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Fire Management Plan

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For Proposed Development of
a Solar Farm Facility
Goroke-Harrow Rd
Charam, VIC

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Fire Management Plan

Charam Solar Farm, Goroke-Harrow Road, Charam VIC



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Glossary Of Terms

Term	Meaning
Asset Protection Zone	(APZ) a buffer zone of modified fuel and vegetation to reduce the threat to life and property adjoining key community assets and critical infrastructure. Also referred to as a 'fire break'.
Battery Energy Storage System	(BESS) is a dedicated battery and associated components housing, often shaped like a shipping container.
Bushfire	Unplanned fire in natural or managed vegetation.
Bushfire Prone Vegetation	Vegetation that is vulnerable to fire, either through specific adaptation or by inherent characteristics such as high levels of fine fuels, volatile oils or dead material retention.
Crown Fire	Fire that reaches and burns the tree canopy, which can be spread to neighbouring trees by wind.
Defendable Space	An area of managed vegetation surrounding an asset to protect it from radiant heat and direct flame contact.
Fire Behaviour Index	(FBI) is a potential fire intensity scale running from 0 to 100 and beyond, with increasingly high values indicating increasingly dangerous fire behaviour and therefore increased fire danger risk.
Fuel Load	The amount of fire fuels available to burn in a given area, usually described in tons per hectare.
Fuel Reduction	The process of removing/reducing fuel loads through mechanical, burning or chemical means.
Minimum Fuel Condition	Describes managed landscapes where fuel reduction or management such as mowing, watering or spraying has occurred to restrict the severity, impact and spread of fire.
Solar Energy Facility	A facility where solar energy is converted to electricity, often connected to the electricity grid. They can be photovoltaic or solar thermal technology.
Spotfire	Fires that occur ahead of the main fire front during a bushfire, usually started by embers carried ahead of the fire by strong winds.

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Abbreviations

Term	Meaning
APZ	Asset Protection Zone
AS 3959:2018	Australian Standards, Construction of Dwellings in Bushfire Prone Areas
BAL	Bushfire Attack Level
BESS	Battery Energy Storage System
BMO	Bushfire Management Overlay
BPA	Bushfire Prone Area
CFA	Country Fire Authority
EMP	Emergency Management Plan
FBI	Fire Behaviour Index
FDR	Fire Danger Rating
FMP	Fire Management Plan
FRA	Fire Risk Assessment
PCS	Power Conversion System
PV	photovoltaic
RMU	Ring Main Unit
VFRR	Victorian Fire Risk Register

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1 Introduction

Phoenix Wildfire has been engaged by Green Gold Energy ('the client') to undertake a Fire Management Plan (FMP) and provide recommendations on mitigation strategies to manage the fire risk at the proposed Charam Solar Energy Facility ('the proposal') on land at Goroke-Harrow Road, Charam ('the study area'). The overall risk assessment has been undertaken for the site to identify and demonstrate how the proposed development can appropriately mitigate the fire risk at the site from both within and external to the property, including the broader landscape bushfire risk.

The proposal is for the construction, operation and eventual decommissioning of a 4.95 Mw Photovoltaic Solar Farm with BESS storage capacity (yet to be decided). Protection of life and property is the primary directive for this FMP in identifying the risks and providing and mitigation strategies to increase protection of the proposed development, its employees, emergency responders and the broader community.

This report will respond to and comply with the applicable bushfire planning and building controls, policies and guidelines, in particular the *Design Guidelines and Model Requirements: Renewable Energy Facilities* Version 4 (CFA, 2023) hereafter referred to as 'the CFA Guidelines'.



2 Aims and Objectives

The purpose of this Fire Management Plan (FMP) is to propose fire risk reduction strategies to protect life and property at the Charam Solar Farm. This includes preventing the spread of fires, including bushfires, within the solar farm and to neighboring areas. Specific objectives include:

- Minimize risks to life to the lowest reasonable extent.
- Decrease the likelihood of fires originating at the solar farm due to human activities.
- Limit the impact of fires on the solar farm and surrounding community assets, such as agricultural lands, rural residences, the township of Charam and nearby bushland reserves.
- Outline effective and practical strategies to mitigate fire risks.
- Develop a schedule for inspecting, maintaining, and monitoring fire mitigation efforts at the solar farm.

2.1 Plan Accountability and Review

This Fire Management Plan (FMP) will be the responsibility of the designated Emergency Planning Committee (EPC). The appointment of the EPC will set out the conditions for review of the FMP. Green Gold Energy have not yet contracted the roles for the EPC and therefore the responsibility for the review of this plan remains with Green Gold Energy Management.

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The FMP should be reviewed every five years, or when significant changes occur to the operation of the facility. The FMP should be reviewed in conjunction with the Risk Management Plan and the Emergency Management Plan, in line with any reviews and changes to hazards and risk management as per the Risk Management Plan, and where there is a near-miss or incident at the facility.

2.1.1 Organisational Structure

The organisational framework for managing fire/emergency preparation, compliance, asset maintenance, emergency response and ongoing facility housekeeping is as follows:

Emergency Planning Committee

The Emergency Planning Committee will be comprised of representatives and stakeholders in the facility. The EPC is made up of:

- Senior Management
- Staff
- Chief Warden
- Specialist Facility Personnel e.g. maintenance engineer

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Emergency Control Organisation (ECO)

The ECO will implement the emergency procedures in a building, including the evacuation of the occupants and organisational command on the declaration of an emergency.

The ECO will be responsible for staff training and evaluation, and record keeping of staff training.



3 Fire Hazard and Risk Summary

The hazards and risks at the Charam Solar Farm have been identified in the RMP. The fire hazards threatening the development from outside and within have been identified, and the risk chance of occurrence identified as follows:

Identified Hazard	Hazard Description (Solar Energy Facilities)	Hazard Description (BESS)	Risk Level
Electrical hazards causing a fire	Electrical hazards, such as panel/inverter electrical faults; power surges; lightning strikes; water ingress; retained DC electricity in solar panels after shut-down/isolation. There is potential for limited emergency response due to proximity of panel banks to each other, on-site infrastructure and vegetation.	Electrical hazards, such as battery faults; overcharging; rapid discharge; loss of remote monitoring systems; internal short circuits; overheating; water ingress; lightning strike (leading to thermal runaway).	Medium
Fire causing spread to adjoining infrastructure	Fire starting within the facility can potentially spread to adjoining infrastructure. Infrastructure includes other solar panels, substation, inverters or the BESS. Rapid escalation can occur from fire spreading through vegetation within the facility.	Potential fire spread due to the proximity of batteries (and containment measures) to each other, on-site infrastructure and vegetation (including screening vegetation). Fire starting within components of the BESS can spread rapidly, potentially causing thermal runaway. This escalation can raise the complexity of suppression for firefighters and cause issues with the broader community.	Low
Fire spreading to adjoining properties	Fire can spread to adjoin properties from uncontrolled fire within the site, most likely through vegetation continuity or escaping embers on elevated fire danger days. Fire could rapidly develop and impact neighbouring properties and infrastructure.	The BESS infrastructure is well-contained by an APZ however there is a small chance that fire can spread beyond the BESS on elevated fire danger days.	Low
Fire impacting the site from the surrounding landscape	Grassfires can enter and impact the facility, especially on elevated fire danger days. Embers may be carried into the facility over fire breaks in extreme fire conditions.	The BESS may be impacted by embers from grassfire entering the facility from the surrounding landscape.	Low
Dangerous goods	There are chemical hazards, such as the inherent hazards of stored dangerous goods; spills and leaks of transformer oil/diesel, refrigerant gas/coolant within various components of the facility.	There are chemical hazards, such as battery chemicals, refrigerant gas/coolant within various components of the BESS.	Low
Fire water runoff	Fire involving the BESS will result in water being used to extinguish and cool the area. The CFA Guideline outlines the management of fire water runoff for the BESS to ensure this water does not enter the environment.		Low
Safety of staff and firefighters	There are various safety hazards associated with fire in the solar energy facility and the BESS. Firefighting and emergency response by staff and firefighters can be hazardous.		Medium

