APPENDIX N TECHNICAL MEMO – BUSHFIRE RISK ASSESSMENT

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TECHNICAL MEMO – BUSHFIRE RISK ASSESSMENT

TO	Mark Vile
DATE	4 April 2025
REFERENCE	0657132
SUBJECT	Bendemeer Solar Farm

The Bendemeer Solar Farm Environmental Impact Statement (EIS) was publicly exhibited for comment by the NSW Department of Planning and Environment (DPE) between 27 July 2023 and 23 August 2023. During this period, 244 submissions relating to the Project EIS were received from government agencies, local council, organisations and members of the public. Of these, there were:

- six (6) submissions received regarding access concerns in the event of a fire;
- twelve (12) submissions received regarding concerns of increased fire risk to the project; and
- five (5) submissions that were raised voicing concerns regarding hazards from fire within the BESS.

A Submissions Report has been prepared to respond to matters raised in submissions and an Amendment Report has been prepared to assess impacts associated with changes to the Project since EIS exhibition.

This technical memo has been prepared to support the Amendment Report and confirms that the project amendments and all bushfire mitigations are generally consistent with the Bushfire Assessment Report submitted as Appendix Q of the EIS (Ember Bushfire Consulting, May 2023). It has been structured to provide:

- a brief comparison between the Project presented in the EIS and the proposed amendment, as relevant to the bushfire assessment;
- an overview of bushfire risk factors including bushfire prone land mapping, vegetation hazards, and fire history; and
- recommended mitigation strategies during construction and operation of the solar farm including the provision of defendable space around infrastructure, access requirements and preparation of a Bushfire Emergency Management and Operations Plan.

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It contains management and mitigation measures in accordance with NSW Rural Fire Service (RFS) Planning for Bushfire Protection Guidelines (2019). It does not assess the individual design or engineering components of the Project (or other infrastructure) but does consider locations of the infrastructure relative to identified hazards and requirements for separation distances relative to these. Electrical hazards including battery fires, and transformer fires are addressed separately as part of the Preliminary Hazard Assessment (Riskcon, 2025) and are not considered in this memo.

PROJECT DESCRIPTION

The Project is situated about 1.8 kilometres (km) east of the Bendemeer town centre, represented by the Bendemeer Hotel, and is located 46 km (by road) north-east of the Tamworth Post Office. The Project is located within the New England Renewable Energy Zone (REZ), in the Tamworth Regional Council Local Government Area (LGA) in the New England Region of NSW. The Project Area extends across an area of approximately 606.9 hectares (ha), over three (3) freehold land parcels, on land that is predominately used for agricultural activities.

The Project will involve the construction, operation and decommissioning of a photovoltaic (PV) solar farm, Battery Energy Storage System (BESS) and associated infrastructure. The Amended Project Layout is shown in **Figure 1**. **Table 1** provides a comparison between the Project as presented in the EIS and the proposed amendment, as relevant to the bushfire assessment.

