



Viewbank Solar Farm

Bushfire Risk Assessment

3 December 2020

Project No.: 0493694

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3 December 2020

Viewbank Solar Farm

Bushfire Risk Assessment

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1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by FRV Services Australia Pty Ltd to facilitate the planning approval of the Viewbank Solar Farm (the Project). The location of the Site is shown in Figure 1-1 and the proposed layout is shown in Figure 1-2 and Appendix C.

The need for this Bushfire Risk Assessment was identified by the Department of Environment, Land, Water & Planning (DELWP) as part of their request for further information dated on 02 September 2020. Specifically they requested assessment of the proposal against the CFA's 'Guidelines for Renewable Energy Installations' (CFA 2019).

This Bushfire Risk Assessment identifies potential hazards and risks associated with the use of bushfire prone land, and contains management and mitigation measures designed to address these obligations. It aims to provide assessment under the Planning Scheme and with due consideration of the Guidelines for Renewable Energy Installations. It does not assess the individual design or engineering components of the solar farm itself.

1.1 Planning Considerations

Clause 13.02 and Clause 13.02-1S of the Planning Schemes specify that planning for bushfire risk should be considered on all land that is:

- within a designated bushfire prone area;
- subject to a Bushfire Management Overlay; or
- proposed to be used in a way that may create a bushfire hazard.

The Site is not subject to a Bushfire Management Overlay, although it is within a designated bushfire prone area and the provisions of Clause 13.02-1S are relevant. The objective of the policy is to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. The policy also provides guidance for the assessment of bushfire hazard identification.

In consideration of Clause 13.02-1S, the proposed Solar Farm does not involve any of the following uses listed that specifically require bushfire risk assessment:

- Subdivisions of more than 10 lots.
- Accommodation.
- Child care centre.
- Education centre.
- Emergency services facility.
- Hospital.
- Indoor recreation facility.
- Major sports and recreation facility.
- Place of assembly.
- Any application for development that will result in people congregating in large numbers.

Consideration is given to whether the proposed Solar Farm will result in people congregating in large numbers. The operation of the proposed Solar Farm is considered to be a low intensity use in terms of the number of people on site at any one time, with only 4-5 full time staff on site during the operational phase. On this basis, the risk to human life (which is prioritised under Clause 13.02) can reasonably be considered to be low during the operational phase.

However, there could be up to 150 people on site during construction phase over a period of 14 months. Although the construction period does not pertain to the expected end use of the Site, the number of people who could be on Site at one time does warrant further consideration below.

Based on the nature of the proposal, Australian Standards (AS) 3959-2018 Construction of Buildings in Bushfire-prone Areas and *Building Act 1993* have been considered in terms of providing adequate defensible space and access requirements only. This report contains management and mitigation measures designed to address these obligations. It does not assess the individual design or engineering components of the solar farm infrastructure.

The relevant conditions of the Victorian Country Fire Authority (CFA) Guidelines for Renewable Energy Installations (CFA, 2019) have also been referred to within this assessment.

1.2 Existing Environment

The Site is approximately 5km east of Stanhope and 30km west of Shepparton, and covers approximately 217 hectares of rural land, the vast majority of which has been cleared of native vegetation and used for agricultural grazing and cropping. The majority of the Site offers low fuel load (pasture grass and cropping land), with scattered native trees and isolated patches of native woodland vegetation. The native vegetation and habitat of the site has been a key driver of the proposed layout, and the layout of the solar farm has taken care to retain as many of the larger trees and native vegetation as possible.

Topography is generally flat with a small rise at the northern end of the site. The property then slopes down towards the irrigation areas, which also includes a natural drainage channel and swamp that are located to the south west corner.

As described by Ecolink Consulting (2020), the south-west portion of the site includes a mapped wetland, which has been planted with native species. The wetland is artificial and is of moderate to high quality. The remnant areas of woodland vegetation are generally isolated from each other and do not create a continuous path to any large vegetated areas. Roadside vegetation is also present along the southern boundary of the site (along either side of the Midland Highway).

Existing onsite ignition sources include:

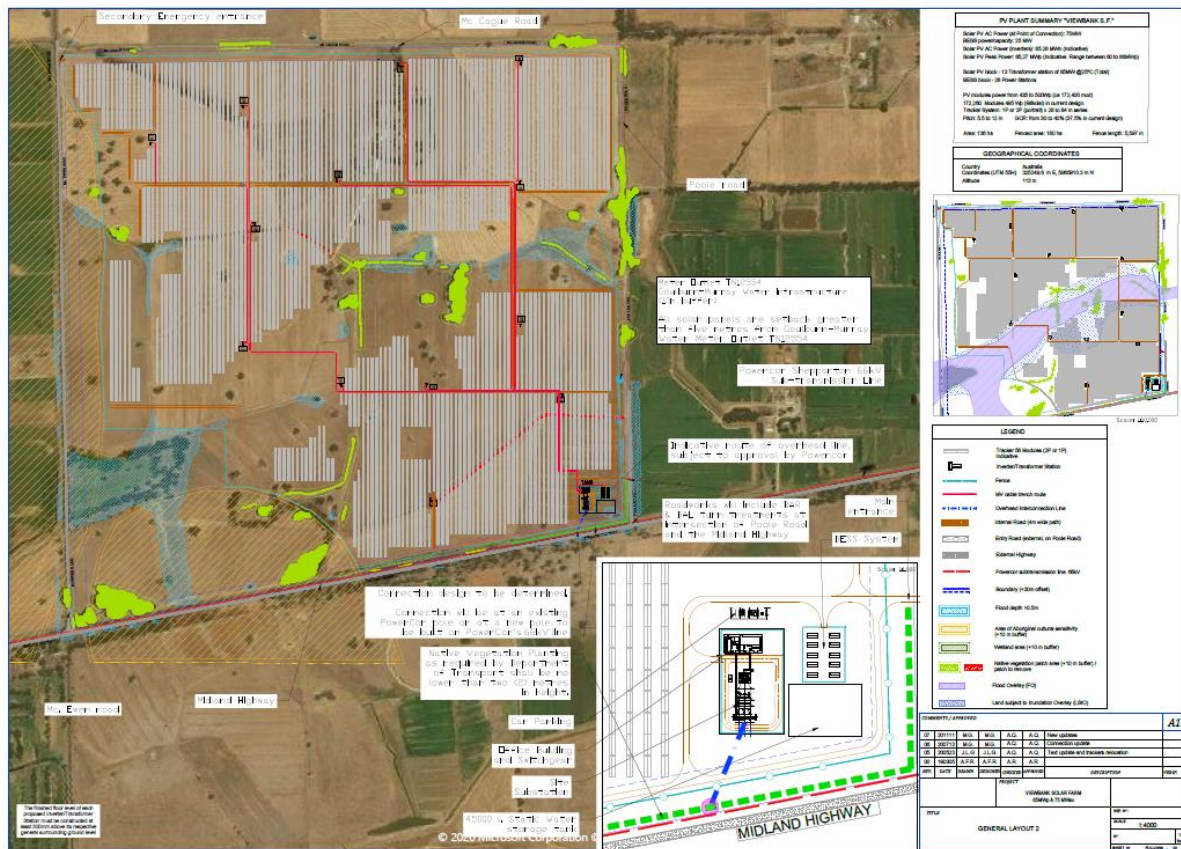
- Machinery operating in long grass;
- Lightning strikes; and
- Agricultural activities.