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4 Control Measures

4.1 Policy and Procedures

4.1 Policy, Procedures and Checklists			
Control Measure	Description	Responsibility	Review Frequency
Risk Management Plan (RMP)	The RMP has been developed in accordance with the CFA guidelines to identify and assess the risks to the facility, and provide strategies to lower the risks.	Emergency Planning Committee	The RMP is prepared for each stage of the development. Review will occur before any site changes are undertaken, or every three years.
Fire Management Plan (FMP)	The FMP has been developed in accordance with the CFA guidelines and outlines the control measures to reduce the risk of fire impacting the facility from within and from external fire.	Emergency Planning Committee	The FMP is prepared for each stage of the development. Review will occur before any site changes are undertaken, or every 5 years.
Emergency Management Plan (EMP)	The EMP will be developed in accordance with the CFA guidelines and AS 3745-2010 Planning for Emergencies in Facilities.	Emergency Planning Committee	The EMP is prepared for each stage of the development. Review will occur annually.
Emergency Information Book and Emergency Information Containers	<p>An Emergency Information Book will be developed and a date to emergency responders. Emergency Information Books must be located in Emergency Containers, provided at each vehicle entrance the facility.</p> <p>The Emergency Information Book (as per the CFA Guidelines (2021)) will include:</p> <ul style="list-style-type: none"> a) A description of the premises, its infrastructure and operations. b) Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems (BESS), substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. Block plans for the facility (as per AS 2419.1-2021: Fire hydrant installations, Clause 11.5: Block plan). c) A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. d) Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at-risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire). e) Details of emergency equipment, including the type and location of gas detectors. f) Up-to-date contact details for site personnel, regulatory authorities and site neighbours. g) Safety Data Sheets (SDS) for dangerous goods stored on-site. 	Emergency Planning Committee	<p>The Emergency Information Book is prepared for each stage of the development. Review will occur annually.</p> <p style="text-align: center; color: red; font-weight: bold; font-size: 24px;">ADVERTISED PLAN</p>



4.1 Policy, Procedures and Checklists ctd.

Control Measure	Description	Responsibility	Review Frequency
<p>Emergency Information Book and Emergency Information Containers (continued)</p>	<p>Emergency Information Containers must be:</p> <ul style="list-style-type: none"> a) Painted red and marked 'EMERGENCY INFORMATION' in white contrasting lettering not less than 25mm high. b) Located at all vehicle access points to the facility, installed at a height of 1.2 metres – 1.5 metres. c) Accessible with a fire brigade standard '003' key. d) Kept clear of obstructions, including products, rubbish, vehicles, vegetation and any hazards (e.g. pest infestation). <p>Specific to the BESS, the Emergency Information Book will provide information on hazards to emergency responders including:</p> <ul style="list-style-type: none"> a) Specifications for safe operating conditions for temperature. b) Schematics and technical data for battery energy storage system (BESS) containers/enclosures, the number of containers/enclosures on-site, and the number of battery racks/modules within each container/enclosure. c) Details of the hazards for the battery energy storage system (BESS), including thermal events/runaway, electrical safety hazards, explosion hazards, dangerous goods hazards including off-gassing and associated vapour clouds), and the effects of fire on the battery energy storage system (BESS) (e.g. explosion, release of toxic gases). d) Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available (e.g. at the BESS containers, in an on-site control room, off-site monitoring facilities). e) Details of all provided battery safety and protective systems, including activation process, automatic trigger, and associated hazards. f) The shut down and/or isolation procedures for if the batteries are involved in fires, and appropriate personnel contact details for verifying that the battery enclosure/container system has been isolated/shut-down and de-energised during emergencies. 	<p>Emergency Planning Committee</p>	<p>The Emergency Information Book is prepared for each stage of the development. Review will occur annually.</p>
<p>Personnel Training</p>	<p>Employers must provide information, instruction and training in accordance with the Occupational Health and Safety Act 2004 and AS 3745-2010 Planning for Emergencies in Facilities</p> <p>The following information and training should be provided to any personnel working at the facility (and visitors where appropriate):</p> <ul style="list-style-type: none"> • Facility and operational risks and hazards. Facility emergency management roles, responsibilities and arrangements (as per the Emergency Plan). • The on-site emergency warning systems and location of evacuation assembly areas. • The safe and effective use of any fire-fighting equipment where there is an expectation for staff to undertake first-aid firefighting training. • The storage, handling and emergency procedures for dangerous goods at the facility. • The location of first aid facilities and application of first aid equipment. 	<p>Site Manager (to be appointed)</p>	<p>Site induction will occur for all new personnel and contractors.</p> <p>6 monthly refreshers will occur for all personnel and contractors.</p>

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4.1 Policy, Procedures and Checklists ctd.

Control Measure	Description	Responsibility	Review Frequency
Personnel Training (continued)	<p>As the facility is at risk from grassfire the following will be included in the personnel training:</p> <ul style="list-style-type: none"> the VicEmergency app will be downloaded and 'watch zones' will be set for the facility location and any related areas of travel. Information and training on the warning levels and messages issued by CFA and Emergency Management Victoria will be carried out. CFA's free 'Bushfire Safety for Workers' e-learning module prior to the Fire Danger Period will be mandatory for all personnel at the facility. 	Site Manager (to be appointed)	
Fire permits and restrictions	Ensure that fire permits are obtained from the relevant authority and followed. Ensure that restrictions based on Fire Danger Ratings or Total Fire Ban status are implemented.	Site Manager (to be appointed)	Annually for the fire danger period.
Hot Works Permit	A hot works permit system will be established for the facility that will ensure that any hot works, including welding, cutting or grinding will only occur after a hot works procedure has been granted by site management.	Site Manager (to be appointed)	As Required.
Dangerous Goods	Signage and labelling compliant with the Dangerous Goods (Storage and Handling) Regulations 2022 and the relevant Australian Standards must be provided at the site for all dangerous goods storage locations, and storage tanks where applicable. All dangerous goods stored on-site must have a current Safety Data Sheet (SDS) . Safety Data Sheets must be provided within the facility's Emergency Information Book(s) in the Emergency Information Container(s).	Site Manager (to be appointed)	Review annually
Emergency Service Familiarisation and Engagement	Before commissioning of the facility, operators are to offer a familiarisation visit and explanation of emergency procedures to CFA brigades and other Emergency Services. Site familiarisation visits allows brigades to obtain information and develop pre-plans based on the facility's <ul style="list-style-type: none"> Operations and personnel complement Site access points, layout and infrastructure Specific hazards Installed fire detection and suppression systems. 	Site Manager (to be appointed)	Annually
Electrical Equipment Commissioning Procedures	Ensure all electrical equipment is fully commissioned and maintained as per the manufacturer's specifications and other legislative requirements.	Site Manager (to be appointed)	Ongoing