TABLE 1 AMENDED PROJECT SUMMARY

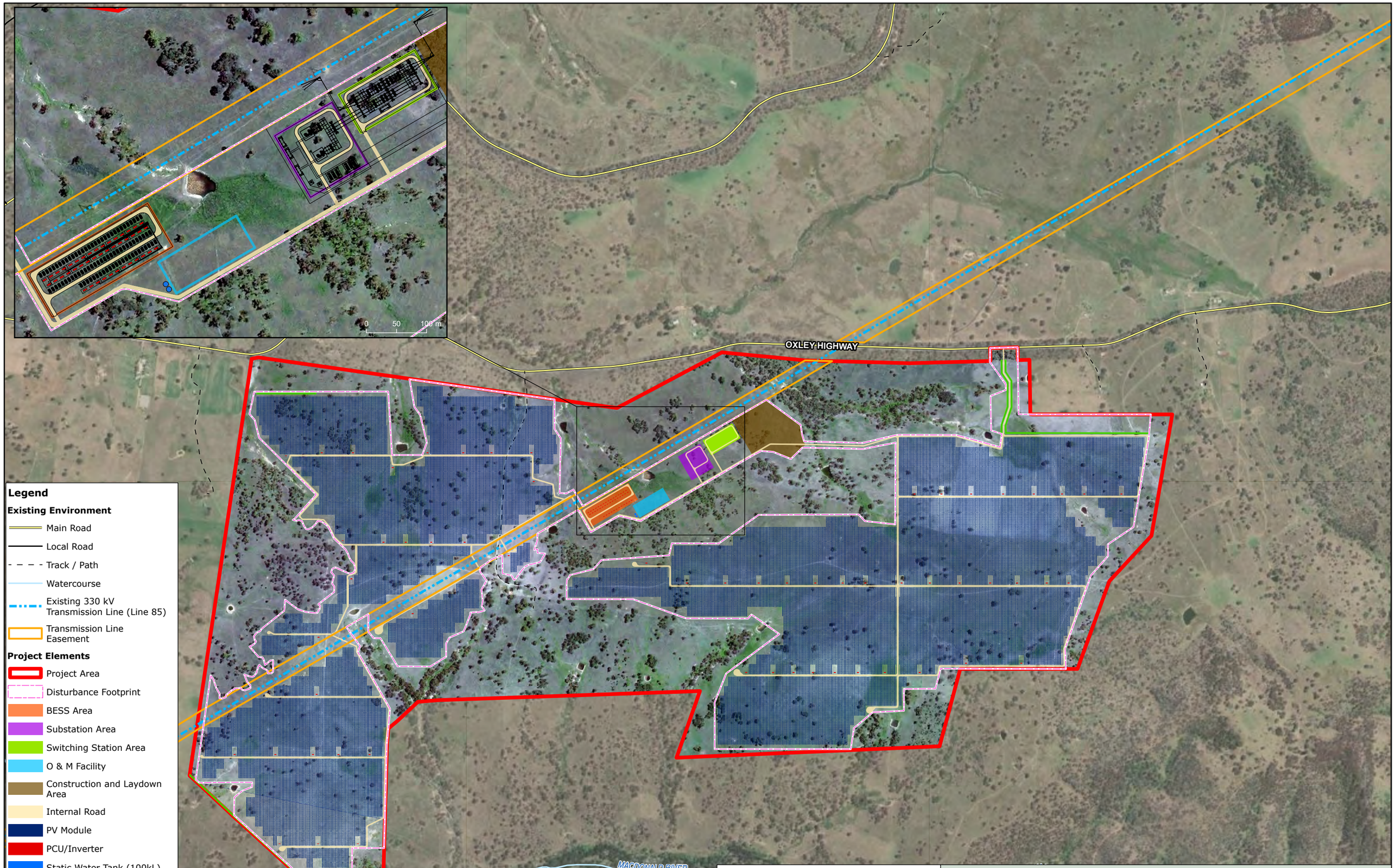
Project Elements	EIS (original) Project	Amended Project	Difference between EIS and Amended Project
Project Area	• 606.4 ha	• 606.9 ha	• Negligible (0.08% increase)
Disturbance Footprint	• 476.6 ha	• 369.2 ha	• Reduction by 107.4 ha (23%)
Solar Arrays	• 280 MW DC • 430,000 PV modules • 350.8 ha • 4.2 m panel height	• 255 MW DC • 354,330 PV modules • 301.0 ha • 2.66 m panel height	• DC Capacity reduced by 25 MW (9%) • PV modules reduced by 75,670 modules (18%) • Area reduced by 49.8 ha (14%) • Panel height reduced by 1.54 m
BESS	• 150 MW/ 300 MWh • 3.2 ha • 120 BESS units • LFP or NMC battery technology • Lot 2 DP 1211502 • 4 m high noise walls in the BESS Layout	• 150 MW/ 300 MWh • 1.9 ha • 264 BESS units • LFP battery technology • Lot 2 DP 1211502 • 4 m high noise walls in the BESS Layout	• No change in capacity • Area reduced by 1.3 ha (41%) • BESS make and model refined with individual BESS units of a smaller MWh capacity selected for the amended project. Due to the smaller capacity of the BESS, the number of BESS units increased by 144 (120%) • Commitment to LFP battery technology • No change in location • No change in noise walls mitigation measure
Solar PV Power Conversion Units (PCU)	• 60 PCUs housing up to 60 inverters (within main solar area) • Lots 1, 2 and 3 of DP 1211502 • 3.5 m high noise walls for 14 inverters within solar array area	• 60 PCUs housing up to 60 inverters (within main solar area) • Lots 1, 2 and 3 of DP 1211502 • 3.5 m high noise walls for 28 inverters within solar array area • Noise attenuation kits for all 60 inverters within solar array area	• No change in number of PCUs or inverters (within main solar area) • Construction of noise walls for 14 additional inverters • Addition of noise attenuation kits to all inverters

Project Elements	EIS (original) Project	Amended Project	Difference between EIS and Amended Project
Inverters	• 40 inverters within BESS with noise attenuation kits	• 44 inverters within BESS with noise attenuation kits	• Inverters increased by 4 units (10%) due to refinement in BESS and inverter proposed makes and models and to achieve National Electricity Rule compliance at the proposed 150 MW capacity
Substation and Switching station	• 200 MW AC registered capacity • One 33/330 kV collector substation and associated structures • 330 kV switching station • 2.9 ha	• 200 MW AC registered capacity • One 33/330 kV collector substation and associated structures • 330 kV switching station • 2.37 ha • 6 m high noise walls around the substation transformers	• No change in AC registered capacity • Reduced by 0.53 ha (18%) and slightly relocated 25 m further east • Addition of 6 m high noise walls around the substation transformers
Electrical Reticulation Infrastructure	• Internal underground high-voltage (HV) cables between solar arrays, BESS and transformers and overhead 330 kV conductors • Approximately 100 m distance between the switching station and existing 330 kV line • Direct grid connection to existing 330 kV line	• Internal underground HV cables between solar arrays, BESS and transformers and overhead 330 kV conductors • Approximately 48 m distance between the switching station and existing 330 kV line • Direct grid connection to existing 330 kV line	• No change