Existing receptors and assets at risk from fire including neighbouring residences and existing power infrastructure (Powercor Shepparton 66kV Sub Transmission Line) which runs directly south of the Site. There is also an existing dwelling and associated buildings on the site at 90 McCague Road, Girgarre East to the north of the Site, although it is proposed to remove these dwellings as part of the project.

Figure 1-1 – Locality Plan



Figure 1-2 – Site Layout Plan



1.3 Areas of Biodiversity Conservation Value

As described by Ecolink Consulting (2020), one threatened flora species, *Allocasuarina luehmannii* (Buloke) was recorded within the Site and will be retained. This tree species is listed as Endangered within Victoria (Department of Environment and Primary Industries 2014) and is listed under the *Flora and Fauna Guarantee Act 1988*. This species is susceptible to high intensity fires.

No threatened fauna has been recorded and the artificial wetland in the south-west of the Site, which is likely to support a range of native fauna species will be retained.

The roadside vegetation along the southern boundary of the site has been identified by Ecolink Consulting (2020), as likely to meet thresholds to be classified as Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. Fragmentation of native vegetation remnants and inappropriate land use regimes (including altered fire regime) are listed as potential threats to this community. No ecological or hazard reduction burns are recommended as part of this assessment. If they are required in the future, they should be undertaken in consultation with the CFA and with consideration of the ecological values of the retained habitats.

2. BUSHFIRE HAZARD IDENTIFICATION

2.1 Grassland and Fire Behaviour

The predominant vegetation class within the Site and surrounding lands is grazed pasture and cropping land and the dominant fire hazard is grassfire (as opposed to a densely treed or vegetated bushfire).

As highlighted by CFA (2012), grassfires can start quickly and spread rapidly especially on days when the Fire Danger Rating is Severe, Extreme or Code Red. They are very hot and can produce large amounts of radiant heat. In summary,

- grassfires can spread quickly and are extremely dangerous;
- grassfires can travel up to 25 kilometres per hour (km/hr), in extreme circumstances pulsing up to 60km/hr in open grassland;
- as grass is a fine fuel, fire burns through it faster than through forest;
- grassfires tend to be less intense than a forest fire however they can still generate enormous amounts of radiant heat;
- the taller and drier the grass, the more intensely a grassfire will burn;
- short grass (under 100mm) is a much lower risk;
- the shorter the grass the lower the flame height and the easier the fire will be to control; and
- grassfires can start earlier in the day than forest fires as grass dries out more quickly than forest when temperatures are high.

The intensity of a fire and its difficulty of control is also affected by the quantity of grass in the pasture. The residence time for flames in the heavily grazed pasture is likely to be relatively short and the solar farm components would have a similarly short time of exposure to flame and radiant heat. It is therefore intended that vegetation fuel under and between the PV panels will be maintained in a low fuel level by either grazing or other land management practices such as mowing, although it is recognised that under extreme weather fire would still spread between and under panels.

In accordance with Section 4.2 of the Guidelines for Renewable Energy Installations, grass is to be maintained at below 100mm in height during the declared Fire Danger Period and would be specified within an Operational Environmental Management Plan (OEMP) for the site which can be dealt with as a condition to any permit issued.

3. BUSHFIRE RISK ASSESSMENT

3.1 Construction Phase

Earth moving equipment, power tools (e.g. welders, grinders), mowers and slashers are well known for starting bushfires under conditions of high temperature, low humidity and high wind. Activities associated with solar farm construction that may cause or increase the risk of bush fire include:

- Site maintenance activities such as mowing, slashing and using other petrol-powered tools.
- Hot works, including welding and soldering activities.
- Operating a petrol, LPG or diesel vehicle in grassland areas.
- Operating plant fitted with power hydraulics in grassland areas.
- Smoking and disposal of cigarettes on site.

Site access is provided from Poole Road (off Midland Highway), with a secondary or emergency access off McEwen Road. These would be formalised at the beginning of the construction stage, which would increase the ability to access and suppress any fire onsite or on adjoining sites. A series of gravel roads will also provide access around the site and to the solar modules.

Construction and ongoing maintenance of the solar farm will be a potential source of ignitions, with a greater risk within the declared fire danger period (typically from August to March). All activities that involve flame cutting, grinding, welding or soldering (hot works) are to be performed under a 'hot work permit' system or equivalent hazard or risk management process.

The bushfire hazard associated with these activities is considered manageable through appropriate access arrangements, fuel load reduction programs, safety protocols during periods of high fire risk and the implementation of an Emergency Response Plan (ERP). The ERP will be developed in consultation with the CFA and included as a sub plan of both the CEMP and OEMP which can be dealt with as a condition to any permit issued.

