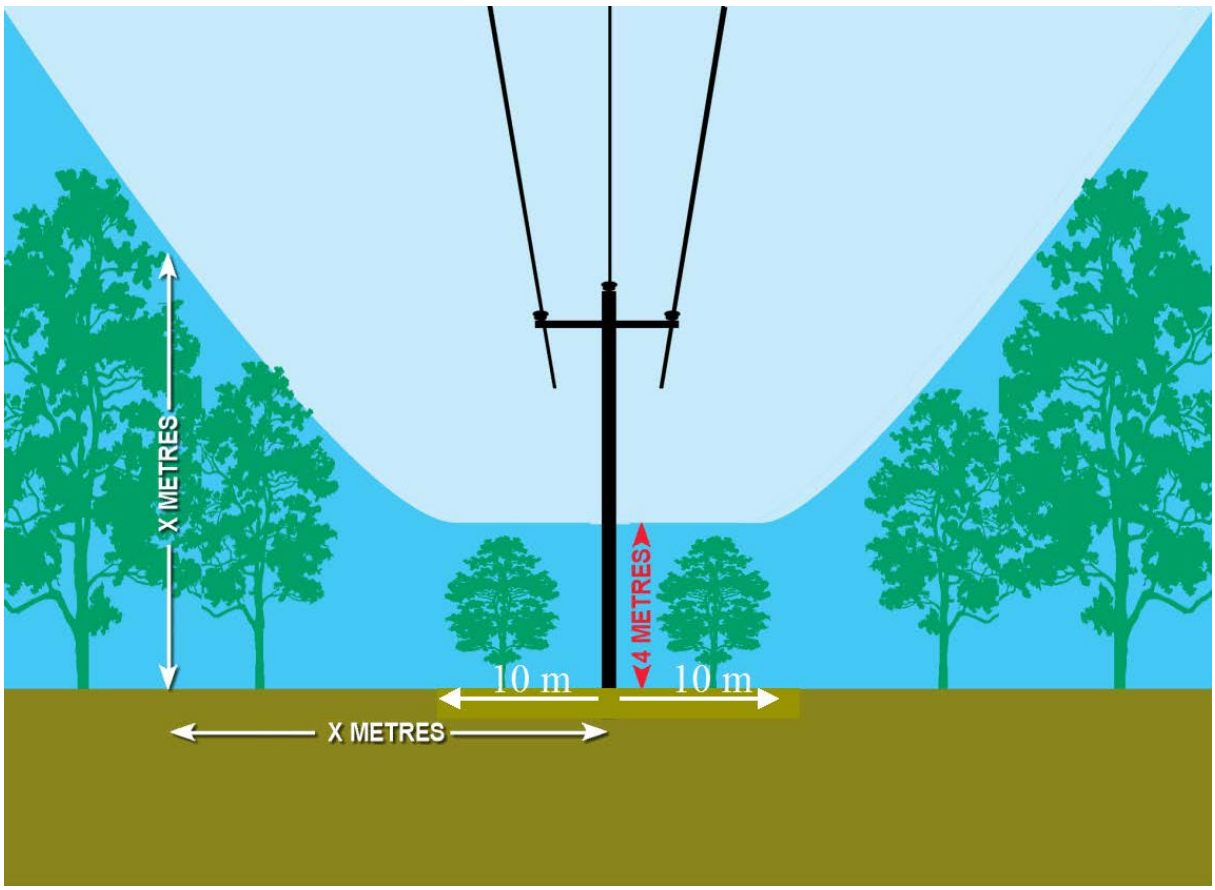

Figure 6.5 Energy Queensland vegetation management specification for overhead transmission lines

7 Closing

This BMP has been prepared for compliance with condition 18a) and b) of the development permit for the Project. It has been technically reviewed and approved by a suitably qualified person, is in general accordance with the requirements of the SPP bushfire prone area overlay code and Bushfire resilient communities. Its preparation involved an in-field inspection of the Study area and consultation with some of the landowners hosting the Project.

The site-specific bushfire hazard assessment in this BMP confirmed that the disturbance footprint of the Project is affected by bushfire hazard and that the construction and the operations and maintenance phases of the Project are subject to compliance with the SPP bushfire prone area overlay code. An assessment of compliance with the SPP bushfire prone area overlay code is provided in Appendix 5.

Mitigation measures that must be implemented during the construction and the operations and maintenance phases of the Project are specified in Chapter 6. Upon appointment, the construction contractor and the operations and maintenance contractor may wish to prepare their own version of this BMP to distil the matters which are specific to their contract or to include corporate documentation or procedures. Notwithstanding, this does not permit the construction contractor or operations and maintenance contractor to change or deviate from the mitigation measures specified in Chapter 6.

There is an opportunity for refining the APZs specified in Chapter 6 through detailed design and micro-siting of the Project's infrastructure.

Compliance with condition 18b)ii of the development permit for the Project requires the draft version of this BMP to be submitted to the QFES for their review and comment. Consideration of QFES comments will be undertaken during the finalisation of this BMP. Compliance with condition 18c) requires details and confirmation that consultation with the QFES has been undertaken to be provided to the Office of The Assistant Commissioner, Central Region QFES at sdu@qfes.qld.gov.au. Compliance with condition 18d) requires the final version of the BMP to be submitted to:

- Department of State Development, Infrastructure, Local Government and Planning at windfarms@dsdilgp.qld.gov.au;
- Banana Shire Council at enquiries@banana.qld.gov.au;
- Rockhampton Regional Council at enquiries@rrc.qld.gov.au; and
- QFES at sdu@qfes.qld.gov.au.

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Appendix 1 Summary of site observations

Summary of site observations at infrastructure areas

Infrastructure	Catalyst VHC	Ground truthed VHC	Notes
Wind turbine generators (WTGs)			
WTG 1	VHC 10.1 *Spotted gum dominated open forests* (**VHC 10.1**)	VHC 10.1	Continuous forest vegetation on 15° slope
WTG 2	VHC 10.1	VHC 10.1	Continuous forest vegetation on 14° slope
WTG 3	VHC 10.1	VHC 10.1	Continuous forest vegetation on 12° slope
WTG 4	VHC 10.1	VHC 10.1	Continuous forest vegetation on 18° slope
WTG 5	VHC 10.1	VHC 10.1	Continuous forest vegetation on 11° slope
WTG 6	VHC 10.1	VHC 10.1	Continuous forest vegetation on 5° slope
WTG 7	VHC 10.1 and VHC 40.4 *Low grass or tree over in rural areas* (**VHC 40.4**)	VHC 10.1	Continuous forest vegetation on 15° slope
WTG 8	VHC 10.1	VHC 10.1	Continuous forest vegetation on 13° slope
WTG 9	VHC 10.1	VHC 10.1	Continuous forest vegetation on 16° slope
WTG 10	VHC 10.1	VHC 10.1	Continuous forest vegetation on 10° slope
WTG 11	VHC 40.4	VHC 10.1	Continuous forest vegetation on 6° slope
WTG 12	VHC 10.1	-	Not ground-truthed
WTG 13	VHC 10.1	-	Not ground-truthed
WTG 14	VHC 10.1	VHC 40.4	Grassland with low tree cover on 7° slope
WTG 15	VHC 10.1 and VHC 40.4	VHC 10.1	Continuous forest vegetation on 13° slope
WTG 16	VHC 10.1	-	Not ground-truthed
WTG 17	VHC 40.4	-	Not ground-truthed
WTG 18	VHC 10.1	-	Not ground-truthed
WTG 19	VHC 10.1	VHC 10.1	Continuous forest vegetation on 11° slope
WTG 20	VHC 10.1 and VHC 40.4	VHC 10.1	Continuous forest vegetation on 20° slope
WTG 21	VHC 10.1	VHC 10.1	Continuous forest vegetation on 8° slope
WTG 22	VHC 10.1	VHC 10.1	Continuous forest vegetation on 18° slope
WTG 23	VHC 10.1	VHC 10.1	Continuous forest vegetation on 18° slope
WTG 24	VHC 10.1	VHC 10.1	Continuous forest vegetation on 13° slope
WTG 25	VHC 10.1	VHC 10.1	Continuous forest vegetation on 5° slope
WTG 26	VHC 10.1	-	Not ground-truthed
WTG 27	VHC 10.1	-	Not ground-truthed
WTG 28	VHC 10.1	-	Not ground-truthed
WTG 29	VHC 10.1	-	Not ground-truthed
WTG 30	VHC 10.1	-	Not ground-truthed