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4.2 Maintenance

4.2 Maintenance			
Control Measure	Description	Responsibility	Review Frequency
Solar Energy Facility Component and Equipment Maintenance	Solar energy facility components and equipment must be checked regularly for damage. Any signs of damage must be assessed and repaired by a qualified person. Ensure that the installation and maintenance complies with AS/NZS 5139-2019: Electrical installations .	Site Manager (to be appointed)	Monthly or as required. Check after any significant incident weather events.
Solar Energy Facility Monitoring Systems Maintenance	All facility monitoring systems must be regularly tested according to the manufacturers specifications. This ensures that early detection, and if required, remote shut down is achievable in the event of an emergency.	Site Manager (to be appointed)	As required. Check after any significant incident weather events.
BESS Monitoring Systems Maintenance	As with the facility monitoring systems, the BESS monitoring systems must be regularly tested according to the manufacturers' specifications. This ensures that early detection, and if required, remote shut down is achievable in the event of an emergency.	Site Manager (to be appointed)	Monthly, or as required. Check after any significant incident weather events or seismic activity.
Battery Enclosures and Infrastructure Maintenance	Battery enclosures and infrastructure must be checked regularly for damage. Any signs of damage must be assessed and repaired by a qualified person.	Site Manager (to be appointed)	Monthly or as required. Check after any significant incident weather events or seismic activity.
Dangerous Goods Safety Systems Maintenance	All dangerous goods on the site must comply with Dangerous Goods Storage and Handling regulations. Storage and handling of dangerous goods must be regularly reviewed, especially if: <ul style="list-style-type: none"> Any changes in type, quantity or associated equipment or housing of dangerous goods. Review the RMP prior to commencing any changes. 	Site Manager (to be appointed)	Annually, or as required.
Site Signage	Ensure all signage relevant to emergencies is current, legible and clear of obstructions. Emergency related signage should include: <ul style="list-style-type: none"> Emergency Information Booklet Locker. Hazchem or Dangerous Goods signage. Emergency site plans and Evacuation procedures. Directions to static water supplies. 	Site Manager (to be appointed)	Annually, or as required.
Firefighting Resource Maintenance	Inspect all vehicles and site buildings to ensure they are fitted with functioning fire extinguisher, fire blankets and any other PPE.	Site Manager (to be appointed)	Annually, or as required.



4.2 Maintenance ctd.

Control Measure	Description	Responsibility	Review Frequency
Emergency Vehicle Access	<p>All access roads are to be maintained to ensure they meet the following requirements:</p> <ul style="list-style-type: none"> A four (4) metre perimeter road within the perimeter fire break. Must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes. 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 fifty (50) metres. Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle. 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. 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. The provision of at least two access points to the facility to ensure safe and efficient access to and egress from areas that may be impacted or involved in fire. 	Site Manager (to be appointed)	Monthly, or as required.

4.3 Vegetation Management

Control Measure	Description	Responsibility	Review
Asset Protection Zone	Remove all vegetation during the Fire Danger Period. Regularly inspect the fire break around the perimeter and BESS.	Site Grounds Caretaker (to be appointed)	Regularly during the Fire Danger Period, at other times as required.
Vegetation Screening	<p>Inspect vegetation screening prior to and during the Fire Danger Period. Conduct vegetation management in accordance with the following:</p> <ul style="list-style-type: none"> Remove any dead vegetation and branches. Remove loose litter and manage groundcover vegetation to 100mm. Remove any lower branches to a height of 2m. Replace any dead screening vegetation with appropriate fire resilient species. 	Site Grounds Caretaker (to be appointed)	Annually before the Fire Danger Period, at other times as required.
Facility Grounds	All grounds around the facilities will be maintained to a height of no more than 100mm during the Fire Danger Period.	Site Grounds Caretaker (to be appointed)	Regularly during the Fire Danger Period, at other times as required.

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5 Ignition Management

The most effective fire management strategy is the prevention of unplanned ignition. Awareness of hazards that may lead to fire is key to reducing the ignition risk across the site.

5 Ignition Management			
Ignition Risk	Mitigation	Responsibility	Review Frequency
Vehicle and Machinery	<ul style="list-style-type: none"> Ensure all plant or equipment have spark arrestors. Ensure adequately maintained vehicle access roads and firebreaks within the solar facility. Ensure adequate maintenance standard of vehicles and machinery. Ensure workers are aware of the risk of driving over and parking on dry grassland. 	Site Manager (to be appointed)	Every three months, or as required.
Dangerous Goods	<ul style="list-style-type: none"> Locate external flammable liquid fuel tanks (diesel) well away from work areas Keep flammable liquid fuel tanks (diesel) within the temporary construction compound cleared of any combustible vegetation. Fuel tanks should be constructed to meet AS 1940-2017 Eliminate the use of external flame sources near where flammable goods are stored. 	Site Manager (to be appointed)	Every three months, and monthly prior to and during the FDP
Facility Buildings	<ul style="list-style-type: none"> Install smoke alarms, fire extinguishers, and fire blankets within boundary onsite buildings. All workers should take care in using heating and cooking appliances within facilities. 	Site Manager (to be appointed)	Every three months, or as required.
Smoking	Ensure that all staff, contractors and other site visitors receive an onsite induction, including the requirement that the site is a smoking free zone.	Site Manager (to be appointed)	Annually, or as required.
Lightning Strikes	<ul style="list-style-type: none"> Remotely monitor the site for ignitions immediately after dry storms have passed through the area. Maintain the APZ per Fire Management Plan-Asset Protection Zone. Maintain vehicle access roads and tracks with the facility. 	Site Manager (to be appointed)	Every three months, or as required.
Powerlines	<ul style="list-style-type: none"> Construct and maintain powerlines to meet AS/NZS 5139-2019: Electrical installations - Safety of battery systems for use with power conversion equipment. Inspect and repair faulty powerlines. Maintain adequate vegetation separation around powerline infrastructure. 	Site Manager (to be appointed)	Every three months, or as required.
Electrical Infrastructure	<ul style="list-style-type: none"> Identify all electrical infrastructure that may pose an ignition risk. Regularly test the alarm and monitoring systems. Regularly test the automatic shut-down and isolation systems. Isolate infrastructure that may present an ignition risk. Isolate infrastructure following an electrical fault and confirm there is a low risk of ignition prior to re-energising. 	Site Manager (to be appointed)	Every three months, or as required.
Arc Flash Hazards	Where required, appropriate demarcation of arc boundaries to at least 10m from PCU. Arc flash outlet flaps (blow-out panels) must be provided.	Site Manager (to be appointed)	Annually, or as required.



6 Housekeeping

All facilities must conduct regular site-wide housekeeping inspections.

