

Appendix L

Bushfire Threat Assessment

Bushfire Threat Assessment

Great Western Battery

Environmental Impact Assessment

Prepared for
AECOM



Project Name:	Great Western Battery EIS
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Version	Primary Author(s)	Description	Date Completed
1.2	Lew Short	Final	7 December 2021

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1. Introduction

AECOM Australia Pty Ltd (AECOM) for Neoen Australia Pty Ltd (Neoen) has engaged Blackash Bushfire Consulting to complete a Bushfire Threat Assessment to construct, operate and maintain a battery energy storage system (BESS) of approximately 500 megawatts (MW) and approximately 1000 megawatt-hour (MWh) at 173 Brays Lane, Wallerawang, NSW 2845 (the Site), as well as a new transmission line that would connect the BESS to the existing Transgrid 330 kilovolt (kV) substation at Wallerawang (together referred to as the Project). The location of the Project at a regional scale, and the regional context of the Project Area is shown on Figure 1.

The proposed location of the BESS is at Lot 4 Deposited Plan (DP) 751651. The Site is located approximately 1.25 km northwest of the Transgrid 330 kV Wallerawang substation. This substation is located at the end of James Parade, Wallerawang 2845 (Lot 91 of DP 1043967).

This report is a Bushfire Threat Assessment that addresses the SEARS by assessing the potential impacts associated with bushfire risk. This assessment demonstrates how the proposed BESS meets the development criteria for bushfire protection, specifically for the protection of life and safety, infrastructure and environmental values associated with the Site.

The Project is in a designated bushfire prone area. All new development on bushfire prone land must comply with the NSW Rural Fire Service (RFS) document *Planning for Bushfire Protection 2019* (PBP 2019). This Bushfire Risk Assessment supports the environmental impact statement (EIS) for the Project. It documents the assessment of bushfire risk in accordance with PBP 2019. As State Significant Development (SSD), the Project must comply with the aim and objectives of PBP 2019. This technical paper provides an assessment of the forecast impacts of the Project on the surrounding landscape and as required by PBP 2019, with special consideration for the vulnerability of the Project and the mitigation measures in regard to bushfire.

This map illustrates the proposed transmission line route in the Wallerawang area. The route is highlighted in yellow, starting from a 'Site' (indicated by a red square) and extending towards the 'Wallerawang Power Station'. Key locations and features include:

- Power Stations:** Mount Piper Power Station, Wallerawang Power Station, and Springvale Coal Mine.
- Infrastructure:** Wallerawang Ash Repository, Lidsdale Siding Upgrade Project, and Wallerawang Quarry Project.
- Geographical Features:** Ben Bulbin State Forest, Blackmans Flat, Lidsdale State Forest, and Marrangaroo National Park.
- Roads:** Castlereagh Highway, Wolgan Road, Great Western Highway, and Old Western Road.
- Waterways:** Wallerawang Creek, Spring Creek, and various gullies like Lotts Gully.
- Other Labels:** Gullen Bulbin, Ben Bulbin, Lidsdale, Wallerawang, Marrangaroo, and Bowditch.

An inset map in the top right corner shows the location of the study area within the broader context of the region, including labels for Bathurst, Orange, and other nearby towns.

Legend

- Site boundary
- TransGrid 330 kV Wallerawang Substation
- The Project Area
- State Forest
- NPWS Reserve
- Watercourse
- Primary road

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2. Project Overview

The proposed location of the BESS is at Lot 4 Deposited Plan (DP) 751651. The Site is located approximately 1.25 km northwest of the Transgrid Wallerawang 330 kV substation. This substation is located at the end of James Parade, Wallerawang 2845 (Lot 91 of DP 1043967). The Project would involve the installation of a transmission line connection between the Site and the Transgrid Wallerawang 330 kV substation (Figure 2). The alignment of the new transmission line would traverse:

- Lot 8 and Lot 9 DP 252472
- Lot 2 DP 108089
- Lot 1 DP 108089
- Lot 10 DP 1168824
- Lot 1115 DP 1204803
- Lot 91 DP 1043967.

The Site, transmission line easement and connection to the substation is referred to as the Project Area and is shown on Figure 1-2. Other key components of the Project would include:

- Subdivision of Lot 4 DP 751651 to separate the existing residence in the southeast portion of the lot from the proposed BESS
- Site establishment, including installation of fencing, environmental controls, grading and other civil works
- Establishment of a new driveway located at the southern boundary of the Site, providing access to the Site from Brays Lane
- Establishment of internal access roads and car parking
- Installation, commissioning, and operation of a large-scale BESS including battery enclosures, inverters, and transformers
- Construction of a permanent operations building, including staff amenities
- Construction of lighting and installation of security devices around the perimeter of the BESS compound
- Establishment of noise walls, landscaping and screening vegetation
- Above ground transmission within the Site substation, and underground transmission line connection from the BESS to the existing Wallerawang 330 kV substation switchyard
- Upgrades to the Transgrid Wallerawang 330 kV substation switchyard.

The Project is considered State Significant Development (SSD) under the *Environmental Planning and Assessment Act 1979* (EP&A Act) as it satisfies the requirements of Clause 8 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP), being:

- a. The development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the EP&A Act; and
- b. The development is specified in Schedule 1 or 2 of the SRD SEPP.

The NSW *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across NSW. Division 4 of the ISEPP applies to electricity generating works or solar energy systems.

Under Division 4, electricity generating work means a building or place used for the purpose of:

- a. Making or generating electricity, or
- b. Electricity storage.

The purpose of the Project is to store energy in chemical form and dispatch electrical energy on demand in discharge mode. As such, the Project would be for the dispatch of electricity storage and Division 4 of the ISEPP is applicable.

Clause 34 of the ISEPP provides that development permitted with consent for electricity generating works may be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone.

The Project is located on land zoned under the Lithgow Local Environment Plan 2014 (Lithgow LEP) as: RU1 – Primary production; SP2 – Rail Infrastructure Facility; and IN1 – General industrial. The Site is located on land zoned RU1 – Primary production. The alignment of the new transmission line would be located within land use zones: RU1 – Primary Production; IN1 – General Industrial; and SP2 – Rail Infrastructure Facility (refer to Section 2.4).

Under Clause 34 of the ISEPP, electricity generating works are a permissible with consent on RU1, SP2, and IN1 land use zones as they are defined as prescribed rural, industrial or special use zones under Division 4 of the ISEPP. As such, the Project is permissible with development consent under the ISEPP. Clause 20 under Schedule 1 of the SRD SEPP relates to electricity generating works with a capital investment value (CIV) of greater than \$30 million. The Project is classified as SSD.

3. Site Context

The Project is located in the Central Tablelands of NSW, in the suburb of Wallerawang, about 110 km west of Sydney. Wallerawang is located in the Lithgow City Local Government Area (LGA).

The Site is located at 173 Brays Lane, Wallerawang NSW, 2854 on part of Lot 4 Deposited Plan (DP) 751651. The Lot is about 16ha in size and consists of the Site which is about 13ha in size and the land around the property in the south eastern corner which is about 3 ha in size. The BESS would only occupy a portion of the total area of the Site. It is proposed that Lot 4 DP 751651 would be subdivided as part of the Project to delineate the existing residential landuse at the southeast portion of the lot from the proposed BESS (Figure 3).

The Lot is privately owned and is currently occupied by a residential property, agricultural buildings and marginal agricultural land. Beyond the residential property the majority of the Lot is used for occasional horse grazing. As a result of its use for grazing and residential purposes, the Lot has undergone vegetation removal and the majority of vegetation on the Site consists of pasture grasses. A small area of mature vegetation is located in the northwestern corner of the Site. The Lot is currently accessed through an entrance close to the residential property.

A series of small man-made dams are located on the Site. The dams are fed by two ephemeral drainage lines that enter the Site on the western boundary and generally flow to the east before entering the largest dam onsite and becoming one drainage line. This drainage line passes through one more dam before leaving the Site along the southern part of the eastern boundary before draining to Pipers Flat Creek offsite.

The Site is located nearby the Transgrid 330 kV Wallerawang substation, which at its closest point, is about 1.25 km southeast from the Site. The substation is located at Lot 91 of DP 1043967. The substation is located on freehold land owned by Electricity Transmission Ministerial Holding Corporation (ETMHC) and operated by Transgrid.

The new transmission line for the Project would be located on land that is currently owned and / or managed privately, by Lithgow City Council, Transgrid, Transport for NSW and John Holland Rail. The new transmission line would connect the BESS to the Transgrid Wallerawang 330 kV substation. The new transmission line would exit from the eastern boundary of the Site, crossing Brays Lane and entering into the vegetated area to the east of Brays Lane. From here, it would travel in a north easterly direction, before passing under Pipers Flat Creek and into the existing rail corridor where it would travel

southeast along the rail corridor (including its crossing of Main Street) to connect to the southwestern portion of the Transgrid Wallerawang 330kV substation.

Figure 2 Project Area



Figure 3 Site location



4. Legislative Framework

The statutory requirements outline the relevant statutory and regulatory obligations relevant to bushfire risk management for the Project. This section also includes relevant policies, standards, and guidelines for the consideration of bushfire risk for new development.