Summary of site observations at infrastructure areas

Infrastructure	Catalyst VHC	Ground truthed VHC	Notes
WTG 31	VHC 10.1	VHC 40.4	Grassland with low tree cover on 20° slope
WTG 32	VHC 10.1	VHC 40.4	Grassland with low tree cover on 21° slope
WTG 33	VHC 10.1	VHC 40.4	Grassland with low tree cover on 16° slope
WTG 34	VHC 10.1 and VHC 40.4	VHC 40.4	Grassland with low tree cover on 23° slope
WTG 35	VHC 13.2 *Dry to moist eucalypt woodlands on undulating metamorphics and granite* (**VHC 13.2**) and VHC 40.4	VHC 40.4	Grassland with low tree cover on 14° slope
WTG 36	VHC 40.4	-	Not ground-truthed
WTG 37	VHC 13.2	-	Not ground-truthed
WTG 38	VHC 13.2	VHC 40.4	Grassland with low tree cover on 21° slope
WTG 39	VHC 13.2	VHC 40.4	Grassland with low tree cover on 17° slope
WTG 40	VHC 10.1	VHC 10.1	Continuous forest vegetation on 13° slope
WTG 41	VHC 10.1	VHC 10.1	Continuous forest vegetation on 16° slope
WTG 42	VHC 10.1	VHC 10.1	Continuous forest vegetation on 6° slope
WTG 43	VHC 40.4	VHC 10.1	Continuous forest vegetation on 19° slope
WTG 44	VHC 10.1	VHC 10.1	Continuous forest vegetation on 14° slope
WTG 45	VHC 10.1 and VHC 40.4	VHC 40.4	Grassland with low tree cover on 17° slope
WTG 46	VHC 40.4	VHC 10.1	Continuous forest vegetation on 12° slope
WTG 47	VHC 10.1	VHC 10.1	Continuous forest vegetation on 16° slope
WTG 48	VHC 7.1 *Semi-evergreen to deciduous microphyll vine forest* (**VHC 7.1**)	-	Not ground-truthed
WTG 49	VHC 10.1	-	Not ground-truthed
WTG 50	VHC 10.1	VHC 10.1	Continuous forest vegetation on 12° slope
WTG 51	VHC 13.2	VHC 13.2	Continuous forest vegetation on 10° slope
WTG 52	VHC 10.1	VHC 10.1	Continuous forest vegetation on 20° slope
WTG 53	VHC 10.1	VHC 10.1	Continuous forest vegetation on 20° slope
WTG 54	VHC 10.1	VHC 10.1	Continuous forest vegetation on 9° slope
WTG A01	VHC 10.1	VHC 10.1	Continuous forest vegetation on 15° slope
WTG A02	VHC 10.1	VHC 10.1	Continuous forest vegetation on 17° slope
WTG A03	VHC 10.1	VHC 10.1	Continuous forest vegetation on 9° slope
WTG A04	VHC 10.1	VHC 10.1	Continuous forest vegetation on 10° slope
WTG A05	VHC 10.1	VHC 10.1	Continuous forest vegetation on 17° slope

Summary of site observations at infrastructure areas

Infrastructure	Catalyst VHC	Ground truthed VHC	Notes
WTG A07	VHC 10.1	VHC 10.1	Continuous forest vegetation on 8° slope
WTG A08	VHC 10.1	VHC 10.1	Continuous forest vegetation on 12° slope
WTG A09	VHC 10.1	VHC 10.1	Continuous forest vegetation on 9° slope
WTG A10	VHC 10.1	VHC 10.1	Continuous forest vegetation on 0° slope
Permanent meteorology masts			
1	VHC 10.1	-	Not ground-truthed
2	VHC 10.1	-	Not ground-truthed
3	VHC 10.1	VHC 10.1	Continuous forest vegetation on 14° slope
4	VHC 10.1	VHC 10.1	Continuous forest vegetation on 15° slope
5	VHC 10.1	-	Not ground-truthed
6	VHC 10.1 and VHC 40.4	-	Not ground-truthed
7	VHC 10.1	-	Not ground-truthed
8	VHC 10.1	-	Not ground-truthed
9	VHC 10.1	-	Not ground-truthed
10	VHC 10.1	-	Not ground-truthed
Infrastructure			
Laydown area and concrete batching plant near WTG 14	VHC 40.4	VHC 40.4	Grassland with low tree cover on 3° slope
Switching yard and point of connection	VHC 16.2 *Eucalyptus dominated woodland on drainage lines and alluvial plains* (**VHC 16.2**) and VHC 40.4	VHC 40.4	Grassland with low tree cover on 2° slope
Substation near WTG 20	VHC 10.1	VHC 10.1	Continuous forest vegetation on 5° slope
Operations and Maintenance facility near WTG 20	VHC 10.1	VHC 10.1	Continuous forest vegetation on 8° slope
Substation near WTG 31	VHC 10.1	VHC 40.4	Grassland with low tree cover on 5° slope
Laydown area and concrete batching plant near WTG 31	VHC 10.1 and VHC 40.4	VHC 40.4	Grassland with low tree cover on 6° slope
Construction compound near WTG 34	VHC 10.1 and VHC 40.4	-	Not ground-truthed
Laydown area and concrete	VHC 10.1 and VHC 40.4	VHC 10.1	Continuous forest vegetation on 17° slope

Summary of site observations at infrastructure areas

Infrastructure	Catalyst VHC	Ground truthed VHC	Notes
batching plant near WTG 40			
Temporary worker's accommodation camp	VHC 16.2 and VHC 40.4	-	Not ground-truthed
275 kilovolt (kV) overhead transmission line (OHTL)			
275 kV OHTL in Fern Hills	VHC 7.1, VHC 16.2, VHC 10.1, VHC 13.2 and VHC 40.4	VHC 40.4	Grassland with low tree cover on 2° slope
275 kV OHTL in Gelobra	VHC 10.1	VHC 10.1	Continuous forest vegetation on 8° slope
275 kV OHTL in Pomegranate	VHC 7.1, VHC 10.1 and VHC 40.4	VHC 40.4	Grassland with low tree cover on 5° slope.