6 Housekeeping			
Control Measure	Description	Responsibility	Review Frequency
Hazard Identification	Ensure that infrastructure, plant, equipment, vehicles and safety/warning signs show no signs of damage or dilapidation. Ensure that the signage complies with AS/NZS 5139-2019: Electrical installations and Dangerous Goods (Storage and Handling) Regulations 2022 .	Site Grounds Caretaker (to be appointed)	Every three months, and monthly prior to and during the FDP
Facility Access	Ensure all vehicle site access points, including emergency access points, are clear and accessible.	Site Grounds Caretaker (to be appointed)	Every three months, and monthly prior to and during the FDP
Fire Protection Systems and Equipment	Ensure that all equipment is unobstructed, clearly identifiable and performing optimally.	Site Manager (to be appointed)	Every three months, and monthly prior to and during the FDP
Security Measures	Ensure that fences, gates, and security cameras are monitored for damage, and that any damage is immediately actioned (eg., repaired or replaced).	Site Manager (to be appointed)	Every three months, and monthly prior to and during the FDP
Vegetation Management	Ensure that any accumulation of combustible materials leading to fire from infrastructure, buildings and fire breaks, and removed from the site.	Site Grounds Caretaker (to be appointed)	Every three months, and monthly prior to and during the FDP
Firefighting Resource Maintenance	Inspect all vehicles and site buildings to ensure they are fitted with functioning fire extinguisher, fire blankets and any other PPE.	Site Manager (to be appointed)	Every three months, and monthly prior to and during the FDP
Facility and System Monitoring	Conduct regular monitoring of the facility and infrastructure to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled, and any fire is notified to 000 immediately.	Site Manager (to be appointed)	Regular monitoring is required to ensure remote systems are operating properly.

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7 Equipment and Resources

The site must be equipped with the following fire safety equipment:

- Static water supply
- BESS heat and flame detection system
- SCADA system
- CCTV camera systems
- Remote alarm and notification systems
- Remote shutdown systems

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7.1 Static Water Supply

The Facility is located in a Bushfire Prone Area and does not have a reticulated water supply. Provision of a dedicated firefighting water supply is critical to support firefighting operations. Therefore a static water supply must be provided for the Solar Facility and BESS system. The static water supplies must comply with AS2419.1:2005, Fire Hydrant Installations and the CFA Guidelines, and be maintained as per AS1851 Routine Service of Fire Protection Systems and Equipment.

The following static water supply infrastructure requirements should include:

- Above ground tanks constructed of concrete or steel with a minimum capacity of 288,000 litres.
- 150mm full bore isolation valve equipped with a Storz connection. Adapters to include 125mm, 100mm, 90mm, 75mm, 65mm Storz adapters with a matching blank end cap to be provided. Hydrants and outlets should be protected from mechanical damage through the provision of bollards.
- Tank level indicator
- Tank signage, including the tank capacity and location of the Contaminated Water Shutoff Valve.
- Hardstand area that enables firefighting appliances to park within four meters of the tank outlet.
- All-weather road access 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).

In the event of a fire emergency impacting the BESS, the following procedures will be followed:

1. Isolate the storm drains to ensure fire water will be retained in the Fire Runoff Storage Area.
2. Begin suppression tactics when the isolation valves are shut to ensure fire water is contained.
3. Ensure the procedures for removal and disposal of contaminated water are followed according to the Emergency Management Plan.



7.2 BESS Fire Suppression System

The BESS Fire Suppression System (FSS) is mainly composed of aerosol generators, smoke detectors, thermal detectors, flammable gas detectors, ventilation and exhaust systems, and auxiliary devices.

7.2.1 Smoke Detectors

The battery will produce a lot of smoke in the early stage of battery thermal runaway. The smoke detector will transmit the signal to the controller after detecting the smoke, and the controller performs a series of operations, which are displayed in FSS logic diagram.

7.2.2 Thermal Detectors

Many tests show that the change of external temperature is not obvious in the early stage of battery thermal runaway, so the temperature detection has hysteresis.

When an abnormally high temperature is detected, the thermal runaway of the battery has already occurred, so the priority of smoke detection is higher than that of thermal detection. Nevertheless, thermal sensor can be used as an auxiliary input signal. Similarly, the details are displayed in FSS logic diagram.

7.2.3 Flammable Gas Detectors

Testing has shown that flammable gases are released in the early stage of battery thermal runaway. A buildup of these gases creates an explosion hazard. The flammable gas detectors can accurately detect anomaly and report an alarm.

7.2.4 Ventilation and Exhaust System

The ventilation and exhaust system mainly includes ventilation inlet and exhaust fan windows. The ventilation inlet and exhaust windows are equipped with electric shutters, which can be started and closed according to the needs of the system, and it has a protective structure on the outside. Ventilation and exhaust system can control and reduce the explosion hazard.

7.2.5 Aerosol Generators

Aerosol generators are automatic units which are thermally or electrically activated.

Aerosol generators are automatically activated when it reaches a pre-selected temperature which is determined by the thermal head temperature chosen. Generally, the activation temperature is 95°C.

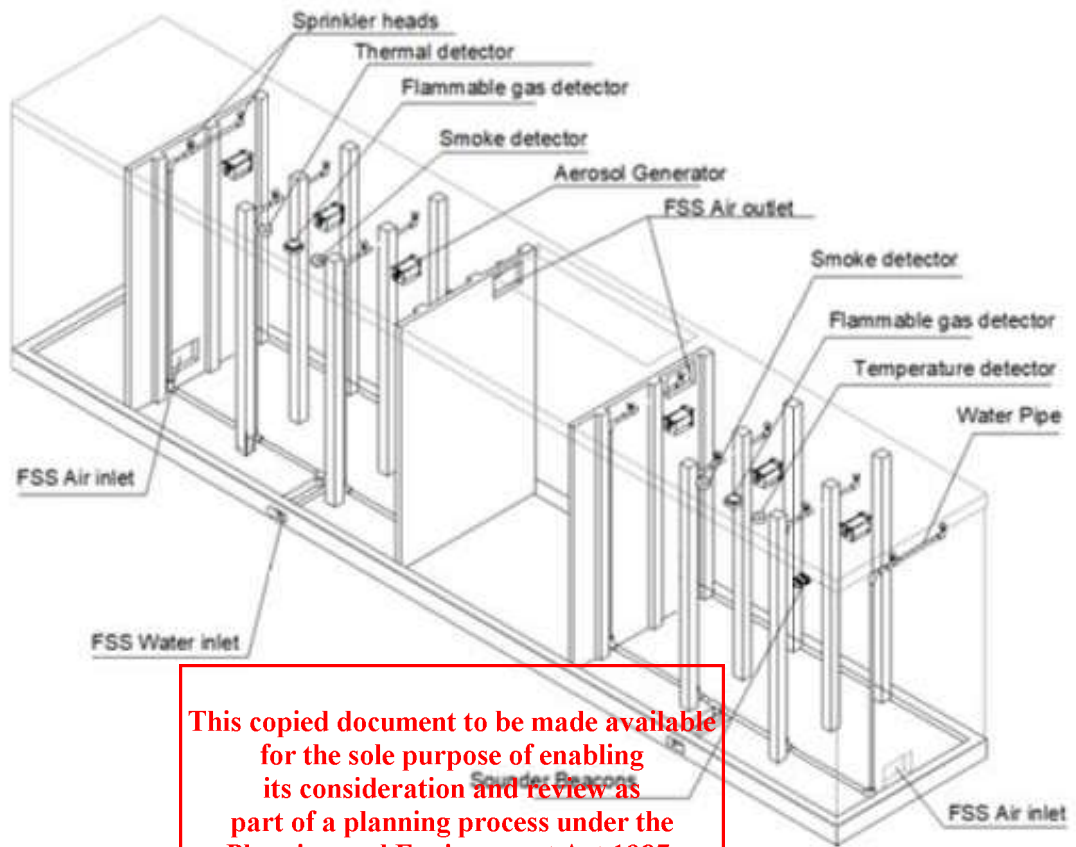
Once the aerosol begins to erupt, a feedback signal will be given to the controller, and the controller will close the ventilation and exhaust system according to this signal.