Project Elements	EIS (original) Project	Amended Project	Difference between EIS and Amended Project
On-site Permanent Supporting Infrastructure	Site access road, entry and internal roads		
	• APZ of minimum 10 m (PV modules), 17 m (BESS and Substation) and 12 m (associated infrastructure) • Internal roads 29.7 ha Perimeter and internal roads up to 6m wide, aligned on APZs and/or existing farm or other access tracks, where possible • Site access via B56 Oxley Highway	• APZ of minimum 10 m (PV modules), 12-31 m (BESS, Substation and associated infrastructure) • Internal roads 13.48 ha Perimeter and internal roads up to 6m wide, aligned on APZs and/or existing farm or other access tracks, where possible • Site access via B56 Oxley Highway, with internal roads realigned to avoid existing vegetation	• No change in APZ minimum for PV modules • Allowance for a minimum 12-31 m APZ width for BESS, Substation and associated infrastructure based on surrounding vegetation categorisation, including slight disturbance footprint adjustment to accommodate minimum 31 m APZ adjacent to some areas of the BESS • Internal roads reduced by 16.22 ha (55%) • No change in maximum road width • Minor (~10m) adjustment of site access road location
	Operations and Maintenance (O&M) Facility		
	• Located within the construction compound and laydown area, to the north of the substation and BESS compound • 0.65 ha • 12 m APZ • 100 kL static water tank	• Located within the substation and BESS compound • 0.91 ha • 12-31 m APZ • 2 x 100 kL static water tanks	• Relocated south of existing transmission line • Area increased by 0.26 ha (40%) • Adjustment of APZ width based on vegetation adjacent to the new location • Addition of a static water tank, with total volume increased by 100 kL (100%)
Construction			
Construction Duration	• Approximately 18 months	• Approximately 18 months	• No change in duration

Project Elements	EIS (original) Project	Amended Project	Difference between EIS and Amended Project
Construction Workforce	• Peak workforce of approximately 307 Full Time Equivalent (FTE) (some additional contractor personnel) and average annual workforce of 260 FTE for the peak 12-month of construction of the Project	• Peak workforce of approximately 307 FTE (some additional contractor personnel) and average annual workforce of 250 FTE for the peak 12-month of construction of the Project	• 10 FTE reduction for peak 12-month average annual workforce (4%)
On-site Temporary Infrastructure	• Construction compound and laydown area located north of existing transmission line • 11.6 ha	• Construction compound and laydown area located to south of existing transmission line • 4.8 ha	• Relocated south of existing transmission line • Area reduced by 6.8 ha (59%)
Services and Utilities	• Adjustment, protection or relocation of existing utilities	• Adjustment, protection or relocation of existing utilities	• No change
Ancillary Activities	• Import of external gravel, aggregate and sand to site for on-site construction use	• Import of external gravel, aggregate and sand to site for on-site construction use	• No change
Traffic and Transport Route	• Main equipment deliveries via Port of Newcastle or Port of Brisbane • 62 heavy vehicles and 48 light vehicles movements per day during peak construction • Associated external road upgrades (also used for operational maintenance or decommissioning activities)	• Main equipment deliveries via Port of Newcastle or Port of Brisbane or Port of Melbourne • 94 heavy vehicles and 76 light vehicles movements per day during peak construction with an additional 36 shuttle bus movements • Associated external road upgrades (also used for operational maintenance or decommissioning activities)	• Port of Melbourne may also be used for deliveries of Project equipment • During peak construction increase in daily heavy vehicle movements by 32 (52%) and light vehicles by 28 (58%) • No upgrades to external roads required

Project Elements	EIS (original) Project	Amended Project	Difference between EIS and Amended Project
Operations			
Duration	• Development Consent in perpetuity • Infrastructure life minimum of 30 years	• Development Consent in perpetuity • Infrastructure life minimum of 30 years	• No change
Hours of Operation	• 24 hours a day, seven days a week	• 24 hours a day, seven days a week	• No change
Operational Workforce	• Approximately 15 FTE	• Approximately 15 FTE	• No change



Legend

Existing Environment

- Main Road
- Local Road
- Track / Path
- Watercourse
- Existing 330 kV Transmission Line (Line 85)
- Transmission Line Easement

