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Final Report

Risk Management Plan for the Mologa Solar Hybrid Project: Mologa-Durham Ox Road, Mologa, Victoria

Prepared for

Urbis Pty Ltd

June 2026

Ecology and Heritage Partners Pty Ltd

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DOCUMENT CONTROL

Assessment type	Risk Management Plan for the Mologa Solar Hybrid Project
Address	Mologa-Durham Ox Road, Mologa, Victoria
Project number	19225
Project manager	Cat Stephenson (Associate Bushfire Consultant/Botanist)
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Mapping	Petra Sorensen (GIS Analyst)
File name	19225_EHP_RMP_MologaSolarHybridProject_Finalv2_29062026
Client	Urbis Pty Ltd
Council	Loddon Shire Council

VERSION CONTROL

Report version	Comments	Report authored by:	Report reviewed by:	Date submitted
Draft	Report sent to the client for review	CS	AH	05/05/2026
Final	Minor client updates throughout the report. Report sent to the client	CS	-	11/05/2026
Final v2	CFA 2023 reference updated in the References section	CS	-	29/06/2026

Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

Disclaimer

Although Ecology and Heritage Partners Pty Ltd have taken all the necessary steps to ensure that an accurate document has been prepared, the company accepts no liability for any damages or loss incurred as a result of reliance placed upon the report and its contents.

CONTENTS

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was engaged by Urbis Pty Ltd to prepare a Risk Management Plan for the Mologa Solar Hybrid Project along Mologa-Durham Ox Road, Mologa. The site includes seven parcels of land (the study area):

- CA 6 Section A Parish of Mologa. Volume: 09056 Folio: 961
- CA 7 Section A Parish Mologa. Volume: 02429 Folio: 740
- CA 8 Section A Parish of Mologa. Volume: 07628 Folio: 185
- CA 17 Section A Parish of Mologa. Volume: 09056 Folio: 962
- CA 17A Section A Parish of Mologa. Volume: 10991 Folio: 175
- CA 17B Section A Parish of Mologa. Volume: 02667 Folio: 397
- CA 17C Section A Parish of Mologa. Volume: 10407 Folio: 536

The Mologa Solar Hybrid Project is located approximately 65 kilometres north of Bendigo and 51 kilometres west of Echuca (Attachment 1). The site is located to the east of Bendigo-Pyramid Road and south of Mologa-Durham Ox Road, in Mologa.

The proposed solar hybrid project comprises:

- 250 MW solar farm;
- 250 MW 4-hour Battery Energy Storage System (BESS);
- Substation; and,
- Terminal station.

A 220 kV transmission line easement runs north-south through the western side of the site. The proposed BESS and substation will connect directly to this existing line, enabling efficient integration with the grid.

The purpose of this Risk Management Plan is to identify and analyse the potential bushfire risks associated with the project and address the legislative and policy implications associated with the proposal against the Design Guidelines and Model Requirements for Renewable Energy Facilities (Design Guidelines) (Country Fire Authority [CFA] 2023). Clause 13.02-1S Bushfire and Australian Standard 3959:2018 Construction of buildings in bushfire prone areas (AS 3959:2018) (Standards Australia 2020) and were also considered as part of this report.

1.2 Study Area

The study area extends across approximately 591 hectares and is currently used predominantly for dryland cropping and some grazing. The study area is generally flat and largely comprises agricultural land, with Blind Creek, a drainage channel, some dams and planted native windrows distributed throughout. Approximately, the eastern 300 metres of the study area contains natural bushland (Figure 1). The study area is within the Farming Zone (FZ), is partially covered by the Land Subject to Inundation Overlay (LSIO) and is entirely covered by the Specific Controls Overlay – PS Map Ref SCO2 Schedule (SCO2) and Bushfire Prone Area (BPA) (Department of Transport and Planning [DTP] 2026) (Figure 1; Attachment 1).

The study area was assessed on 1-2 September 2025.

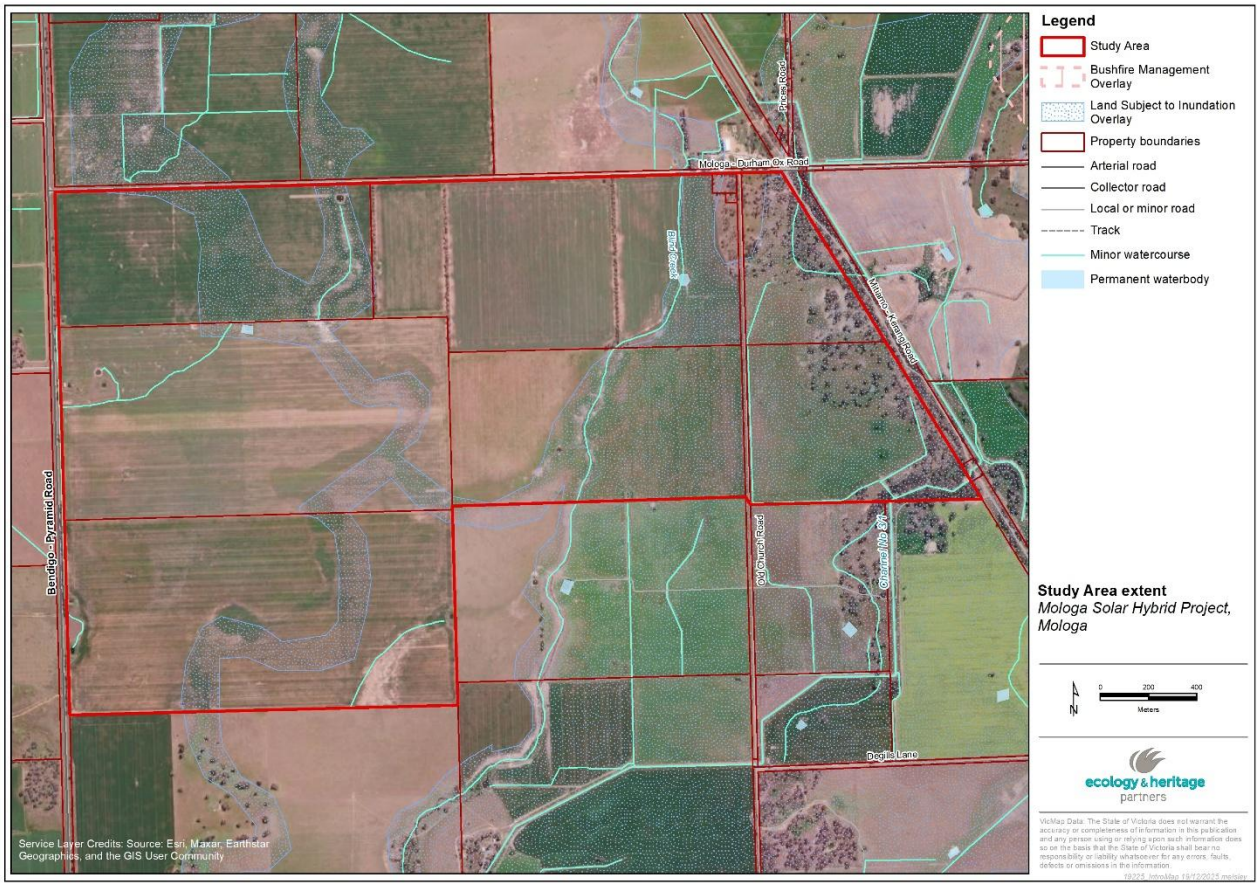


Figure 1. Study area and relevant planning overlays.

1.3 Project Overview

Mologa Solar Hybrid Project is a proposed renewable energy development located within the Loddon Shire. Table 1 provides a description of the infrastructure components, as well as an overview of the proposed bushfire mitigation measures.

Table 1. Project components and bushfire mitigation measures.

Component	Description
Solar panels	• Approximately 326MWp solar panel array with associated infrastructure, including: o 2-string tracker tables – 56 panels per table, 459 trackers in total o 3-string tracker tables – 84 panels per table, 903 trackers in total o 4-string tracker tables – 112 panels per table, 3438 trackers in total o 76 solar inverters o 76 solar transformers
BESS facility	• Containerised BESS with a power output of 250MW 4-hour, including the installation of: o 272 containerised BESS's in total across two discrete locations located next to each other o 68 Power Conditioning Units (PCUs) o 68 containerised inverters o 9 transformers (eight AUX transformers and one sub-AUX transformer) o 1 HV main power transformers • The BESS containers and associated infrastructure (i.e. the two yellow polygons on Attachment 2) cover an area of 1.98 ha. • SMA has been chosen as the manufacturer for the BESS containers and inverters, which are built to the highest fire safety standards. The product design specifications for the containers and inverters are provided in Appendix 1. The BESS containers will incorporate the following safety measures as a minimum: o Battery Management System (BMS) that continuously monitors parameters such as cell temperature, voltage, and state of charge, as well as early detection for smoke, heat and combustible gases within the battery containers. o Battery units are also design with a thermal management system, internal fibre barriers between modules, appropriate cell spacing to minimise propagation risk, and enclosure protection against environmental conditions. In addition, automatic fire detection and suppression systems (such as aerosol, water mist, or clean agent systems) are integrated within the containers, supported by ventilation systems, alarms, and emergency shutdown functions. o These types of safety features represent the minimum standard of protection that would be implemented by the project, noting that the final configuration will ultimately depend on the selected OEM and will be confirmed during the detailed design stage o Design and layout of the battery containers will be undertaken as a result of the testing completed in accordance with *UL9540A Standard*