Aerosol generators are maintenance free products. Suggestions for timely replacement within the validity period are provided in the product manual.

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No.	Device	Number	Standard
1	Smoke detector	2	AS 7240.7-2004
2	Thermal detector	2	AS 7240.5-2004
3	Flammable gas detector	2	-NA
4	Fused Sprinkler Head	16	-NA
5	Ventilation system	2	-NA
6	Detector base	4	AS 7240.5-2004 AS 7240.7-2004
7	I/O module	4/6	AS ISO 7240.18:2015

No.	Device	Number	Standard
1	Aerosol generator	6	AS/NZS 4487:1997
2	Sounder Beacon	1	AS ISO 7240.3:2014

Fig.1 BESS fire suppression system details and layout, model ST2752UX (Sungrow 2024)



7.3 BESS Monitoring, Remote Alarm and Notification Systems

The BESS area will be provided with a SCADA system that will monitor the batteries and associated infrastructure to assist with fire risk management. A range of sensors are pre-programmed to send alert messages to the remote monitoring centre.

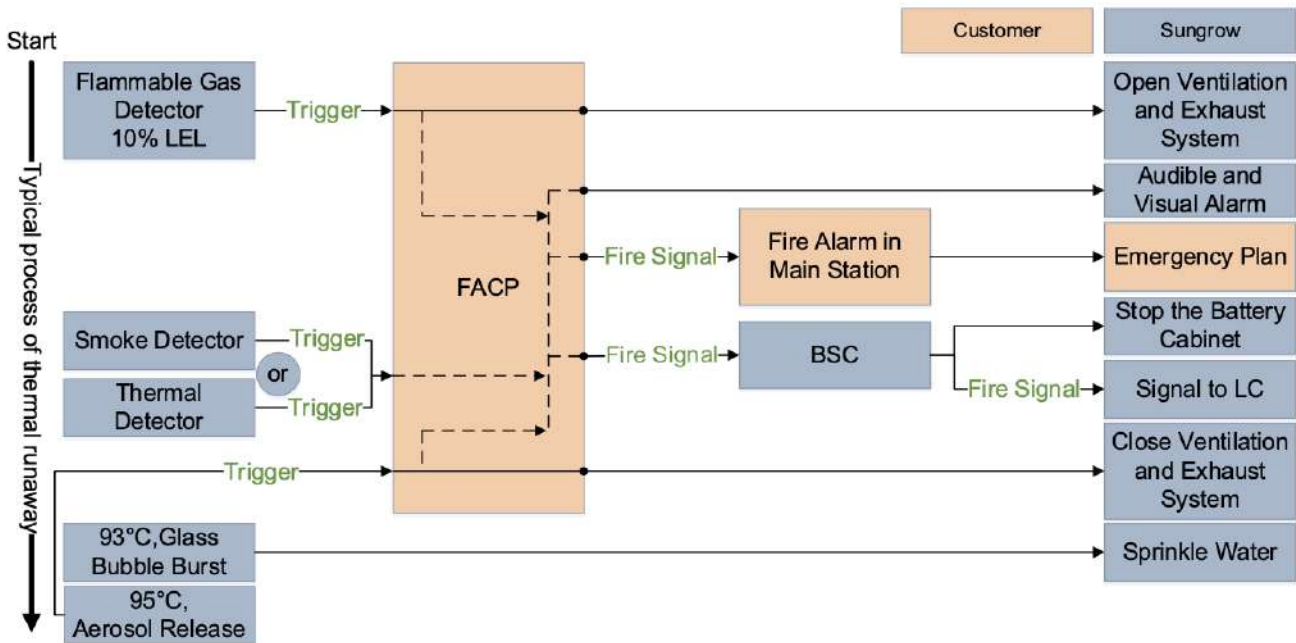


Fig.2 Fire Signal of FSS configuration in battery cabinet, model ST2752UX (Sungrow 2024)

The monitoring centre will be able to implement remote shutdown procedures in the event of a fire emergency or on days of extreme bushfire risk.

CCTV cameras surrounding the site will be able to monitor all activity across the facility. Site management will be able to monitor the site remotely and gather information to provide to Emergency Services.

7.4 Arc Flash Hazard Management

Where required, appropriate demarcation of arc boundaries to at least 10m from PCU Arc flash outlet flaps (blow-out panels) must be provided.

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8 Appendix

8.1 Management Actions Review Schedule

The tables below summarise the management objectives within this FMP. Annual recording of activities should be undertaken as an overview of management activity, with some specific management tasks requiring more detailed schedules.

8.1.1 Emergency Management Plan

8.1.1 Emergency Management Plan								
Management Action	Description	Responsibility	Review Schedule	2024	2025	2026	2027	2028
Review and Maintain	Review and update the EMP in accordance with the CFA guidelines. Ensure the Emergency Information Booklet remains current and in line with any changes to the EMP.	Emergency Planning Committee	The EMP is prepared for each stage of the development. Re-signing will occur before any site changes are undertaken, after review of EMP or RMP, after emergency training exercises, or at least annually.					

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8.1.2 Risk Management Plan

8.1.2 Risk Management Plan								
Management Action	Description	Responsibility	Review Schedule	2024	2025	2026	2027	2028
Review and Maintain	Review and update any changes to the RMP	Emergency Planning Committee	The RMP is prepared for each stage of the development. Review will occur before any site changes are undertaken, or every three years.					



8.1.3 Fire Management Plan

8.1.3 Fire Management Plan						
Management Action	Description	Responsibility	Review Schedule	2024	2025	2026
Review and Maintain	Review and update any changes to the FMP	Emergency Planning Committee	The FMP is prepared for each stage of the development. Review will occur before any site changes are undertaken, or every five years.			
Audit	Undertake an audit of all management actions and procedures within the FMP	Site Manager	Every five years, or as required			

8.1.4 Vegetation Management

8.1.4 Vegetation Management						
Management Action	Description	Responsibility	Review Schedule	2024	2025	2026
Fuel Hazard Monitoring	Regular monitoring of fuel loads within all vegetation areas and firebreaks/APZ areas.	Site Grounds Caretaker	Monthly, during and immediately prior to the FDP, otherwise, three-monthly.			
Asset Protection Zone	Keeping Asset Protection Zones clear of all vegetation.	Site Grounds Caretaker	Monthly, during and immediately prior to the FDP, otherwise, three-monthly.			
Vegetation Screening	Keep groundcovers below 100mm Remove lower branches to a height of 2m	Site Grounds Caretaker	Monthly, during and immediately prior to the FDP, otherwise, three-monthly.			
Facility Grounds	Keep all grassed areas below 100mm total height.	Site Grounds Caretaker	Monthly, during and immediately prior to the FDP, otherwise, three-monthly.			