Project Elements

- Project Area
- Disturbance Footprint
- BESS Area
- Substation Area
- Switching Station Area
- O & M Facility
- Construction and Laydown Area
- Internal Road
- PV Module
- PCU/Inverter
- Static Water Tank (100kL)
- Vegetation Screening
- Internal Electrical Infrastructure

Source:
Layout: Client Provided (Sept 2024)
Basedata: NSW DCDB/DTDB
Imagery: ESRI | Client Provided (Jan 2023)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 01/04/2025
Created By: MB
Drawing Size: A3

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F1 Amended Project Layout

Bendemeer Solar Farm
Bushfire Technical Memo
Client: Athena Energy Australia (Holdings) Pty Ltd

ERM

0657132_BendSF_BFTM_R02.mxd

BUSHFIRE RISK FACTORS

BUSHFIRE PRONE LAND

The Bushfire Risk Assessment (Ember 2023) was prepared to identify potential hazards and risks associated with bushfires / use of bushfire prone land. As reported by Ember (2023), the NSW RFS Bushfire Prone Land mapping identifies the Project Area and surrounding properties as Category 1 and Category 3 Vegetation.

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

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

The NSW Government Central Resources for Sharing and Enabling Environmental Data (SEED) provides information on wildfires that have occurred in the vicinity of the Project Area. No additional fires have been reported within the Project Area since the submission of the EIS.

EXISTING VEGETATION HAZARD

Descriptions of the vegetation types including species composition and structural diversity are provided in Bendemeer Solar Farm Biodiversity Development Assessment Report (ERM, 2023).

The Project Area contains two NSW Plant Community Types (PCTs):

- PCT 538 Rough-barked Apple – Blakely's Red Gum open forest of the Nandewar Bioregion and western New England Tableland Bioregion; and
- PCT 510 Blakely's Red Gum – Yellow Box grassy woodland of the New England Tablelands Bioregion.

For the purposes of this technical memo, and in accordance with the Planning for Bushfire Protection Guidelines (2019), the vegetation has been simplified in line with the vegetation formations as per Keith (2004). The vegetation classifications are shown in **Figure 3** and **Table 2**.

OXLEY HIGHWAY

MACDONALD RIVER

Legend

- Main Road
- Track-Vehicular
- Main Watercourse

Bushfire Prone Land

- Vegetation Category 1
- Vegetation Category 2
- Vegetation Category 3
- Project Area

Source:
Boundary: Client Provided (Oct 2023)
BFPL: NSW RFS
Basedata: NSW DCDB/DTDB
Imagery: Client Provided (Jan 2023)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 01/04/2025
Created By: MB
Drawing Size: A3

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F2 Bushfire Prone Land Mapping

Bendemeer Solar Farm
Bushfire Technical Memo
Client: Athena Energy Australia (Holdings) Pty Ltd

ERM

0657132_BendSF_BFTM_R02.mxd

OXLEY HIGHWAY

MACDONALD RIVER

MACDONALD RIVER

Legend

- Main Road
- Track-Vehicular
- Main Watercourse

Vegetation formation

- Dry Sclerophyll Forests (Shrubby sub-formation)
- Grassy Woodlands
- Grassland
- Project Area

Source:
Boundary: Client Provided (Oct 2023)
Basedata: NSW DCDB/DTDB
Imagery: Client Provided (Jan 2023)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 01/04/2025

Created By: MB

Drawing Size: A3

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F3 Vegetation Classifications

Bendemeer Solar Farm
Bushfire Technical Memo
Client: Athena Energy Australia (Holdings) Pty Ltd

ERM

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TABLE 2 VEGETATION CLASSIFICATIONS

PCT ID	Vegetation formation[1]	Vegetation class[1]	Overall Fuel Load[2]
538	Dry Sclerophyll Forests (Shrubby sub-formation)	Northern Tableland Dry Sclerophyll Forests	31.5 t/ha
510	Grassy Woodlands	New England Grassy Woodland	20.2 t/ha
0 Non Native	Grassland	Grassland	6 t/ha

1. Keith (2004) From ocean shores to desert dunes: the vegetation of New South Wales and the ACT
2. Fuel loads are expressed in tonnes per hectare as per NSW RFS – Comprehensive Vegetation Fuel Loads (NSW RFS 2019)

INDICATIVE FIRE BEHAVIOUR

The areas of Dry Sclerophyll Forests and Grassy Woodland present the greatest vegetation hazard, although it is important to note that grassfires should not be underestimated and can start and spread quickly. It should be assumed that, under the most extreme weather, a fire would spread even in heavily grazed grass and embers may breach any APZ. For this reason, we have considered all the native and grassland vegetation communities a bushfire hazard and minimum APZ of 10m has been recommended around the solar arrays as per the NSW RFS Planning for Bushfire Protection Guidelines (2019) and Ember (2023).