Potential fire risk during decommissioning activities would be similar to those for construction phases.

3.2 Operational Phase

As noted above, the operation of the proposed Solar Farm is considered to be a low-intensive use of the land with the risk to human life considered to be low. Notwithstanding, similar project based ignition sources during the operation and maintenance phases of the Solar Farm would include:

- Machinery movement in long grass;
- Hot work activities, including welders and grinders;
- The storage of waste and combustible materials onsite; and
- Storage of flammable liquids.

The level of risk from faults and/or the likelihood of a fire spreading within the area of the proposed PV panels, by propagating from panel to panel in a solar farm is difficult to assess and there is a lack from case history from Australia. However, the risk is considered to be low based on the panel construction materials and the assumption that fast moving grass fires would result in relative short time of direct flame exposure.

In accordance with Section 4.1 of the Guidelines for Renewable Energy Installations, all maintenance and repair activities that involve flame cutting, grinding, welding or soldering (hot works) will be performed under a 'hot work permit' system or equivalent hazard or risk management process and will be outlined within the Emergency Response Plan (ERP), which would have developed in consultation with the CFA and included as a sub plan of both the CEMP and OEMP.

3.3 Fire-fighter and Public Safety

The risks to fire-fighter safety associated with a fire burning the solar panels and associated equipment include:

- electrocution – solar panels would be energised under any natural or artificial light conditions;
- safe use of foam application is likely only possible from the perimeter of the solar arrays and would not reach the centre of the arrays; and
- inhalation of fumes and smoke from any plastic components such as cables (although the main structure of the panels will be tempered glass and aluminium).

The flammability and toxicity of burning components have not been determined in detail although this information will form part of the Emergency Response Plan (ERP) that will be developed prior to construction.

Any fire-fighters or neighbouring farmers attending bushfires in this area may not be trained in structural and electrical fire-fighting. Given these safety concerns for fire-fighters, it is not recommended that fire-fighting equipment for fire-fighters be located permanently on site unless directed to by CFA because such equipment may not be utilised safely or effectively.

In accordance with Section 2.2 and Section 2.3 of the Guidelines for Renewable Energy Installations, an ERP should be prepared for the Solar Farm (consistent with the requirements of AS 3745: Planning for emergencies in facilities) and must include:

- facility description and site plan, including infrastructure details, operating hours, site entrances, exits and internal roads; fire services (water tanks, fire hydrants, fire hose reels); and neighbouring properties
- emergency prevention, preparedness and mitigation activities (including training and maintenance);
- control and coordination arrangements for emergency response (eg evacuation procedures, emergency assembly areas and procedures for response to hazards);
- up-to-date contact details of site personnel and any relevant off-site personnel who could provide technical support during an emergency;
- agreed roles and responsibilities of on-site personnel (eg equipment isolation, fire brigade liaison, evacuation management);
- 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 on-site;
- clearly states work health safety risks and procedures to be followed by fire-fighters, including personal protective clothing;
- minimum level of respiratory protection;
- the location of first-aid facilities and application of first aid equipment;
- a safe method of shutting down and isolating the PV system; and
- activation of other response/protection measures

Two copies of the ERP should be permanently stored in a prominent 'Emergency Information Cabinet' to be located at each vehicle entrance point to the solar farm, external to any security fence or locked gate, and a copy provided to local emergency responders. Two copies of the ERP will also be stored within the operations facilities.

The Emergency Information Cabinets must be clearly visible, painted red and marked 'EMERGENCY INFORMATION' in white contrasting lettering not less than 25mm high, installed at a height of 1.2m - 1.5m and accessible with a fire brigade standard '003' key.

In accordance with Section 2.4 of the Guidelines for Renewable Energy Installations, prior to commissioning the Solar Farm, information in relation to the specific hazards and fire suppression requirements of the site should be provided to CFA during a site familiarisation visit. An annual emergency exercise should also be conducted at the site, with an invitation extended to the local CFA brigade to participate.

4. BUSHFIRE MANAGEMENT AND MITIGATION

Standard requirements addressing bushfire (and grassfire) protection that are relevant to the Solar Farm, include maximising the separation distance between the infrastructure and the hazard; and providing access for emergency service vehicles. The following key points will be addressed within the CEMP and OEMP.

- Defendable Space and Vegetation Management;
- Water Supply;
- Access; and
- Consultation with the CFA.

4.1 Defendable Space and Vegetation Management

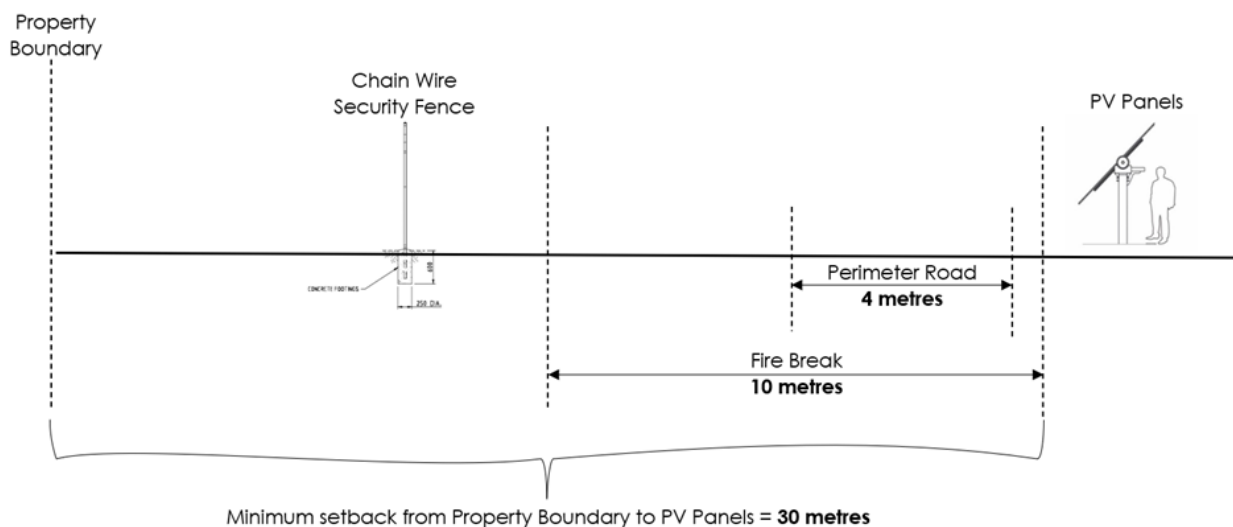
Defendable space (fire break) is an area of land around a building/infrastructure where vegetation (fuel) is modified and managed to reduce the effects of flame contact and radiant heat associated with a bushfire. This is also required as a workable area in which firefighters, emergency services personnel and others can undertake property protection after the passage of a bushfire.

