

11 November 2022

Our ref: 22MEL 3721

Urbis
Level 12,
120 Collins Street
Melbourne Victoria 3000

Attention: Ben Davies

Dear Ben,

**Preliminary Bushfire Opportunities and Constraints Assessment
Lancefield Solar Farm- Lot 1 of TP168495, 313 Collivers Road, Lancefield**

Eco Logical Australia (ELA) has been engaged by Urbis to undertake a bushfire constraints assessment at 313 Collivers Road Lancefield (known as the 'subject land') to inform the proposed Lancefield Solar Farm Facility design and in meeting legislative requirements and policy, including the requirements of the Country Fire Authority (CFA) Design Guidelines and Model Requirements for Renewable Energy Facilities 2022.

This report is suitable for the purpose for which it is commissioned, and further assessment may be required if there are significant changes to the development concept layout, surrounding bushfire hazard or change in Victorian State bushfire protection legislative and / or policy. This assessment has been undertaken from desktop assessment analysis only based on the concept design layout of the solar farm facility.

NB: This Bushfire Opportunities and Constraints Assessment is valid as of the date of issue and is suitable for the purpose for which it was commissioned and is not a bushfire risk assessment.

1. Methodology

The advice provided herein is based on the following research and knowledge:

- A desktop analysis of the vegetation and topography within and surrounding the subject land;
- Site plan layout as provide by BNRG Renewables Ltd (dated 19 April 2022); and
- Country Fire Authority Design Guidelines and Model Requirements for Renewable Energy Facilities (CFA 2022).

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2. Bushfire Threat Assessment

The subject land is identified within the Farming Zone (FZ) and is in a Bush Prone Area (BPA) within the Victorian State Governments online Vic Plan site at www.mapshare.vic.gov.au/vicplan/. The subject land however is not impacted by the Bushfire Management Overlay (BMO). The BMO is defined as land that may be significantly impacted by extreme bushfires under Clause 44.06 of the Victorian Planning schema.

The site and nearby surrounding lands being FZ lands predominately consist of grasslands used for agricultural and grazing practices and represents a lower bushfire hazard vegetation type. Terrain is largely flat to gently undulating topography.

Under the CFA Guidelines the land on which the proposed solar farm development is located is considered to meet the low bushfire risk location attributes contained within Section 6.1.

3. CFA Renewable Energy Fire Design Requirements

The proposed Lancefield Solar Farm layout, which includes a Battery Energy Storage System (BESS) has a potential generating capacity of no greater than 5MW and is therefore considered to be required to meet the design guideline and model requirements stipulated for “Micro Solar Farm Facilities” together with other requirements under Section 6.2 of the CFA Guidelines.

The design requirements under Section 6 the CFA Guidelines that warrant addressing are:

- Emergency Vehicle Access (Section 6.2.1);
- Fire Fighting Water Supply (Section 6.2.2);
- Landscape Screening and On-Site Vegetation (Section 6.2.3);
- Fire Breaks (Section 6.2.4); and
- Design Specific to Facility Type (Section 6.2.5).

Table 1 and Figure 1 below show the association of the currently proposed layout design elements against and the degree of compliance with the CFA Guidelines criteria.

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Table 1: Current Lancefield Micro Solar Farm Fire Concept Design Layout Compliance

Model Criteria (CFA Guidelines 2022) See also APPENDIX A	Concept Design Layout Observations	Compliance Status / Recommendations
Section 6.2.1 Emergency Vehicle Access	<ul style="list-style-type: none"> A four (4) metre perimeter road is provided within a 10 m fire break and with a vertical clearance of four (4) metres. No passing bays have been incorporated into the concept design layout. Perimeter and other roads within the facility provide access to all infrastructure for emergency services (BESS, switch gear, inverters and PV panels arrays). Three (3) road access points are provided for the facility, two (2) for primary access and one(1) emergency access.. 	<ul style="list-style-type: none"> Perimeter roads comply with CFA requirements (excluding passing bays) To achieve compliance with CFA requirements, perimeter roads to incorporate passing bays every 600 m, twenty metres (20) metres long and with a trafficable width of six (6) metres. The road network is compliant to CFA requirements to access all infrastructure. The number of road access points is compliant with CFA requirements (minimum of two access points).
Section 6.2.2 Fire Fighting Supply	<ul style="list-style-type: none"> A 45,000 litre static water supply has been incorporated into the concept design and is located near the unobstructed primary access point to the facility and BESS 	<ul style="list-style-type: none"> Static water supply location within the facility complies with CFA requirements. However given the facility accommodates a BESS, the water supply will need to be upgraded to a total of 288,000 litres to comply with CFA requirements.
Section 6.2.3 Landscape Screening and On-site	<ul style="list-style-type: none"> No landscape screening currently specified in concept design layout. 	<ul style="list-style-type: none"> Where landscape screening is required, this should use low flammability vegetation together with consideration to species, density, height, location, and width of screening which can be planted so as to not increase potential fire risk.
Section 6.2.4 Fire Breaks	<ul style="list-style-type: none"> A 10 m fire break has been incorporated around the perimeter of the solar farm facility. A 10 m fire break is provided around the BESS. 	<ul style="list-style-type: none"> Fire breaks for perimeter of facility and BESS comply with CFA requirements. Extend the 10 m firebreak in the layout design for full compliance with model requirement to be around other BESS related infrastructure (switch gear and inverters).
Section 6.2.5 Design Specific to Facility Type	<ul style="list-style-type: none"> The primary solar power banks are separated by ten (10) metres on the site design layout.. 	<ul style="list-style-type: none"> There are no requirements in the CFA Guidelines for solar panel banks to be separated by 6 m for this micro solar farm facility. A fire engineering study or the like be undertaken to determine the required separation distance of BESS units so as to prevent

