CONSULTANT ADVICE NOTICE

PROJECT:	**1 EDWARDS TERRACE, BARINGA BESS – BUSHFIRE HAZARD ASSESSMENT**	**CAN NO:**	**FE001[1.0]**
Date:	**9 May 2025**	**Project No:**	**51146 - L0001**
		Pages:	**5**

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PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL
Approval no: DEV2025/1694
Date: 03/02/2026
Queensland Government

FIRE ENGINEERING REVIEW

INTRODUCTION

SCOPE

The project proposes the installation of six (6) ST255kWh-110kW Battery Energy Storage System (BESS) external to Baringa Retail Centre located at 1 Edwards terrace Baringa, QLD.

NDY has been engaged by Urbis Ltd to provide a hazard analysis assessment for the proposed BESS location which is in close proximity to adjacent high and medium density bushland. This assessment is specifically to address Economic Development Queensland (EDQ)'s request for an analysis of appropriate set-backs with respect to bush fire risk.

The fire engineering hazard commentary within this document integrates bushfire advice from Ecological Australia (ELA).

PURPOSE

This Consultant's Advice Notices (CAN) is provided to document a fire engineering review of the potential bushfire radiant heat exposure to the BESS, as calculated by ELA, for the purpose of commenting on the suitability of external wall construction. In addition, commentary is provided on additional key mitigation measures considered relevant to the project to mitigate BESS fire safety risks.

LIMITATIONS

- The advice provided within this CAN is limited to the bushfire hazard and analysis requested by EDQ, and does not constitute a fire safety study or building related fire risk assessment.

INFORMATION SOURCES

The following information provided to us has been utilized for our fire safety review:

- Architectural Layout of proposed BESS, prepared by Energy Bay, Preliminary Issue, dated 18/06/2024.
- Meeting minutes from Economic Development Queensland (EDQ) pre-lodgment discussion on 14/3/25, ref Pre2025/880.
- Bushfire Hazard Advice from ELA, 25SYD10837, dated 6 May 2025.

KEY STAKEHOLDERS

Table 1 below summarises the key project stakeholders.

ROLE	NAME	COMPANY
End Client	Aaron Hellmrich	Energy Bay
Planning Consultant (NDY Client)	Adam Donaldson Sophie Lam	Urbis
Bushfire Consultant	Bruce Horkings Nathan Kearnes	ELA
Fire Safety Consultant	Alicia Troeger Frazer MacDonald	NDY
DA Assessing Authority	Jocelyn Bowyer Jen Snessby Amanda Dryden Xi Gan	EDQ

Table 1 – Key Project Stakeholders

FIRE RISK REVIEW

BUSHFIRE RISK

The radiant heat flux exposure to the Battery Energy Storage System (BESS) has been assessed by ELA. They have determined the radiant heat flux from potential bushfire attack to be approximately 0.7 kW/m² (Refer Appendix A Bushfire Report), based on a minimum separation distance of 120 meters from the nearest bushland (refer to Figure 1).

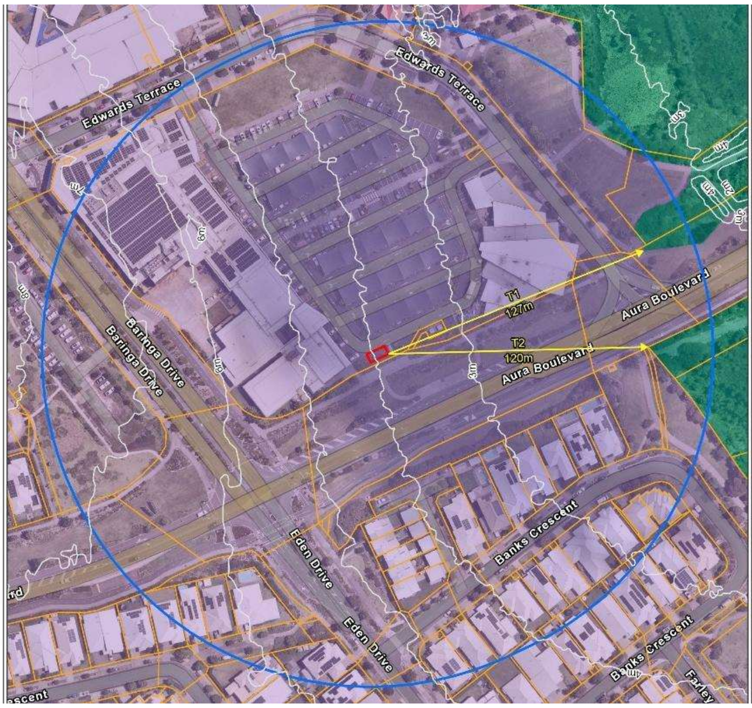

Figure 1 -Proximity of proposed BESS location to adjacent Bushland (from ELA Advice)

The radiant heat flux exposure signifies the amount of thermal energy that the BESS unit may receive during a bushfire event. The analysis of this exposure aids in evaluating the risk of the BESS reaching its ignition temperature. Whether ignition occurs depends on various factors, including the amount of incoming heat, heat absorption by the material through convection and radiation, and heat dissipation to the environment.