Understanding the value and limitations of fire break is important, and as is the understanding that bushfires attack built assets by either flame contact, radiant heat or burning debris. A managed fire break 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 this cleared zone to ignite grassy fuel within the solar farm itself.

Despite these limitations, and with due consideration of Section 4.2 and Section 6 of the Guidelines for Renewable Energy Installations the concept design has been updated to include:

- 10m fire break around the perimeter of the facility (includes 4m wide perimeter road);
- 3.5m – 7.5m setbacks between the solar panel rows;
- 30m perimeter setback around the subject site;
- Minimum of 10m setback from areas of Aboriginal cultural sensitivity; and
- Minimum of 10m setback from wetland area.

Figure 1-3 : Indicative Plan View of setback, firebreak, and perimeter Road at Viewbank Solar Farm



These areas will be cleared of infrastructure and grass heights will be maintained to under 100mm during declared fire periods. Additional measures (and comments) to be considered in the detailed design include:

- The BESS, Site Substation and Office building are located near the main entrance and must be clear of vegetation (including grass) for 10m on all sides.
- Solar facilities are to have a minimum separation of 6 metres between solar panel banks/rows;
This has not been addressed in the Concept Layout and Design. The concept design currently provides 3.5m – 7.5m setbacks between the solar panel rows and access to panels is achieved through the internal access tracks and perimeter road.
- Slashing or grazing to maintain a grass height less than 100mm throughout the summer fire danger period and extending into the late summer/autumn period if conditions continue to pose bushfire risks.

In 2018, Parkes Solar Farm in NSW undertook a three-week trial using sheep to manage grass fire hazards on solar Farms. The sheep were monitored closely throughout the trial period, and toward the end of the trial all of the sheep were observed to be relaxed, eating and moving freely around the 15 hectares block. By the end of the trial, all of the grass had been eaten to a reasonable length (not less than 50mm) and the hazard reduction was determined a complete success. Continued grazing is to be considered within the Site to ensure that grass is maintained below 100mm high; and

- The Landscape Plan and planting of visual screening must also consider bushfire management. Specifically the AS 3959 definition of low threat vegetation that includes:
Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of other areas of vegetation being classified vegetation.
- Where possible any planted vegetation corridors should be less than 20m wide.

4.2 Water Supply

In accordance with Section 3.2 of the Guidelines for Renewable Energy Installations, there is a requirement to have water tanks installed. The concept plan currently provides one 45,000lt tank and will be capable of being completely refilled automatically or manually within 24 hours.

The hard-suction point shall be provided, with a 150mm full bore isolation valve 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 with a matching blank end cap to be provided.

The hard-suction point shall be positioned within 4m to a hardstand area and provide clear access for fire personnel. The hardstand shall be maintained to a minimum of 15 tonne GVM, 8m long and 6m wide or to the satisfaction of the relevant fire authority.

As with any electrical fires, it is not considered safe to utilise water to fight fires on or within proximity to the solar modules. This is because the modules continue to be under current when the sun shines on them (they cannot be 'turned off').

As foam will be required for an electrical fire on-site, the CFA will draft the water from the tanks into their trucks, to then mix it with foam concentrate to create the foam required for an electrical fire. The water can also be used to fight grass fires near the site if necessary.

Water supply should be provided during the construction stage of the project and all plant and heavy equipment is to carry at least a 9-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.

4.3 Access

In accordance with Section 3.1 of the Guidelines for Renewable Energy, the road network will enable responding emergency services to access all areas of the facility and should consider:

- a four (4) metre perimeter road constructed within the ten (10) metre perimeter fire break;
- at least two (2) but preferably more access points to the site, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. This will require a total of four access points (two access points to the northern portion and two access points to the southern portion of the Solar Farm);
- Where possible all roads should be through roads, or alternatively incorporate a turning area for fire fighting vehicles at the end of the road, or passing bays every 600m. No dead ends;
- 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;
- 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 50 metres;
- Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle; and
- Gates must be wide enough and in good condition for entry and exit of fire fighting vehicles.

4.4 Bushfire Preparedness during Construction

As outlined within the Guidelines for Renewable Energy Installations, the construction and commissioning phases of development pose challenges for effective risk management. Site occupiers must:

- Develop a Construction Environmental Management Plan (CEMP) which incorporates fire management and emergency response;
- Bushfire awareness included in training and inductions for all contractors (see Table below for example);
- Firefighting equipment lists will be detailed in the Work Method Statements;
- 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 (refer to www.cfa.vic.gov.au)
- Carry fire extinguishers or firefighting equipment in vehicles
- Carry emergency communications equipment
- Ensure vehicles keep to tracks whenever possible
- Designated smoking area; and
- Safe storage of flammable and combustible materials

4.5 Consultation with the CFA

Ongoing communication with CFA is very important, as all attending units must be aware of any current site access restrictions (for example locked gates).

A copy of the site ERP (once requested by way of permit conditions) will be provided to the CFA. This will allow the fire fighters to have ready access to information that details the effective control measures, and for these to be implemented quickly. The CFA should also be provided within updated plans showing all access roads, gates and the location of supplies.