It is intended that the vegetation fuel under and between the solar panels, within the overhead transmission line easements and access roads will be maintained in a low fuel state by ongoing sheep grazing (and other land management activities such as mowing, slashing and application of herbicides as required). The ongoing management and monitoring of the grassland will be considered as part of the Bushfire Emergency Management and Operations Plan. The mitigation measures and treatments will be a combination of complementary strategies, however it is recognized that despite any mitigation measures applied, bushfire risk will always remain. Climate Change and Bushfires

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

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

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

FIRE HISTORY AND SOLAR FARMS IN AUSTRALIA

The likelihood of a fire spreading within the area of the proposed PV panels, by propagating from panel to panel in a solar farm installation is likely to be low because of the panel construction materials (i.e., fire resistance rating). Electrical hazards including battery fires, and transformer fires are addressed separately as part of the Preliminary Hazard Assessment (Riskcon, 2025) and are not included here. Riskcon also provides a review of the 2021 Victorian Big Battery (VBB) fire.

A review of available literature identifies that there have been three reported fires involving solar farms within Australia:

- Raywood Solar Farm near Bendigo in February 2025. One of the invertors had caught fire in the moderate sized commercial solar farm and crews used foam to extinguish it once the power was isolated. The invertor transfers power from the solar farm to the high voltage lines and batteries. Access was reported by CFA to be difficult for crews because of the density of the smoke. The incident is being investigated by Energy Safe Victoria.
- Beryl Solar Farm (110 MW) near Gulgong in central west NSW in April 2023. Grass between the solar panels caught fire around midday. Fire crews attended the site within 20 minutes of notification and had the fire under control by the late afternoon with no injuries reported.

  Ground conditions in the area had been impacted by the extended period of wet weather which together with higher-than-average temperatures, resulted in the extension of the bushfire season to the end of April. A spokesperson for the development stated that vegetation levels are continuously monitored and maintained in line with NSW RFS guidelines to mitigate fire risk.

  Information relating to the cause of the fire was not publicly available at the time of this memo.
- Finley Solar Farm (175 MW) 6 km west of Finley, NSW. Up to five hectares of grassland was burned after a fire ignited at 9 am in early January 2022. NSW RFS and FRNSW attended the scene for 90 minutes to monitor and extinguish the fire. Though the panels had been powered off, attending crews chose to attack the fire from outside due to safety concerns.

  The fire had been caused by electrical wiring that rubbed against an exposed spring. No panels were damaged as flame heights remained low due to ongoing onsite management of vegetation.
- Brigalow Solar Farm (35 MW) in Queensland. Three points of fire ignited during a morning in early September 2019. This included among equipment and materials being stored in the laydown area for later installation, and in low grass. Queensland Fire and Emergency Services contained the fire by the afternoon. Information relating to the cause of the fire was not publicly available at the time of this report.

Overhead electrical infrastructure can also cause ignition, as evidenced by the Currandooley Wind Farm Fire in January 2017. The fire ignited when a crow connected with overhead electrical infrastructure caught alight and dropped into dry foliage underneath a power line. The fire burnt approximately 3,400 hectares and was subject to a class action.

FIREFIGHTER AND PUBLIC SAFETY

As noted by Ember (2023), the Project Area is serviced by both NSW RFS and Fire and Rescue NSW (FRNSW).

Any volunteer firefighters from the NSW RFS, FRNSW or property owners from neighbouring farms attending bushfires in this area may not be trained in structural and electrical firefighting. The Bushfire Emergency Management and Operations Plan as recommended by Ember (2023) will detail appropriate risk control measures that would need to be implemented to safely mitigate potential risks to the health and safety of the firefighters and first responders. At least two copies of the Bushfire Emergency Management and Operations Plan will be stored in an Emergency Information Cabinet located at the main entrance points and will be accessible to all first responders. Two copies of the Bushfire Emergency Management and Operations Plan will also be stored within the operations facilities and at the local Bendemeer Brigade office.

The combination of dense smoke and hot gases generated by a large fire directly under or near a high voltage power line can create a conductive path that increases the potential for a 'flashover'. The National Guidelines on Electrical Safety for Emergency Personnel provide critical information relating specifically to fire control near high voltage power lines, including the special conditions that apply to the use of water in fire control activities near power lines. This industry code will be considered in the preparation of the Bushfire Emergency Management and Operations Plan.

A schedule for ongoing site familiarisation to account for changing personnel, site infrastructure and hazards will be developed in conjunction with NSW RFS and FRNSW. As requested by FRNSW, an Emergency Services Information Package and Emergency Responders Induction Package will be developed for the site in consultation with, and to the satisfaction of FRNSW prior to commissioning. These packages will aim to inform first responders of site-specific features and safety measures to ensure they are able to undertake their duties effectively in accordance with agency specific Standard Operational Guidelines.