Experimental studies indicate that materials typical in construction can reach their ignition point under different conditions. Studies have found that the critical radiant heat flux required for ignition in the presence of an existing flame (pilot ignition) ranges from 10–30 kW/m². In scenarios of spontaneous ignition, where no flame is present, this threshold can increase to about 40 kW/m². The exact ignition values may vary based on the type of fuel (Drysdale, 1999).

Further, Figure 2 below from An Introduction to Fire Dynamics by Drysdale 2nd Ed. outlines the observed effects of thermal radiation under various everyday scenarios, with the average radiant heat flux received by the Sun in the UK to be 0.67 kW/m^2, which serves as a benchmark for comparison.

Table 2.9 Effects of thermal radiation

Radiant heat flux (kW/m^2)	Observed effect
0.67	Summer sunshine in UK[a]
1	Maximum for indefinite skin exposure
6.4	Pain after 8 s skin exposure[b]
10.4	Pain after 3 s exposure[a]
12.5	Volatiles from wood may be ignited by pilot after prolonged exposure (see Section 6.3)
16	Blistering of skin after 5 s[b]
29	Wood ignites spontaneously after prolonged exposure[a] (see Section 6.4)
52	Fibreboard ignites spontaneously in 5 s[a]

[a]D.I. Lawson (1954).
[b]S.H. Tan (1967).
The data quoted for human exposure are essentially in agreement with information given by Purser (2008) and Beyler (2008).

Figure 2 – Effects of Thermal Radiation from Drysdale (Drysdale, 1999)

Considering the above, the calculated radiant heat flux from a bushfire event fire sources is deemed low enough such that the risk of impact on the BESS is negligible.

Further, various guidance including NFPA 855 and various fire authority guidance such as FRNSW Guidance on Open Yard BESS, a typical minimum separation distance from any fire source feature is 6 m. Given the BESS is approx 120 m from the nearest bushland, the risk of fire spread in the other direction is also considered negligible..

CONCLUSION

This assessment primarily addresses the bushfire hazard associated with the BESS installation. The immediate risk of fire spread to/from adjacent bushland is deemed low.

A building risk assessment has not been undertaken at this juncture. Note that in some situations this could result in additional mitigation measures such as selecting fire tested battery modules, reviewing clearances from buildings, fire brigade infrastructure, egress routes etc.

NDY, A Tetra Tech Company

Frazer MacDonald | Director – Fire Engineer
f.macdonald@ndy.com

APPENDIX A – BUSHFIRE ASSESSMENT

Level 13, 420 George Street,
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t: (02) 9259 3800

6 May 2025

Our ref: 25SYD10837

NDY
By email: a.troeger@ndy.com

Attention: Alicia Troeger

Dear Alicia

RE: Proposed Battery Energy Storage System (BESS)
1 Edwards Terrace, Baringa

Eco Logical Australia (ELA) has been engaged by NDY to undertake a desktop bushfire assessment of the above-mentioned development, in order to support a broader hazard analysis. This bushfire assessment is divided into the following key steps:

- Desktop assessment of potential bushfire hazard.
- Analysis of potential radiant heat flux (RHF) exposure from bushfire attack.
- Key recommendations.

This assessment has been prepared by Eco Logical Australia (ELA) Principal Bushfire Consultant and Technical Lead, Bruce Horkings (FPAA BPAD Level 3 Certified Practitioner No. BPAD29962) and reviewed by Nathan Kearnes, Principal Bushfire Consultant and Bushfire Team Manager (FPAA BPAD Level 3 Certified Practitioner No. BPAD23575). Both Bruce and Nathan are recognised as qualified bushfire consultants in bushfire risk assessment.

Bushfire Prone Area Mapping

Examination of the current bushfire prone mapping State Planning Policy Interactive Mapping System[1] (SPP IMS) was undertaken and although the site is mapped as impacted by both High and Medium Potential Bushfire Intensity, this mapping appears outdated and does not reflect the current hazard extent or surrounding development.

Bushfire Hazard Assessment

The assessment methodology detailed in the Queensland Fire Department's (QFD) technical reference guide (QFD 2019) has been applied in this Bushfire Hazard Assessment (BHA) to determine the required inputs and calculated outputs including radiant heat flux (RHF) exposure to the proposed development.