This Bushfire Assessment will also be forwarded to the CFA for comment.

5. CONCLUSION

Clause 13.05 places a strong emphasis on the protection of human life over all other policy considerations. Careful consideration has been given to the design and siting of the proposal in accordance with the Guidelines for Renewable Energy Installations, with specific measures incorporated to minimise and reduce fire risk.

The risk to human life as a result of bushfire is considered to be minimal based upon the following:

- Low number of people on site during the operational phase of the solar farm;
- Existing conditions of the Site are already low-fire risk; and
- The design, mitigation and safety measures proposed further reduce risk fire.

Accordingly, the proposed solar farm is considered to be acceptable in terms of bushfire management under the Planning Scheme and with due consideration of the Guidelines for Renewable Energy Installations.

Note: Despite the mitigation measures and treatments that are put in place it is noted that some bushfire risk will always remain and it is important that an Emergency Response Plan (ERP) is developed as a sub plan to both the CEMP and OEMP, and is prepared in conjunction with relevant stakeholders, including local fire services, adjoining property owners and employees.

Key Resources

Australian Standards (AS) 3959-2018 Construction of Buildings in Bushfire-prone Areas

CFA (2011) Fire Ecology - Guide to Environmentally Sustainable Bushfire Management in Rural Victoria.

https://www.cfa.vic.gov.au/documents/20143/202133/FireEcologyGuide_Final_web.pdf/7cedddf1-cf36-0356-2a52-6af401cdcb6f

CFA (2012) Grassland Factsheet. http://www.cfa.vic.gov.au/plan-prepare/grassfires/Grassfires_fact_sheet.pdf

CFA (2018) Fire Ready Kit. <http://www.cfa.vic.gov.au/plan-prepare/fire-ready-kit>

CFA (2019) Guidelines for Renewable Energy Installations.

<https://www.cfa.vic.gov.au/documents/20143/3558078/CFAGuidelinesforRenewableEnergyInstallations.pdf/eb29e41a-18a4-998e-97a7-9a4c9350574e>

Ecolink Consulting (2020) Biodiversity Assessment, Viewbank Solar Farm, Girgarre East, Victoria. Report prepared for ERM, October 2020.

APPENDIX A

EXAMPLE BUSHFIRE RISK AND MANAGEMENT ACTIONS FOR CONSRUCTION PHASE

EXAMPLE BUSHFIRE RISK AND MANAGEMENT ACTIONS FOR CONSRUCTION PHASE

Fire Danger Rating	What does it mean (CFA 2018 Fire Ready Kit)	Working Restrictions and Emergency Actions	Preparedness	Site Restrictions
Low-Moderate	<ul style="list-style-type: none"> If a fire starts, it can most likely be controlled in these conditions and homes can provide safety. 	No specific restrictions in place. Activities must be consistent with CEMP.		
High	<ul style="list-style-type: none"> Be aware of how fires can start and minimise the risk. Controlled burning off may occur in these conditions if it is safe – check to see if permits apply. 	<p>Consider suspending activities with the potential to cause accidental ignitions.</p> <p>The following activities are considered to be high fire risk activities:</p> <ul style="list-style-type: none"> welding; gas cutting; soldering; grinding; charring; and the use of power operated abrasive cutting discs. <p>Any person conducting or engaging in a high risk activity must ensure:</p> <ul style="list-style-type: none"> a shield or guard of fire resistant material is placed or erected in such a way as to prevent the emission of sparks, hot metal or slag; and the area for a radius of at least 1.5m from the activity is clear of all flammable material or wetted down sufficiently to prevent the spread of fire; and there is available for immediate use in the event of fire a reticulated water supply or an effective water spray pump of the knapsack 	<p>Monitor weather conditions and CFA alerts. When bushfire warnings are issued you need to understand what each one means.</p> <p>Be aware that action may be necessary.</p>	<p>Parts of the site may be closed in response to escalating fire danger.</p>
Very High				

Fire Danger Rating	What does it mean (CFA 2018 Fire Ready Kit)	Working Restrictions and Emergency Actions	Preparedness	Site Restrictions
		pattern with a tank capacity of not less than 9L and fully charged with water.		
Severe	<p>Expect hot, dry and possibly windy conditions.</p> <ul style="list-style-type: none"> ■ If a fire starts and takes hold, it may be uncontrollable. ■ Well-prepared homes that are actively defended can provide safety. ■ You must be physically and mentally prepared to defend in these conditions. 	<p><u>Suspension of activities likely to cause sparks or fire.</u></p> <p>When working on a Severe Fire Danger Rating day, a risk assessment of the work site as listed below must be undertaken before works can start.</p> <p>Site Managers to check (BoM) website information and brief staff prior to starting work in the morning and before staff change work sites.</p> <ul style="list-style-type: none"> ■ Height of grass ■ Dryness of grass ■ Adjacent properties ■ Prevailing wind speed > 10-15km/h ■ Wind direction ■ Is there an existing fire break <p>Is your equipment fitted with:</p> <ul style="list-style-type: none"> ■ Spark arresters that are working effectively ■ Equipment is free from faults and mechanical defects, which could cause an outbreak of fire?; ■ All machinery operators - knapsack spray pump in working order and fully charged with water with a capacity of not less than 16L; 	<p>Be aware of local conditions. Seek information by listening to ABC local radio, commercial and designated community radio stations, or watch Sky News TV, visit cfa.vic.gov.au, call the Victorian Bushfire Information Line on 1800 240 667 or via National Relay Service on 1800 555 677.</p>	<p>Parts of the site may be closed in response to escalating fire danger and all non-essential access to grassland will be restricted.</p>
Extreme	<p>Expect extremely hot, dry and windy conditions.</p> <ul style="list-style-type: none"> ■ If a fire starts and takes hold, it will be uncontrollable, unpredictable and fast moving. Spot fires will start, move quickly and come from many directions. ■ Homes and/or buildings that are situated and constructed or modified to withstand a bushfire, that are well prepared and actively defended, may provide safety. 	<p>Is your equipment fitted with:</p> <ul style="list-style-type: none"> ■ Spark arresters that are working effectively ■ Equipment is free from faults and mechanical defects, which could cause an outbreak of fire?; ■ All machinery operators - knapsack spray pump in working order and fully charged with water with a capacity of not less than 16L; 		