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Model Criteria (CFA Guidelines 2022) See also APPENDIX A	Concept Design Layout Observations	Compliance Status / Recommendations
	<ul style="list-style-type: none">• All BESS units have a separation distance of 3m between units.• A 10 m fire break provided around the BESS.• The BESS are located reasonably adjacent to within approximately 40 m of the primary site entrance.• The location of BESS are located near the site entrance & water tanks are not aligned to the prevailing wind direction in the event of a BESS fire.• Four (4) metre wide access is provided to and within the facility to provide suitable access to BESS and fire service infrastructure (including water supply).• No impact protection barriers to prevent mechanical damage to BESS shown on indicative layout.• No spill containment details provided in the indicative layout for management of water runoff.	<p>fire spread between battery containers or enclosures within the solar farm facility.</p> <ul style="list-style-type: none">• Fire break around BESS meets minimum requirements.• Location of BESS meets siting requirements for emergency vehicle access from designated site entrance.• Location and alignment of BESS and water tanks compliant with requirements.• Access to BESS and fire infrastructure is provided.• Include impact protection barrier location on indicative layout around BESS to comply (as inset map).• Include spill containment details for BESS on indicative layout to comply (as inset map).

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Figure 1: Concept Design Layout of the Lancefield Solar Farm

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4. Conclusion and Recommendations

This assessment provides a preliminary assessment of the concept design for the Lancefield Solar Farm facility against the CFA model design guidelines. It identifies that there are a number of areas of non-compliance of the current concept design. It is therefore recommended that amendment to the concept design for Lancefield Solar Farm facility be undertaken to address any non-compliances or recommendations as detailed in Table 1 above.

Regards,



John Norris
Senior Bushfire Consultant



Nathan Kearnes
Principal Consultant-Landscape Mapping & Bushfire
FPAA BPAD Certified Practitioner: BPAD23575-L3



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APPENDIX A- SOLAR FARM FACILITY MODEL DESIGN GUIDELINE REQUIREMENTS (COUNTRY FIRE AUTHORITY 2022)

Section 6.2.1 Emergency Vehicle Access

All Facilities

Providing adequate vehicle access to and within facilities assists CFA in responding to and managing fires.

The following requirements represent CFA's minimum expectations for emergency vehicle access at renewable energy facilities.

Model Requirements

- a) Construction of a four (4) metre perimeter road within the perimeter fire break.
- b) Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes.
- c) Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface.
- d) The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than fifty (50) metres.
- e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.
- f) Roads must incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated.
- g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and battery energy storage systems and related infrastructure.
- h) The provision of at least two (2) but preferably more access points to the facility, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. The number of access points must be informed through a risk management process.

Modifications to Model Requirements must be in consultation with CFA.

Solar Energy Facilities

Micro Solar Facilities (up to and including 5MW)

Construction of a four-metre perimeter road (6.2.1(a)) and the incorporation of passing bays to perimeter roads (6.2.1(f)) may be disregarded for micro solar facilities without battery energy storage systems.

Section 6.2.2 Firefighting Water Supply

All Facilities

Model Requirements

- a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.
- b) Static water storage tank installations must comply with *AS 2419.1-2005: Fire hydrant installations – System design, installation and commissioning*.
- c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.

(Continued overleaf.)

Model Requirements (Continued)

- d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.
- e) The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (solar panels, wind turbines, battery energy storage systems, etc.).
- f) The hard-suction point must be provided, with a 150mm full bore isolation valve (Figure 1) equipped with a Storz connection, sized to comply with the required suction hydraulic performance.
Adapters that may be required to match the connection are: 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters (Figure 2) with a matching blank end cap to be provided.
- g) The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.
- h) An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonne GVM, eight (8) metres long and six (6) metres wide or to the satisfaction of the CFA.
- i) The road access and hardstand must be kept clear at all times.
- j) The hard-suction point must be protected from mechanical damage (eg. bollards) where necessary.
- k) Where the access road has one entrance, a ten (10) metre radius turning circle must be provided at the tank.

Solar Energy Facilities

Model Requirements

- a) The fire protection system for solar energy facilities must incorporate at least one (1) x 45,000L static water tank for every 100ha. For example, a 500ha site requires a minimum of five (5) x 45,000L static water tanks.
- b) A fire water tank must be located at the primary vehicle access point to the facility, and elsewhere in consultation with CFA.
- c) Fire water must be provided to cover buildings, control rooms, substations and grid connections, in consultation with CFA.
- d) Additional fire protection systems or equipment required under any Australian Standards for dangerous goods must be provided as prescribed.