[1] State Planning Policy Interactive Mapping System

Data has been sourced from the bushfire hazard/prone dataset (QFD 2021) and includes values used in the modelling for the Forest Fire Danger Index (FFDI), vegetation hazard class (VHC) and slope values.

The Newcastle Bushfire Consulting (NBC) Bushfire Attack Assessor (BFAA) was used to determine the radiant heat flux (RHF) exposure and corresponding Bushfire Attack Level (BAL). This approach is in accordance with the 'Detailed Methodology for Determining the Bushfire Attack Level (BAL) – Method 2' of AS 3959 (SA 2018).

The BFAA tool is a custom software application designed by NBC in Microsoft Access and regularly used in the bushfire industry for undertaking a range of bushfire modelling utilising AS 3959 as the base. As outlined in CB2 and CB3 of Method 2 (SA 2018), a FFDI value and vegetation classification system specific to a relevant State is accepted as an alternate to the national system. This assessment utilises the FFDI from the QFD dataset (QFES 2021) and fuel loadings for the identified VHC as detailed in the Guide (QFD 2019).

The BHA map is included overleaf in Figure 1 and it should be noted that this information has not been verified by site inspection and relies upon desktop assessment and available data sources.

Results

Two potential fire transects where identified (T1 and T2 in Figure 1), being ≥120 m away from the BESS. Analysis of potential RHF exposure from bushfire attack is conservatively calculated at 0.7 kW/m^2 for both T1 and T2. The modelling results are included overleaf in Figure 2.

Although the surrounding landscaping directly adjoining the site could become involved in a fire, it is not considered a bushfire hazard meeting the required design fire parameters. This corridor of landscaping is less likely to ignite and is considered a low hazard which is normally excluded as part of the hazard assessment process as it is not a high exposure point to any asset.

Conclusion

The proposed BESS sited in the location shown in Figure 1 has limited exposure to the surrounding bushfire hazard and has the potential to be exposed to the identified RHF values, if there was a fire in surrounding hazard.

Recommendations

The following recommendations are made in consideration of potential bushfire risk to the proposed BESS:

- Locate the BESS facility on a non-combustible surface (e.g. concrete pad, crushed gravel) which should extend out a minimum of 1-2 m from any part of the BESS structure.
- Minimise landscape planting, especially flammable plant species, within close proximity (≤5 m) of the BESS.

If you require any further information or additional services, please do not hesitate to contact me on 0488 209 860.

Regards,

Bruce Horkings
Principal Bushfire Consultant and Technical Lead
FPAA BPAD L3 Certified Practitioner No. BPAD29962-L3

BPAD
Bushfire
Planning & Design
Accredited Practitioner
Level 3

References

Queensland Fire Department (QFD). 2019. *Bushfire Resilient Communities – Technical Reference Guide for the State Planning Policy State Interest 'Natural Hazards, Risk and Resilience – Bushfire'*. October 2019. The State of Queensland, Queensland Fire and Emergency Services.

Queensland Fire Department (QFD). 2021. *Bushfire hazard area - Bushfire prone area - inputs – Queensland.* May 2021. The State of Queensland, Queensland Fire and Emergency Services.

Standards Australia (SA). 2018. *Construction of buildings in bushfire-prone areas (including Amdt 1 and 2), AS 3959:2018*. SAI Global, Sydney.