Environmental Planning and Assessment Act 1979

The (NSW) EP&A Act requires that any development on bushfire-prone land (BPL) for any purpose complies with the aim and objectives of PBP 2019. SSD is exempt from this requirement but is generally encouraged to comply with PBP. As such, a Bushfire Safety Authority is not required for SSD. However, the SEARs issued under the EP&A Act for this SSD project requires this Project to be assessed against the PBP 2019.

Environmental Planning and Assessment Act, 1979: Section 10.3 Bushfire Prone Land

The designation of Bushfire Prone Land (BPL) in NSW is required under the EP&A Act (s.10.3). BPL Maps provide the trigger for the various development assessment provisions. The BPL Map is a trigger for the consideration of bushfire matters for new development. It is not intended as a detailed measure of risk.

Environmental Planning and Assessment Act, 1979: Section 4.41 Approvals etc legislation that does not apply

A consented SSD project is not required to secure a bush fire safety authority under section 100B of the Rural Fires Act 1997.

Rural Fires Act, 1997

The (NSW) Rural Fires Act 1997 (RF Act) establishes the NSW Rural Fire Service, defines its functions and makes provision for the prevention, mitigation and suppression of rural fires. Section 63 of the RF Act requires public authorities and owners and occupiers of land to prevent bushfires and to manage land they are responsible for. The RF Act states that it is the duty of public authorities, landowners and occupiers to take all notified and practical steps to prevent ignition and minimise spread on or from their land. Permits are required to light fires for bushfire fuel hazard reduction or to clear fire breaks. The Act reiterates that certain instruments under the EP&A Act, NPW Act, Local Government Act 1993, Biodiversity Conservation Act 2016, and the Local Land Services Act 2013 do not apply when responding to fire emergencies.

The RF Act provides for the RFS Commissioner to declare the bushfire danger period which generally runs from October to March (inclusive), which can be modified by the RFS. Total fire bans (TOBANS) may be issued by the RFS Commissioner in the interests of public safety.

Section 63 places an ongoing bushfire management requirement on the Project to mitigate the risk of bushfire within the Project site.

4.1. Government plans, policies, standards and guidelines

The relevant guidelines and requirements in NSW for the consideration of bushfire risk for new development are:

Planning for Bushfire Protection 2019 NSW Rural Fire Service

This document contains specifications for planning and building on land identified as bushfire prone. PBP seeks to provide for human safety (including fire fighters) during bushfire events and minimise the effects of bushfires on property; while considering development potential, site characteristics and protection of the environment. As SSD, the Project is exempt from the requirement under the EP&A Act to comply with PBP. However, the SEARs requires compliance with PBP to consider the level of bushfire risk to and from the Project.

BESS, substations, and transmission lines are not specifically addressed in PBP. The document sets standards for electrical transmission for residential subdivision and special fire protection purpose developments, the intent of which is to reduce bushfire risk to nearby buildings or surrounding bush. However, the document also provides guidance for the consideration of bushfire risk for electrical infrastructure more broadly, which can apply to this Project.

The main bushfire risk associated with electricity assets as identified by PBP is the risk of ignition associated with electrical conduction. For this risk, PBP refers to ISSC3 - Guide for Management of Vegetation in the Vicinity of Electricity Assets (ISSC, 2016). However, ISSC3 does not provide guidance for transmission lines. Commercial and industrial development with no residential component is held to the aims and objectives of PBP and requires that appropriate bushfire protection measures be put in place, however, no particular measures are mandated.

Standards for Asset Protection Zones NSW Rural Fire Service

This document provides standards for the establishment and maintenance of asset protection zones. Relevant Asset Protection zones as identified in this document have been considered in the bushfire planning and design for this Project with the BESS area and onsite substation being managed as an APZ.

Guide for Bush Fire Prone Land Mapping

The identification of bushfire prone land (BPL) in NSW is required under the EP&A Act. It is the responsibility of local government to prepare the Bushfire Prone Land Map (BPLM) for the local government area. The RFS Commissioner certifies the BPL according to guidance provided by NSW RFS (2015). BPL assessments are based on allocation of the vegetation present into one of three broad categories, as follows:

- Category 1: which includes areas of forest, woodland, heath, forested wetland and timber plantation. Highest risk category
- Category 2: rainforests and “lower risk vegetation parcels” these parcels contain remnant vegetation, but it is limited in its connectivity to larger areas and contain land management practices and a bushfire plan that identifies the appropriate management of bushfire risk
- Category 3: which includes grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands. Moderate risk category
- Exclusion: Areas of vegetation less than 1 hectare and greater than 100 metres separation from category 1, 2 or 3 vegetation; small patches or strips of remnant vegetation; managed grasslands; agricultural cropland; gardens; and mangroves are not mapped as bushfire prone.

The Site is affected by BPL as per section 7.1.

ISSC 20 – Guideline for the Management of Activities Within Electricity Easements and Close to Electricity Infrastructure

The proposed BESS transmission line is required to comply with *ISSC 20 - Guideline for the Management of Activities Within Electricity Easements and Close to Electricity Infrastructure* (ISSC, 2012) which was written to protect public safety and electricity assets and by offering guidance on the management of activities in electricity easements including the consideration of access and safety aspects associated with the operation and maintenance, repair, replacement, upgrade or renewal of electricity infrastructure on property, whilst being mindful of the property owner's rights to maximise use and enjoyment of the land.

Lighting of fires, including planned or prescribed burns, is a controlled activity under ISSC 20 and is subject to consultation and negotiation with the network operator.

5. Limitations

Australia has a history of high consequence bushfires, which have caused loss of life, damage and disruption. Risk based land use planning provides the tolerable bushfire risk levels through documents such as PBP 2019, legislation, policy and guidelines.

Risk based land use planning has consistently been identified as one of the key means to reduce natural disaster risks to assets and communities. Improved risk-based land use planning in areas that are subject to natural hazard are fundamental to developing and enhancing resilient development, critical infrastructure and communities.

The objectives of PBP 2019 articulates the criteria to determine tolerable risk to assets and people associated with 'other' development. As SSD, the Project is exempt from the requirement under the EP&A Act to comply with PBP and does not require a Bushfire Safety Authority. However, the SEARs require compliance with PBP and the level of bushfire risk to and from the Project means PBP has been considered in the design of the Project. Inform the bushfire management of the Project. Electricity assets such as battery storage, substations and high-voltage transmission lines are not specifically addressed in PBP.

In order to understand the nature of bushfire risks posed to the assets, people working within the sites and people using the access road to and from the Site, it is critical to contemplate the elements of bushfire risk which may be relevant. The DPIE SEARs require *'an assessment of potential hazards and risks including but not limited to assessment of bushfire risk against the RFS Planning for Bushfire Protection 2019'*

The tolerable level of bushfire risk (i.e. bushfire from outside the site impacting the Project) to the asset will be determined by Neoen during detailed design. The BESS facility will be managed as an asset protection zone and an acoustic barrier would be provided on the boundary of the Project area to reduce noise. The acoustic barrier would be non combustible and would form a radiant heat shield. The height of the acoustic barrier would be determined by Neoen during detailed design work.

The radiant heat and forms of bushfire attack will be reduced by managing the BESS facility and providing an acoustic barrier. The bushfire assessment undertaken for this report have been based on publicly available data and desktop specialist investigations.

6. Bushfire Risk

Bushfires are a normal part of the landscape, and due to climate change are predicted to become more severe, more frequent and an increasingly common part of life in eastern Australia. Climate change modelling predicts increasing frequency and severity of fire events correlating with altered rainfall and drought patterns and increasing numbers of severe and intense heat events. As the dryness of more areas increases beyond levels historically considered 'normal', the footprint of areas with a propensity to burn are likely to increase.

Not all bushfires lead to loss of life or damage to assets. Bushfires of low to moderate intensity often pose little threat to life, property and community assets. Fire agencies are very successful at extinguishing low to moderate intensity fires before they lead to injury or death. However, bushfires that burn during dangerous conditions have a much higher risk of leading to loss of life and property and causing significant injuries and environmental impact. The risk is greatest when fire occurs on hot, dry windy days, and where ignition occurs in heavy fuels, and in steep terrain. These conditions present fire that can spread rapidly, crown in forests, produce powerful convection columns and create extensive spot fires ahead of the fire front. This often makes their control impossible until weather conditions moderate.

When fires reach a certain intensity, they are beyond the capacity of firefighting resources to suppress. Firefighting resources are allocated where they will be most effective at protecting lives, not necessarily where property losses are most likely. Firefighting resources are also unlikely to be allocated to property infrastructure and community assets that cannot be defended safely. The Project is in a remote area and may not be actively defended by fire fighters.

Radiant heat is the primary cause of death or serious injury in a bushfire, and this can impact people at the site or travelling to or from the site. In addition, wind conditions can cause branches and trees to fall and block access roads, making driving hazardous. Smoke and embers will make driving hazardous.

Fires burning under extreme conditions can behave erratically and with intensity well above what has been assessed in this report. This report takes a balanced approach to considering bushfire risk and has assumed a credible worst case fire scenario burning up to a Catastrophic Fire Danger Rating (FDR). It is possible that fires could burn through the area and impact the site and surrounds with significantly higher Forest Fire Danger Index (FFDI). The risk-based approach used in this assessment is that provided by PBP 2019 with a credible worst-case scenario of FFDI 100 or a 1:50 year bushfire event. Additional redundancy will be considered by Neoen during detailed design.