Appendix 2 Photographs of infrastructure areas

Photograph 1 VHC 10.1 at WTG 1

Photograph 2 VHC 10.1 at WTG 2

Photograph 3 VHC 10.1 at WTG 3

Photograph 4 VHC 10.1 at WTG 4

Photograph 5 VHC 10.1 at WTG 5

Photograph 6 VHC 10.1 at WTG 6

Photograph 7 VHC 10.1 at WTG 7

Photograph 8 VHC 10.1 at WTG 8

Photograph 9 VHC 10.1 at WTG 9

Photograph 10 VHC 10.1 at WTG 10

Photograph 11 VHC 10.1 at WTG 11

Photograph 12 VHC 40.4 at WTG 14

Photograph 13 VHC 10.1 at WTG 15

Photograph 14 VHC 10.1 at WTG 19

Photograph 15 VHC 10.1 at WTG 20

Photograph 16 VHC 10.1 at WTG 21

Photograph 17 VHC 10.1 at WTG 22

Photograph 18 VHC 10.1 at WTG 23

Photograph 19 VHC 10.1 at WTG 24

Photograph 20 VHC 10.1 at WTG 25

Photograph 21 VHC 40.4 at WTG 31

Photograph 22 VHC 40.4 at WTG 32

Photograph 23 VHC 40.4 at WTG 33

Photograph 24 VHC 40.4 at WTG 34

Photograph 25 VHC 40.4 at WTG 35

Photograph 26 VHC 40.4 at WTG 38

Photograph 27 VHC 40.4 at WTG 39

Photograph 28 VHC 10.1 at WTG 40

Photograph 29 VHC 10.1 at WTG 41

Photograph 30 VHC 10.1 at WTG 42

Photograph 31 VHC 10.1 at WTG 43

Photograph 32 VHC 10.1 at WTG 44

Photograph 33 VHC 40.4 at WTG 45

Photograph 34 VHC 10.1 at WTG 46

Photograph 35 VHC 10.1 at WTG 47

Photograph 36 VHC 10.1 at WTG 50

Photograph 37 VHC 13.2 at WTG 51

Photograph 38 VHC 10.1 at WTG 52

Photograph 39 VHC 10.1 at WTG 53

Photograph 40 VHC 10.1 at WTG 54

Photograph 41 VHC 10.1 at WTG A01

Photograph 42 VHC 10.1 at WTG A02

Photograph 43 VHC 10.1 at WTG A03

Photograph 44 VHC 10.1 at WTG A04

Photograph 45 VHC 10.1 at WTG A05

Photograph 46 VHC 10.1 at WTG A07

Photograph 47 VHC 10.1 at WTG A08

Photograph 48 VHC 10.1 at WTG A09

Photograph 49 VHC 10.1 at WTG A10

Photograph 50 VHC 10.1 at permanent meteorology mast 3

Photograph 51 VHC 10.1 at permanent meteorology mast 4

Photograph 52 VHC 40.4 at laydown and concrete batching plant near WTG 14

Photograph 53 VHC 10.1 at substation near WTG 20

Photograph 54 VHC 10.1 at operations and maintenance facility near WTG 20

Photograph 55 VHC 40.4 at substation WTG 31

Photograph 56 VHC 40.4 at laydown and concrete batching plant near WTG 31

Photograph 57 VHC 10.1 at laydown area and concrete batching plant near WTG 40

Photograph 58 VHC 40.4 at 275 kV OHTL in Fern Hills

Photograph 59 VHC 10.1 at 275 kV OHTL in Gelobra

Photograph 60 VHC 40.4 at 275 kV OHTL in Pomegranate

Photograph 61 VHC 40.4 at switching yard and point of connection

Appendix 3 Potential bushfire intensity calculations

Potential bushfire intensity calculations

Infrastructure	VHC	Potential fuel load (t/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
Wind turbine generators (WTGs)					
WTG 1	VHC 10.1 *Spotted gum dominated open forests* (**VHC 10.1**)	20.8	15	52,103	Very high
WTG 2	VHC 10.1	20.8	14	48,629	Very high
WTG 3	VHC 10.1	20.8	12	42,361	Very high
WTG 4	VHC 10.1	20.8	18	64,086	Very high
WTG 5	VHC 10.1	20.8	11	39,536	High
WTG 6	VHC 10.1	20.8	5	26,134	High
WTG 7	VHC 10.1	20.8	15	52,103	Very high
WTG 8	VHC 10.1	20.8	13	45,387	Very high
WTG 9	VHC 10.1	20.8	16	55,825	Very high
WTG 10	VHC 10.1	20.8	10	36,900	High
WTG 11	VHC 10.1	20.8	6	28,000	High
WTG 12[3]	VHC 10.1	20.8	15	52,103	Very high
WTG 13[3]	VHC 10.1	20.8	15	52,103	Very high
WTG 14	VHC 40.4 *Low grass or tree over in rural areas* (**VHC 40.4**)	5	7	1,734	Non-bushfire hazard class[2]
WTG 15	VHC 10.1	20.8	13	45,387	Very high
WTG 16[3]	VHC 10.1	20.8	15	52,103	Very high
WTG 17[3]	VHC 10.1	20.8	13	45,387	Very high
WTG 18[3]	VHC 10.1	20.8	11	39,536	High
WTG 19	VHC 10.1	20.8	11	39,536	High
WTG 20	VHC 10.1	20.8	20	73,569	Very high
WTG 21	VHC 10.1	20.8	8	32,144	High
WTG 22	VHC 10.1	20.8	18	64,086	Very high
WTG 23	VHC 10.1	20.8	18	64,086	Very high
WTG 24	VHC 10.1	20.8	13	45,387	Very high
WTG 25	VHC 10.1	20.8	5	26,134	High
WTG 26[3]	VHC 10.1	20.8	5	26,134	High
WTG 27[3]	VHC 10.1	20.8	18	64,086	Very high
WTG 28[3]	VHC 10.1	20.8	18	64,086	Very high
WTG 29[3]	VHC 10.1	20.8	18	64,086	Very high
WTG 30[3]	VHC 10.1	20.8	18	64,086	Very high

Potential bushfire intensity calculations

Infrastructure	VHC	Potential fuel load (t/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
WTG 31	VHC 40.4	5	20	4,251	Medium[2]
WTG 32	VHC 40.4	5	20[4]	4,251	Medium[2]
WTG 33	VHC 40.4	5	16	3,226	Non-bushfire hazard class[2]
WTG 34	VHC 40.4	5	20[4]	4,251	Medium[2]
WTG 35	VHC 40.4	5	14	2,810	Non-bushfire hazard class[2]
WTG 36[3]	VHC 40.4	5	14	2,810	Non-bushfire hazard class[2]
WTG 37[3]	VHC 40.4	5	14	2,810	Non-bushfire hazard class[2]
WTG 38	VHC 40.4	5	20[4]	4,251	Medium[2]
WTG 39	VHC 40.4	5	17	3,456	Non-bushfire hazard class[2]
WTG 40	VHC 10.1	20.8	13	45,387	Very high
WTG 41	VHC 10.1	20.8	16	55,825	Very high
WTG 42	VHC 10.1	20.8	6	28,000	High
WTG 43	VHC 10.1	20.8	19	68,664	Very high
WTG 44	VHC 10.1	20.8	14	48,629	Very high
WTG 45	VHC 40.4	5	17	3,456	Non-bushfire hazard class[2]
WTG 46	VHC 10.1	20.8	12	42,361	Very high
WTG 47	VHC 10.1	20.8	16	55,825	Very high
WTG 48[3]	Non-remnant VHC 7.1 *Semi-evergreen to deciduous microphyll vine forest* (**VHC 7.1**)	12	16	20,485	High
WTG 49[3]	VHC 10.1	20.8	12	42,361	Very high
WTG 50	VHC 10.1	20.8	12	42,361	Very high
WTG 51	VHC 13.2 *Dry to moist eucalypt woodlands on undulating metamorphics and granite* (**VHC 13.2**)	14.4	10	17,686	Medium
WTG 52	VHC 10.1	20.8	20	73,569	Very high
WTG 53	VHC 10.1	20.8	20	73,569	Very high
WTG 54	VHC 10.1	20.8	9	34,440	High
WTG A01	VHC 10.1	20.8	15	52,103	Very high