Component	Description
	for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems ○ Compliance with *UL1973 Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications*, *UL9540 Energy Storage System* Requirements and *NFPA 855 Standard for the Installation of Stationary Energy Storage Systems* during installation ○ Surge protection devices and DC-fuses ○ Warning and alarm systems for faults, status, smoke, off-gassing and fire ○ Fire alarm control panel ○ Fire and smoke detection (2 x smoke and 2 x thermal detectors in battery compartments) ○ Hydrogen gas detector in the BESS container ○ Automatic mechanical gas exhaust ○ Dry-pipe water suppression system in the battery compartment ○ OVEC1230 automatic fire suppression system in the battery pack ○ 120 minutes FRL fire wall ○ Thermal runaway protection to UL9540 or UL1973 ○ Water runoff bunding and retention bank around the BESS
Substation	• Switch room • Circuit breakers • Power transformers • Harmonic filters • Control equipment (including a Supervisory Control and Data Acquisition [SCADA] system) • Inverters and converters • Protection relays including Current Transformers (CT's) and Voltage Transformers (VT's)
Terminal Station	• Establishment of the terminal station • control room • 220kV Switchyard
Auxiliary supplies Operations and Maintenance (O&M) facilities	• Office building • Offices/technical rooms • Meeting rooms • Kitchen • Restrooms • Waste storage area (solid and chemical) • Storage area • Workshop facilities
Other features within the compound containing the above infrastructure	• Temporary laydown area • Car parking area and provision of electrical vehicle charging infrastructure • Perimeter and internal security fencing (chain link style to a height of up to 2.5 metres)

Component	Description
Static water supply	• Eleven 45,000L water tanks and associated hardstand areas at each vehicle access point. • Two water tanks within the BESS facility to support the fire hydrant network.
Public road access points	• Ten vehicle access points, including: o Three primary use access points for normal operational aspects, with one located at the corner of the BESS compound along Mologa-Durham Ox Road and another at the southern entrance point to the eastern section of the facility on Old Church Road. o Seven other access points around the facility are designated for emergency use only.
Internal road network	• Minimum six-metre-wide internal road network • Passing bays are not included in the project's design given the internal road network width negates the need for them.
Vegetation	• Vegetated screenings five or 10-metres wide around the study area perimeter where the boundary interfaces public roads or adjoining farming properties.
Fire break	• Minimum 10-metre-wide Asset Protection Zones provided around the perimeter of the BESS compound and property boundary, and between the solar panels and native and windrow vegetation to be retained. • A minimum separation distance as calculated under AS 3959:2020 (Standards Australia 2020) where solar panels interface native vegetation to the east of the study area.
Workforce	• Up to 300 staff at its peak will be constructing the solar farm. • Up to eight personnel will form part of the operations team following construction.

2 BUSHFIRE RISK ASSESSMENT

In the context of the CFA (2023) Design Guidelines, a Risk Management Plan identifies and manages fire risk to protect site personnel, firefighters and the community. This plan addresses the occupational health and safety requirements for eliminating or reducing risk so far as is reasonably practicable in line with AS/ISO 31000:2018 Risk Management - Guidelines (Standards Australia 2018) via the following strategies:

1. Risk identification – identifying the potential sources of fire ignition;
2. Risk analysis and evaluation – identifying the nature of the risk and its characteristics and an analysis of controls for all identified risks;
3. Risk treatment/mitigation measures – the selection and implementation of controls for each identified risk; and
4. Monitoring and review, recording and reporting – involves regular and comprehensive review of risks and controls.

Strategies 1 and 2 are discussed in the Sections 2.1 and 2.2 respectively, with Strategies 3 and 4 being discussed in Section 3.

2.1 Bushfire Risk Identification

There is the potential for several on-site and off-site hazards to impact the safe operation of the project. These fire hazards and the risks associated with them are identified in Table 2.

Table 2. Potential fire hazards and their ignition sources.

Hazard Category	Ignition Risk
On-site fire	• Electrical hazards, e.g. battery or panel/inverter faults, battery overcharging or rapid discharge, power surges, water ingress • Chemical hazards, e.g. spills and leaks of transformer oil/diesel, inherent hazards of stored dangerous goods, chemical reactions • Structural faults/damage to equipment or buildings • Equipment/technological failure, e.g. loss of remote monitoring systems, hydrant system fault • Human induced (e.g. equipment mismanagement, arson, car accident) or natural (i.e. lightning strike, embers) fire event
On-site fire event spreading throughout the site and/or off-site	• Escalation of on-site fire event from on-site hazards expanding outwards from the source igniting: - Other facility infrastructure and/or - Spreading beyond the study area
Landscape fire event entering the site	• External fire entering the study area and igniting site infrastructure from embers, radiant heat or flames

2.2 Bushfire Risk Analysis and Evaluation

Risk analysis is an important step in the risk management process and provides the foundation upon which informed decisions on mitigation may be based. Risk is measured in terms of a combination of the consequences of an event and their likelihood. A risk matrix has been developed (Table 3) to analyse and evaluate the risks associated with the potential hazards identified in Table 2. The results of the analysis and evaluation, as well as the potential mitigation measures to effectively mitigate the threat to an acceptable level are provided in Table 4.

Table 3. Risk analysis matrix. Green indicates a Low (L) risk, yellow indicates a Moderate (M) risk and red indicates a High (H) risk.

Consequences				Increasing Likelihood				
Severity Rating	People	Infrastructure	Natural Environment	A	B	C	D	E
				Rare/Low chance of occurrence	Moderate chance of occurrence	High chance of occurrence	Very High chance of occurrence	Almost certain chance of occurrence
0	No injury	No damage	No effect	L	L	L	L	L
1	Slight injury	Slight damage	Slight effect	L	L	L	M	M
2	Minor injury	Minor damage	Minor effect	L	L	M	M	H
3	Major injury	Local damage	Local effect	L	M	M	H	H
4	Single fatality	Major damage	Major effect	M	M	H	H	H
5	Multiple fatalities	Extensive damage	Massive effect	M	H	H	H	H

Table 4. Summary of the risk analysis, evaluation and mitigation strategies for each hazard identified in Table 2. Note: IRR – Initial Risk Rating before strategies to lower the risk; RRR – Residual Risk Rating after strategies to lower the risk.

Hazard Category	Ignition Risk	Potential Consequence	Risk Assessment Matrix Score (refer to Table 3)						Recommended Mitigation Measures to Lower the Risk
			People		Infrastructure		Environment		
			IRR	RRR	IRR	RRR	IRR	RRR	
On-site fire	Electrical hazard, Chemical hazard, structural fault, equipment/ technological failure	• Injury and/or death • Reduced/ceased output for component/ structure with fault • Adverse environmental impacts • Loss of revenue	Mod. (A4)	Low (A3)	Low (A3)	Low (A2)	Low (A3)	Low (A2)	• Ensure appropriate Personal Protective Equipment (PPE) is always available and worn when required. • Select BESS containers and other facility infrastructure with a high level of fire mitigation and safety measures. • Ensure all electrical infrastructure is installed in accordance with manufacturers specifications and to the relevant Australian Standards and/or policies/guidelines. • Operation, maintenance and routine checks of facility equipment to be undertaken by suitably qualified and trained staff. • Ensure all staff on site have undergone the appropriate bushfire and fire safety-related training/induction. • All employees to ensure safe work practices are implemented as per relevant company and government/industry policies and standards. • Familiarity with the Fire Management Plan and Emergency Plan by all employees and contractors. • Report all potential hazards, damage, accidents and/or injuries and unsafe work practices to the operator and relevant authority. • Ensure the internal road network is always accessible and well maintained for use by employees and emergency vehicles. • BESS and other electrical facilities to be fenced off and secured, thereby maintaining these as controlled areas which are only accessible by appointed employees and contractors. • Dangerous goods storage building/s are to be locked at all times and only accessed by appointed employees and contractors.

Hazard Category	Ignition Risk	Potential Consequence	Risk Assessment Matrix Score (refer to Table 3)						Recommended Mitigation Measures to Lower the Risk
			People		Infrastructure		Environment		
			IRR	RRR	IRR	RRR	IRR	RRR	
On-site fire event spreading throughout site and/or off-site	Escalation of on-site fire event from on-site hazards expanding outwards from the source ignition	• Injury and/or death on-site and/or in the wider community • Damage to other structures and associated infrastructure in the facility • Reduced/ceased output across some or all the facility • Local or landscape scale fire • Property/community infrastructure damage • Adverse environmental impacts	Low (A3)	Low (A2)	Mod. (A4)	Low (A3)	Mod. (A4)	Low (A3)	In addition to the mitigation measures in the above row: • Ensure fire breaks are always maintained in a no-fuel state, i.e. composed of concrete, mineral earth or a non-combustible layer such as crushed rock. • Ensure firefighting tanks are always full, maintained and accessible. • Ensure the internal access tracks are always maintained to a high standard. • Follow the Fire Management Plan and Emergency Plan procedures (when prepared) to ensure emergency services are notified immediately of an on-site fire.

Hazard Category	Ignition Risk	Potential Consequence	Risk Assessment Matrix Score (refer to Table 3)						Recommended Mitigation Measures to Lower the Risk
			People		Infrastructure		Environment		
			IRR	RRR	IRR	RRR	IRR	RRR	
Landscape fire event entering site	External fire entering the study area and igniting site infrastructure from embers, radiant heat or flames	• Injury and/or death on-site • Minor to extensive damage to/destruction of facility infrastructure • Reduced/ceased output across some or all the facility • Adverse environmental impacts	Low (A2)	Low (A1)	Low (A3)	Low (A2)	Mod. (A4)	Low (A3)	In addition to the mitigation measures in the above two rows: • Ensure at least one employee (e.g. the fire warden) is monitoring emergency phone apps (e.g. VicEmergency) throughout the day during the Fire Danger Period to ensure employees and contractors present on site are aware of any fires within 50km of the study area, particularly on days with a Fire Danger Rating of High, Extreme or Catastrophic. • Ensure the Fire Management Plan and Emergency Plan provide a procedure for when to modify work activities or leave the site in the event a bush/grassfire is burning within 50km of it.