7. Assessment Methodology

This SSD project is subject to the DPIE's SEARs which requires 'an assessment of potential hazards and risks including but not limited to assessment of bushfire risk against the RFS Planning for Bushfire Protection 2019'. Section 2.4.2 of the PBP 2019 in relation to SSD projects states "Given the scale of SSI and SSD projects, the requirements of this document (PBP 2019) should still be applied and seeking advice from the NSW RFS is encouraged." To comply with PBP, SSD projects are required to comply with the aim and objectives of PBP 2019. The aim of PBP 2019 is to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment. The objectives are to:

- > afford buildings and their occupants protection from exposure to a bushfire
- > provide for a defensible space to be located around buildings
- > provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings
- > ensure that appropriate operational access and egress for emergency service personnel and occupants is available
- > provide for ongoing management and maintenance of bushfire protection measures (BPMs); and
- > ensure that utility services are adequate to meet the needs of firefighters.

PBP 2019 articulates the regulatory framework for new development in NSW, along with the relevant bushfire protection measures to be contemplated in the delivery of bushfire-resilient development design. The document provides detailed provisions for various types of development which is focussed at residential and Special Fire Protection Purpose development which are vulnerable uses such as schools, hospitals, aged care etc.

The Project is considered as 'other development' in PBP 2019. 'Other development' includes industrial, commercial and infrastructure development. PBP 2019 does not provide a framework for the Project in a meaningful way as the document is focussed on new residential development in Bushfire Prone Areas. However, 'other development' must satisfy the aim and objectives of PBP 2019. This assessment includes an analysis of the hazard, threat and subsequent bushfire risk to the Project and provides recommendations that satisfy the aims and objectives of PBP 2019.

PBP 2019 identifies the methodology to determine Bushfire Attack Levels (BAL) based on calculated radiant heat levels at a site. This assessment is based on mapping of vegetation formations and slope assessment in accordance with PBP 2019. This assessment is based on a detailed GIS analysis of the site with accessible public data layers utilising the following resources:

- > Planning for Bushfire Protection (RFS, 2019)

- > aerial mapping
- > detailed GIS analysis.

Bushfire risk as influenced by fire history and future mitigation strategies (e.g., hazard reduction burning) has no bearing on the determination of bushfire protection strategies for future development of the Project. This is due to the fact that PBP 2019 assesses bushfire threat based purely on vegetation and slope (i.e., hazard and not risk), making the assumption that a fire may occur at a near worst-case fire weather scenario and with maximum fuel loads.

In undertaking the report, Blackash has undertaken a landscape wide assessment of the bushfire risk and review of the Lithgow Bush Fire Risk Management Plan 2020 to gain an appreciation of the broader risk affecting the Project.

The bushfire landscape assessment considers the likelihood of a bushfire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.

The more detailed consideration of bushfire risk to the Project has followed the methodology outlined in accordance with PBP 2019. The following methodology is from PBP 2019 (p. 80) which has been used to determine the BAL at the site. The process to determine BAL is outlined below:

To Determine Bushfire Attack Level

- > Step 1: Determine vegetation formation in all directions around the building to a distance of 140 metres
- > Step 2: Determine the effective slope of the land from the building for a distance of 100 metres
- > Step 3: Determine the relevant FFDI for the council area in which the development is to be undertaken
- > Step 4: Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall of an asset
- > Step 5: Match the relevant FFDI, appropriate vegetation, distance and effective slope to determine the appropriate BAL using the relevant tables in PBP 2019.

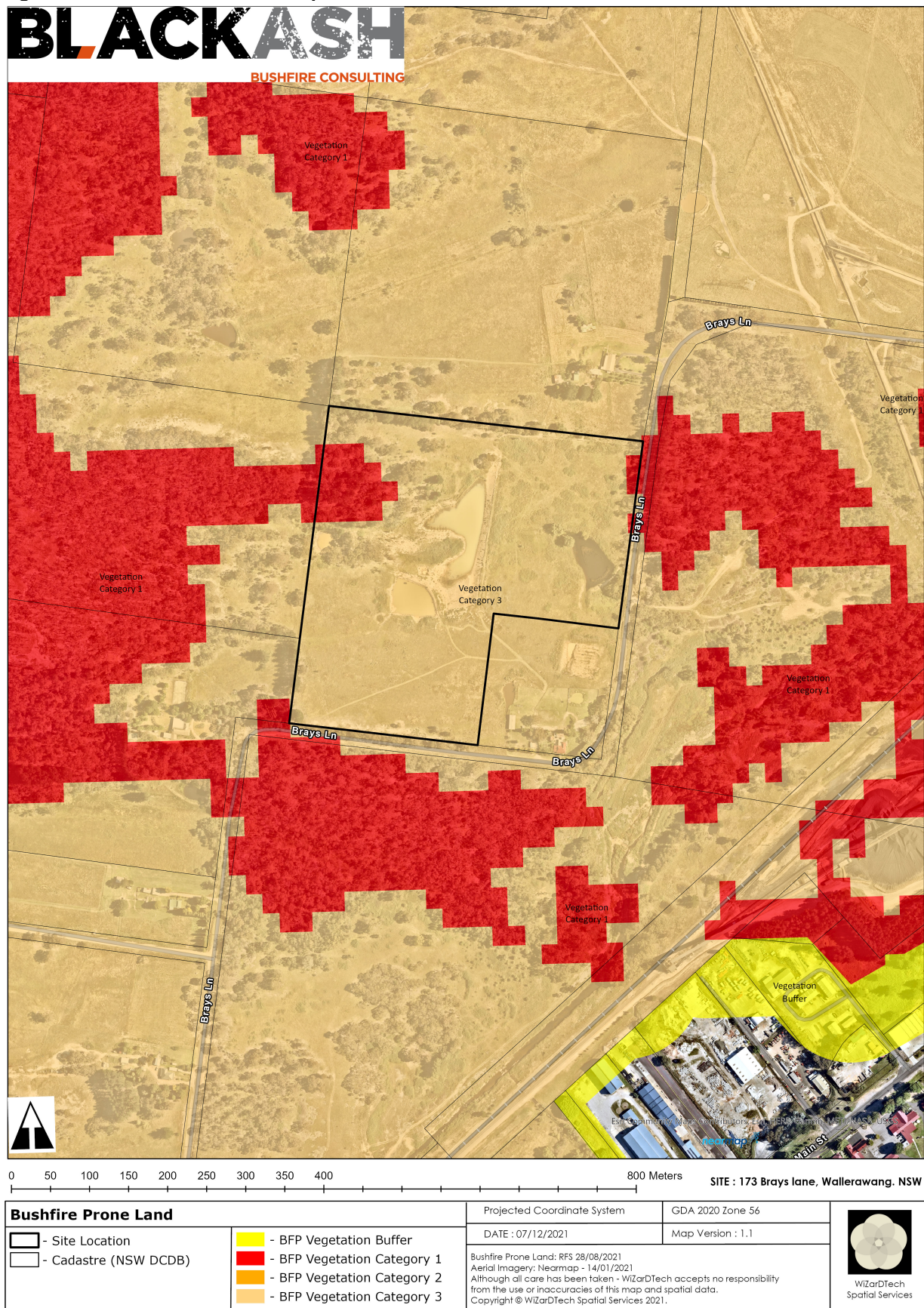
The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the Project site, and which determine the planning and building response of PBP 2019. A detailed assessment has been undertaken to determine the bushfire hazard and likely radiant heat at the Project.

7.1. Bushfire prone land

The identification of BPL in NSW is provided under Section 10.3 of the EP&A Act. The Site and Project are on designated BPL (Figure 4) and the surrounding grassland area is not managed which causes a bushfire risk. The Bush Fire Prone Land Maps provide the trigger for the consideration of bushfire matters for new development. Much of the Project Area is mapped as Category 3 Bush Fire Prone Land with the proposed transmission line traversing Category 1 land. Category 1 land surrounds the Site. Bush Fire Prone Land is considered an area of land that can support a bush fire or is likely to be subject to bush fire attack.

The grassland surrounding the Site is designated as being bushfire prone on the BFPL map and it is able to carry a bushfire. As such, the unmanaged grassland areas have been treated within this Bushfire Hazard Assessment as a hazard.

Figure 4 Bushfire Prone Land Map



7.2. Landscape Scale Bushfire Assessment

The Victorian Planning Permit Applications Bushfire Management Overlay – Landscape Scale Threat Assessment has been used as the framework to assess the broader landscape scale potential of bushfire affecting the Site. Blackash has expanded and modified the criteria to emphasise the priority of life safety, and the criticality of bushfire emergency management and evacuation planning as part of the broader landscape risk assessment process. NSW does not have a landscape scale risk assessment process for new development and the use of the modified Victorian model is appropriate for assessment purposes.