Potential bushfire intensity calculations

Infrastructure	VHC	Potential fuel load (t/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
WTG A02	VHC 10.1	20.8	17	59,813	Very high
WTG A03	VHC 10.1	20.8	9	34,440	High
WTG A04	VHC 10.1	20.8	10	36,900	High
WTG A05	VHC 10.1	20.8	17	59,813	Very high
WTG A07	VHC 10.1	20.8	8	32,144	High
WTG A08	VHC 10.1	20.8	12	42,361	High
WTG A09	VHC 10.1	20.8	9	34,440	High
WTG A10	VHC 10.1	20.8	0	18,508	Medium
Permanent meteorology masts					
1[3]	VHC 10.1	20.8	15	52,103	Very high
2[3]	VHC 10.1	20.8	14	48,629	Very high
3	VHC 10.1	20.8	14	48,629	Very high
4	VHC 10.1	20.8	15	52,103	Very high
5[3]	VHC 10.1	20.8	9	34,440	High
6[3]	VHC 10.1	20.8	8	32,144	High
7[3]	VHC 10.1	20.8	9	34,440	High
8[3]	VHC 10.1	20.8	20	73,569	Very high
9[3]	VHC 10.1	20.8	20	73,569	Very high
10[3]	VHC 10.1	20.8	9	34,440	High
Infrastructure					
Laydown area and concrete batching plant near WTG 14	VHC 40.4	5	3	1,315	Non-bushfire hazard class[2]
Switching yard and point of connection	VHC 40.4	5	2	1,228	Non-bushfire hazard class[2]
Substation near WTG 20	VHC 10.1	20.8	5	26,134	High
Operations and Maintenance facility near WTG 20	VHC 10.1	20.8	8	32,144	High
Substation near WTG 31	VHC 40.4	5	5	1,510	Non-bushfire hazard class[2]
Laydown area and concrete batching plant near WTG 31	VHC 40.4	5	6	1,618	Non-bushfire hazard class[2]
Construction compound near WTG 34[3]	VHC 40.4	5	4	1,409	Non-bushfire hazard class[2]

Potential bushfire intensity calculations

Infrastructure	VHC	Potential fuel load (t/ha)[1]	Slope (°)	Potential bushfire intensity (kW/m)	Bushfire hazard class
Laydown area and concrete batching plant near WTG 40	VHC 10.1	20.8	17	59,813	Very high
Temporary worker's accommodation camp[3]	VHC 40.4	5	1	1,146	Non-bushfire hazard class[2]
275 kilovolt (kV) overhead transmission line (OHTL)					
275 kV OHTL in Fern Hills	VHC 40.4	5	2	1,228	Non-bushfire hazard class[2]
275 kV OHTL in Gelobra	VHC 10.1	20.8	8	32,144	High
275 kV OHTL in Pomegranate [5]	VHC 10.1	20.8	20	73,569	Very high

Notes
1 Fuel load taken from *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019) (**Bushfire resilient communities**).
2 VHC 40.4 is defined as grass fire prone in Bushfire resilient communities.
3 Infrastructure site not inspected - based on information in Catalyst and slope measured using the path tool in Google Earth or a slope measured in the field at nearby infrastructure.
4 Actual slope is > 20°. Slope was set in accordance with Section 4.2.4 of Bushfire resilient communities where max slope is set as 20° down slope or 15° up slope.
5 This infrastructure spans over a large area of land and ground-truthing did not cover the entire infrastructure area. Therefore, VHC is based on Catalyst and slope is measured using the path tool in Google Earth or a slope measured in the field at nearby infrastructure to determine the worst case bushfire attack scenario for this infrastructure.

Appendix 4 Radiant heat exposure assessment

Bushfire attack – WTG 6, WTG 25, WTG 26, WTG A10 and substation near WTG 20

- Forest fire danger index - 69
- Vegetation - VHC 10.1 *Spotted gum dominated open forests*
- Understorey fuel load – 19.3 t/ha[1]
- Total fuel load – 20.8 t/ha[1]
- Effective slope – 5° down slope
- Site slope – 0° slope
- Flame width – 100 m

Note 1 Understorey fuel load and total fuel load taken from *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'* (QFES 2019) (**Bushfire resilient communities**)

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Calculated November 21, 2022, 5:16 pm (MDc v.4.9)

J22120

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	69	Rate of spread	2.25 km/h
Vegetation classification	Forest	Flame length	17.16 m
Understorey fuel load	19.3 t/ha	Flame angle	52 °, 62 °, 70 °, 74 °, 75 ° & 82 °
Total fuel load	20.8 t/ha	Elevation of receiver	6.76 m, 7.57 m, 8.06 m, 8.24 m, 8.279999999999999 m & 8.49 m
Vegetation height	n/a	Fire intensity	24,248 kW/m
Effective slope	5 °	Transmissivity	0.867, 0.846, 0.819, 0.793, 0.78 & 0.721
Site slope	0 °	Viewfactor	0.6025, 0.4488, 0.3042, 0.2067, 0.1679 & 0.0455
Flame width	100 m	Minimum distance to < 40 kW/m²	14.1 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	18.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	27.1 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	37.6 m
		Minimum distance to < 10 kW/m²	44.2 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Bushfire attack – WTG 10, WTG 11, WTG 21, WTG 42, WTG 54, WTG A03, WTG A04, WTG A07, WTG A09 and operations and maintenance facility near WTG 20

- Forest fire danger index - 69
- Vegetation - VHC 10.1 *Spotted gum dominated open forests*
- Understorey fuel load – 19.3 t/ha[1]
- Total fuel load – 20.8 t/ha[1]
- Effective slope – 10° down slope
- Site slope – 6° down slope
- Flame width – 100 m

Note 1 Understorey fuel load and total fuel load taken from Bushfire Resilient Communities.