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8.1.5 Ignition Management

8.1.5 Ignition Management								
Management Action	Description	Responsibility	Review Schedule	2024	2025	2026	2027	2028
Hot Works	Ensure all hot works are undertaken with the appropriate Fire permits during the Fire Danger Period.	Site Manager	As Required					
Motor Vehicles	Ensure all vehicles are fitted with spark arrestors and are operating in a safe manner so as to avoid accidental ignition.	Site Manager	Annually					
Equipment and Infrastructure	Ensure all equipment and facilities are fitted with functioning extinguishers and smoke alarms (where appropriate)	Site Manager	Annually					
Elevated Fire Danger (TFB Days)	Prohibit all high-risk activities such as slashing, burning-off, hot works etc. Inform all workers and site visitors of the elevated risk from ignitions. Monitor fire weather and alerts.	Site Manager	On Total Fire Ban Days and when the Bar exceeds 50+ Bredas for fire weather monitoring fire weather daily during the FDP					
Dangerous Goods	Ensure all external flame sources are removed and prohibited near dangerous goods storage areas.	Site Manager	As required					
Access	Inspect and monitor (CCTV) boundary fencing and gates to ensure gates are locked to prevent illegal access.	Site Manager	Annually					
Smoking	Ensure all staff and visitors to the facility are aware of the smoking policy and have received site induction to minimise the risk of accidental ignition.	Site Manager	As Required					

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8.1.6 Water Resource Management

8.1.6 Water Resource Management								
Management Action	Description	Responsibility	Review Schedule	2024	2025	2026	2027	2028
Static Water Supply	Inspect and maintain the 288,000 L static water supply storage tank for water levels and leaks. Ensure water tank is at capacity and refill as required.	Site Manager	Annually and once before the Fire Danger Period. After use of the static water supply.					
Outlets and Fittings	Inspect and test all fittings and valve outlets to ensure operation.	Site Manager	Annually and once before the Fire Danger Period.					
Signage	Ensure all signage is clear and visible	Site Manager	Annually and once before the Fire Danger Period.					

8.1.7 Access and Egress Management

8.1.7 Access and Egress Management								
Management Action	Description	Responsibility	Review Schedule	2024	2025	2026	2027	2028
Access Roads and Tracks	Inspect and maintain all tracks and roads throughout the facility to ensure access is possible for Emergency Service vehicles to all assets and infrastructure, including BESS, inverters, PV panels and firefighting resources.	Site Manager	Annually					
Signage	Ensure all access signage is clear and visible.	Site Manager	Annually					
Gates/ Fencing	Inspect and maintain all gates and fencing.	Site Manager	Annually					

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8.2 BESS Maintenance Plan

Below is the BESS preventative maintenance plan provided by the manufacturer for the proposed BESS unit.



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Preventative Maintenance Plan

1. Introduction

This document gives a brief introduction to preventive maintenance plan list for Photovoltaic (PV) and Energy Storage System (ESS).

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2. Technical items, maintenance method, interval and service provider required training level

2.1 Enclosure

No.	Technical Item	Maintenance Method	Interval	Level
1	Equipotential connections	Check whether the equipotential connections between station, internal devices and the oil tray are done properly.	Once per year	2
2	Exterior of container	Check whether there are any mechanical damages, peeling or sagging of paint and so on. Check whether Turnkey windows and doors can be closed and opened flexibly; Check if the sealing strip is sealed properly	Once per year	2
3	Interior of container	Check whether there is any dust, foreign objects dirt or water inside the container.	Once per year	2
4	Cables and wires arrangement	Check whether all cables and wires are properly arranged and fixed without short circuit to the enclosure. Check whether all cable entries are sealed properly; Check whether there is water leakage inside the Turnkey Station; Check whether the power cable connections are loose. Retighten them with the torque specified in the manual if necessary. Check whether the power cables and control cables, especially the surface in contact with the metal are damaged; Check whether the wrapping belt of the connection terminals is strip-off.	Once per year	2
5	Grounding	Check whether the grounding connection is done properly and the grounding resistance is less than 4Ω.	Once per year	2
6	Air inlet/outlet	Check whether the air inlet filter and ventilation ducts of Turnkey station and internal devices are normally clean or replace the filter if necessary.	Every 6 months	1
7	Fan	Check the running state of the fan inside the Turnkey	Once per year	2

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		station. Check if there is a crack in the fan blade ; Check if there is abnormal noise during the running period.		
8	Fasten screws	Check all the fasten screws of the turnkey station.	Once per year	2
9	System states and cleaning	Check the Turnkey Station and internal devices for deformation and damages Check the Turnkey Station and internal devices for abnormal noise Check whether the temperature of the Turnkey Station interior and device enclosure is too high Check whether the Turnkey Station internal humidity and dust deposition are too heavy. Clean the Turnkey Station. Check whether the air inlet and outlet are blocked.	Every two years	2
10	Lightning proof device and fuses	Check whether lightning proof device and fuses are in good and usable condition.	Every two years	2
11	Corrosion	Check whether there is any corrosion or oxidation inside of the inverter.	Every two years	2
12	Warning labels and marks	Check whether labels and marks are attached steadily, clean and easy to read.	Every two years	2
13	Interconnection splice box to Ethernet switch	Check whether the interconnection between the fibre splice box and the Ethernet switch is done properly.	Every two years	2
14	Shield ground wires	Check whether the shield cable used are in good contact with the insulating level and ground copper bars.	Every two years	2

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2.2 Battery System

No.	Technical Item		Maintenance Method	Interval	Level
1	Environment	Temp	Measure the room temperature with other equipment and compare the result with the temperature sensor which installed in battery room Draw the 1 month accumulated temperature trend, and check abnormality	Monthly	1
		Humidity	Measure the humidity with other equipment and compare the result with the humidity sensor which installed in battery room. Draw the 1 month accumulated humidity trend. and check abnormality		
2	Visual inspection		Visual inspection of the battery system Data and power cabling connection check (any loosen parts or not) Any wire distortions or changed color Check the distortions of mechanical structure (Bent,	Monthly	1