The Blackash Landscape Scale Assessment Tool (LSAT) combines quantitative and qualitative techniques which are scaffolded by the Landscape Scale Threat Assessment and associated documentation. The approach is shown in Table 1 and uses elements of the Bayesian decision making model and Expert Judgment techniques backed by data. Bayesian decision making has been used where there is both objective and subjective data to analyse, and decisions need to be made on the probability of successful outcomes where there are high levels of uncertainty. Expert Judgement has been used in the assessment and determination of the landscape scale risk.

The likelihood of a bushfire, its severity and intensity, and the potential impact on life and property varies depending on where a site is in the broader landscape. Landscape scale fires will place greater pressure on emergency response capability and will have a wider impact on roads and the length of time roads cannot be safely used. This will affect the likelihood of successful evacuations taking place across larger areas. Multiple factors have been considered for the landscape scale assessment. Key considerations in our assessment have included:

- > extent and continuity of vegetation
- > topography
- > prevailing winds
- > the potential fire run and area that is likely to be impacted by the fire
- > the impact on evacuation routes to safer places considering road networks, distances, and landscape factors
- > the location and exposure of the development to bushfire
- > the ability to seek bushfire shelter on site or at alternative locations
- > the extent of neighbourhood-scale damage the bushfire may produce.

The Landscape Scale Assessment Tool (LSAT) rates the Project bushfire risk as Moderate Threat (see Table 1). The Project is subject to extreme landscape scale bushfire risk.

Table 1 Landscape scale bushfire risk assessment

Parameter	Low Landscape Scale Threat		Moderate Landscape Scale Threat		High Landscape Scale Threat		Extreme Landscape Scale Threat	
Landscape Vegetation Threat	There is little vegetation beyond 150 metres of the site (except grasslands and low-threat vegetation) and will not result in neighbourhood scale destruction of property.	<input type="checkbox"/>	The type and extent of vegetation beyond 150m from the site may result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site.	<input type="checkbox"/>	The type and extent of vegetation beyond 150m is likely to result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site.	<input checked="" type="checkbox"/>	The type and extent of vegetation beyond 150m will result in neighbourhood-scale destruction as it interacts with the bushfire hazard on and close to a site.	<input type="checkbox"/>
Vegetation Location	Bushfire can only approach from one aspect and the vegetation is surrounded by a suburban, township or urban area managed in a minimum fuel condition.	<input type="checkbox"/>	Bushfire can only approach from one aspect and the site is within a suburban, township or urban area managed in a minimum fuel condition.	<input type="checkbox"/>	Bushfire can approach from more than one aspect and site is on the interface with a developed area managed in a minimum fuel condition.	<input type="checkbox"/>	Bushfire can approach from more than one aspect and fires have hours or days to grow and develop before impacting and/or site is surrounded by unmanaged vegetation.	<input checked="" type="checkbox"/>
Bushfire Behaviour	Extreme bushfire behaviour at the site is not possible given the broader landscape.	<input type="checkbox"/>	Extreme bushfire behaviour at the site is unlikely in this broader landscape.	<input type="checkbox"/>	Extreme bushfire behaviour at the site is likely due to the broader landscape.	<input type="checkbox"/>	Extreme bushfire behaviour is very likely due to the broader landscape.	<input checked="" type="checkbox"/>
Separation	Hazard separation between extreme bushfire hazard and buildings of greater than 100m.	<input type="checkbox"/>	Hazard separation between extreme bushfire hazard and buildings of 50-100m.	<input type="checkbox"/>	Hazard separation between extreme bushfire hazard and buildings of 20-50m.	<input checked="" type="checkbox"/>	Hazard separation between extreme bushfire hazard and buildings of <20m.	<input type="checkbox"/>
Shelter	Immediate access is available to a place that provides shelter from bushfire.	<input type="checkbox"/>	Access is readily available to a place that provides shelter from bushfire. This will often be the surrounding developed area.	<input checked="" type="checkbox"/>	Access to an appropriate place that provides shelter from bushfire is not certain.	<input type="checkbox"/>	Access to an appropriate place that provides shelter from bushfire is not possible unless there is a public bushfire refuge or private shelter.	<input type="checkbox"/>
Vegetation Corridors	Vegetation corridors within the site do not enable fire to enter and move through the site by a continuous fire path from the primary fire source feature.	<input type="checkbox"/>	Vegetation corridors within the site are unlikely to enable fire to enter and move through the site by a continuous fire path from the primary fire source feature.	<input type="checkbox"/>	Vegetation corridors within the site may enable fire to enter and move through the site by a continuous fire path from the primary fire source feature.	<input type="checkbox"/>	Vegetation corridors provide for passage of fire to enter and move through the site.	<input type="checkbox"/>
Evacuation	Good, multiple route evacuation is possible and connects with the public road network.	<input type="checkbox"/>	Evacuation to alternate location that provides life safety refuge is <200m.	<input type="checkbox"/>	Evacuation to alternate location that provides life safety refuge is 200m – 10km.	<input checked="" type="checkbox"/>	Evacuation to alternate location that provides life safety refuge is >10km.	<input type="checkbox"/>
Isolation	Seamless integration with existing settlement – no effect on evacuation.	<input type="checkbox"/>	Short bushland pinch points that may restrict access temporarily or carry fire across roads. Unlikely impact on evacuation.	<input type="checkbox"/>	Pinch points that are likely to restrict access along evacuation routes for short periods (15-30 minutes) and carry fire across roads.	<input checked="" type="checkbox"/>	Large areas of bushland or multiple pinch points along evacuation routes that could block evacuation routes for extended time.	<input type="checkbox"/>
Access	Site is within urban area. public road network with multiple access / egress routes.	<input type="checkbox"/>	Access to public road network with multiple access / egress routes.	<input checked="" type="checkbox"/>	More than one access / egress routes.	<input type="checkbox"/>	Only one access / egress route.	<input type="checkbox"/>
TOTAL		0		2		5		2
Overall Threat Rating:		EXTREME Landscape Scale Threat						

7.3. Bushfire Risk Management Plan

The *Lithgow Bush Fire Risk Management Plan 2020* (Risk Plan) is a strategic document that identifies community assets at risk and sets out a five-year program of coordinated multi-agency (state and local) treatments to reduce the risk of bushfire to the assets. The Risk Plan (p. 8) identifies the typical climate in the Lithgow Bushfire Management Committee (BFMC) (in which the Site and Project are located) notes:

The typical average climate in the Lithgow BFMC area is cold to very cold winters (mean temps 1.3 °C-11.2 °C) followed by hot dry summers (11.5 °C-24.9 °C) with average rains experienced per month throughout the year, average annual rainfall is 862mm. The bush fire season generally runs from October to March yet has, on occasion been extended when the weather conditions have created a landscape more susceptible to fire occurrences and expansion.

The weather conditions associated with the bush fire season in the Lithgow BFMC area are high daytime temperatures and low relative humidity associated with strong gusty north westerly winds. Dry lightning storms occur frequently during the Bush Fire Danger Period. January is usually the month with the highest rainfall volume and maximum temperatures.

The Risk Plan follows the RFS guidelines for the assessment of bushfire risk. Identifying the level of bushfire risk firstly involved identifying important community assets considered to be at risk from bushfire in the Lithgow BFMC area, and then assessing the likelihood and consequence ratings. The risk planning process requires that all asset types assess the likelihood of a bushfire occurring. This involves considering fire history, including ignition cause and patterns, known fire paths, access, containment potential and potential fire run (size of the vegetated area).