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Calculated November 21, 2022, 5:18 pm (MDc v.4.9)

J22120

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	69	Rate of spread	3.18 km/h
Vegetation classification	Forest	Flame length	23.2 m
Understorey fuel load	19.3 t/ha	Flame angle	55 °, 65 °, 72 °, 77 °, 78 ° & 86 °
Total fuel load	20.8 t/ha	Elevation of receiver	7.61 m, 8 m, 7.48 m, 6.47 m, 5.71 m & 0 m
Vegetation height	n/a	Fire intensity	34,239 kW/m
Effective slope	10 °	Transmissivity	0.859, 0.834, 0.804, 0.778, 0.766 & 0.71
Site slope	6 °	Viewfactor	0.6095, 0.4555, 0.3102, 0.2112, 0.1712 & 0.0461
Flame width	100 m	Minimum distance to < 40 kW/m²	17.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	23.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	33.8 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	46 m
		Minimum distance to < 10 kW/m²	53.6 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Bushfire attack – WTG 1, WTG 2, WTG 3, WTG 5, WTG 7, WTG 8, WTG 12, WTG 13, WTG 15, WTG 16, WTG 17, WTG 18, WTG 19, WTG 24, WTG 40, WTG 44, WTG 46, WTG 49, WTG 50, WTG A01 and WTG A08

- Forest fire danger index - 69
- Vegetation - VHC 10.1 *Spotted gum dominated open forests*
- Understorey fuel load – 19.3 t/ha[1]
- Total fuel load – 20.8 t/ha[1]
- Effective slope – 15° down slope
- Site slope – 11° down slope
- Flame width – 100 m

Note 1 Understorey fuel load and total fuel load taken from Bushfire Resilient Communities.

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Calculated November 21, 2022, 5:20 pm (MDc v.4.9)

J22120

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	69	Rate of spread	4.49 km/h
Vegetation classification	Forest	Flame length	31.73 m
Understorey fuel load	19.3 t/ha	Flame angle	57 °, 66 °, 73 °, 78 °, 80 ° & 89 °
Total fuel load	20.8 t/ha	Elevation of receiver	8.81 m, 8.58 m, 6.97 m, 4.57 m, 3.01 m & 0 m
Vegetation height	n/a	Fire intensity	48,345 kW/m
Effective slope	15 °	Transmissivity	0.848, 0.819, 0.788, 0.763, 0.752 & 0.697
Site slope	11 °	Viewfactor	0.6194, 0.4642, 0.3163, 0.2148, 0.1743 & 0.047
Flame width	100 m	Minimum distance to < 40 kW/m²	23.1 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	30.4 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	42.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	56.3 m
		Minimum distance to < 10 kW/m²	64.90000000000001 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Bushfire attack – WTG 4, WTG 9, WTG 20, WTG 22, WTG 23, WTG 27, WTG 28, WTG 29, WTG 30, WTG 41, WTG 43, WTG 47, WTG 52, WTG 53, WTG A02 and WTG A05

- Forest fire danger index - 69
- Vegetation - VHC 10.1 *Spotted gum dominated open forests*
- Understorey fuel load – 19.3 t/ha[1]
- Total fuel load – 20.8 t/ha[1]
- Effective slope – 20° down slope
- Site slope – 16° down slope
- Flame width – 100 m

Note 1 Understorey fuel load and total fuel load taken from Bushfire Resilient Communities.

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Calculated November 21, 2022, 5:22 pm (MDc v.4.9)

J22120

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	69	Rate of spread	6.35 km/h
Vegetation classification	Forest	Flame length	43.78 m
Understorey fuel load	19.3 t/ha	Flame angle	58 °, 66 °, 73 °, 78 °, 80 ° & 92 °
Total fuel load	20.8 t/ha	Elevation of receiver	10.02 m, 8.949999999999999 m, 5.96 m, 1.82 m, 0 m & 0 m
Vegetation height	n/a	Fire intensity	68,263 kW/m
Effective slope	20 °	Transmissivity	0.836, 0.805, 0.774, 0.75, 0.74 & 0.6820000000000001
Site slope	16 °	Viewfactor	0.6277, 0.473, 0.3222, 0.2185, 0.1771 & 0.0481
Flame width	100 m	Minimum distance to < 40 kW/m²	29.8 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	38.5 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	52.2 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	68.3 m
		Minimum distance to < 10 kW/m²	78 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Bushfire attack – WTG 14, switching yard and point of connection and substation near WTG 31 and temporary worker's accommodation

- Forest fire danger index – 69
- Grassland fire danger index – 100
- Vegetation - VHC 40.4 *Continuous low grass or tree cover*
- Understorey fuel load – 5 t/ha[1]
- Total fuel load – 5 t/ha[1]
- Effective slope – 7° down slope
- Site slope – 3° down slope
- Flame width – 100 m

Note 1 Understorey fuel load and total fuel load taken from Bushfire Resilient Communities.

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Calculated November 21, 2022, 5:34 pm (MDc v.4.9)

J22120

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Grassland Fire Danger Index	100	Rate of spread	21.07 km/h
Vegetation classification	Grassland	Flame length	8.789999999999999 m
Understorey fuel load	5 t/ha	Flame angle	56 °, 67 °, 75 °, 80 °, 82 ° & 87 °
Total fuel load	5 t/ha	Elevation of receiver	3.26 m, 3.52 m, 3.47 m, 3.2 m, 2.99 m & 0.74 m
Vegetation height	n/a	Fire intensity	54,436 kW/m
Effective slope	7 °	Transmissivity	0.884, 0.87, 0.851, 0.828, 0.8159999999999999 & 0.745
Site slope	3 °	Viewfactor	0.5874, 0.4345, 0.2926, 0.1974, 0.1606 & 0.044
Flame width	100 m	Minimum distance to < 40 kW/m²	7.2 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	9.800000000000001 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	14.6 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	21.5 m
		Minimum distance to < 10 kW/m²	26 m

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Bushfire attack – WTG 31, WTG 32, WTG 33, WTG 34, WTG 35, WTG 36, WTG 37, WTG 38, WTG 39 and WTG 45

- Forest fire danger index – 69
- Grassland fire danger index – 100
- Vegetation - VHC 40.4 *Continuous low grass or tree cover*
- Understorey fuel load – 5 t/ha[1]
- Total fuel load – 5 t/ha[1]
- Effective slope – 20° down slope
- Site slope – 14° down slope
- Flame width – 100 m

Note 1 Understorey fuel load and total fuel load taken from Bushfire Resilient Communities.

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Calculated November 21, 2022, 5:40 pm (MDc v.4.9)

J22120

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Grassland Fire Danger Index	100	Rate of spread	51.67 km/h
Vegetation classification	Grassland	Flame length	13.77 m
Understorey fuel load	5 t/ha	Flame angle	63 °, 75 °, 84 °, 89 °, 91 ° & 97 °
Total fuel load	5 t/ha	Elevation of receiver	3.56 m, 3.11 m, 1.53 m, 0 m, 0 m & 0 m
Vegetation height	n/a	Fire intensity	133,490 kW/m
Effective slope	20 °	Transmissivity	0.874, 0.855, 0.829, 0.803, 0.79 & 0.729
Site slope	14 °	Viewfactor	0.5973000000000001, 0.4441, 0.3003, 0.2038, 0.166 & 0.0449
Flame width	100 m	Minimum distance to < 40 kW/m²	10.2 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	14.1 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	21.3 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	30.7 m
		Minimum distance to < 10 kW/m²	36.5 m

Rate of Spread - Noble et al. 1980

Flame length - Purton, 1982

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Bushfire attack – WTG 48 and WTG 51

- Forest fire danger index – 69
- Vegetation - VHC 13.2 *Dry to moist eucalypt woodlands on undulating metamorphics and granite* and VHC 7.1 *Semi-evergreen to deciduous microphyll vine forest* (Non-remnant)
- Understorey fuel load – 12.8 t/ha[1]
- Total fuel load – 14.4 t/ha[1]
- Effective slope – 16° down slope
- Site slope – 10° down slope
- Flame width – 100 m

Note 1 Understorey fuel load and total fuel load is based on VHC 13.2 and is taken from Bushfire Resilient Communities.