SUMMARY OF BUSHFIRE RISK FACTORS

If a fire breaches any containment lines and threatens the solar farm assets, it is possible that the solar farm infrastructure will sustain direct flame contact.

As identified by Ember (2023), it is important that key assets such as the switching station, substations, BESS and O&M buildings have adequate defendable space on all sides, and that unimpeded access is provided to the solar arrays (in the form of perimeter APZ).

MITIGATION STRATEGIES

As identified within Section 8.3.5 of the NSW RFS Planning for Bushfire Protection Guidelines 2019, solar farms require special consideration and should be provided with adequate clearances to combustible vegetation as well as firefighting access and water.

As outlined within Section 2 of the Ember (2023) assessment, mitigation will be a combination of complementary strategies, all of which are required to provide the best possible protection outcome for the solar farm and the community.

In terms of design principles to minimise risk, the amended solar farm layout has been designed to:

- Provide a defendable space around infrastructure; and
- Ensure that appropriate access, egress and maneuverability within the solar farm is provided for first responders.

ASSET PROTECTION ZONE

An APZ is typically designed to separate a vulnerable asset from the bushfire hazard (vegetation/fuel). APZs do not eliminate the fire risk but may lower it to an extent where fire control is more feasible or damage to the asset is reduced or eliminated.

Understanding the value and limitations of APZ is important, as is the understanding that bushfires attack-built assets by either flame contact, radiant heat or burning debris. An APZ can be used to lower or eliminate the bushfire attack from flame contact and radiant heat around the perimeter of the solar farm and all built assets, but under strong winds or during a major fire event burning debris can result in a fire breaching an APZ. As discussed in Ember 2023, the NSW RFS Planning for Bushfire Protection Guidelines does not provide a maximum radiant heat threshold for Solar Farms or BESS facilities, with the only direction being a minimum 10 m APZ for structures and associated buildings. This does not consider the nature of the surrounding hazard and as per the recommendations in Ember 2023, the recommended APZ provided below will meet or exceed the minimum specifications outlined in NSW RFS Planning for Bushfire Protection and are based on a maximum 29 kW/m^2 radiant heat threshold for the BESS, substation and associated infrastructure.

The minimum APZ provided in **Table 3** are consistent with Ember 2023 and can be accommodated within the Amended Project Layout.

TABLE 3 ASSET PROTECTION ZONES

Asset	Vegetation Formation	Slope °	Minimum APZ[1]
PV solar arrays	All	>5° – 10° downslope	10 m
BESS, substation and associated infrastructure	Dry Sclerophyll Forest	>5° – 10° downslope	31 m
	Grassy Woodland	>5° – 10° downslope	17 m
	Grassland	>5° – 10° downslope	12 m

[1] – Indicative APZ dimensions and classification of slope in accordance with the Bendemeer Solar Farm Bushfire Assessment Report, Ember 2023.

The specifications recommended for the APZ are as follows:

- To allow for emergency service personnel to undertake property protection activities, a 10 metre defendable space (APZ) that permits unobstructed vehicle access is to be provided around the perimeter of the development footprint;
- All APZ are to be managed as an inner protection zone (IPA) for the life of the development as outlined within Appendix 4 of NSW RFS Planning for Bushfire Protection Guidelines 2019 and Standards for Asset Protection Zones;
- APZ will not extend beyond the property boundary or rely on actions being undertaken by adjacent landowners;
- Where the recommended APZ overlaps the infrastructure footprint, detailed design will ensure that this area only contains elements permissible within an APZ (e.g., access roads and car parking areas). The associated infrastructure such as the O&M building will be sited outside the APZ and can be accommodated within the disturbance boundary; and
- No trees and shrubs are to be planted within the APZ.

SOLAR FARM CONSTRUCTION

Human induced climate change is influencing the frequency and severity of dangerous bushfire conditions in Australia including an earlier start to the bushfire season with dangerous weather conditions occurring significantly earlier in spring than they used to. The following measures are recommended to be implement during the entire period of construction and are consistent with the EIS and Ember 2023:

- The APZ and access road will be constructed prior to the installation of any solar panels or related infrastructure;
- Ensure appropriate bunding in areas where there is potential for flammable fuels and oils to leak and create bushfires or other environmental risks;
- Install appropriate signs to assist emergency response crews determine track names, and location of infrastructure;
- Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to;
- Adhere to restrictions on Total Fire Ban or days of high fire danger;

- Suitable firefighting equipment (specific requirements to be confirmed in consultation with NSW RFS) is present onsite;
- Install a 10,000 litre dedicated static water supply within the APZ for the BESS, substation and associated infrastructure. All fittings to be in accordance with NSW RFS requirements as outlined within the NSW RFS Planning for Bushfire Protection (2019)[1];
- Where practicable, site vehicles during the construction phase will have diesel engines and/or will use the site access roads (if available) to minimise the likelihood of igniting dry grass;
- All plant, vehicles and earth moving machinery are cleaned of any accumulated flammable material (e.g., vegetation); and
- On days when Very High fire danger or worse is forecast, the "fires near me' app is to be checked at least twice daily (morning and afternoon) for the occurrence of any fires likely to threaten the Project Area.