3 RISK TREATMENT/MITIGATION MEASURES: RESPONSE TO THE CFA (2023) DESIGN GUIDELINES

A series of mitigation measures are being implemented for the project's design and operations phases, which comply with the Risk Management Plan model requirements specified in the Design Guidelines (CFA 2023). The model requirements are provided in Table 5 to Table 12.

3.1 Planning Application Model Requirements

Table 5. Planning Application Model Requirements (CFA 2023, Section 2.2.2).

Model Requirements	Compliance	Comments
ALL FACILITIES		
a) Where located within a Bushfire Prone Area, bushfire risk is addressed according to the Victoria Planning Provisions, Clause 13.02-1S Bushfire, through bushfire hazard identification and assessment (including a bushfire hazard site and landscape assessment). This assessment must include risks to the proposed technologies from the landscape (bushfire/grassfire).	✓	Ecology and Heritage Partners Pty Ltd (2026) has prepared a Bushfire Risk Assessment that directly addresses Clause 13.02-1S Bushfire of the Victoria Planning Provisions, including a bushfire hazard assessment. A risk assessment to the proposed technologies is provided in Section 2 of this report.
b) Address risks from proposed technologies through a comprehensive risk management process, documented in a Risk Management Plan.	✓	A risk identification and analysis assessment was undertaken in Section 2, with risk mitigation measures being provided in Section 3 as per the Risk Management Plan requirements specified in the Design Guidelines (CFA 2023).
c) Indicate where the exact specifications of elements within the renewable energy facility will be determined during the detailed design phase, such as solar panel or wind turbine model/manufacturer and battery chemistry.	✓	While a manufacturer has not been selected for all infrastructure at this stage, the BESS containers and inverters will be sourced from SMA. SMA's design specifications for the selected products are provided in Appendix 1, which adhere to the highest level of fire safety standards. Section 1.3 also provides the minimum fire safety features for BESS containers used as part of the project.
d) Explicitly state that the following documentation will be prepared in accordance with this guideline, in consultation with CFA, before development starts: • Risk Management Plan • Fire Management Plan • Emergency Plan	✓	This report addresses the requirements of the Risk Management Plan. Section 4 states that the proponent will prepare a Fire Management Plan and Emergency Plan prior to the commencement of construction in consultation with CFA.

3.2 Risk Factors Model Requirements

Table 6. Risk Factors Model Requirements (CFA 2023, Section 3.3.2).

Model Requirements	Compliance	Comments
ALL FACILITIES		
A Risk Management Plan must be developed for all renewable energy facilities.	✓	This report addresses the requirements of the Risk Management Plan.
The Risk Management Plan must: a) Describe the infrastructure (natural and built), landscape, nature of operations and occupancy of the facility.	✓	Section 1.3 provides a comprehensive description of the project infrastructure and occupancy. The Bushfire Risk Assessment (Ecology and Heritage Partners 2026) for this project describes the landscape features.
b) Describe the risks and hazards at the facility to and from the renewable energy infrastructure (including the BESS).	✓	Section 2 includes a risk assessment of the hazards.
c) Specify and justify, in accordance with Section 4.2 of the CFA (2023) Design Guidelines: i. The location of the facility in the landscape, and the proposed infrastructure on-site.	✓	Section 1.3 details the project infrastructure, while Attachment 2 illustrates the project's infrastructure layout. The attachments in the Bushfire Risk Assessment (Ecology and Heritage Partners 2026) provide context regarding the project's location in the landscape.
ii. Emergency vehicle access to and within the facility that: ○ Includes site access points of a number suitable to the size and hazards of the facility (a minimum of two). ○ Provides access to renewable energy infrastructure, substations and fire service infrastructure.	✓	The access track network and vehicle access points are provided on Attachment 2, which illustrates three primary access points and seven emergency access points across the study area. These access points provide a high level of accessibility, including at least two access points to each area of the site, e.g. BESS, solar panels groups east and west of the existing transmission line, and east of Old Church Road (Attachment 2).
iii. Firefighting water supply to the facility.	✓	Eleven 45,000 litre water tanks are provided at all vehicle access points into the study area (Attachment 2), which result in a combined volume of 495,000 litres. Two water tanks are provided for the BESS facility at each entrance point.
iv. A fire break width of 10m or greater, based on radiant heat flux (output) as an ignition source: ○ Around the perimeter of the facility. ○ Between any landscape buffer/vegetation screening and infrastructure.	✓	Fire breaks with a minimum width of 10 metres are provided around the perimeter of the facility, between retained windrows and native bushland and solar panels, and around the perimeter of the BESS/terminal station/substation facility (Attachment 2).

Model Requirements	Compliance	Comments
v. The separation distance, based on radiant heat flux (output) as an ignition source, between: o Adjacent renewable energy infrastructure (e.g. between adjacent battery containers/ enclosures). o Battery containers/enclosures and related battery infrastructure, buildings/structures and vegetation.	✓	The BESS design will be designed in accordance with the manufacturers specifications to ensure the separation distance between BESS containers and associated infrastructure minimise the potential for fire spread. The BESS containers will be separated from each other by a minimum of three metres, and a minimum 10-metre-wide fire break will be located around the perimeter of the BESS infrastructure.
vi. All other controls for the management of on and off-site hazards and risks at the facility (including all proposed BESS safety and protective systems).	✓	All appropriate bushfire mitigation measures will be incorporated at every phase of the project in line with the CFA (2023) Design Guidelines and other relevant Acts, Australian Standards, policies and guidelines.
d) Provide an evidence-based determination of the effectiveness of the risk controls against the identified hazards, including justification for the omission of any battery safety and protective system/s.	✓	Section 2 provides a fire risk assessment, with Section 3 providing mitigation measures in response. The BESS containers and inverters will be sourced from SME, which incorporate several fire safety features. The product design specifications for this infrastructure are provided in Appendix 1.
e) Form the basis for the design.	✓	This report is informing the basis of the project's design from a bushfire risk management perspective.

3.3 High-risk Environments Model Requirements

Low-risk environments where development should be directed include the following attributes (CFA 2023, p14):

- *Grassland;*
- *No continuous other vegetation types within one to 20 kilometres of the study area;*
- *Generally flat topography, some undulation may be present;*
- *Slopes are less than five degrees;*
- *Good road access with multiple routes available to and from the project site; and*
- *No BMO applies*.
- *No Land Subject to Inundation Overlay applies*.'

Five of the above seven low-risk attributes apply to the study area, with '*No continuous other vegetation types within one to 20 kilometres of the study area*' and '*no Land Subject to Inundation Overlay applies*' being the two attributes that do not apply. Given at least one of the above attributes apply to the study area, the project is considered to be in a high-risk environment.

The Land Subject to Inundation Overlay applies to a portion of the study area, including a small part of the BESS compound (Attachment 2). A Hydrology and Irrigation District Assessment (Eco Logical Australia 2025) was prepared for the project, which assessed the flood hydrology and irrigation impacts for the development. Flood risk was assessed under the 10%, 2% and 1% Annual Exceedance Probability (AEP) events, which resulted in a flood hazard classification of H1 (i.e. generally safe for people, vehicles and buildings) in accordance with the Guidelines for Development in Flood Affected Areas (Department of Environment, Land, Water and Planning [DELWP] 2019) across most of the study area. However, there were isolated areas of deeper water, such as in dams and drainage lines, where the flood hazard was rated as H4 (unsafe for vehicles and people) under the 1% AEP conditions. The modelling assumed that the BESS, terminal station and substation are raised 0.5 metres above the current ground level to account for the platform height, with buildings in the O&M facility being approximately three metres high (ground level to rooftop). The modelling indicated some minor changes to overland flow patterns around these structures; however, these were considered negligible, with suggested flood mitigation measures being the incorporation of culverts and a water management/drainage system.

Table 7. High-risk Environments Model Requirements (CFA 2023, Section 4.1.1).

Model Requirements	Compliance	Comments
ALL FACILITIES		
Planning applications for all renewable energy facilities proposed in high-risk environments must address the following:		
a) An assessment against policy at Clause 13.02-1S Bushfire where the facility is located in a BPA.	✓	Clause 13.02-1S is addressed in the Bushfire Risk Assessment (Ecology and Heritage Partners 2026) prepared for this project.
b) The impact of any ignitions arising from the infrastructure (e.g. solar panels, wind turbines, BESS, electrical infrastructure) on nearby communities, infrastructure and assets.	✓	The potential impact of ignitions from the project infrastructure on nearby communities, infrastructure and assets has been considered in Section 2. A bushfire hazard landscape assessment that discussed potential bushfire impacts on the surrounding landscape has also been discussed in the Bushfire Risk Assessment (Ecology and Heritage Partners 2026).
c) The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat, flame contact).	✓	The impact of bushfire on the infrastructure has been discussed in Bushfire Risk Assessment (Ecology and Heritage Partners 2026).
d) Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks on site to an acceptable level.	✓	A risk assessment has been undertaken in Section 2 in which there was considered to be no increase in risk to adjacent land due to the project. Several bushfire mitigation measures will be incorporated into the project's development, which are discussed throughout Section 3.

3.4 Emergency Vehicle (Fire Truck) Access Model Requirements

Table 8. Emergency Vehicle (Fire Truck) Access Model Requirements (CFA 2023, Section 4.2.1).