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Calculated November 21, 2022, 5:48 pm (MDc v.4.9)

J22120

Minimum Distance Calculator - AS3959-2018 (Method 2)			
Inputs		Outputs	
Fire Danger Index	69	Rate of spread	3.19 km/h
Vegetation classification	Forest	Flame length	22.5 m
Understorey fuel load	12.8 t/ha	Flame angle	58 °, 69 °, 77 °, 81 °, 83 ° & 90 °
Total fuel load	14.4 t/ha	Elevation of receiver	6.56 m, 6.5 m, 5.23 m, 3.25 m, 2 m & 0 m
Vegetation height	n/a	Fire intensity	23,783 kW/m
Effective slope	16 °	Transmissivity	0.86, 0.835, 0.804, 0.779, 0.767 & 0.711
Site slope	10 °	Viewfactor	0.61, 0.4548, 0.3093, 0.2105, 0.1712 & 0.0461
Flame width	100 m	Minimum distance to < 40 kW/m²	16.8 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	22.7 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	32.5 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	44.6 m
		Minimum distance to < 10 kW/m²	52 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

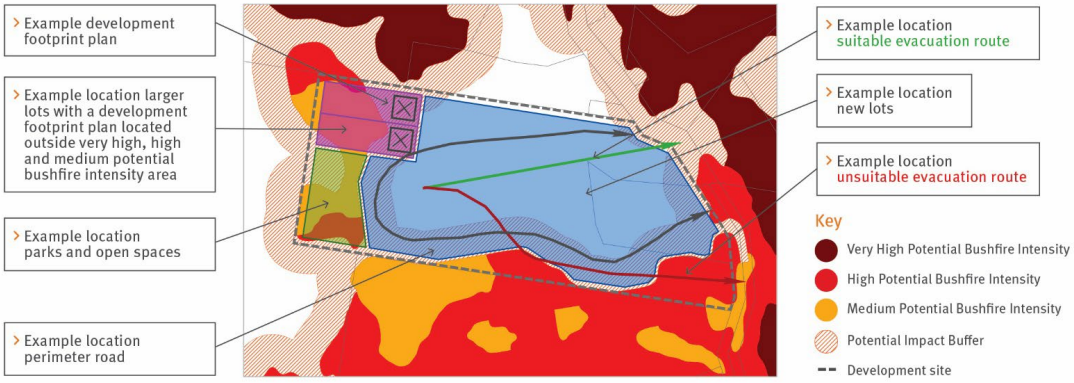
Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Appendix 5 SPP bushfire prone area overlay code assessment

Performance outcomes	Acceptable outcomes	Compliance assessment
Section A **Reconfiguring a lot (RaL) – where creating lots of more than 2,000 square metres**		
PO1 The subdivision layout: (a) enables future buildings to be located away from slopes and land forms that expose people or property to an intolerable risk to life or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	**AO1.1** A development footprint plan is identified for each lot that avoids ridgelines, saddles and crests where slopes exceed 15 per cent.	**Not applicable**
	AO1.2 A development footprint plan is identified for each lot that is separated from the closest edge to the adjacent mapped medium, high or very high potential bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all development footprint plan boundaries; or (b) a distance that achieves a radiant heat flux level of 29 kW/m2 or less at all development footprint plan boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document.	**Not applicable**
PO2 The subdivision layout enables: (a) future buildings to be located as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) future site access to be located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions.	**AO2** A development footprint plan is identified for each lot that: (a) is located within 60 metres of the street frontage; and (b) sited to enable a route between the development footprint plan and the street frontage with a gradient that does not exceed of 12.5 per cent.	**Not applicable**
Section B		
Reconfiguring a lot (RaL) – where creating lots of 2,000 square metres or less		
PO3 The subdivision layout: (a) avoids creating lots on slopes and land forms that expose people or property to an intolerable risk to life	**AO3.1** The subdivision layout results in lots that are sited so that they are separated from the closest edge to the adjacent mapped medium, high or very high potential	**Not applicable**

Performance outcomes	Acceptable outcomes	Compliance assessment
or property; and (b) facilitates emergency access and operational space for firefighters in a reduced fuel area between future buildings and structures and hazardous vegetation, that reduce risk to an acceptable or tolerable level. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	bushfire intensity area by: (a) a distance that is no closer than the distances specified in Table 5 at all lot boundaries; or : (b) a distance that achieves a radiant heat flux level of 29 kW/m^2 or less: (i) at the building envelope, if identified at RaL stage; or (ii) where a building envelope is not identified, at all lot boundaries. Note – This separation area is often termed an asset protection zone. Note – The radiant heat flux levels can be established by undertaking a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document. Note – For staged developments, temporary separation areas may be absorbed as part of subsequent stages. Note - Existing cleared areas external to the site may only be used in calculating necessary separation where tenure ensures that the land will remain cleared of hazardous vegetation (for example the land is a road, watercourse or highly managed park in public ownership).	
	AO3.2 The subdivision layout does not create lots that are within bushfire prone areas and on ridgelines, saddles and crests where slopes exceed 15 per cent (roads and parks may be located in these areas).	**Not applicable**
Section C		
Reconfiguring a lot (RaL) – where creating more than 20 lots		
PO4 The subdivision layout is designed to minimise the length of the development perimeter and number of lots exposed to hazardous vegetation. Note – For example, avoid finger-like subdivision patterns or substantive	**AO4** No acceptable outcome is prescribed	**Not applicable**

Performance outcomes	Acceptable outcomes	Compliance assessment
vegetated corridors between lots.		
PO5 The subdivision layout provides for adequate access and egress and safe evacuation routes, to achieve an acceptable or tolerable risk to people.	**AO5.1** The subdivision layout: (a) avoids the creation of bottle-neck points in the movement network within the development (for example, avoids hourglass patterns); and (b) ensures the road network has sufficient capacity for the evacuating population.	**Not applicable**
	AO5.2 The subdivision layout ensures evacuation routes: (a) direct occupants away from rather than towards or through areas with a greater potential bushfire intensity; and (b) minimise the length of route through bushfire prone areas. Refer Figure 5.	**Not applicable**
 *Figure 5 – Subdivision layout and evacuation routes*		
PO6 The subdivision layout provides adequate buffers between hazardous vegetation and development. Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous	**AO6.1** The subdivision layout results in an asset protection zone being located to create a separation area from adjacent mapped medium, high or very high potential bushfire intensity areas.	**Not applicable**

Performance outcomes	Acceptable outcomes	Compliance assessment
vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.	**AO6.2** The asset protection zone is comprised of: (a) parks and open spaces; and/or (b) lots greater than 2000 square metres; and/or (c) public roads (termed perimeter roads). Note – Parks and open space may be located within the mapped medium, high and very high potential bushfire intensity areas to create a separation between the development and the balance of the bushfire prone area. Note – Portions of lots greater than 2000 square metres may be located within the mapped medium, high and very high potential bushfire intensity areas. Refer Figure 5.	**Not applicable**
	AO6.3 Where the asset protection zone includes lots greater than 2000 square metres a development footprint plan is identified for each lot that is located in accordance with AO1.2.	**Not applicable**
PO7 Parks or open space provided as part of the asset protection zone do not create additional bushfire prone areas. Note –The undertaking of a bushfire hazard assessment, in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO7** Where the asset protection zone includes parks or open spaces, they: (a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, cultivated gardens and nature strips; or (b) are designed to ensure a potential available fuel load is maintained at less than eight tonnes/hectare in aggregate and with a fuel structure that remains discontinuous. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres.	**Not applicable**
PO8 Perimeter roads are accessible for fire-fighting vehicles, to facilitate	**AO8.1** Where the asset protection zone includes a perimeter road it: (a) has a two-lane	**Not applicable**