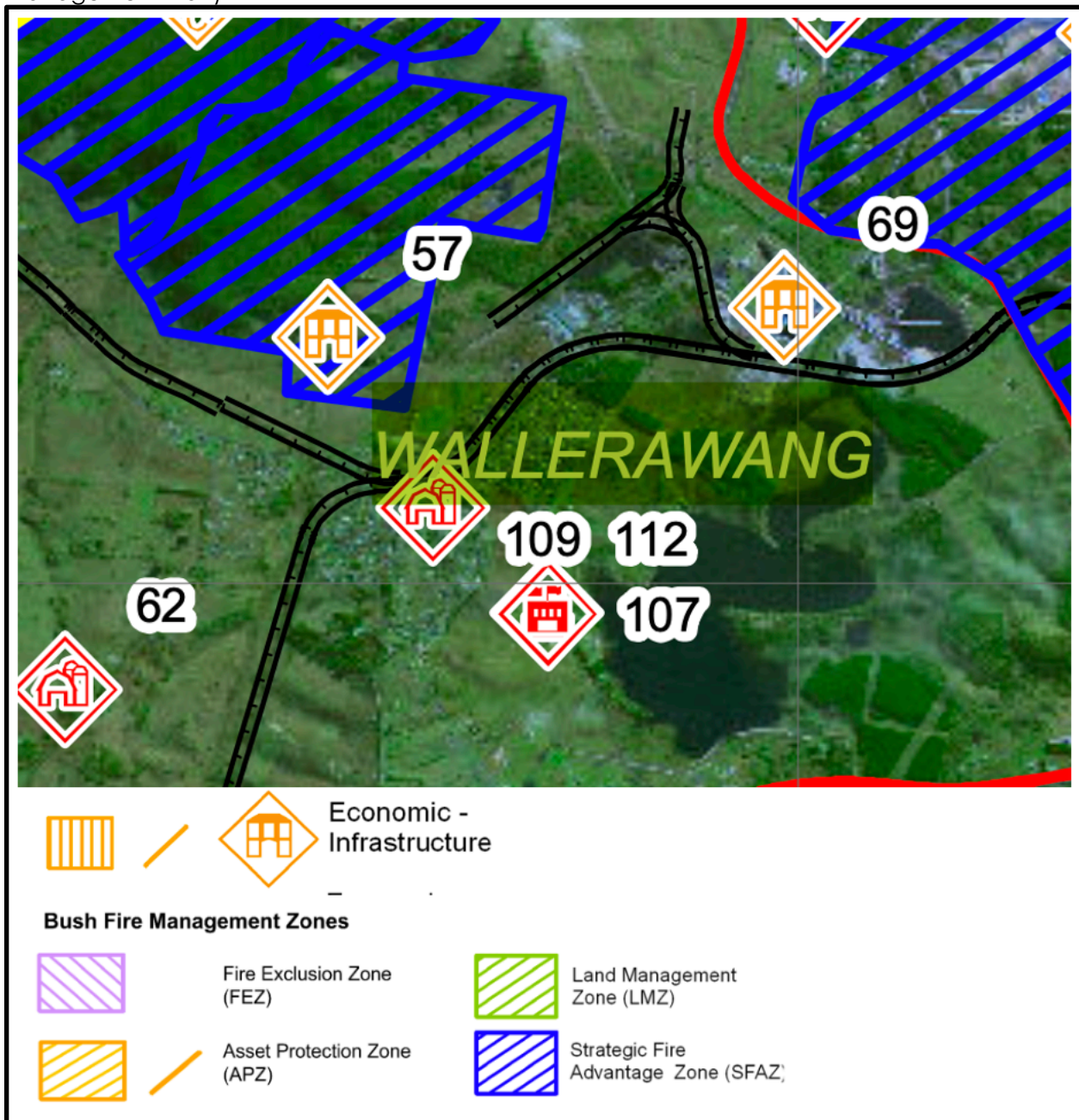
The Risk Plan does not identify the Project (see Figure 5) but does identify the broader context as being a Strategic Fire Advantage Zone. The Risk Plan (p. 17) notes (see Table 2) the following for the SFAZ:

Table 2 Bush Fire Management Zones: Purpose, objectives and characteristics (source Lithgow Risk Plan p. 17)

Zone	Purpose	Suppression Objective	Zone Characteristics
Strategic Fire Advantage Zone	<p>To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires and reduce the potential for spot fire development.</p> <p>To aid containment of wildfires to existing management boundaries.</p>	<p>To improve the likelihood and safe use of:</p> <p>Parallel Attack suppression strategies within the zone.</p> <p>and/or</p> <p>Indirect Attack (back burning) in high to very high fire weather</p>	<p>Zone width related to suppression objectives and dependent upon:</p> <ul style="list-style-type: none"> • Topography • Aspect • Spotting propensity • Location of adjacent firebreaks • Mosaic pattern of treatment Assess Overall Fuel Hazard (OFH) once vegetation communities

Zone	Purpose	Suppression Objective	Zone Characteristics
		<p>conditions within the zone.</p> <p>To reduce the likelihood of: Crown fire development within the zone. and/or</p> <p>Spot fire ignition potential from the zone.</p>	<p>reach minimum fire thresholds within this plan.</p> <p>Management practices should aim to achieve mosaic fuel reduction patterns so that the majority of the SFAZ has an OFH of less than high.</p>

Figure 5 Extract from Bushfire Risk Management Plan for the Site (source Lithgow Bushfire Risk Management Plan)



7.4. Bushfire History

The Site, Project Area and broader landscape have an assumed and documented history of bushfires. Figure 6 shows the fire history in the vicinity of the Site. No fire records directly affect the Site. However, the Gaspers Mountain bushfire was to the north and east of the Site (Figure 6). On 26 October 2019, a fierce electrical storm passed through the Wollemi National Park. One lightning strike ignited a tree near Gaspers Mountain and started a huge bushfire over the following 79 days and earned the name the Gaspers Mountain Megafire which is Australia's largest bushfire.

The Risk Plan states (p. 10) states:

The Lithgow BFMC area has, on average, 128 bush/grass fires per year, of which an average of 3 per year may be considered to be major fires (>20ha).

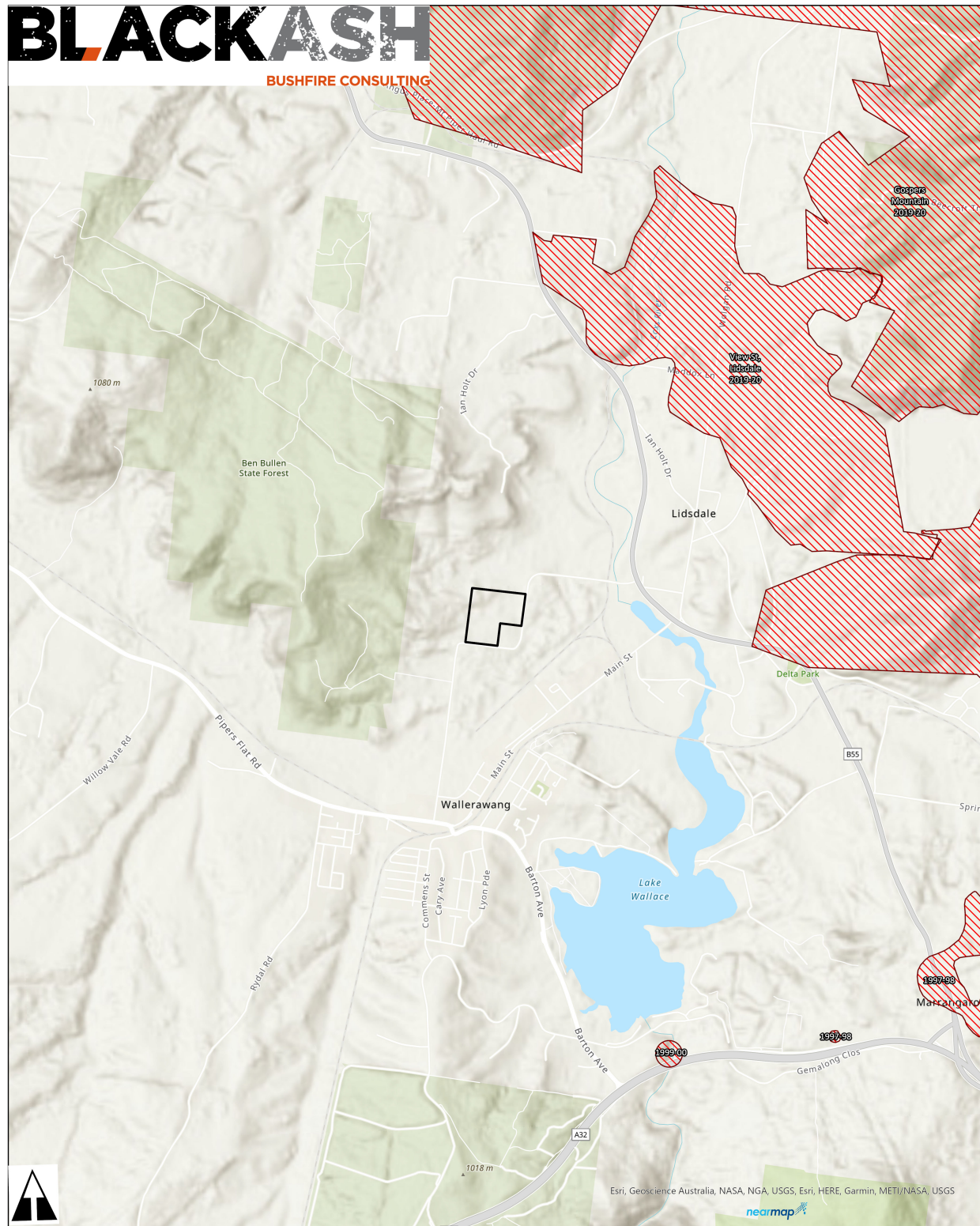
October 2019 and 2013 fire activity included two significant fire events for the Lithgow BMC area. The Gosper's Mountain Fire commenced in October 2019 in a remote area of the Wollemi National Park. This fire burnt an area of 512,626ha, of which 225,882 is within the Lithgow BFMC area. This is the largest recorded fire in the Lithgow BFMC area. The State Mine Fire in October 2013 commenced at Marrangaroo and impacted 56,590 hectares as it spread north, east and south of Lithgow township. The impact of these fires have been considered in the development of this BFRMP.

The main sources of ignition for bush/grass fires in the Lithgow BFMC area are:

- *Lightning activity (mainly associated with late spring and early summer);*
- *Escaped fires from legal burning activities by private landowners/occupiers;*
- *Illegal / careless burning activities by private landowners/occupiers;*
- *Most commonly in grasslands and forested areas adjacent to villages.*

While not having been subject to direct bushfire attack, the Site and surrounds has a history of high intensity and very large bushfires.