Model Requirements	Compliance	Comments
ALL FACILITIES		
a) Construction of a minimum 4m perimeter road within the perimeter fire break.	✓	A six-metre-wide perimeter road has been provided around the facility within the perimeter break.
b) Roads must be of all-weather construction and capable of accommodating a vehicle of 15t (i.e. no compacted earth).	✓	All roads and access tracks as part of the project will be of all-weather condition and capable of accommodating a vehicle of 15 tonnes.
c) Constructed roads should be a minimum of 4m in trafficable width with a 4m vertical clearance for the width of the formed road surface. Ensure any fencing along access routes allows for the width of fire vehicles.	✓	Access tracks will be approximately six metres in trafficable width and have a vertical clearance of four metres. All fencing along a track's route will have a minimum six-metre-wide opening/gate.
d) The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than 50m.	✓	The study area is generally flat and thus these grades will not be exceeded.
e) Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	The study area is generally flat and thus there will be no dips.
f) Roads must incorporate passing bays at least every 600m, which must be at least 20m long and have a minimum trafficable width of 6m. At least one passing bay must be incorporated where roads are less than 600m long.	✓	Passing bays are not required given access tracks will be approximately six metres wide.
g) Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, BESS and related infrastructure, substations and grid connection areas.	✓	All infrastructure within the study area will be accessible to emergency services, including the BESS, terminal station, substation, O&M area and solar panels.
h) Provision of at least two but preferably more access points to each part of the facility. The number of access points must be informed through a risk management process, in consultation with CFA.	✓	A total of 10 access points are provided across the facility, with at least two access points to each part of the facility, i.e. west of the transmission line easement, east of the transmission line easement and east of Old Church Road.
SOLAR ENERGY FACILITIES		
Where solar energy facilities are designed over several land parcels separated by private or public roads, overhead powerlines, and/or water courses, vehicle entrances are to be provided into each section. The number and location of vehicle access points must be determined in consultation with CFA.	✓	An overhead transmission line runs north-south towards the western end of the study area, while Old Church Road runs north-south towards its eastern end. In this context, the study area is in three parts. There are two access points to the western section, six access points to the central section and two access points to the eastern section (Attachment 2).

Model Requirements	Compliance	Comments
BATTERY ENERGY STORAGE SYSTEMS		
At least two access points are to be provided into each section where the BESS is located. The number and location of vehicle access points must be determined in consultation with CFA.	✓	Two access points are provided to the BESS facility at its eastern and western ends. In addition, a perimeter road around the BESS containers and associated infrastructure will be provided.

3.5 Firefighting Water Supply Model Requirements

Table 9. Firefighting Water Supply Model Requirements (CFA 2023, Section 4.2.2).

Model Requirements	Compliance	Comments
ALL FACILITIES		
a) Water access points must be clearly identifiable and unobstructed to ensure efficient access.	✓	All water access points will be clearly identifiable and unobstructed.
b) Static water storage tank installations must comply with Australian Standard 2419.1-2021: Fire Hydrant installations – System design, installation and commissioning (AS 2419.1:2021) (Standards Australia 2021).	✓	All water tanks will comply with Australian Standard 2419.1-2021: Fire Hydrant installations – System design, installation and commissioning (AS 2419.1:2021) (Standards Australia 2021).
c) The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.	✓	All water tanks in the study area will be an above-ground water tank constructed of concrete or steel.
d) The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	✓	All static water storage tanks will be capable of being completely refilled within 24 hours.
e) The static water tank(s) must be located at vehicle access points to the facility and must be positioned at least 10m away from any infrastructure (solar panels, wind turbines, BESS, etc.).	✓	Water tanks are located at all 10 vehicle access points to the facility and are positioned at least 10 metres away from any infrastructure.
f) The hard-suction point must 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 connections are: 125mm, 100mm, 90mm, 75mm, 65mm Storz tree adapters with a matching blank end cap to be provided.	✓	A hard-suction point will be provided with the correct specifications.
g) The hard-suction point must be positioned within 4m to a hard stand area and provide a clear access for emergency services personnel.	✓	All hard-suction points associated with water tanks will be positioned within four metres to a hard stand area and provide a clear access for emergency services personnel.
h) An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15t Gross Vehicle Mass, 8m long and 6m wide or to the satisfaction of the CFA.	✓	An all-weather road access and hardstand will be provided to the hard-suction point and maintained to the minimum weight and distance standard.

Model Requirements	Compliance	Comments
i) The road access and hardstand must be kept clear at all times.	✓	The road access and hardstand will always be kept clear.
j) The hard-suction point must be protected from mechanical damage (e.g. bollards) where necessary.	✓	All hard-suction points will be protected from mechanical damage using bollards or equivalent protection.
k) Where the access road has one entrance, an 8m radius turning circle must be provided at the tank.	✓	One turning circle has been provided towards the north-eastern extent of the study area where the access track terminates at Blind Creek (Attachment 2).
l) An external water level indicator must be provided to the tank and be visible from the hardstand area.	✓	An external water level indicator will be provided to the tank and be visible from the hardstand area.
m) Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.	✓	Signage will be provided as per Figure 5 in the CFA (2023, p19) Design Guidelines
n) Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s).	✓	Signage will be provided as per Figure 6 in the CFA (2023, p19) Design Guidelines.
SOLAR ENERGY FACILITIES		
a) The fire protection system for solar energy facilities must incorporate at least one x 45,000 litre static water tank at the primary vehicle entrance to each part of the facility.	✓	A 45,000 litre water tank has been incorporated into the design at each vehicle access point into the facility, with ten water tanks (excluding the BESS facility) being provided overall.
b) Additional static fire water tanks of at least 45,000 litres effective capacity must also be incorporated for every 100ha.	✓	No additional water tanks are proposed for the project given 450,000 litres of effective water supply (excluding the BESS tank volume) are already provided.
BATTERY ENERGY STORAGE SYSTEMS (CENTRALISED OR STAND-ALONE FACILITIES)		
For facilities with a centralised BESS, the fire protection system must include at a minimum:		
a) Where reticulated water is available, a fire hydrant system that meets the requirements of AS 2419.1:2021 Fire Hydrant Installations, Section 3.9: Open Yard Protection, and Table 2.2.5(D): Number of Fire Hydrant Outlets Required to Flow Simultaneously – Open Yards (Standards Australia 2021), Except, that fire hydrants must be provided and located so that every part of the BESS is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.	N/A	A reticulated water supply will not be used as part of this project.
OR		

Model Requirements	Compliance	Comments
b) Where no reticulated water is available, a fire hydrant system that complies with AS 2419.1:2021 (Standards Australia 2021) must be provided:		
i. The fire water supply must be of a quantity no less than 288,000 litres or as per the provisions of AS 2419.1:2021 (Standards Australia 2021), Table 2.2.5 (D) for open yards flowing for a period of no less than four hours at 20L/s, whichever is the greater.	✓	The water supply for the BESS facility is currently being investigated. It will meet the requirements as per AS 2419.1:2021 (Standards Australia 2021) if no reticulated water is available.
ii. The quality of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1:2021 (Standards Australia 2021), Table 2.2.5(D).	✓	The BESS design is being determined and will meet the fire water supply requirements as per AS 2419.1:2021 (Standards Australia 2021). The BESS facility is approximately 1.98 ha in area (i.e. the two yellow polygons on Attachment 2) and will therefore require four fire hydrant outlets to flow simultaneously as stated in Table 2.2.5(D) in AS 2419.1:2021 (Standards Australia 2021).
iii. Fire hydrants must be provided and located so that every part of the BESS is within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet.	✓	Fire hydrants will be located so they are within 70 metres of every BESS container and associated infrastructure. Attachment 2 illustrates eight hydrants around the perimeter of the BESS based on preliminary analysis. However, detailed analysis will be undertaken at a later stage to conform the total number and location of these fire hydrants.
iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, BESS, buildings).	✓	A water tank will be located at each vehicle access point into the BESS/terminal station/substation facility and will be positioned at least 10 metres away from any infrastructure.
v. The fire water supply must be reasonably adjacent to the BESS and shall be accessible without undue danger in an emergency (e.g. fire water tanks are to be located closer to the site entrance than the BESS).	✓	The two water tanks are located at each entrance point to the BESS/terminal station/substation facility, thereby being accessible without undue danger to emergency personnel.
vi. The fire water supply must comply with AS 2419.1:2021, Section 5: Water storage tanks (Standards Australia 2021),	✓	The fire water supply will comply with AS 2419.1:2021, Section 5: Water storage tanks (Standards Australia 2021), which describes the water tank requirements with respect to tank construction and accessories.

3.6 Fire Detection and Suppression Equipment Model Requirements

Table 10. Fire Detection and Suppression Equipment Model Requirements (CFA 2023, Section 4.2.3)

Model Requirements	Compliance	Comments
ALL FACILITIES		
Suitable fire detection and suppression equipment must be provided:		
a) For on-site buildings and structures, according to the requirements of the National Construction Code.	✓	All on-site buildings and structures will incorporate suitable fire detection and suppression equipment.
b) For storages of dangerous goods, according to the requirements of any Australian Standard for storing and handling of dangerous goods.	✓	Suitable fire detection and suppression equipment will be provided for storages of dangerous goods.
c) For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3-20m of each Power Conversion Unit.	✓	A minimum of two fire extinguishers will be provided within 3-20 metres of each Power Conversion Unit.
d) In all vehicles and heavy equipment, each vehicle must carry at least a 9l 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.	✓	All vehicles and heavy equipment will carry a minimum nine-litre fire extinguisher to the correct specifications.

3.7 Fire Break Model Requirements

Table 11. Fire Break Model Requirements (CFA 2023, Section 4.2.5).