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			rusty or else)		
3	Environment	Temp	Check the temperature trend in one year and perform calibration of the temperature sensor if necessary AVG Temperature shall be less than 23°C Uniformity shall be less than 5°C	Once per year	2
		Humidity	Check the humidity trend in one year and perform calibration of humidity sensor if necessary Not higher than 80% RH for the period	Once per year	
4	Battery log		Check the 1 years of battery information which logged by EMS Draw below trend and check whether any dramatic changes or not Charge & discharge energy (Daily accumulated & Total accumulated) Max & Min SOC, SOH value of each rack (of daily trend) Max Cell temperature of each rack (of daily trend) Max & Min Cell voltage of each rack (of daily trend) Max charge & discharge power of system (of daily trend) Alarm & Trip information (of daily trend) Max & Min Rack voltage (of daily trend) Any abnormality?	Once per year	2
5	Battery cycling		Discharge the battery system to 40% condition (Average cell voltage > 3.1V or the lowest voltage < 2.8V), then stop discharging, standing for 1 hour. Full charging automatically to the battery system (The highest voltage > 3.65V), after charging, standing for 1 hour. Discharge the battery system to 40% and stop	Once per year	2
6	Battery function	Voltage & Temperature uniformity	During the rest time, read all cell's voltage and temperature for each rack	Once per year	2
		DC contactor operation	During the rest time, Turn OFF and ON DC contactor by sending external command and check the DC contactor feedback arose according to command and measure the actual voltage goes to near 0 during the turn OFF DC contactor. (For checking DC contactor operation) After checking the DC contactor functionality then stay 30min with DC contactor off status (For updating current sensor calibration)		

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		Voltage sensor accuracy	Compare the total voltage and the sum of each cell voltage value (DC contactor OFF)		
		Insulation resistance	Measure the insulating resistance between Battery(+) & GND, Battery(-) & GND		
7	Battery room inspection		Check the HVAC, Fire sensor, FFS operation Visual check of battery system, and make sure : No distortion of wire nor rusty in metallic housing No loose of power connection No chemical smells in battery room	Once per year	2

2.3 PCS System

No.	Technical Item	Maintenance Method	Interval	Level
1	System general running status and environment	<p>Check the PCS for visible damages or deformation; Check the PCS for any abnormal noise during running; Check each parameter of the PCS during normal operation; Check the principal components; Check if the enclosure temperature is normal with the thermal imager;</p> <p>Check the air inlet and outlet; Check the ambient humidity, dust and air inlet filter;</p>	Every 6 months	1
2	System cleaning	<p>Check whether the circuit board and the component are clean; Check the temperature and dust of the heat-sink. Use pressurized air and open the fan to clean the module if necessary; Replace the air filter.</p>	Once per year	2
3	Power circuit connection	<p>Check whether the power cable connections are loose. Retighten them with the torque specified in the manual if necessary; Check if the power cables and control cables, especially the surface in contact with the metal are damaged; Check if the wrap belt of the connection terminals is strip-off.</p>	Once per year	2
4	Terminal and cable connection	<p>Check whether the screws of the control terminals are loose. Refasten them with screwdriver if necessary; Check whether the terminals of the main circuit are in poor contact and whether the screws are hot;</p>	Once per year	2

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		Check if the connection bus bar or screws are discoloring. Visually check the device terminal connection and cable layout		
5	Fan maintenance and replacement	Check if there is any crack in the fan blade; Check if there is abnormal noise during the running of the fan; Replace the fan if necessary	Once per year	2
6	Switches maintenance	Routine check of the corrosion of the metal components Annually check the contactors (auxiliary switches and micro-switches) to ensure the optimal operation; Check the running parameters (voltage and insulation especially)	Once per year	2
7	Safety function	Check the emergency stop button and the LCD stop function; Simulation shutdown and check the shutdown signal communication signal; Check the warning labels and other markings for damage or unclearness. Replace them if necessary.	Once per year	2

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2.4 BCP(Battery Control Panel)

No.	Technical Item	Maintenance Method	Interval	Level
1	Switches maintenance	Check the corrosion of the metal components Annually check the contactors (auxiliary switches and micro-switches) to ensure the optimal operation; Check the running parameters (Voltage and insulation especially)	Once per year	2
2	System cleaning	Check whether the circuit board and the component are clean; Check the temperature and dust. Replace the air filter.	Once per year	2
3	Power circuit connection	Check whether the power cable connections are loose. Retighten them with the torque specified in the manual if necessary; Check if the power cables and control cables, especially the surface in contact with the metal are damaged;	Once per year	2
4	Fan maintenance and replacement	Check if there is any crack in the fan blade; Check if there is abnormal noise during the running of the fan; Replace the fan if necessary	Once per year	2
5	Corrosion	Check whether there is any corrosion or oxidation inside	Every two years	2

2.5 HVAC(Heating, Ventilation and Air Conditioning)



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No.	Technical Item	Maintenance Method	Interval	Level
1	Cable connection	Visually check whether the cable connection is loose.	Once per year	2
2	Fan abnormalities	Turn on the fan to check if it is smooth and if there is any abnormal noise.	Once per year	2
3	Drainage pipe	Visually check whether the outfall is blocked.	Every 6 months	1
4	Condenser	Check the cleanness of the condenser and clean it with compresses air.	Every 6 months	1

2.6 FSS(Fire Suppression System)-Optional

No.	Technical Item	Maintenance Method	Interval	Level
1	Visual Inspection of the equipment	Tanks: Pressure Gauge, Bracket, Damage Detectors: Clean Manual Pull: Free Access Nozzles: Piping	Once per year	2
2	Visual check over detection components	Ensure that they are in place. Ensure that they are not damaged. Make sure that they are clean and not coated with grease, dirt, paint or any other contaminating substance.	Once per year	2
3	Check manual pull stations	Ensure that they have not been tampered with. Ensure that access to pull stations is not blocked from use.	Once per year	2
4	Visual check over piping network	Ensure that distribution piping is secure. Ensure that nozzles are in place. Make sure nozzles are not covered with dirt, grease, paint and that the discharge will not be obstructed.	Once per year	2
5	Inspect cylinder gauge	Check the cylinder pressure to ensure that it is in the operative pressure range.	Once per year	2
6	Visual check over all actuators	Check that the actuators are in place. Check all actuation piping. Check that wiring has not been tampered or disconnected.	Once per year	2
7	Visual check over pressure switches	Ensure that all pressure switches are installed and in the correct non-operated position.	Once per year	2
8	Check condition of actuators	With all actuators removed, check the condition of each one. Leave them off until the final step in the Maintenance Section.	Once per year	2
9	Check all alarm devices	While pull stations, check alarm condition and verify that it operates properly when energized. Reset the alarm circuit after each test.	Once per year	2

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2.7 Combiner box

No.	Technical Item	Maintenance Method	Interval	Level
1	CB running status	Check the device is running well and normal, No fault or warning	Once per month	2
2	General exterior checking	Combine Boxes are installed vertically or horizontally, no other plants or animals around and no physical damages	Twice per year	1
3	General interior checking	All components are looks in good condition, no other things inside. Dry and clean	Twice per year	1
4	Conductor Connections	Cables are routed in a safe place and/or protected against mechanical damage	Once per year	2
5	MC4 checking	Ensure MC4 connections have been installed properly, no damages or burnt signs	Twice per year	2
6	Fuses	Ensure fuses are in good and usable condition	Twice per year	2
7	Sealing strip	Verify there are no loose strip which in risk of water leaking	Twice per year	2