Figure 6 Fire History



0 0.5 1 1.5 2 2.5 5 Kilometers SITE : 173 Brays lane, Wallerawang, NSW

Fire History		Projected Coordinate System	GDA 2020 Zone 56
<div> <div></div> - Site Location </div> <div> <div></div> - Wildfire </div> <div> <div></div> - Prescribed Burn </div>		DATE : 07/12/2021	Map Version : 1.0
		Fire History - NPWS 28/10/2021 Aerial Imagery: Nearmap - 14/01/2021 Although all care has been taken - WizarDtech accepts no responsibility from the use or inaccuracies of this map and spatial data. Copyright © WizarDtech Spatial Services 2021.	



7.5. Fire Weather

The fire weather is dictated by PBP 2019 and assumes a credible worst-case scenario and an absence of any other mitigating factors relating to aspect or prevailing winds. The Forest Fire Danger Index (FFDI) measures the degree of danger of fire in Australian vegetation.

For the purposes of PBP 2019, the FFDI required to be used for development assessment purposes is based on local government boundaries. The Project Area has a FFDI of 100 as required by the RFS and PBP 2019.

It may be possible that days of higher FFDI may be experienced at the Project Area. This may result in fire situations where conditions challenge survivability of buildings and their occupants. The framework provided for by PBP 2019 has been used in this assessment.

7.6. Bushfire Hazard Assessment

The vegetation formations (bushfire fuels) and the topography (effective slope) combine to create the bushfire threat that may affect bushfire behaviour at the site, and which determine the planning response. An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as setbacks from the hazard.

7.6.1. Vegetation Structure

Predominant vegetation is classified by structure or formation using the system adopted by David Keith (2004) and by the general description using PBP 2019. Vegetation types give rise to radiant heat and fire behaviour characteristics. The predominant vegetation has been determined for the Site over a distance of at least 140 metres in all directions from the proposed Site boundary or key assets on the Site. Where a mix of vegetation types exist, the type providing the greater hazard to the Project Area is said to predominate.

The land surrounding the Site is grassland and Southern Tableland Dry Sclerophyll Forest (Figure 7). Inside the BESS facility would be managed to Asset Protection Zone Standards and would be managed land.

7.7. Slopes Influencing Bushfire Behavior

The slope assessment (Figure 7) for the Site has been undertaken in the GIS analysis and is a component of determining the BAL rating. The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux. The effective slope is the slope of the ground under the hazard (vegetation). It is not the slope

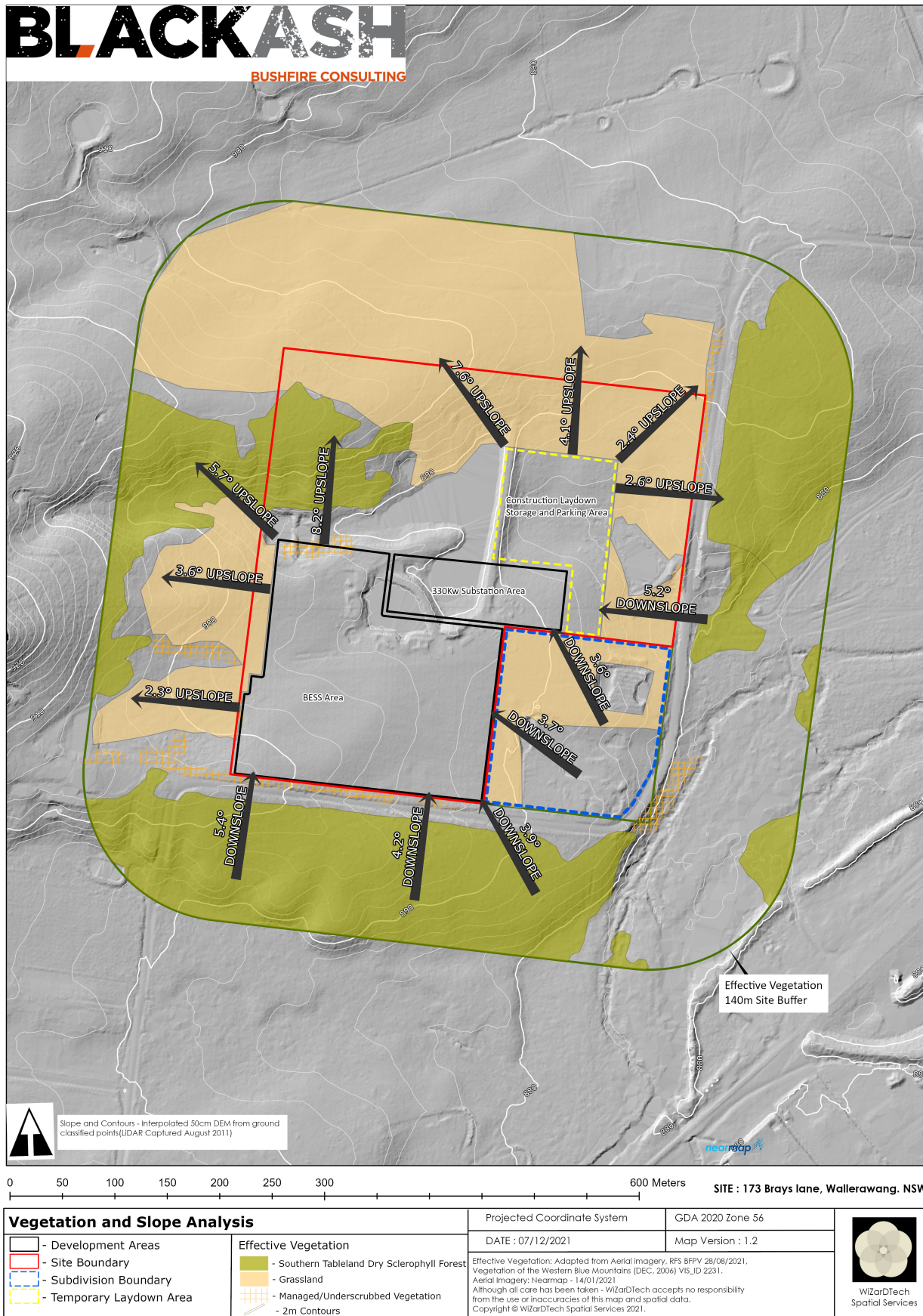
between the vegetation and the asset (slope located between the asset and vegetation is the site slope).

The effective slope is considered to be the slope under the vegetation which will most significantly influence the bushfire behaviour for each aspect. This is usually the steepest slope which has been used in this assessment. A detailed slope analysis has been completed at Figure 7. The slopes to the west and north are upslope. Slopes to the east and south are up to 5 degrees downslope.

Figure 7 Vegetation and slope



Figure 8 Detailed slope



7.8. Setbacks from Hazard and Bushfire Attack Levels

The predominant (direct) threat to the BESS facility is from forest and grassfire being driven by north westerly or westerly winds into the Site. The risk posed by forest fire to the Site is significant with potential for large runs of uncontrolled fire through the landscape. The vegetation surrounding the BESS facility is mapped in the Risk Plan (see Section 7.3) as a SFAZ with the management objective to:

- *To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bush fires, and reduce the potential for spot fire development*
- *To aid containment of wildfires to existing management boundaries.*

The forest vegetation is interspersed with grassland vegetation. Grass fires is different to that of fires in other vegetation types. Grass fires burn at a higher intensity and spread more rapidly with a shorter residence time. Embers produced by grass fires are smaller and fewer in number.

The Bushfire Attack Levels (BAL) for the Site have been determined in accordance with PBP 2019 and the *Australian Standards for Construction of Buildings in Bushfire Prone Areas (AS3959)*. The BAL is a means of measuring the severity of a building or assets potential exposure to ember attack, radiant heat and direct flame contact (see Table 3).

In the Building Code of Australia through AS3959 and in PBP, the BAL is used as the basis for establishing the requirements for construction to improve protection of building elements and to understand the radiant heat exposures for people in the open. The impact of the radiant heat associated with the BAL is shown in Table 3. Figure 9 shows the effects of the various forms of bushfire attack.