Model Requirements	Compliance	Comments
ALL FACILITIES		
A fire break must be established and maintained around:		
a) The perimeter of the facility, commencing from the boundary of the facility of from the vegetation screening inside the property boundary.	✓	A 10-metre-wide fire break is provided around the perimeter of the solar panels where they directly adjoin a public road or private landowners paddock. Separation distances as per the site assessment methodology in AS 3959:2018 (Standards Australia 2020) have been applied to solar panels interfacing retained native vegetation along the eastern end of the study area. The site assessment details are provided in Section 2.2.4 of the Bushfire Risk Assessment (Ecology and Heritage Partners 2026), which resulted in separation distances of 19 metres from Grassland, 33 metres from Woodland and 48 metres from Forest (Attachment 2). Vegetation under the solar panels and within the separation distances will be managed in a low threat state during the Fire Danger Period (i.e. maximum height of 100 millimetres) primarily using sheep to graze the paddocks. The study area will be inspected prior to the commencement of the Fire Danger Period (i.e. in October/ November) and the grass will be slashed in November/beginning of December if it is above 100 millimetres.
b) The perimeter of control rooms, electricity compounds, substations and all other buildings on-site. The width of the fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.		A minimum 10-metre-wide fire break is provided around the perimeter of the BESS/terminal station/substation facility. The O&M facility will contain an office building, which requires a minimum of 19 metres separation distance between the building and Grassland to the north (based on a Bushfire Attack Level (BAL)-12.5 construction standard and Upslope/Flat land, as per the site assessment methodology in AS 3959:2018 [Standards Australia 2020]). Given there is a 25-metre-wide gap between the northern boundary of the O&M facility and vegetation (being the vegetation screening), habitable buildings can be located anywhere within this facility.
BATTERY ENERGY STORAGE SYSTEMS		
A fire break must be established and maintained around BESS's and related infrastructure.	✓	A 10m-wide fire break around the BESS and related infrastructure will be provided.

3.8 Design Specific to Facility Type Model Requirements

Table 12. Design Specific to Facility Type Model Requirements (CFA 2023, Section 4.2.6).

Model Requirements	Compliance	Comments
SOLAR ENERGY FACILITIES		
Solar energy facilities are to have a minimum six metre separation between solar panel banks.	✓	All solar panel banks will be separated by a minimum of six metres.
BATTERY ENERGY STORAGE SYSTEMS		
The design of the facility must incorporate: a) A separation distance that prevents fire spread between battery containers/enclosures and: i. Other battery containers/enclosures. ii. On-site buildings. iii. Substations. iv. The site boundary. v. Any other site buildings. vi. Vegetation. Separation must be at least the distance where the radiant heat flux (output) from a BESS container/enclosure fully involved in fire does not create the potential for ignition of these site elements.	✓	The BESS facility will be designed in accordance with the manufacturers specifications to ensure the separation distance between BESS containers, associated infrastructure and vegetation minimise the potential for fire spread between an ignition source and surrounding containers, other infrastructure or surrounding vegetation. The BESS containers will be separated from each other by a minimum of three metres, and a minimum 10m-wide fire break will be located around the perimeter of the BESS infrastructure.
b) A fire break around the BESS and related infrastructure, of a width of no less than 10m, or greater where determined in the Risk Management Plan. Fire breaks must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping.	✓	A 10-metre-wide fire break will be provided around the BESS and be non-combustible.
c) A layout of site infrastructure that: i. Considers the safety of emergency responders. ii. Minimises the potential for grassfire and/or bushfire to impact the BESS.	✓	The BESS facility will be designed to minimise the potential for off-site fires to impact the facility, on-site fires to ignite and spread through the facility, and provide safe and effective access for firefighters.

Model Requirements	Compliance	Comments
iii. Minimises the potential for fires in battery containers/enclosures to impact on-site and off-site infrastructure.		Some of the ways this will be achieved include: • Having a perimeter road around the BESS infrastructure within a 10-metre-wide fire break; • Locating the water tanks close to the BESS site entrances; • Locating the fire hydrants around the perimeter of the BESS infrastructure along the perimeter road and ensuring all infrastructure is with 70m of a hydrant. • Separating the BESS containers by a minimum of three metres; and • Ensuring the battery containers have several fire safety features such as an inbuilt thermal monitoring system, warning detection system, thermal runaway mitigation system and automatic shutdown and isolation system.
The BESSs must be:		
a) Located to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles).	✓	The BESS facility entrance is located approximately 360 metres from a public road, being Mologa-Durham Ox Road to the north (Attachment 2).
b) Located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of fire at the BESS).	✓	Given the most likely directions of bushfire attack on potential severe fire weather days (i.e. December to February) in this region of Victoria are from the north-west, west and south-west (Ecology and Heritage Partners 2026) locating a water tank at the western side of the BESS facility would ensure it is not aligned with the prevailing wind direction in most cases.
c) Provided with in-built fire and gas detection systems. Where these systems are not provided, measures to effectively detect fires within containers must be detailed within the Risk Management Plan.	✓	The BESS containers will be provided with in-built fire and gas detection systems.
d) Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.	✓	The BESS containers will be provided with explosion prevention systems.
e) Provided with suitable ember protection to prevent embers from penetrating battery containers/enclosures.	✓	The BESS containers will be provided with suitable ember protection.
f) Provided with suitable access roads for emergency services vehicles, to and within the site, including to BESS and fire service infrastructure.	✓	There are two site entrances to the BESS/terminal station/substation facilities on their eastern and western sides, which both have direct access to Mologa-Durham Ox Road 360 meters north of these entrances. A perimeter road around the BESS facility will be provided within a minimum 10-metre-wide firebreak.
g) Installed on a non-combustible surface such as concrete.	✓	The BESS containers will be installed on a non-combustible surface.

Model Requirements	Compliance	Comments
h) Provided with suitable ventilation.	✓	The BESS containers will be provided with suitable ventilation.
i) Provided with impact protection to at least the equivalent of a W guardrail-type barrier, to prevent mechanical damage to battery containers/enclosures	✓	The BESS containers will be provided with impact protection.
j) Provided with enclosed wiring and buried cabling, except where require do to be above ground for grid connection.	✓	The BESS containers will be provided with enclosed wiring and buried cabling, except where require do to be above ground for grid connection.
k) Provided with spill containment that includes provision for management of fire water runoff.	✓	The BESS containers will be provided with spill containment that includes provision for management of fire water runoff.

3.9 Risk Monitoring, Reviewing, Recording and Reporting

An ongoing risk monitoring, reviewing, recording and reporting process will be developed for the facility in accordance with AS/ISO 31000:2018 Risk Management - Guidelines (Standards Australia 2018) as part of the Fire Management Plan and Emergency Plan to address and document fire safety risks.

A Supervisory Control and Data Acquisition (SCADA) system will be incorporated into the project's design. This system will provide continuous monitoring and coordinated control of the solar farm, BESS and associated electrical infrastructure, incorporating dedicated bushfire risk management functions. Real-time environmental conditions, including temperature, wind, humidity and Fire Danger Index, will be assessed alongside asset-level sensors and external alerts from the Bureau of Meteorology, CFA and the Network Service Provider. Automated alarms and control logic will enable graduated responses to elevated fire risk, including disabling auto-reclose, limiting inverter output and initiating controlled shutdown or disconnection during Extreme or Catastrophic Fire Danger Periods. Integration with protection systems will ensure appropriate bushfire protection settings are applied, while SCADA dashboards, alarms and event logs will support operator awareness, regulatory compliance and post-incident investigation in accordance with network requirements and the project's Fire Management Plan.

4 OTHER BUSHFIRE PLANS TO BE PREPARED

The Design Guidelines (CFA 2023) specify three plans that must be prepared as part of a renewable energy development, being the Risk Management Plan (i.e. this report), Fire Management Plan and Emergency Plan. The Risk Management Plan is required as part of a planning permit application, where the other two plans can be prepared following the issuing of a planning permit but before construction commences.

4.1 Fire Management Plan

A Fire Management Plan will be developed for the project in accordance with Section 6.1 of the Design Guidelines (CFA 2023), which details the fire hazards and risks within and to the facility. It specifies the activities and responsibilities for developing and implementing appropriate and effective risk control measures. The proponent is committed to preparing the Fire Management Plan prior to construction commencing in consultation with the relevant fire authority.

The Fire Management Plan will include (CFA 2023, p32):

- '*A summary of fire hazards and risks to and from the site, specific to its location, infrastructure, activities and occupancy.*
- *Description of control measures to prevent fire occurring and limit the consequences of fire at the facility.*
- *Description of control measures to prevent and reduce the consequences of external fire impacting the facility.*
- *Details of equipment and resources to manage fire at the facility.*
- *Policies and procedures that ensure all control measures are appropriate and effective, and remain so.*
- *Procedures for review of the Fire Management Plan.*'

4.2 Emergency Plan

An Emergency Plan will be developed for the project in accordance with Section 7 of the Design Guidelines (CFA 2023, p38). This plan provides for the safety of site personnel, emergency responders and the community when preparing for the event of an emergency, and covers the construction and commissioning, and operational phases of the project. The proponent is committed to preparing the Emergency Plan prior to construction commencing in consultation with the relevant fire authority.