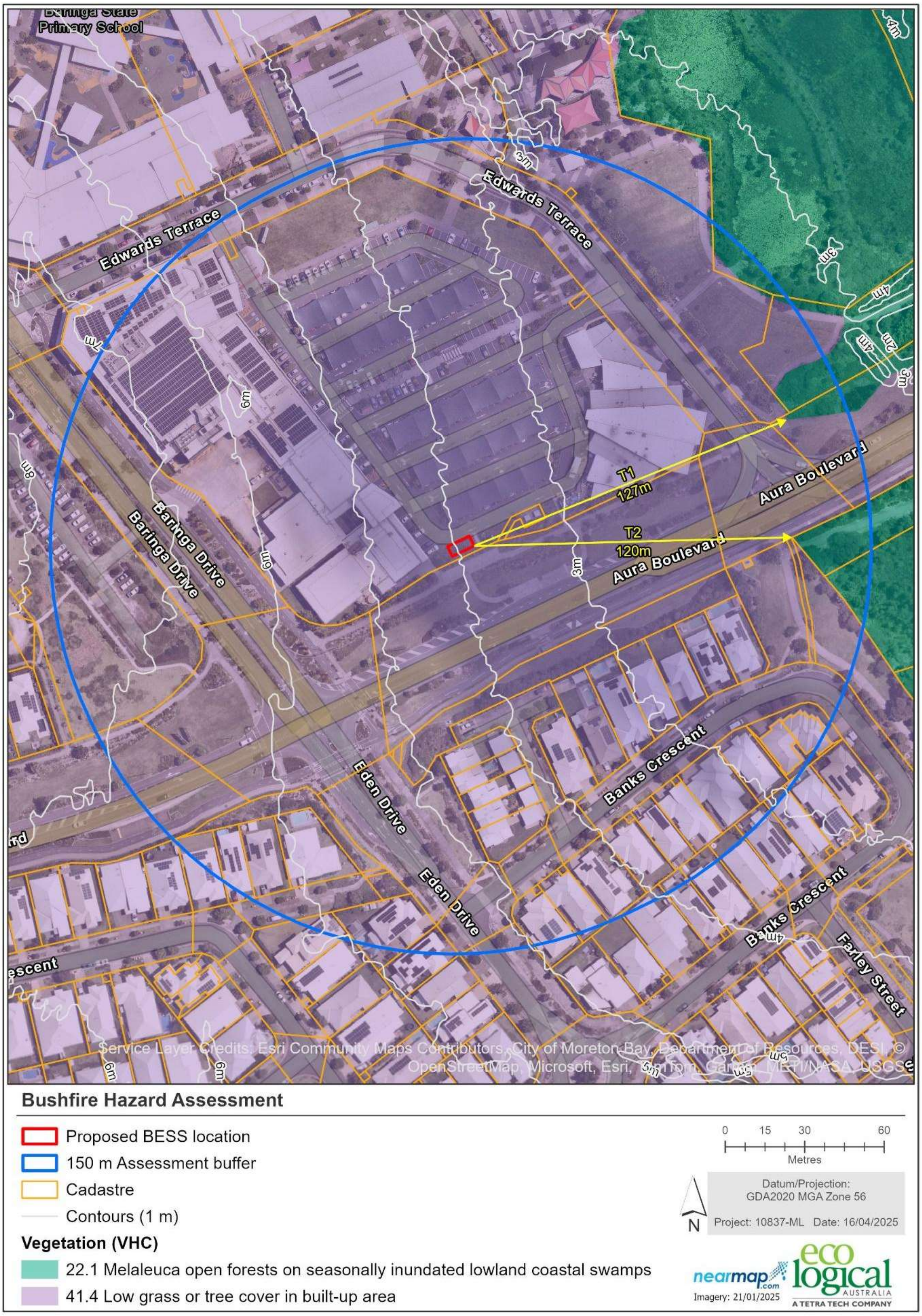

Figure 1: Bushfire Hazard Assessment

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 2/05/2025 **Assessment Date:** 14/04/2025

Site Street Address: 1 Edwards Terrace, Baringa

Assessor: Bruce Horkings; Eco Logical Australia (ELA)

Local Government Area: QLD **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: T1 - Mod Length + Shield

Vegetation Information

Vegetation Type: Forest

Vegetation Group: Forest and Woodland

Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Level
Surface Fuel Load(t/ha):	23.4	**Overall Fuel Load(t/ha):**	28.4
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	1 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	2	**APZ/Separation(m):**	150

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1200

Radiant Heat Shielding Inputs

Shield Height(m):	10	**Shield Width(m):**	70

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	53

Program Outputs

Category of Attack:	VERY LOW	**Peak Elevation of Receiver(m):**	3.91
Level of Construction:	BAL LOW	**Fire Intensity(kW/m):**	21837
Radiant Heat(kW/m2):	0.7	**Flame Angle (degrees):**	86
Flame Length(m):	13.08	**Maximum View Factor:**	0.009
Shielded View Factor:	0.008	**Inner Protection Area(m):**	150
Rate Of Spread (km/h):	1.49	**Outer Protection Area(m):**	0
Transmissivity:	0.703		

Figure 2: Bushfire Modelling

Run Description:	T2 - Mod Width		

Vegetation Information

Vegetation Type:	Forest		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Level
Surface Fuel Load(t/ha):	23.4	**Overall Fuel Load(t/ha):**	28.4
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	

Site Information

Site Slope:	1 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	2	**APZ/Separation(m):**	150

Fire Inputs

Veg./Flame Width(m):	50	**Flame Temp(K):**	1200

Radiant Heat Shielding Inputs

Shield Height(m):	0	**Shield Width(m):**	0

Calculation Parameters

Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	53

Program Outputs

Category of Attack:	VERY LOW	**Peak Elevation of Receiver(m):**	3.91
Level of Construction:	BAL LOW	**Fire Intensity(kW/m):**	21837
Radiant Heat(kW/m2):	0.71	**Flame Angle (degrees):**	86
Flame Length(m):	13.08	**Maximum View Factor:**	0.009
Shielded View Factor:	0	**Inner Protection Area(m):**	127
Rate Of Spread (km/h):	1.49	**Outer Protection Area(m):**	23
Transmissivity:	0.703		