2.8 PV Inverters

No.	Technical Item	Maintenance Method	Interval	Level
1	Inverter Running status	Check the device is running well and normal, No fault or warning, and fault record from the HMI Check if there is over temperature, humidity warning or error on HMI Check the noise of transformer and fan (compare to the noise in the past)	At least monthly checking	2
2	Exterior of container checking	Check whether there are any mechanical damages, painting damages, oxidation etc. Check if Turnkey station windows and doors can close and open flexibly Check if the sealing strip is sealed properly. Check if the turnkey station and the foundation are firmly connected	At least quarterly checking	1
3	Interior of container checking	Check whether there is any dust foreign objects dirt or water inside the container Check if there is abnormal noise Check if the temperature interior and device enclosure is too high Clean and make sure inside is dry Check if there is any abnormal objects inside such as animals or nest	At least quarterly checking	1

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4	Cables and Wires arrangement	<p>Check whether all cables and wires are properly arranged and fixed without short circuit to the enclosure, make connection once unconformity is found</p> <p>Check if all cable entries are sealed properly</p> <p>Check if the power cable connections are loose, tight them with the torque specified in the manual if necessary</p> <p>Check if there is water leakage inside the turnkey station</p> <p>Check if the power cables and control cables especially the surface in contact with metal are damaged.</p> <p>Check if the wrap belt of the connections terminals is strip-off</p>	Once per year	2
5	Grounding	<p>Check whether the grounding connection is done properly, and the grounding resistance is less than 4Ω</p>	Once per year	2
6	Air inlet/outlet	<p>Turnkey station and internal devices are normal clean or replace the filter periodically</p>	Twice per year	1
7	Fan	<p>Check the running status of the fan inside of the Turnkey station</p> <p>Check if there is a crack in the fan blade</p> <p>Check if there is abnormal noise during the running period</p>	Once per year	1
8	Fasten screws	Check all the fasten screws of the turnkey stations	Once per year	1
9	Operational Maintenance	<p>Running parameters verify, as well as other parameters</p> <p>Check the emergency stop button and LCD stop function</p> <p>Optimize software (if it is necessary)</p> <p>Check the touchscreen with its time, date, diagram and all good and readable</p> <p>Check the status LEDs are all good</p>	Twice per year	2
10	Lighting proof device and fuses	Check whether lighting proof device and fuses are in good and usable condition	Every two years	2
11	Shield ground wires	Check whether the shield ground wires are in good contact with the insulating sleeves and ground copper bars.	Every two years	2
12	Fiber optic	Check fiber optic whether efflorescence	Every two years	2

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2.9 Transformer

No.	Technical Item	Maintenance Method	Interval	Level
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1	Visual Inspection	<p>Check is there any abnormal signs on the transformer</p> <p>Check is there any oil leakage around the transformer</p> <p>Check the oil level is correct</p> <p>Check whether the transformer is in good condition, any defect in the parts.</p> <p>Check the gas relays, pressure release valve and the function and maintenance of the thermometer to see their respective operating instructions.</p>	Monthly checking	2
2	Transformer oil sampling	On-load tap-changer is sample test according to the instruction manual switch. With oil storage tank in the transformer oil sampling interval time shall comply with the terms of the transformer operating procedures.	Every one or two years	2
3	Transformer busing	On a regular basis to clean insulation, carefully check the casing with and without fracture, shall timely transfer.	Twice per year	2
4	Tank	If tank coating corrosion occurs, must remove the rust on the surface or touch-up again	Once per year	1
5	The seals	Check the gasket compaction degree, such as find relaxation should tighten again.	Once per year	2
5	Terminal clamp	Check the terminal clamping force regularly, and tighten slowly to keep good touch.	Once per year	2
6	Breather replacement	When moisture absorption in 2/3 of silicone discoloration, change new silicone	Once per year	2

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2.10 Switch Gear

No.	Technical Item	Maintenance Method	Interval	Level
1	Visual Inspection	<p>Check there is not any damage from the switch gear</p> <p>Check there is not any burnt signs or smells</p>	Monthly checking	2
2	Mechanical checking	Check all the switches and buttons are mechanically working, no stuck and open/close smoothly.	Twice per year	2
3	Grounding	Check the grounding connection is good	Twice per year	2
4	Body internal checking	Check there is not any rusty or dust inside	Once per year	1
5	Running status	<p>Checking there is no abnormal noise and heat</p> <p>Check the indicator LED and relay are working normal</p>	Periodically	2



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2.11 DC/DC Converters

No.	Technical Item	Maintenance Method	Interval	Level
1	System cleaning	Check the temperature and dust of the converter. Clean the converter enclosure if necessary. Check if the air inlet and outlet are normal. Clean the air inlet and outlet, clean or replace the filter if necessary.	Twice per year	1
2	Fan	Check the running status of the fan Check the fan blades for broken Check if there is any abnormal noise during the fan running	Twice per year	1
3	System status	Check the turnkey station and internal devices for damages or deformation Check the devices for abnormal noise during running. Check if the device enclosure or internal is over-heating Check if the warning signs are visible, replace them if necessary. Check the humidity and dust deposition inside the Turnkey station. Clean the Turnkey	Twice per year	2
4	Cable entry	Check whether the cable entry is insufficiently sealed or the gap is excessively large, and reseal the entry when necessary.	Once per year	2
5	Electrical Connection	Check whether all cable joints are in place. Check whether a cable is damaged, especially the part contacting the metal enclosure.	Twice per year	2

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2.12 BSP(Battery Supply Panel)

No.	Technical Item	Maintenance Method	Interval	Level
1	Switches maintenance	Routine check of the corrosion of the metal components Annually check the contactors (auxiliary switches and micro-switches) to ensure the optimal operation; Check the running parameters (Voltage and insulation especially)	Once per year	2
2	System cleaning	Check whether the circuit board and the component are clean; Check the temperature and dust. Replace the air filter.	Once per year	2
3	Power circuit connection	Check whether the power cable connections are loose. Retighten them with the torque specified in the manual if necessary; Check if the power cables and control cables, especially	Once per year	2



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		the surface in contact with the metal are damaged;		
4	Fan maintenance and replacement	Check if there is any crack in the fan blade; Check if there is abnormal noise during the running of the fan; Replace the fan if necessary	Once per year	2
5	Corrosion	Check whether there is any corrosion or oxidation inside	Every two years	2
6	Auxiliary transformer	Check is there any abnormal signs on the Aux transformer Check whether the transformer is in good condition, any defect in the parts. Check the terminal connection bolts, nuts and connection cables	Once per year	2

2.13 Local Controller

No.	Technical Item	Maintenance Method	Interval	Level
1	System status and cleaning	Check the system is running well and normal, No fault or warning, and fault record from the HMI. Check if there is over temperature, humidity warning or error on HMI	Once per year	2

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2.14 SCADA

No.	Technical Item	Maintenance Method	Interval	Level
1	System status and cleaning	Check the system is running well and normal, No fault or warning, and fault record from the HMI. Check if there is over temperature, humidity warning or error on HMI	Once per year	2

Level definition

Level 1	Site operator with manual
Level 2	Trained personnel at site or Sungrow engineer

3. Tools and Instruments (not included in the scope of delivery)

Performing maintenance work should have all the necessary tools and instruments to work with turnkey station inverters according to table below.

1	Temp sensor
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ADVERTISED PLAN

SUNGROW

Clean power for all

2	Humidity sensor
3	Volt meter
4	Calibration tool
5	Clamp meter
6	Megger

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