The Emergency Plan will include (CFA 2023, p38):

- '*Emergency prevention, preparedness and mitigation activities.*
- *Activities for preparing for emergencies.*
- *Control and coordination arrangements for emergency response (e.g., evacuation procedures, shelter-in-place arrangements, emergency assembly areas and emergency response procedures).*

- *The agreed roles and responsibilities of on-site personnel (e.g., equipment isolation, fire brigade liaison, evacuation management, shelter-in-place management, if applicable).'*

To facilitate fire brigade response, the Emergency Plan will include (CFA 2023, p38):

- '*A facility description, including infrastructure details, operations, number of personnel, and operating hours.*
- *A site plan depicting infrastructure, site access points and internal roads, fire services (water tanks, pumps, booster systems, fire hydrants, fire hose reels), drainage and neighbouring properties.*
- *An emergency response for each credible emergency event and scenario, based on a comprehensive risk management process. CFA recommends including building, infrastructure and fire vehicles, and grassfire and bushfire.*
- *Up-to-date contact details for facility personnel, and any relevant off-site personnel that could provide technical support during an emergency.*
- *Evacuation procedures and where appropriate, shelter-in-place procedures for facilities at-risk of bushfire or grassfire, if it is too late to evacuate.*
- *Details of emergency resources, including fire detection and suppression systems and equipment; gas detection; emergency eye-wash and shower facilities; spill containment systems and equipment; emergency warning systems; communication systems; personal protective equipment and first aid.*
- *A manifest of dangerous goods (if required under the* Dangerous Goods (Storage and Handling) Regulations 2022*).*

For BESS facilities, the Emergency Plan will also include (CFA 2023, p43):

- '*Contact information for 24/7/365 specialist technical support for the BESS.*
- *Emergency response procedures based on identified risks and hazards of the BESS and related infrastructure, including but not limited to:*
    - *Electrical infrastructure faults and fire.*
    - *BESS damage or faults, including battery monitoring faults, temperature increases above normal operating parameters, electrical faults, chemical spills or reactions, off-gassing, thermal events/runaway, smoke and fire.*
    - *Bushfire and grassfire.*
    - *The management of fire water runoff.*
- *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).*
- *A plan for partial and full decommissioning of the battery energy storage system in the event of an emergency incident that renders the facility inoperable or unsafe, before its anticipated end-of-life.*
- *Any information that supports the considerations in Appendix B of the Design Guideline (CFA 2023).'*

5 CONCLUSION

The bushfire hazards and risks associated with the project have been assessed in accordance with Clause 13.02-1S (Bushfire) of the Loddon Planning Scheme and the Design Guidelines (CFA 2023).

The bushfire risk assessment identified the potential for an on-site fire, an on-site fire spreading throughout the site and/or off-site, and a landscape fire entering the site. Risk ratings were provided for the ignition risk and potential consequence of these three hazard scenarios, with the incorporation of several recommended mitigation measures expected to lower the risk to people, infrastructure and the environment.

Bushfire mitigation measures have been incorporated into the project's design and operations in response to the hazards and potential risks, which complies with all the model requirements as outlined in the Design Guidelines (CFA 2023). These mitigation measures include:

- Providing an access track network with a six-metre-wide trafficable width;
- Providing 45,000 litre static water supply tanks at each vehicle access point and two water tanks within the BESS facility;
- Providing suitable fire detection and suppression equipment for on-site buildings, storage of dangerous goods, electrical installations, vehicles and heavy equipment;
- Providing fire breaks around the perimeter of the study area and BESS/terminal station/substation facility, and fire breaks between vegetation to be retained and solar panels;
- Managing vegetation under the solar panels and within the separation distances in a low threat state during the Fire Danger Period;
- Ensuring all electrical elements associated with the BESS containers, terminal station, substation, solar panels and all associated infrastructure are designed and installed in accordance with manufacturers specifications and relevant Acts, regulations and Australian Standards; and,
- Preparing a Fire Management Plan and Emergency Plan prior to the commencement of construction in consultation with CFA.

Based on the bushfire risk and hazard assessment and mitigation measures being incorporated into the project's design and operational stages, the bushfire risks are considered to be reduced to an acceptable level.

REFERENCES

CFA 2023. *Design Guidelines and Model Requirements for Renewable Energy Facilities v4*. Version 4.4, June 2025. Country Fire Authority, Burwood East, Victoria.

DELWP 2019. *Guidelines for Development in Flood Affected Areas*. Department of Environment, Land, Water and Planning, Melbourne, Victoria.

DTP 2026. VicPlan Map [www Document]. URL: https://mapshare.vic.gov.au/vicplan/. Victorian Department of Transport and Planning, Melbourne, Victoria.

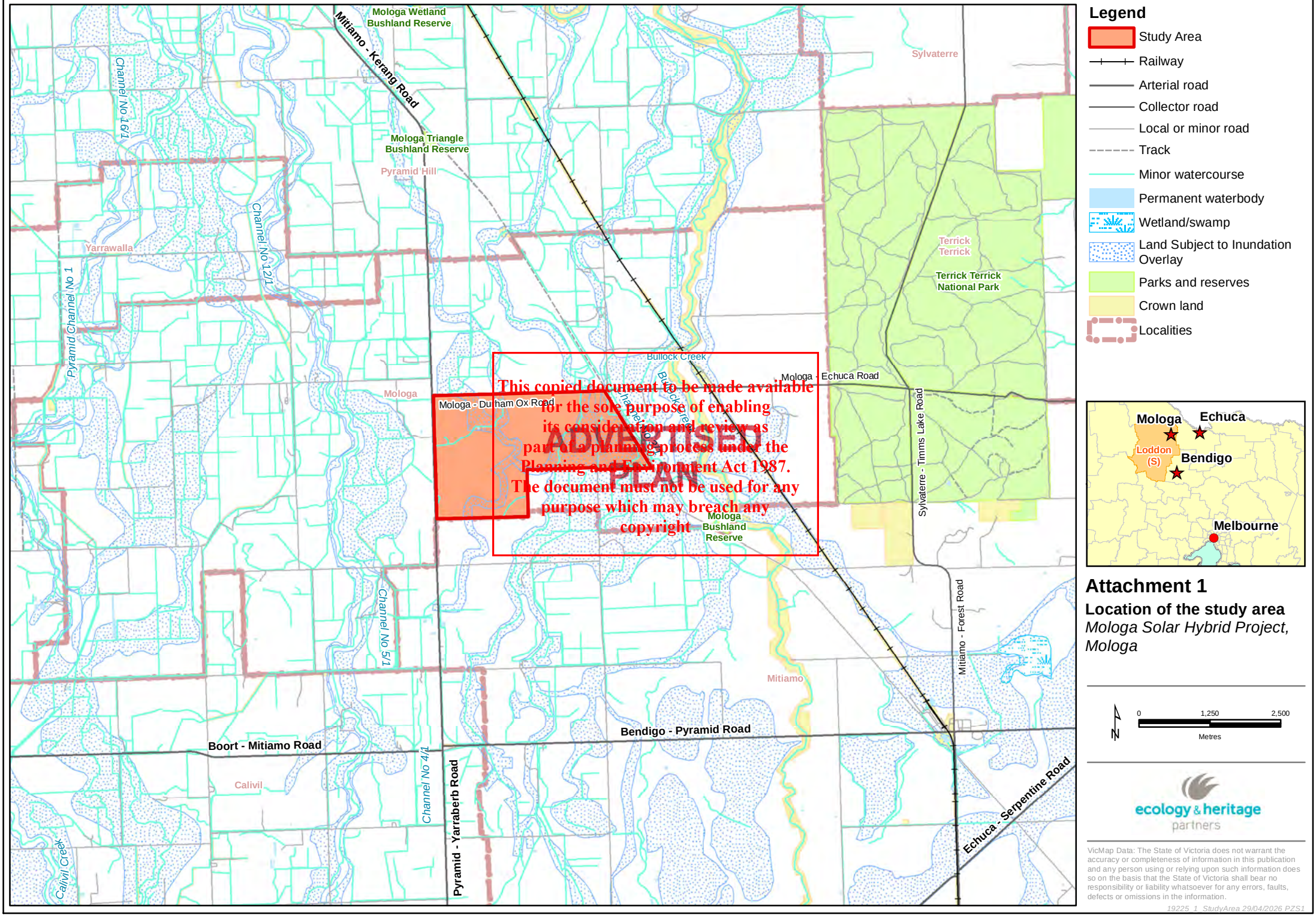
Eco Logical Australia 2025. *Mologa Solar Hybrid Hydrology and Irrigation District Assessment*. Eco Logical Australia, Melbourne, Victoria. Prepared for Urbis Pty Ltd.

Ecology and Heritage Partners Pty Ltd 2026. *Bushfire Risk Assessment for the Mologa Solar Hybrid Project: Mologa-Durham Ox Road, Mologa, Victoria*. Ecology and Heritage Partners Pty Ltd, Ascot Vale, Victoria.

Standards Australia 2018. *AS/ISO 31000:2018 Risk management – Guidelines*. SAI Global Limited, Sydney, New South Wales.

Standards Australia 2020. *AS 3959:2018 Construction of buildings in bushfire-prone areas*. Includes Amendments 1 and 2. SAI Global Limited, Sydney, New South Wales.