Fire Danger Rating	What does it mean (CFA 2018 Fire Ready Kit)	Working Restrictions and Emergency Actions	Preparedness	Site Restrictions
	<ul style="list-style-type: none"> ■ You must be physically and mentally prepared to defend in these conditions. 	<ul style="list-style-type: none"> ■ Minimum 100L water tanker with pumps (per <u>high risk activity</u>). Check to ensure fuel and oil is sufficient. A spark arrestor is in place. 		
Code Red	<ul style="list-style-type: none"> ■ These are the worst conditions for a bush or grassfire. ■ Homes are not designed or constructed to withstand fires in these conditions. ■ The safest place to be is away from high-risk bushfire areas. 	<p>There is to be no high risk activities or plant and equipment to be used for:</p> <ul style="list-style-type: none"> ■ Grass or vegetation reduction works (mowing); ■ Arborist works (chainsaw); ■ Vehicle operations in long grass ■ Other than – (Emergency works) 	<p>Be aware of local conditions. Seek information by listening to ABC local radio, commercial and designated community radio stations, or watch Sky News TV, visit cfa.vic.gov.au, call the Victorian Bushfire Information Line on 1800 240 667 or via National Relay Service on 1800 555 677.</p>	<p>The site should be closed in response to escalating fire danger and all non-essential access will be restricted.</p>

APPENDIX B RESPONSE TO CFA GUIDELINES

Requirement	Response
Part 1: Conditions for All Installation	
Planning, Design and Construction	
<ul style="list-style-type: none"> The design team should consult with CFA as a key stakeholder early in the planning and design phase to ensure that CFA can consider the implications of the design on emergency response. 	A copy of this report will be provided to CFA for their review and comment. Any formal responses will be appended to this report.
<ul style="list-style-type: none"> Where any proposed facility design does not or is unable to meet the requirements of this guideline, designers are to contact CFA's State Infrastructure and Dangerous Goods Unit for design review and advice. 	Not required
<p>During construction of any renewable energy installation, site occupiers must:</p> <ul style="list-style-type: none"> Develop an Emergency Management Plan for the construction and commissioning phases 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 (refer to www.cfa.vic.gov.au) Carry fire extinguishers or firefighting equipment in vehicles Carry emergency communications equipment Ensure vehicles keep to tracks whenever possible Restrict smoking to prescribed areas, and provide suitable ash and butt disposal facilities. 	<p>The proposal will include the development of both a Construction Environmental Management Plan (CEMP) and an Operational Environmental Management Plan (OEMP) for the site which can be dealt with as a condition to any permit issued.</p> <p>Refer to Section 4.4 of the Bushfire Risk Assessment.</p>
Emergency Management	
<ul style="list-style-type: none"> CFA requires that facility operators develop an emergency management plan consistent with the requirements of Australian Standard 3745: Planning for emergencies in facilities. 	<p>An Emergency Response Plan (ERP) will be developed prior to construction of the Solar Farm.</p> <p>Refer to Section 3.3 of the Bushfire Risk Assessment.</p>
Training for Facility Staff	
<p>Staff operating and/or working in this facility are required to be trained and aware of:</p> <ul style="list-style-type: none"> Site and operational risks and hazards Site emergency management roles, responsibilities and arrangements The use of any firefighting equipment where there is an expectation for staff to undertake first aid firefighting The storage, handling and emergency procedures for dangerous goods on-site The location of first-aid facilities and application of first aid equipment. 	<p>An Emergency Response Plan (ERP) will be developed prior to construction of the Solar Farm and includes:</p> <ul style="list-style-type: none"> emergency prevention, preparedness and mitigation activities (including training and maintenance); and control and coordination arrangements for emergency response (eg evacuation procedures, emergency assembly areas and procedures for response to hazards). <p>Refer to Section 3.3 of the Bushfire Risk Assessment.</p>
Access	
<p>Adequate access to and within the facility will assist CFA in responding to and managing fires on-site. To enable access for fire vehicles, CFA requires that the following provisions be considered:</p>	<p>The road network will enable responding emergency services to access all areas of the facility and</p>

Requirement	Response
<ul style="list-style-type: none"> • A four (4) metre perimeter road should be constructed within the ten (10) metre perimeter fire break. • Roads are to be of all-weather construction and capable of accommodating a vehicle of 15 tonnes. • 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. • 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 50 metres. • Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle. • Incorporate passing bays at least every 600m which must be at least 20m long and have a minimum trafficable width of 6m. Where roads are less than 600m long, at least one passing bay is to be incorporated. • Road networks must enable responding emergency services to access all areas of the facility. • The provision of at least two (2) but preferably more access points to the site, to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. The number of access points should be informed through a risk management process. 	<p>will be considered in the detailed design.</p> <p>Refer to Section 4.3 of the Bushfire Risk Assessment.</p>
<p>Firefighting Water Supply</p>	
<p>Static water storage tank installations are to comply with Australian Standard 2419.1 Fire hydrant installations System design, installation and commissioning and the following conditions.</p> <ul style="list-style-type: none"> • The static water storage tank shall be of not less than 45,000 litres effective capacity. The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel. The location and number of tanks should be determined as part of the site's risk management process and in consultation with a CFA delegated officer. • The static storage tanks shall be capable of being completely refilled automatically or manually within 24 hours. • The hard-suction point shall 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 with a matching blank end cap to be provided. • The hard-suction point shall be positioned within 4m to a hardstand area and provide clear access for fire personnel. • An all-weather road access and hardstand shall be provided to the hard-suction point. The hardstand shall be maintained to a minimum of 15 tonne GVM, 8m long and 6m wide or to the satisfaction of the relevant fire authority. • The road access and hardstand shall be kept clear at all times. • The hard-suction point shall be protected from mechanical damage (ie bollards) where necessary. • Where the access road has one entrance, a 10m radius-turning circle shall be provided at the tank. • An external water level indicator is to be provided to the tank and be visible from the hardstand area. • Signage shall be fixed to each tank. • Signage shall be provided at the front entrance to the site, indicating the direction to the static water tank and being to the satisfaction of a CFA delegated officer 	<p>The concept plan currently provides one 45,000lt tank.</p> <p>Refer to Section 4.2 of the Bushfire Risk Assessment.</p>