SOLAR FARM OPERATION

The control room, switch room and storage shed will each contain essential fire safety equipment, including fire extinguishers and hose reels. The provision of fire safety equipment will be further considered as part of the Bushfire Emergency Management and Operations Plan to prepared in consultation with the RFS.

It is recommended that vegetation fuels throughout the solar farm are reduced as much as possible by grazing, or with additional slashing or mowing if required to maintain a height of less than 10cm (during the bushfire season). For slashing to be effective, it is noted that the cut material must be removed or allowed to decompose well before summer starts. This will minimise the potential radiant heat exposure to solar farm components if a fire were to occur and reduce the risk of a fire spreading beyond the solar farm. If grazing or slashing is not possible other lower risk ground cover should be considered e.g., gravel or a non-curing ground cover As noted within the NSW RFS Standards for Asset Protection Zones, when using mechanical hazard reduction methods it is important to retain a ground cover of at least 75% to prevent soil erosion.

BUSHFIRE EMERGENCY MANAGEMENT AND OPERATIONS PLAN

A Bushfire Emergency Management and Operations Plan should be prepared for the solar farm that provides the following:

- A site plan showing infrastructure, site access and the internal road layout;

[1] *It is acknowledged that the Proponent intends to install 2x 100,000 L water tanks within the project footprint, adjacent to site access roads. NSW RFS can also use these tanks provided that the appropriate 65mm Storz outlet is fitted as outlined in NSW RFS Planning for Bushfire Protection guidelines. A minimum of 10,000L can also be reserved for use by NSW RFS only by installing all general use fittings higher up the tank to ensure that that they do not draw water beyond that point.*

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

The Bushfire Emergency Management and Operations Plan will be prepared with consideration of Australian Standard/ISO 31000 Risk management principles and guidelines, Australian Standard 3745: Planning for emergencies in facilities and Hazardous Industry Planning Advisory Paper (HIPAP) No 1 - Emergency Planning. It will also be informed by a detailed Fire Safety Study prepared in accordance with the HIPAP No 2 – Fire Safety Study Guidelines.

ACCESS ROADS AND ROAD NETWORK

The internal access roads will be up to 6 m trafficable width. The internal access roads will be constructed using gravel or sealed pavements. Site access points will be constructed as the first stage of development and the final design of access roads will enable safe access and egress for residents attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations.

Site access points will be maintained for the life of the Project and include appropriate signs throughout the solar farm to assist emergency response crews to determine track names and location of any locked gates.

All access roads will be upgraded to provide sufficient width and other dimensions to ensure safe unobstructed access and allow firefighting crews to operate equipment around the vehicle. Dead-end roads should be avoided. However, where they are present, they will incorporate a sufficient turn-around area to minimise the need for vehicles to make multipoint turns. "No parking" signs must be erected within the turning head.

As a minimum, and to enable access for NSW RFS and FRNSW all roads will be maintained to the minimum standards as outlined within the NSW RFS Fire Trail Standards and the NSW RFS Fire Trail Design, Construction and Maintenance Manual.

Detailed design will allow for emergency service personnel to undertake property protection activities and will ensure that the 10 metre wide APZ around the solar arrays will also permit unobstructed vehicle access around the perimeter of the development footprint. As stated by Ember (2023), where a full perimeter road is not achievable for short sections, the area shall be maintained as per the APZ requirements.

HAZARDOUS INDUSTRY

A preliminary hazard assessment has been completed by Riskcon (2023) to identify potential hazards that may be present as a result of the solar farm operation. A Fire Safety Study will be prepared in accordance with the HIPAP No 2 prior to construction. This study will be used to inform the Bushfire Emergency Management and Operations Plan to ensure that the proposed fire prevention, detection and protection measures are appropriate for the final design.

CONCLUSION

As reported by Ember (2023) (Appendix Q of EIS) the mitigation measures and treatments will be a combination of complementary strategies, all of which are required to provide the best possible protection outcome for the solar farm and the community.

Despite any mitigation measures applied, bushfire risk will always remain and it is therefore important that a Bushfire Emergency Management and Operations Plan is prepared in conjunction with relevant stakeholders, including NSW RFS, NSW Fire and Rescue, host landowner and adjoining property owners.

If a fire does breach any containment lines and threatens the solar farm assets, it is possible that the solar farm infrastructure will sustain direct flame contact. This requirement would not be the result of the solar farm itself although it is recognised that the solar farm would result in additional assets that would need to be protected.