Table 3 Bushfire Attack Levels (source AS3959 p. 34)

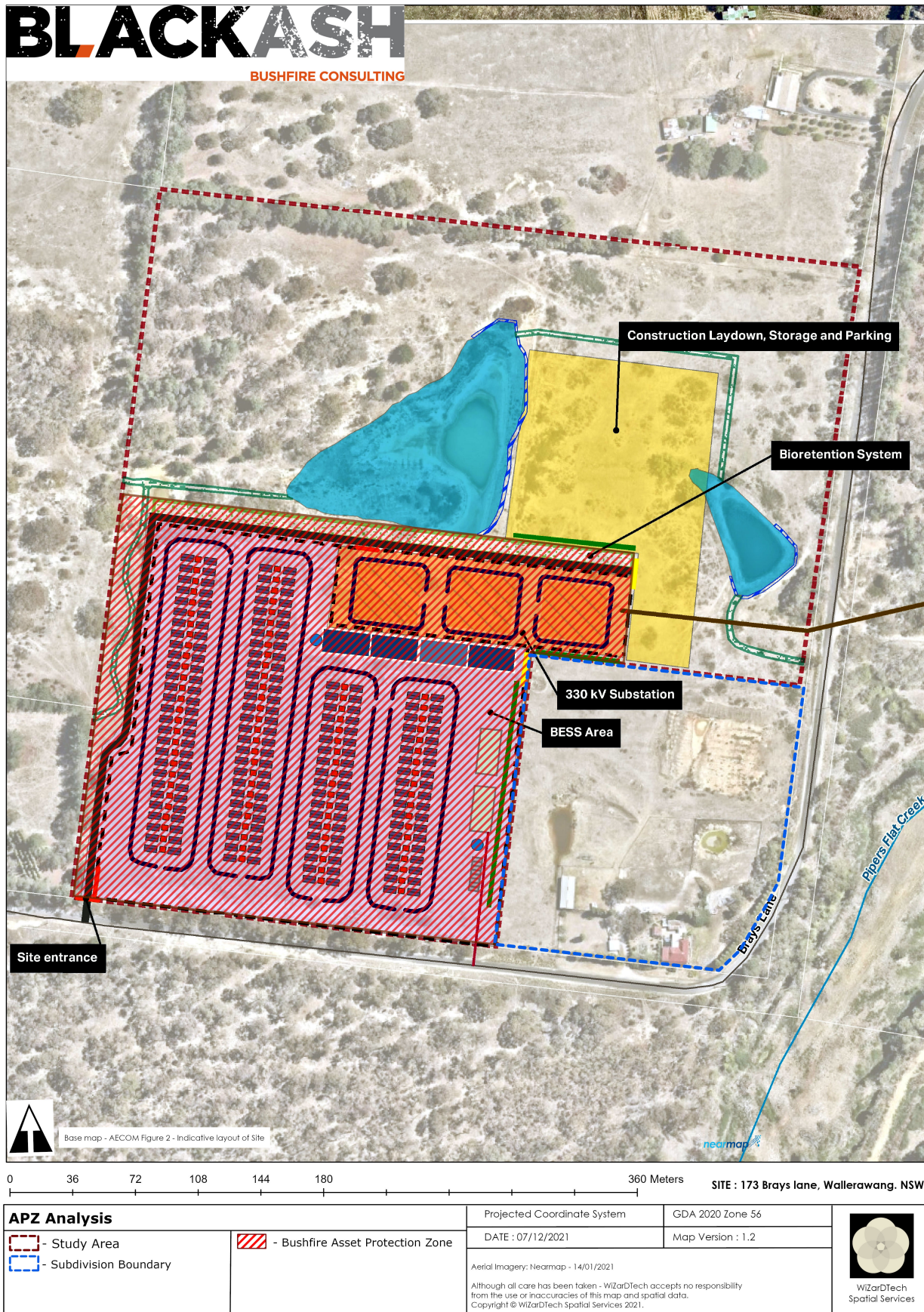
Bushfire Attack Level	Radiant Heat Flux exposure	Description of predicted bushfire attack and levels of exposure
BAL - Low	NA	There is insufficient risk to warrant specific construction requirements
BAL – 12.5	<12.5 kW/m ²	Ember attack
BAL – 19	>12.5kWm ² - <19kWm ²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux

Bushfire Attack Level	Radiant Heat Flux exposure	Description of predicted bushfire attack and levels of exposure
BAL – 29	>19kWm ² - <29kWm ²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux
BAL – 40	>29kWm ² - <40kWm ²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing radiant heat flux with the increased likelihood of exposure to flames
BAL – Flame Zone	>40kWm ²	Direct exposure to flames from the fire front in addition to radiant heat flux and ember attack.

The BAL assessment (Figure 9) has been completed based on the current boundary of the BESS facility and that all vegetation within the BESS facility would be managed as an APZ. The BAL will be determined during detailed design when further detail on the acoustic walls is known. This will help attenuate/ reduce the radiant heat received within the BESS facility.

The tolerable risk of radiant heat at the assets will be determined by Neoen during detailed design work. Subsequent mitigation strategies depending on the vulnerability will then be put into place. The actual location of heat-sensitive components within the BESS facility would not be confirmed until detailed design.

Figure 9 Asset Protection Zones



8. Assessment and mitigation of potential impacts – construction

This section presents an assessment of the potential impacts that could not be avoided or minimised and are expected to occur as part of construction.

The key potential impacts relating to [bushfire] during construction include:

- on-site ignitions which may result in a fire escaping to the surrounding land and spreading in an uncontrolled manner causing damage to assets external to the site
- Occupational fire risk being the risk of workers being caught by out-of-control bushfire impacting the site or while using the access and egress routes.
- provision of access for first responders
- water for firefighting - given the remote location, an adequate supply of water is essential for first response firefighting purposes. The site contains a number of farm dams, some of which will be retained and also has access to the town's potable water supply if required.
- emergency management during construction

8.1. On-site ignitions

Construction activities pose risks for on-site ignitions which may result in a fire escaping to the surrounding land. These mainly arise from hot work, fire risk work, vegetation clearing and management and use of vehicles on site.

Hot work (activities involving high temperatures) and fire risk work (activities involving heat or with the potential to generate sparks) from maintenance activities may cause fire ignition. These works will be managed under a Hot Work and Fire Risk Work procedure, with measures including suspension of activities on days of elevated fire danger. Certain maintenance activities, including hot works, are prohibited by law on any day declared to be a Total Fire Ban (TOBAN). Essential work during operations may be completed on a TOBAN providing it complies with the Hot Work and Fire Risk Work procedure and any exemption provided by the NSW RFS.

All land managers have responsibilities to prevent the occurrence and spread of fire on or from their land. Escaped fire may result in legal action and punitive damages. Reputational risk is an issue to be managed to ensure that contractors do not initiate an out-of-control fire that impacts surrounding assets and values.

The Project and associated APZ is in existing managed and cleared lands. The BESS facility would be managed as an APZ.

8.2. Occupational fire risk

Considering the bushfire risk and recent fire history to the north of the Site, a key risk management activity during construction would be to not expose people to unreasonable risk. The most effective way to reduce loss of life risk is to not occupy the Project Area on above established thresholds for FFDI and fires within the surrounding landscape. This would need to occur with an understanding of the evacuation time from the Site and potential for fire to burn through the evacuation roads.

Due to the remote location of the Site, it is recommended that non-essential works be postponed on days with Fire Danger Rating (FDR) of Severe or greater. This will reduce the risk to personnel by out-of-control bushfire impacting the Site or access and egress routes.

8.3. Emergency management during construction and operation

The design, operation and maintenance of the Project will need to consider and provide vegetation management within the asset protection zone around the BESS facility that should mitigate the impact of uncontrolled bushfire up to an FFDI of 100.

A comprehensive Bushfire Emergency Management and Evacuation Plan would be completed for the construction and operational phase of the Project. The Bushfire Emergency Management and Evacuation Plan for the construction phase would be in place prior to the commencement of construction at the Project. The bushfire evacuation procedures should be completed in accordance with NSW Rural Fire Service *Guide to Developing A Bushfire Emergency Management Plan*. On-site and off-site evacuation procedures would be included.

The focus of the Bushfire Emergency Management and Evacuation Plan would be to put in place strategies that do not expose the workers to the effects of bushfire attack and focus on eliminating exposure to bushfire threat. The management team will be able to determine the safest options regarding forecast bushfire risk and providing for early evacuation from Site if there are fires in the vicinity.

9. Assessment and mitigation of potential impacts – operation

This section presents an assessment of the potential impacts that could not be avoided or minimised and are expected to occur as part of operation. Impacts that have been avoided through design are

described where relevant within the EIS. The key potential impacts relating to bushfire during operation include:

- on-site ignitions which may result in a fire escaping to the surrounding land and spreading in an uncontrolled manner causing damage to assets associated with the substation or external to the site
- occupational fire risk being the risk of workers being caught by out-of-control bushfire impacting the site or while using the access and egress routes.
- provision of access for first responders
- water for firefighting - given the remote location, an adequate supply of water is essential for first response firefighting purposes.
- emergency management during operation
- disruption to power supply if the site is impacted by fire
- loss of critical infrastructure.

10. On site ignitions

Hot work (activities involving high temperatures) and fire risk work (activities involving heat or with the potential to generate sparks) from maintenance activities may cause fire ignition. These works would be managed under a Hot Work and Fire Risk Work procedure, with measures including suspension of activities on days of elevated fire danger.

10.1. Disruption to power supply if the site is impacted by fire

Uncontrolled bushfire has the potential to impact the BESS facility and associated infrastructure. Bushfire impact could damage or destroy the BESS infrastructure to an extent that can stop the transmission of power for the Site and cause power outage. Mitigation measures will be considered in the detailed design.

10.2. Loss of critical infrastructure.

Uncontrolled bushfire has the potential to impact the BESS facility and associate infrastructure directly. Bushfire impact can damage or destroy the batteries, transmission lines, other critical infrastructure or the transmission network that can stop the transmission of power and cause power outage. Bushfires can cause the destruction of assets that are essential to power transmission.

10.3. APZ Maintenance

Ongoing vegetation management would be in accordance with Operational Vegetation Monitoring and Management Procedures which would include routine inspections of the Project. Ongoing management would fall under an inspection and maintenance program, which would include identification, recording, prioritisation and rectification of defects. These vegetation management standards are essential to maintain the safe and effective functioning of the transmission connection, and to minimise the risk of fire ignition from vegetation coming into close proximity to the BESS facility.