Performance outcomes	Acceptable outcomes	Compliance assessment
emergency access and operational space for fire- fighting, maintenance works and hazard reduction activities.	sealed carriageway clear of hazardous vegetation; and (b) is connected to the wider public road network at both ends and at intervals of no more than 200 metres; and (c) does not include design elements that may impede access for fire-fighting and maintenance for fire- fighting purposes (for example traffic calming involving chicanes).	
	AO8.2 Where the subdivision contains a reticulated water supply, the road network and fire hydrants are designed and installed in accordance with: (a) *Fire Hydrant and Vehicle Access Guidelines for residential, commercial and industrial lots*, Queensland Fire and Emergency Services, 2015, unless otherwise specified by the relevant water entity; and (b) the *Road Planning and Design Manual 2nd edition*, Department of Transport and Main Roads, 2013.	**Not applicable**
Section D		
Reconfiguring a lot (RaL) – where creating additional lots for the purpose of residential development and a reticulated water supply is not provided.		
PO9 The subdivision layout provides for perimeter roads or fire trail and working areas that are accessible by the type of fire-fighting vehicles servicing the area, to facilitate emergency access and operational space for fire-fighting, maintenance works and hazard reduction activities.	**AO9.1** The subdivision layout includes: (a) a fire trail and working area designed and constructed in accordance with the design parameters in Table 6 that separates the residential lot or development footprint plan from adjacent mapped medium, high or very high potential bushfire intensity areas; or (b) a perimeter road designed and constructed in accordance with AO8.1. Refer Figure 6.	**Not applicable**

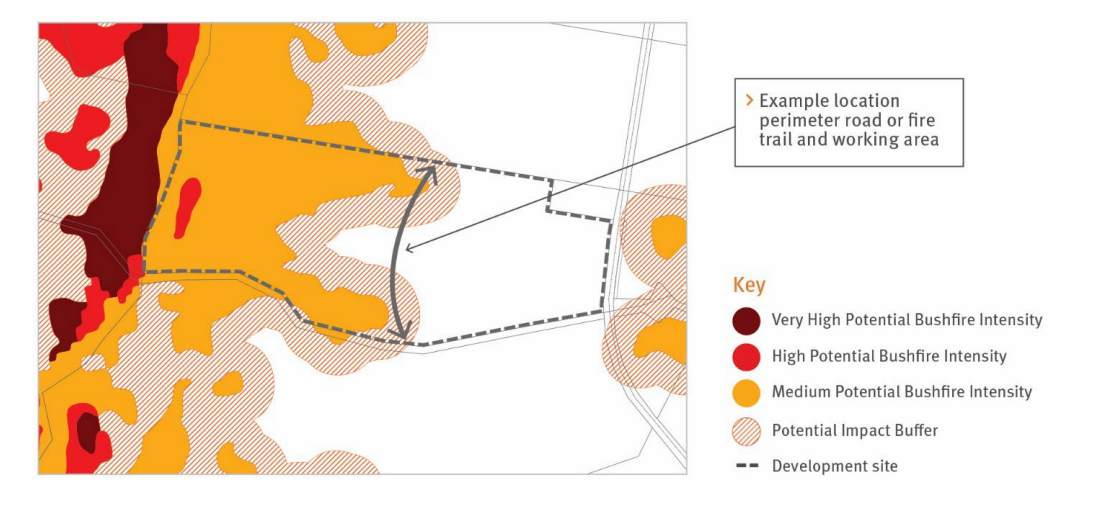
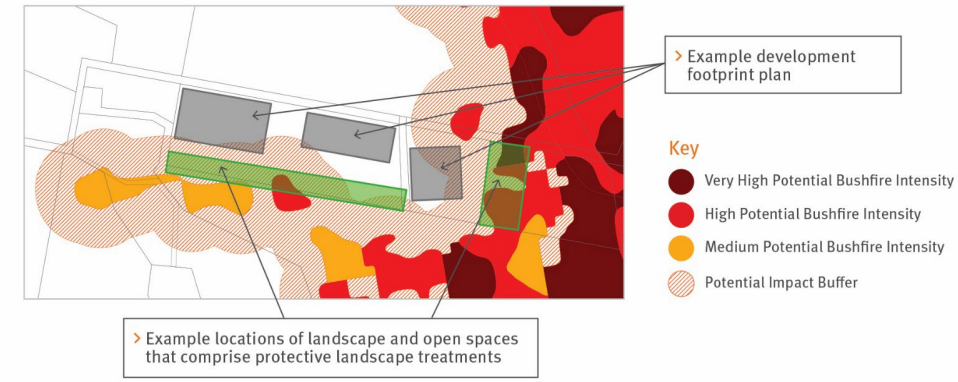
<table>
<tr><th>Performance outcomes</th><th>Acceptable outcomes</th><th>Compliance assessment</th></tr>
<tr><td colspan="3"> 

Figure 6 – Siting of fire trail and working area</td></tr>
<tr><td colspan="3">Section E</td></tr>
<tr><td colspan="3">Material change of use</td></tr>
<tr><td rowspan="2">PO10
Site layout achieve an acceptable or tolerable risk to people.
Landscape or open space provided as part of the development:
(a) acts as a buffer between hazardous vegetation and development; and
(b) does not create additional bushfire prone areas.
Note – An applicant may seek to undertake a site-level verification of the location and nature of hazardous vegetation and resulting potential bushfire intensity levels, for example where changes in foliage have occurred (e.g. as a consequence of adjoining permanent urban development) or where an applicant seeks to verify the regional ecosystem map inputs. This verification should form part of a bushfire hazard assessment in accordance with the methodology in the QFES Bushfire resilient communities document. The outcomes of this assessment can demonstrate how an alternate solution to the acceptable outcome can deliver an acceptable or tolerable level of risk.</td><td>AO10.1
Site layout places the landscape and open spaces within the site between premises and adjacent mapped medium, high or very high potential bushfire intensity areas.
Refer Figure 7.</td><td>Complies with AO10.1
Asset protection zones (APZs) will be established and maintained around above ground infrastructure as specified in Section 6.1 of the bushfire management plan (BMP).</td></tr>
<tr><td>AO10.2
This landscaping and open space comprises protective landscape treatments that:
(a) comprise only low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses and cultivated gardens; or
(b) are designed to ensure a potential available fuel load is maintained at less than 8 tonnes/hectare in aggregate and that fuel structure remains discontinuous.
Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres.</td><td>Complies with AO10.2
APZs will be cleared of vegetation and established as a gravel hardstand area or grass area. A gravel hardstand area will be maintained free of weeds and grass cover. Where establishing a gravel hardstand area is not practical, a grass area will be established and maintained free of woody vegetation and with grass cover which has a height of ≤ 30 centimetres.</td></tr>
</table>