Requirement	Response
Dangerous Goods Storage and Handling	
<ul style="list-style-type: none"> • Signage and labelling compliant with the Dangerous Goods (Storage and Handling) Regulations 2012, and the relevant Australian Standards is to be provided. • All dangerous goods stored on-site must have a current safety data sheet (SDS). Safety data sheets must be contained in the site's emergency information book, in the emergency information container. • Appropriate material (including absorbent, neutralisers, equipment and personal protective equipment) for the clean-up of spills is to be provided and available on-site. 	<p>To be considered in detailed design and outlined within the Emergency Response Plan (ERP), which would be developed in consultation with the CFA and included as a sub plan of both the CEMP and OEMP.</p> <p>Two copies of the ERP should be permanently stored in a prominent 'Emergency Information Cabinet' to be located at each vehicle entrance point to the solar farm, external to any security fence or locked gate, and a copy provided to local emergency responders. Two copies of the ERP will also be stored within the operations facilities.</p> <p>Refer to Section 3.3 of the Bushfire Risk Assessment.</p>
Operation and Maintenance of Facilities	
<ul style="list-style-type: none"> • Maintenance and repair activities that involve flame cutting, grinding, welding or soldering (hot works) are to be performed under a 'hot work permit' system or equivalent hazard or risk management process. 	<p>All maintenance and repair activities that involve flame cutting, grinding, welding or soldering (hot works) will be performed under a 'hot work permit' system or equivalent hazard or risk management process and will be outlined within the Emergency Response Plan (ERP), which would be developed in consultation with the CFA and included as a sub plan of both the CEMP and OEMP.</p>
Fuel/Vegetation Management	
<p>Facility operators are to undertake the following fuel management measures during the Fire Danger Period:</p> <ul style="list-style-type: none"> • Grass is to be maintained at below 100mm in height during the declared Fire Danger Period. • A fire break area of ten (10) metres width is to be maintained around the perimeter of the facilities, electricity compounds and substations. This area is to be of non-combustible mulch or mineral earth. <ul style="list-style-type: none"> ○ The fire break area must commence from the boundary of the facility or from the vegetation screening (landscape buffer) inside the property boundary. ○ The fire break must be constructed using either mineral earth or non-combustible mulch such as crushed rock. ○ The fire break must be vegetation free at all times. ○ No obstructions are to be within fire break area (eg no stored materials of any kind). 	<p>The concept design has been updated to include:</p> <ul style="list-style-type: none"> • 3.5m – 7.5m setbacks between the solar panel rows; • 30m perimeter setback around the subject site including a 10m firebreak around the perimeter of the facility; • Minimum of 10m setback from areas of Aboriginal cultural sensitivity; and • Minimum of 10m setback from wetland area. <p>These areas will be cleared of infrastructure and grass heights will be maintained to under 100mm during declared fire periods.</p> <p>The BESS, Site Substation and Office building are located near the main entrance and will be clear of vegetation (including grass) for 10m on all sides.</p> <p>Refer to Section 4.1 of the Bushfire Risk Assessment.</p>

Requirement	Response
<ul style="list-style-type: none"> Adhere to restrictions and guidance during the Fire Danger Period, days of high fire danger and Total Fire Ban days (refer to www.cfa.vic.gov.au). All plant and heavy equipment is to carry at least a 9-litre water stored-pressure fire extinguisher with a minimum rating of 3A, or firefighting equipment as a minimum when on-site during the Fire Danger Period. There is to be no long grass or deep leaf litter in areas where plant and heavy equipment will be working. 	<p>The Construction Environmental Management Plan (CEMP) will incorporate fire management and emergency response including:</p> <ul style="list-style-type: none"> Adhere to restrictions on Total Fire Ban or days of high fire danger (refer to www.cfa.vic.gov.au) Carry fire extinguishers or firefighting equipment in vehicles Carry emergency communications equipment Ensure vehicles keep to tracks whenever possible. <p>Refer to Section 4.4 of the Bushfire Risk Assessment.</p>

Part 2: Additional Conditions Specific to Facility Type

Siting for Solar Facilities

<ul style="list-style-type: none"> Solar facilities are to have a 6 metre separation between solar panel banks/rows. 	<p><i>This has not been addressed in the Concept Layout and Design. The concept design currently provides 3.5m – 7.5m setbacks between the solar panel rows and access to panels is achieved through the internal access tracks and perimeter road.</i></p>
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Operation and Maintenance of Solar Facilities

<ul style="list-style-type: none"> Solar farm operators must provide specifications for safe operating conditions for temperature and the safety issues related to electricity generation, including isolation and shut-down procedures, if solar panels are involved in fire. This information must be provided within the content of the emergency information book. 	<p>To be considered in detailed design and outlined within the Emergency Response Plan (ERP), which would be developed in consultation with the CFA and included as a sub plan of both the CEMP and OEMP.</p> <p>Refer to Section 3.3 of the Bushfire Risk Assessment.</p>
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Fuel/Vegetation Management at Solar Facilities