APZs will be managed in accordance with RFS *Standards for Asset Protection Zones* to provide minimal ground fuel to support a fully developed bushfire.

11. Mitigation Measures

The following recommendations are provided to mitigate the impact of bushfire as per Table 4.

Table 4 Mitigation measures – design and pre-construction

ID	Identified mitigation measure	Applicable location (s)
BF1	<ul style="list-style-type: none"> > The construction site and BESS Facility would be managed as an APZ in accordance RFS Standards for Asset Protection Zones. At the commencement of building works the entire construction site would be managed as an APZ as outlined within Appendix 4 of 'Planning for Bushfire Protection 2019' and the NSW Rural Fire Service's document 'Standards for asset protection zones'. > APZ requirements are: <p>Trees</p> <ul style="list-style-type: none"> > tree canopy cover should be less than 15% at maturity; > trees at maturity should not touch or overhang the building; > lower limbs should be removed up to a height of 2m above the ground; > tree canopies should be separated by 2 to 5m; and > preference should be given to smooth barked and evergreen trees. <p>Shrubs</p> <ul style="list-style-type: none"> > create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided; > shrubs should not be located under trees; > shrubs should not form more than 10% ground cover; and > clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation. <p>Grass</p> 	<ul style="list-style-type: none"> > As per Figure 9

ID	Identified mitigation measure	Applicable location (s)
	<ul style="list-style-type: none"> > grass should be kept low (as a guide grass should be kept to no more than 100mm in height); and > leaves and vegetation debris should be removed. 	
BF2	<ul style="list-style-type: none"> > Vulnerable buildings and/or critical assets would be constructed to appropriate BAL levels in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas (AS3959). This will be refined during detailed design. 	
BF3	<p>The following recommendations regarding water are provided:</p> <ul style="list-style-type: none"> > A minimum static water supply of 20,000 litres should be provided at the Site for firefighting purposes. The firefighting water can be available in single tank or a number of tanks around the Site > A 65 millimetres metal Storz outlet with a gate or ball valve shall be provided as an outlet on each of the tanks > The water tank, if located above ground, shall be of a non-combustible material > Underground tanks shall have an access hole of 200 millimetres to allow tankers to refill direct from the tank. A hardened ground surface for truck access is to be supplied within 4 metres of the access hole > All associated above ground fittings to the tank shall be non-combustible. > Firefighting equipment will be maintained at and/or accessible to all active construction site during the declared bushfire danger season, and site personnel trained in its use. Equipment should be appropriate to the activities being conducted and the fire danger at the time of works, but as a minimum must include: <ul style="list-style-type: none"> — 4WD Striker with slip-on water unit, equipped with diesel pump and hoses — Extinguishers — Knap sacks — Hand tools (e.g., fire rakes). 	
BF4	<ul style="list-style-type: none"> > A comprehensive Bushfire Emergency Management and Evacuation Plan would be completed for the construction and operational phase of the Project (see Section 12). > The bushfire evacuation procedures would be completed in accordance with NSW Rural Fire Service Guide to Developing A Bushfire Emergency Management Plan 	
BF5	<p>Provide access for Category 1 fire appliances</p> <ul style="list-style-type: none"> > the trafficable surface leading to the fence will have width of 4 metres except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed. 	<ul style="list-style-type: none"> > Around the perimeter of the BESS Facility to and from the Project

ID	Identified mitigation measure	Applicable location (s)
	<ul style="list-style-type: none"> > curves have a minimum inner radius of 6 metres. The minimum distance between inner and outer curves is 6 metres. > trail surfaces and crossing structures are capable of carrying vehicles with a gross vehicle mass of 15 tonnes and an axle load of 9 tonnes. > the maximum grade of a trail is not more than 15 degrees. > the crossfall of the trail surface is not more than 6 degrees. > A minimum vertical clearance of 4 metres is provided above the surface of the trafficable surface clear of obstructions. > capacity for passing is provided every 250 metres comprising: <ul style="list-style-type: none"> — a widened trafficable surface of at least 6 metres for a length of at least 20 metres; or — a 6 metre wide and 8 metre long area clear of the trafficable surface with a minimum inner curve radius of 6 metres and minimum outer radius of 12 metres. 	

Table 5 Mitigation measures – construction

ID	Identified mitigation measure	Applicable location (s)
BF6	> The construction area within the Site will be managed as an APZ.	
BF7	> Maintain access for Category 1 fire appliances	Around the perimeter of the construction area and to and from the Site
BF8	<ul style="list-style-type: none"> > The provision of water for firefighting purposes. > A minimum static water supply of 20,000 litres would be provided at the site for firefighting purposes. The firefighting water can be available in a single tank or several tanks around the Project site. 	
BF9	> Implementation of the Bushfire Emergency Management and Evacuation Plan for the construction phase of the Project.	
BF10	<ul style="list-style-type: none"> > Hot work (activities involving high temperatures) and fire risk work (activities involving heat or with the potential to generate sparks) from construction activities may cause fire ignition. These works will be managed under a Hot Work and Fire Risk Work procedure, with measures including suspension of activities on days of elevated fire danger. > Certain construction activities, including hot works, are prohibited by law on any day declared to be a TOBAN. > Essential work during construction may be completed on a TOBAN providing it complies with the Hot Work and Fire Risk Work procedure exemption from the NSW RFS. 	
BF11	> Non-essential works be postponed on days with Fire Danger Rating (FDR) of Severe or greater.	

Table 6 Mitigation measures – operation

ID	Identified mitigation measure	Applicable location (s)
BF11	> Implementation of the Bushfire Emergency Management and Evacuation Plan for the operational phase of the Project.	
BF12	> The BESS facility would be managed as an APZ in accordance with Figure 4.7 as outlined within Appendix 4 of 'Planning for Bushfire Protection 2019' and the NSW Rural Fire Service's document 'Standards for asset protection zones'.	
BF13	> The BESS facility would be managed as an APZ.	
BF14	> Access for Category 1 fire appliances would be maintained.	Around the perimeter of the BESS facility and to and from the BESS facility

12. Emergency Management

The proposed development initially involves clearing and construction of the Site, and then ongoing operation and maintenance works. Throughout these stages, the development will consider the safety of staff and contractors, and any attending emergency service workers in the event that a bushfire impacts the Site.

A Bushfire Emergency Response Plan should be prepared for the Project that provides the following:

- addresses foreseeable on-site and off-site fire events
- confirmation of acceptable access and emergency access provisions
- evacuation triggers and protocols (evacuate or shelter in place)
- confirmation of water supplies and accessibility and any other response/protection measures
- suppression response strategies and tactics, including aerial suppression options/management
- clearly state work health safety risks and procedures to be followed by fire-fighters, including
 - personal protective clothing
 - minimum level of respiratory protection
 - minimum evacuation zone distances
 - any other risk control measures required to be followed by fire-fighters
- Identify stakeholders (emergency response agencies, contractors, neighbours)

Contact should be made by the site operator with the Local Emergency Management Committee to establish emergency management procedures with relevant authorities for the safety hazards presented by the Site. The operator of the Project should brief the local volunteer fire brigades and neighbouring farmers at appropriate intervals on safety issues and procedures.

13. Conclusion

This report is a Bushfire Risk Assessment that addresses the potential impacts associated with bushfire risk and provides the required information to planning for the construction and operation of the Project.

This Bushfire Risk Assessment has been completed for the Project taking into account the requirements of PBP 2019, in accordance with the SEARs issued for the Project. The Project is within Bushfire Prone Land and bushfire risk is a key consideration for the Project. The report has undertaken a landscape scale bushfire risk assessment and site-specific risk assessment.

The bushfire season in the Project Area generally runs from October to March, although commencement has been declared as early as August. Days of elevated fire danger are frequent and mostly occur during August to April. Dry electrical storms and north-westerly winds are common during the fire season and the area surrounding the Site has a history of bushfires. Substantial bushfires can and do occur in the area. Appropriate measures must be in place to mitigate the bushfire risks from and to the Project and mitigation measures have been recommended in this report for the Project.

Appendix 1 References

Councils of Standards Australia AS3959 (2009) *Australian Standard Construction of buildings in bushfire-prone areas*

Lithgow BFMC (2020) *Lithgow Bush Fire Management Committee Bush Fire Risk Management Plan.*

ISSC (2012) ISSC 20 – *Guideline for the Management of Activities within Electricity Easements and Close to Electricity Infrastructure*. Industry Safety Steering Committee.

https://energy.nsw.gov.au/sites/default/files/2018-09/ISSC-20-Electricity-Easements_0.pdf.

Keith, David (2004) *Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT*. The Department of Environment and Climate Change

McAneney, J, Chen, K, (2004) 'Quantifying Bushfire Penetration into Urban Areas in Australia', *Geophysical Research Letters* <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2004GL020244>

NSW Rural Fire Service (2015) *Guide for Bushfire Prone Land Mapping*

NSW Rural Fire Service (2019) *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Homeowners*. Australian Government Publishing Service, Canberra

NSW Government (1979) *Environmental Planning and Assessment Act 1979*. NSW Government Printer

NSW Department of Justice Office of Emergency Management (2018) *NSW Critical Infrastructure Resilience Strategy*