Modifications to Model Requirements must be in consultation with CFA.

Battery Energy Storage Systems

Model Requirements

- 1) For facilities with battery energy storage systems, the fire protection system must include at a minimum:
 - a) A fire hydrant system that meets the requirements of AS 2419.1-2005: *Fire hydrant installations*, Section 3.3: Open Yard Protection, and Table 3.3: Number of Fire Hydrants Required to Flow Simultaneously for Protected Open Yards. Except, that fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.
- OR
- b) Where no reticulated water is available, a fire water supply in static storage tanks, where:
 - i. The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2005 flowing for a period of no less than four hours at 20L/s, whichever is the greater.
 - ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2005, Table 3.3.
- (E.g., For battery installations with an aggregate area of over 27,000m², 4 hydrant outlets are required to operate at 10L/s for four hours, which equates to a minimum static water supply of 576kL.)*

iii. Fire hydrants must be provided and located so that every part of the battery energy storage system is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.

iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, battery energy storage systems, buildings).

v. The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (Eg., Fire water tanks are to be located closer to the site entrance than the battery energy storage system).

vi. The fire water supply must comply with AS 2419.1-2005: *Fire hydrant installations* - Section 5: Water storage.

Modifications to Model Requirements must be in consultation with CFA.

Section 6.2.3 Landscape Screening and On-Site Vegetation

All Facilities

Any vegetation, proposed or existing, must be considered in the Risk Management Plan for its potential to intensify and propagate fire within and away from the site.

Where landscape screening is required, for example, to screen visual impacts or to prevent visual glare from a solar energy facility, the design must consider any potential increase in fire risk due to the type (species), density, height, location and overall width of the screening.

Facilities must be designed so that the radiant heat flux (output) from vegetation does not create the potential for ignition of on-site infrastructure or other vegetation.

Radiant heat impact leading to ignition may be mitigated through:

- Vegetation removal (where permitted).
- Separation from nearby infrastructure (e.g., fire breaks; refer below).
- The provision of thermal barriers at nearby infrastructure.
- Other means in consultation with CFA.

CFA recommends that bushfire hazard site and landscape assessments are conducted for all facilities located within Bushfire Prone Areas and the Bushfire Management Overlay.

Consultation with CFA is required regarding landscape screening in high-risk environments.

Solar Energy Facilities

Where practicable, low-flammability vegetation (such as root vegetables) may be planted under solar panels, provided foliage does not extend beyond the panel footprint.

Section 6.2.4 Fire Breaks

All Facilities

Model Requirements

A fire break must be established and maintained around:

- a) The perimeter of the facility, commencing from the boundary of the facility or from the vegetation screening inside the property boundary.
- b) The perimeter of control rooms, electricity compounds, substations and all other buildings on-site.

The width of fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.

Modifications to Model Requirements must be in consultation with CFA.

Battery Energy Storage Systems

Model Requirement

A fire break must be established and maintained around battery energy storage systems and related infrastructure.

Modifications to Model Requirements must be in consultation with CFA.

Section 6.2.5 Design Specific to Facility Type

Solar Energy Facilities

Adequate separation of solar panel banks facilitates safe and effective firefighting operations.

Model Requirements

Solar energy facilities are to have a minimum six (6) metre separation between solar panel banks.

Modifications to Model Requirements must be in consultation with CFA.

Battery Energy Storage Systems

Model Requirements

1) The design of the facility must incorporate:

a) A separation distance that prevents fire spread between battery containers/enclosures and:

- Other battery containers/enclosures.
- On-site buildings.
- Substations.
- The site boundary.
- Any other site buildings.
- Vegetation.

Separation must be at least the distance where the radiant heat flux (output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements.

b) A fire break around the battery energy storage system and related infrastructure, of a width of no less than 10m, or greater where determined in the Risk Management Plan.

Fire breaks must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.

The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping.

c) A layout of site infrastructure that:

- Considers the safety of emergency responders.
- Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system.
- Minimises the potential for fires in battery containers/enclosures to impact on-site and off-site infrastructure.

- 2) Battery energy storage systems must be:**
- a) Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).**
 - b) Located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of fire at the battery energy storage system.)**
 - c) Provided with in-built detection and suppression systems. Where these systems are not provided, measures to effectively detect and/or suppress fires within containers must be detailed within the Risk Management Plan.**
 - d) Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures.**
 - e) Provided with suitable access roads for emergency services vehicles, to and within the site, including to battery energy storage system(s) and fire service infrastructure.**
 - f) Installed on a non-combustible surface such as concrete.**
 - g) Provided with adequate ventilation.**
 - h) Provided with impact protection to at least the equivalent of a W guardrail-type barrier, to prevent mechanical damage to battery containers/enclosures.**
 - i) Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.**
 - j) Provided with spill containment that includes provision for management of fire water runoff.**

Modifications to Model Requirements must be in consultation with CFA