ATTACHMENTS

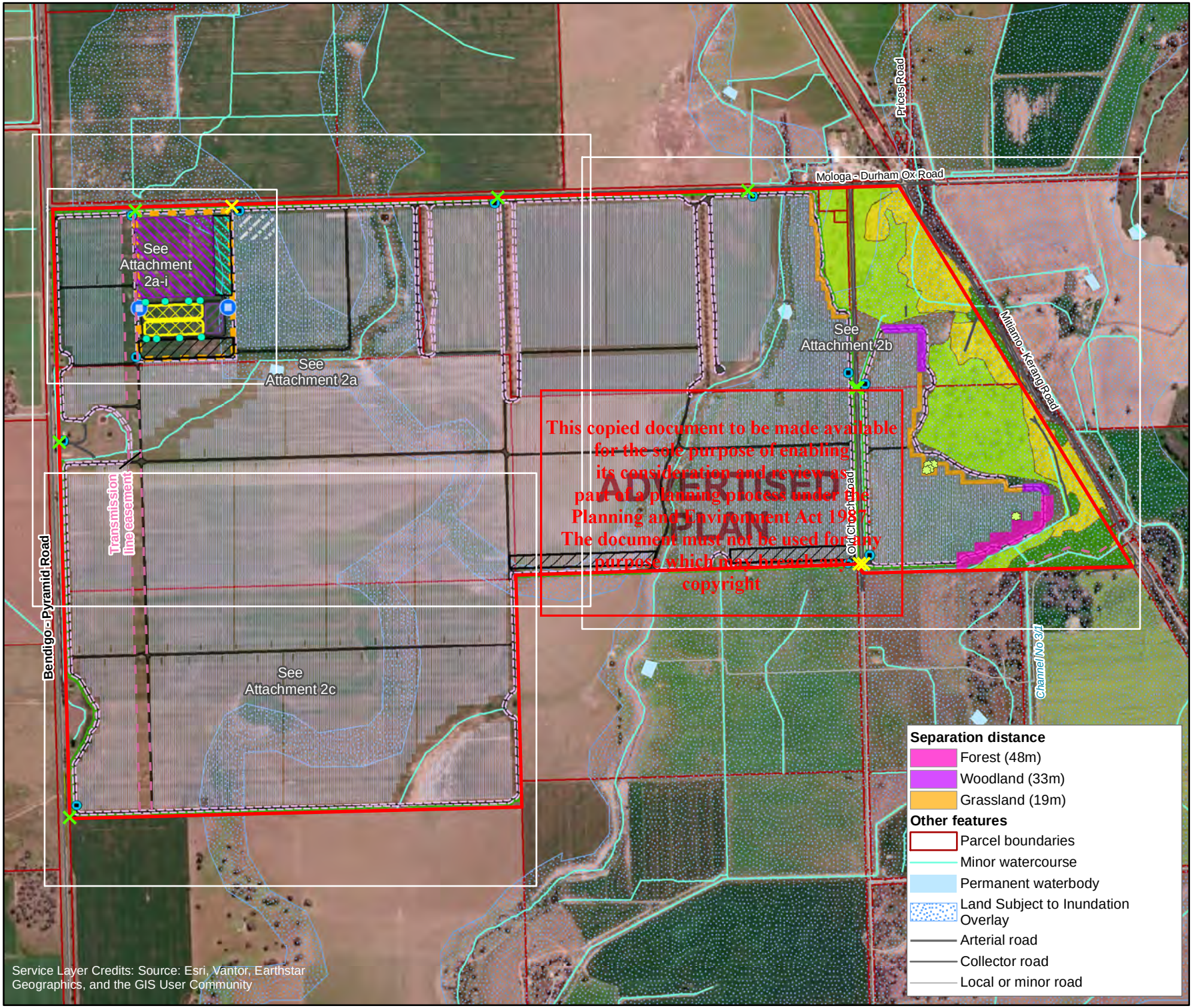


Attachment 1

Location of the study area

Mologa Solar Hybrid Project, Mologa

ecology & heritage partners



Legend

- Study Area

Development plan

- Solar panels
- BESS Compound
- BESS
- Terminal Station
- Substation
- Operations and Maintenance facilities
- Detention Basin
- Temporary laydown area
- Vehicle access track (6m)
- Primary use vehicle access
- Emergency vehicle access
- BESS water tank
- BESS fire hydrant (indicative location)
- Vehicle access point water tank (45,000L)
- Asset protection zone (10m)
- Vegetated screening (5-10m)
- Existing native trees

Classified vegetation

- Forest
- Woodland
- Grassland

Separation distance

- Forest (48m)
- Woodland (33m)
- Grassland (19m)

Other features

- Parcel boundaries
- Minor watercourse
- Permanent waterbody
- Land Subject to Inundation Overlay
- Arterial road
- Collector road
- Local or minor road

Attachment 2 Overview

Bushfire Management Plan

Mologa Solar Hybrid Project, Mologa

N

0 250 500

Metres

ecology & heritage partners

A FYFE Company

Legend

- Study Area

Development plan

- Solar panels
- BESS Compound
- BESS
- Terminal Station
- Substation
- Operations and Maintenance facilities
- Detention Basin
- Temporary laydown area
- Vehicle access track (6m)
- Primary use vehicle access
- Emergency vehicle access
- BESS water tank
- BESS fire hydrant (indicative location)
- Vehicle access point water tank (45,000L)
- Asset protection zone (10m)
- Vegetated screening (5-10m)

Other features

- Parcel boundaries
- Minor watercourse
- Permanent waterbody
- Land Subject to Inundation Overlay

Attachment 2a

Bushfire Management Plan

Mologa Solar Hybrid Project, Mologa

N

0 100 200

Metres

ecology & heritage partners

A FYFE Company

Legend

- Study Area

Development plan

- Solar panels
- BESS Compound
- BESS
- Terminal Station
- Substation
- Operations and Maintenance facilities
- Detention Basin
- Temporary laydown area
- Vehicle access track (6m)
- Primary use vehicle access
- Emergency vehicle access
- BESS water tank
- BESS fire hydrant (indicative location)
- Vehicle access point water tank (45,000L)
- Asset protection zone (10m)
- Vegetated screening (5-10m)

Other features

- Parcel boundaries
- Minor watercourse
- Permanent waterbody
- Land Subject to Inundation Overlay

Attachment 2a-i

Bushfire Management Plan

Mologa Solar Hybrid Project, Mologa

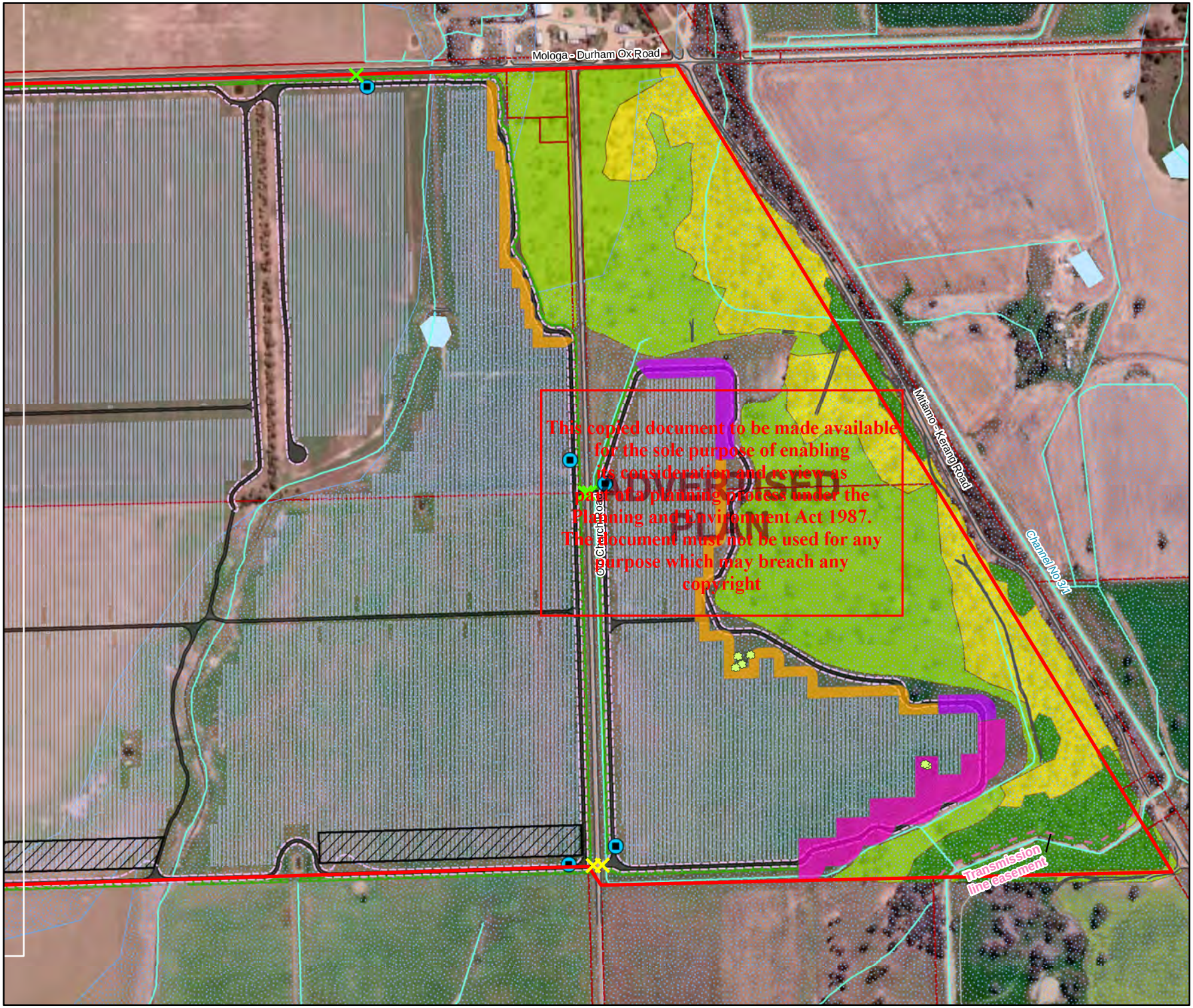
N

0 40 80

Metres

ecology & heritage partners

A FYFE Company



Legend

- Study Area

Development plan

- Solar panels
- Temporary laydown area
- Vehicle access track (6m)
- Primary use vehicle access
- Emergency vehicle access
- Vehicle access point water tank (45,000L)
- Asset protection zone (10m)
- Vegetated screening (5-10m)
- Existing native trees