Performance outcomes	Acceptable outcomes	Compliance assessment
 *Figure 7 – Siting of protective landscape treatments*		
PO11 The development establishes evacuation areas, to achieve an acceptable or tolerable risk to people.	**AO11** If in an isolated location, development establishes direct access to a safe assembly/evacuation area. Note – Guidance on identifying safe evacuation areas is contained in the QFES *Bushfire resilient communities* document.	**Complies with AO11** Section 6.10.9 of the BMP requires separate emergency response plans to be prepared for the construction and the operations and maintenance phases of the Project. The emergency response plans must identify the location of safe assembly/evacuation areas and the access routes to these areas. Section 6.10.9 of the BMP provides guidance for the construction contractor and the operations and maintenance contractor to identify safe assembly and evacuation areas. It states that they must have a gravel or similar hardstand surface and must not be located in areas identified as medium, high and very high potential bushfire intensity and potential impact buffer by the Queensland State Planning Policy *Bushfire prone areas overlay map* which is shown in Figures 2.2-2.4 of the BMP.
PO12 If on a lot of over 2,000 m^2, where involving a new premises or an existing premises with an increase in development footprint, development: (a) locates occupied areas as close as possible to property entrances to facilitate safe evacuation during a bushfire event; and (b) ensures vehicular access is	**AO12** No acceptable outcome is prescribed.	**Complies with PO12** Specifications for the minimum standard of vehicle access tracks within the Study area are provided in Section 6.4 of the BMP and are based on the design specifications by the New South Wales Rural Fire Service.

Performance outcomes	Acceptable outcomes	Compliance assessment
located and designed to allow safe evacuation of the site by occupants and maintain access by emergency services under critical event conditions		
PO13 Development is located within a reticulated water supply area or includes a dedicated static water supply that is available solely for fire-fighting purposes and can be accessed by fire-fighting vehicles. Note – Swimming pools, farm ponds and dams are not considered reliable sources of static water supply in Queensland due to regular drought events. Note for Local Government – Information on how to provide an appropriate static water supply, may form a condition of a development approval. For further information on preferred solutions refer to the QFES *Bushfire resilient communities* document.	**AO13** No acceptable outcome is prescribed	**Complies with PO13** A fire-fighter water storage tank will be installed at the operations and maintenance facility for the operations and maintenance phase of the Project. Design specifications for the fire-fighter water storage tank are based on guidance in *Bushfire Resilient Communities Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience - Bushfire'* (QFES 2019) (**Bushfire resilient communities**) and are provided in Section 6.5 of the BMP.
PO14 Vulnerable uses listed in Table 7 are not established or intensified within a bushfire prone area unless: (a) there is an overriding need in the public interest for the new or expanded service the development provides; and (b) there are no other suitable alternative locations within the required catchment; and (c) site planning can appropriately mitigate the risk (for example, siting ovals for an educational establishment between the hazardous vegetation and structures. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome	**AO14.1** No acceptable outcome is prescribed.	**Not applicable**
PO15 Community infrastructure providing essential services listed in Table 7 are not established within a bushfire prone area unless: (a) there is an overriding need	**AO15** No acceptable outcome is prescribed.	**Complies with PO15** The substations and switching yard could be regarded as community infrastructure providing essential services.

Performance outcomes	Acceptable outcomes	Compliance assessment
in the public interest for the new or expanded service the development provides (for example, there are no other suitable alternative locations that can deliver the required level of service or meet emergency service response times during and immediately after a bushfire event); and (b) the infrastructure can function effectively during and immediately after a bushfire event. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.		Electrical infrastructure within these components of the wind farm will have an APZ which is designed to achieve a radiant heat flux level ≤ 10 kilowatts/square metre (**kW/m^2**) at the electrical infrastructure which is considered a tolerable radiant heat flux outcome for community infrastructure providing essential services in Bushfire resilient communities.
PO16 Development avoids or mitigates the risks to public safety and the environment from the manufacture or storage of materials listed in Table 7 that are hazardous in the context of bushfire to an acceptable or tolerable level. Note – The preparation of a bushfire management plan in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome. Editor's note – In addition to the requirements of this code the *Work Health and Safety Act 2011* and associated Regulation and Guidelines, the *Environmental Protection Act 1994* and the relevant building assessment provisions under the *Building Act 1975* contain requirements for the manufacture and storage of hazardous substances. Information is provided by Business Queensland on the requirements for storing and transporting hazardous chemicals, available at: www.business.qld.gov.au/running-business/protecting-business/risk-management/hazardous-chemicals/storing-transporting**.**	**AO16** No acceptable outcome is prescribed.	**Complies with PO16** Storage or handling of hazardous chemicals during the construction and the operations and maintenance phases of the Project must not occur in vegetated areas and must be in accordance with *Managing risks of hazardous chemicals in the workplace – Code of Practice* (SWA 2020), applicable safety data sheets, and otherwise in accordance with Queensland *Work Health and Safety Act 2011* and its regulations.
Section F		
Where involving an asset protection zone		
PO17 Asset protection zones are designed and managed to ensure they do not	**AO17.1** Landscaping treatments within any asset protection zone comprise only low threat vegetation,	**Complies with AO17.1** APZs will be cleared of vegetation and established as a gravel

Performance outcomes	Acceptable outcomes	Compliance assessment
increase the potential for bushfire hazard. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks. Note – Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack, for example short-cropped grass to a nominal height of 10 centimetres. OR	hardstand area or grass area. A gravel hardstand area will be maintained free of weeds and grass cover. Where establishing a gravel hardstand area is not practical, a grass area will be established and maintained free of woody vegetation and with grass cover which has a height of ≤ 30 centimetres.
	AO17.2 Landscaping management within any asset protection zone maintains a: (a) potential available fuel load which is less than eight tonnes/hectare in aggregate; and (b) fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	**Complies with AO17.2** See response to AO17.1.
Section G		
Where planning provisions or conditions of approval require revegetation or rehabilitation		
PO18 Revegetation or rehabilitation areas are designed and managed to ensure they do not result in an unacceptable level of risk or an increase in bushfire intensity level. Note – The undertaking of a bushfire hazard assessment in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this performance outcome.	**AO18.1** Required revegetation or rehabilitation: (a) is located outside of any asset protection zone; or (b) maintains a potential available fuel load which is less than eight tonnes/hectare in aggregate and fuel structure which is discontinuous. Note – The preparation of a landscape management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with acceptable outcome (b).	**Not applicable** There will be no revegetation or rehabilitation within the disturbance footprint.
	AO18.2 Revegetation or rehabilitation of areas located within mapped medium, high or very high potential bushfire intensity areas, revegetate and rehabilitate in a	**Not applicable** There will be no revegetation or rehabilitation within the disturbance footprint.

Performance outcomes	Acceptable outcomes	Compliance assessment
	manner that maintains or reduces the existing fuel load. OR Revegetation or rehabilitation of areas located within the mapped potential impact buffer area, revegetate and rehabilitate in a manner that maintains or reduces the existing fuel load. Note – The preparation of a vegetation management plan undertaken in accordance with the methodology in the QFES *Bushfire resilient communities* document may assist in demonstrating compliance with this acceptable outcome.	Nonetheless, radiant heat exposure modelling undertaken to determine the width of APZs specified in Section 3.6 of the BMP is based on the potential fuel load for vegetation outside of the disturbance footprint and vegetation hazard classes in Bushfire resilient communities, ie a worst case scenario and considers the potential for natural regeneration of this vegetation to reach the mature state of a functioning regional ecosystem.