The detailed mitigation measures outlined in the EIS are also relevant to the amended project layout and have been developed to meet the relevant provisions outlined in Section 8.3.5 of NSW RFS Planning for Bushfire Protection 2019 and to ensure that the solar farm development does not present any increased risk of widespread fire across the landscape. These mitigation measures will be applied for the life of the Project and have been summarised below.

TABLE 4 MITIGATION MEASURES

Mitigation Strategy	Action	Consistent with EIS
Asset Protection Zone (APZ)	• The 10 metre wide APZ around the solar arrays will aim to provide unobstructed vehicle access around the perimeter of the development footprint. Where a full perimeter road is not achievable for short sections, the area shall be maintained as per the APZ requirements. • The APZ for the BESS, substation and associated infrastructure will be based on a maximum 29 kW/m^2 radiant heat threshold and will meet or exceed the minimum specifications outlined in NSW RFS Planning for Bushfire Protection. • All APZ are to be managed as an inner protection zone (IPA) for the life of the development as outlined within Appendix 4 of NSW RFS Planning for Bushfire Protection Guidelines 2019 and Standards for Asset Protection Zones. • The APZ will not extend beyond the property boundary or rely on actions being undertaken by adjacent landowners. • No trees and shrubs are to be planted within the APZ.	✓
Solar farm construction	• The APZ and access road will be constructed prior to the installation of any solar panels or related infrastructure. • Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to. • Where practicable, site vehicles during the construction phase will have diesel engines and/or will use the site access roads (if available) to minimise the likelihood of igniting dry grass.	✓
Site Access	• The internal access roads will be up to 6 m trafficable width. • The internal access roads will be constructed using gravel or sealed pavements. Site access points will be constructed as the first stage of development and the final design of access roads will enable safe access and egress for residents attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations. • Site access points will be maintained for the life of the Project and include appropriate signs throughout the solar farm to assist emergency response crews determine track names and location of any locked gates. • Dead-end roads should be avoided. However, where they are present, they will incorporate a sufficient turn-around area to minimise the need for vehicles to make multipoint turns. "No parking" signs must be erected within the turning head. To allow for emergency service personnel to undertake property protection activities, the 10 metre wide APZ will also aim to provide unobstructed vehicle access around the perimeter of the development footprint.	✓

Mitigation Strategy	Action	Consistent with EIS
Water Supplies	• The volume and location of static water tanks will be confirmed in consultation with the NSW RFS, although it is likely to require a minimum 10,000 litre static water supply to be maintained within the APZ for the BESS, substation and associated infrastructure. • All fittings to be in accordance with NSW RFS requirements as outlined within the NSW RFS Planning for Bushfire Protection (2019). • The control room, switch room and storage shed will each contain essential fire safety equipment, including fire extinguishers and hose reels.	✓
Electricity Services	• Electrical services will be provided in accordance with Table 7.4a of the NSW RFS Planning for Bushfire Protection Guidelines 2019.	✓
Fire preparedness and response	Prior to construction, a Bushfire Emergency Management and Operations Plan will be prepared for the solar farm that provides the following: • A site plan showing infrastructure, site access and the internal road layout; • Location of all fire control advantages within the Project Area; • Construction of APZ's and their continued maintenance; • Control and coordination arrangements for emergency response; • Agreed roles and responsibilities of onsite personnel; • 24 hour emergency contact details including alternative telephone contact; • A manifest (and safety data sheets) for any battery, diesel or other dangerous goods storage/handling; • Minimum evacuation zone distances • Fire reporting and response to formal emergency alerts; and • Activation of water spray/foam systems and any other response/protection measures; and • Any other risk control measures required to be followed by firefighters. A Fire Safety Study should also be prepared in accordance with the HIPAP No 2 prior to construction. This study will be used to inform the Bushfire Emergency Management and Operations Plan to ensure that the proposed fire prevention, detection fand protection measures are appropriate for the final design. A schedule for ongoing site familiarisation to account for changing personnel, site infrastructure and hazards should be developed in conjunction with NSW RFS and FRNSW An Emergency Services Information Package and Emergency Responders Induction Package will be developed for the site in consultation with, and to the satisfaction of FRNSW prior to commissioning.	✓

Mitigation Strategy	Action	Consistent with EIS
Landscaping and ongoing operations	• Vegetation fuels throughout the solar farm will be reduced as much as possible by grazing, or with additional slashing or mowing if required to maintain a height of less than 10cm (during the bushfire season). This will minimise the radiant heat exposure to solar farm components and reduce the risk of a fire spreading beyond the solar farm. • Vegetation fuel under and between the solar panels, within the overhead transmission line easements and access roads will be maintained in a low fuel state by ongoing sheep grazing (and other land management activities such as mowing, slashing and application of herbicides as required). • Areas below PV modules will be monitored leading up to and during the declared bushfire season.	✓

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

Important Disclaimer:

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