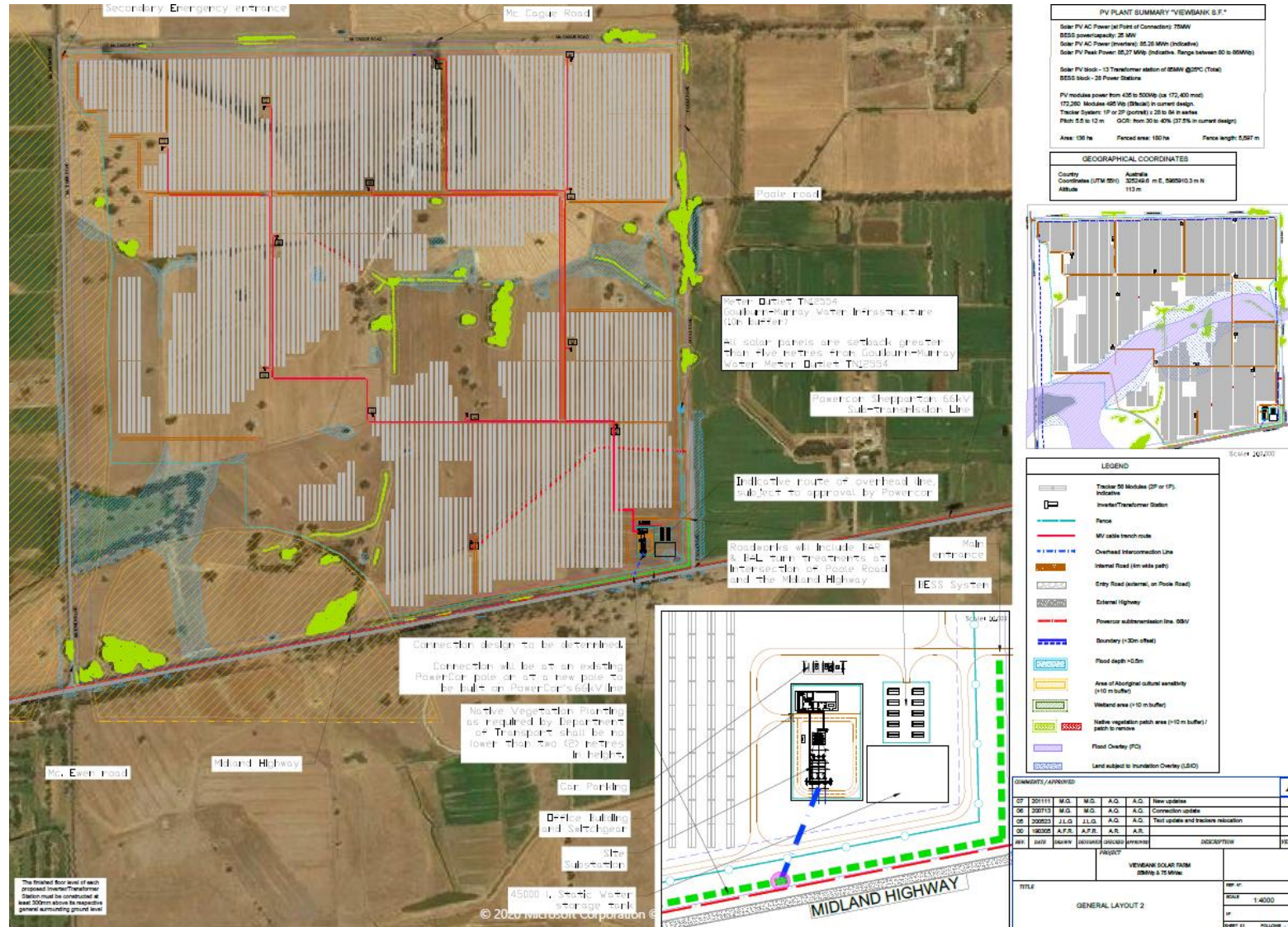
<ul style="list-style-type: none"> Solar arrays are to have grass vegetation maintained to 100mm under the array installation or mineral earth or non-combustible mulch such as stone. Where practicable, solar energy installations can be sited on grazed paddocks. In this case, vegetation is to be managed as per the requirements of this guideline, or as informed through a risk management process. 	<p>Grass is to be maintained at below 100mm in height during the declared Fire Danger Period and would be specified within an Operational Environmental Management Plan (OEMP) for the Site.</p> <p>Refer to Section 4.1 of the Bushfire Risk Assessment.</p>
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Siting of Battery Installations

<ul style="list-style-type: none"> Containers/infrastructure for battery installations are to be located so as to be directly accessible to emergency responders (eg provided with a suitable access road). Adequate ventilation of the battery container/storage area is to be provided where required under (DR) Australian Standard 5139 Electrical Installations – Safety of battery systems for use with power conversion equipment; the manufacturer's requirements and/or SDS for battery storage. 	<p>To be considered in detailed design.</p>
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Requirement	Response
<ul style="list-style-type: none"> Containers/infrastructure for battery installations are to be provided with appropriate spill containment/bunding that includes provision for fire water runoff. 	
<p>Operation and Maintenance of Battery Installations</p>	
<ul style="list-style-type: none"> Battery installations that contain dangerous goods may have to comply with the requirements of the Dangerous Goods Act 1985; the Dangerous Goods (Storage and Handling) Regulations 2012; and relevant Australian Standards. Battery storage manufacturers must provide specifications for safe operating conditions for temperature and the effects on battery storage if involved in fire. This information must be provided within the content of the emergency information book. Battery installations are to be kept free of extraneous materials and combustible materials of all kinds. Regular inspections and housekeeping is to be conducted to ensure materials do not accumulate. Battery installations are to be serviced/maintained as per the manufacturer's requirements. 	<p>To be considered in detailed design and the OEMP.</p>
<p>Fuel/Vegetation Management at Battery Installations</p>	
<ul style="list-style-type: none"> Containers/infrastructure for battery installations must be clear of vegetation for 10 metres on all sides, including grass. CFA requires non-combustible mulch such as stone or mineral earth within this 10-metre area. 	<p>The BESS, Site Substation and Office building are located near the main entrance and must be clear of vegetation for 10m on all sides.</p>

APPENDIX C SITE LAYOUT PLAN PREPARED BY FRV



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