Classified vegetation

- Forest
- Woodland
- Grassland

Separation distance

- Forest (48m)
- Woodland (33m)
- Grassland (19m)

Other features

- Parcel boundaries
- Minor watercourse
- Permanent waterbody
- Land Subject to Inundation Overlay

Attachment 2b

Bushfire Management Plan

Mologa Solar Hybrid Project, Mologa

0 100 200

Metres

ecology & heritage partners

A FYFE Company

Legend

- Study Area

Development plan

- Solar panels
- Temporary laydown area
- Vehicle access track (6m)
- Emergency vehicle access
- Vehicle access point water tank (45,000L)
- Asset protection zone (10m)
- Vegetated screening (5-10m)

Classified vegetation

- Grassland

Other features

- Parcel boundaries
- Minor watercourse
- Land Subject to Inundation Overlay

Attachment 2c

Bushfire Management Plan

Mologa Solar Hybrid Project, Mologa

N

0 90 180

Metres

ecology & heritage partners

A FYFE Company

APPENDIX 1. PRODUCT DESIGN SPECIFICATIONS

/ MVPS 4000-S2-10 / MVPS 4200-S2-10 / MVPS 4400-S2-10 / MVPS 4600-S2-10

MV Power Station

4000-S2 / 4200-S2 / 4400-S2 / 4600-S2

Turnkey solution for PV and battery-storage power plants

Robust
- Station and all individual components type-tested
- Galvanized base frame for extreme ambient conditions

Easy to use
- Turn-key solution
- Fully pre-assembled for easy setup and commissioning

Cost effective
- Lower specific costs thanks to high power classes
- Minimal coordination required during planning and installation
- Low transport costs thanks to 20-foot platform

Flexible
- One design for the whole world
- Numerous options

With the power of the robust central inverters Sunny Central UP or Sunny Central Storage UP and the perfectly matched medium-voltage components, the MV Power Station offers high power density and is a turnkey solution available worldwide.

Ideal for use in the new generation of PV and battery-storage power plants with 1500 V_{DC}, the integrated system solution is easy to transport and quick to assemble and commission. The MVPS and all components are type-tested. The MV Power Station combines rigorous plant safety with maximum energy yield and minimized deployment and operating risk.

MV POWER STATION
4000-S2 / 4200-S2 / 4400-S2 / 4600-S2

Technical data	MVPS 4000-S2	MVPS 4200-S2
Input (DC)		
Available inverters	1 x SC 4000 UP or 1 x SCS 3450 UP or 1 x SCS 3450 UP-XT	1 x SC 4200 UP or 1 x SCS 3600 UP or 1 x SCS 3600 UP-XT
Max. input voltage	1500 V	1500 V
Number of DC inputs	Depending on selected inverter	
Integrated zone monitoring	○	
Output (AC) on the medium-voltage side		
Nominal power at SC UP (from -25°C to +35°C / 40°C; optional 50°C)[1]	4000 kVA / 3600 kVA	4200 kVA / 3780 kVA
Nominal power at SCS UP (from -25°C to +25°C / 40°C; optional 50°C)[1]	3450 kVA / 2930 kVA	3620 kVA / 3075 kVA
Charging power at SCS UP-XT (from -25°C to +25°C / 40°C; optional 50°C)[1]	3589 kVA / 3001 kVA	3769 kVA / 3152 kVA
Discharging power at SCS UP-XT (from -25°C at +25°C / 40°C; optional 50°C)[1]	4000 kVA / 3400 kVA	4200 kVA / 3570 kVA
Typical nominal AC voltages with a tolerance of +/-10%	10 kV to 35 kV	10 kV to 35 kV
AC power frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Transformer vector group Dy11 / YNd11 / YNy0	● / ○ / ○	● / ○ / ○
Transformer cooling method	KNAN[2]	KNAN[2]
Transformer standby power losses, industry standard / Eco design 1 / Eco design 2	● / ○ / ○	● / ○ / ○
Transformer short-circuit losses, industry standard / Eco design 1 / Eco design 2	● / ○ / ○	● / ○ / ○
Max. total harmonic distortion	< 3 %	
Reactive power feed-in (up to max. 60% of nominal power)	○	
Power factor at rated power / adjustable displacement power factor	1 / 0.8 overexcited to 0.8 underexcited	
Inverter efficiency		
Max. efficiency[3] / Europ. efficiency[3] / CEC efficiency[4]	98.8 % / 98.6 % / 98.5 %	98.8 % / 98.7 % / 98.5 %
Protective devices		
Input-side disconnection point	DC load-break switch	
Output-side disconnection point	Medium-voltage vacuum circuit breaker	
DC overvoltage protection	Surge arrester, type I	
Galvanic isolation	●	
Arc fault resistance medium-voltage control room (according to IEC 62271-202)	IAC A 20 kA 1 s	
General data		
Dimensions (W / H / D)	6058 mm / 2896 mm / 2438 mm	
Weight	< 18 t	
Self-consumption (max. / partial load / average)[1]	< 8.1 kW / < 1.8 kW / < 2.0 kW	
Self-consumption (stand-by)[1]	< 370 W	
Ambient temperature -25°C to +45°C / -25°C to +55°C / -35°C to +55°C / -40°C to +45°C	● / ○ / ○ / ○	
Degree of protection according to IEC 60529	Control rooms IP23D, inverter electronics IP54	
Environment: standard/extreme	● / ○	
Maximum permissible value for relative humidity	95% (for 2 months/year)	
Max. operating altitude above MSL 1000 m / 2000 m	● / ○	
Inverter fresh air consumption	6500 m³/h	
Equipment		
DC connection	Lug	
AC connection	Outer-cone angle plug	
Tap changer for MV voltage transformer: without/with	● / ○	
Shield winding for MV transformer: without/with	● / ○	
Monitoring package	○	
Station enclosure color	RAL 7004	
Transformer for external loads: without / 10 / 20 / 30 / 40 / 50 / 60 kVA	● / ○ / ○ / ○ / ○ / ○ / ○	
MV switchgear: without / 1 panel / 3 panels 2 cable panels with load-break switch, 1 transformer panel with circuit breaker, arc fault resistance IAC A FL 20 kA 1 s to IEC 62271-200	● / ○ / ○	
MV switchgear short-circuit current capability (20 kA 1 s / 20 kA 3 s / 25 kA 1 s)	● / ○ / ○	
Accessory for MV switchgear: without / auxiliary contacts / motor for transformer panel / cascade control / monitoring	● / ○ / ○ / ○ / ○	
Integrated oil spill containment: without/with	● / ○	
Industry standards (other industry standards: see inverter datasheet)	IEC 60076, IEC 62271-200, IEC 62271-202, EN50588-1, CSC certificate	
Type designation	MVPS-4000-S2-10	MVPS-4200-S2-10

● Standard features ○ Optional features – Not available

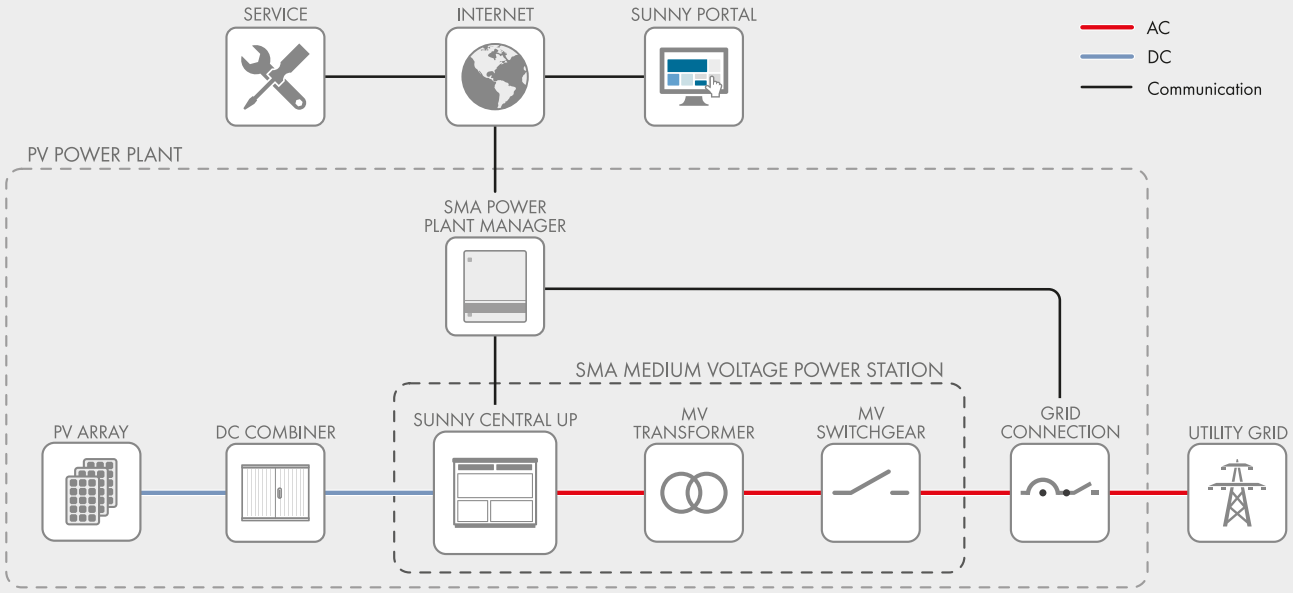
1) Data based on inverter Further details can be found in the inverter datasheet.
2) KNAN = ester with natural air cooling
3) Efficiency measured at inverter without internal power supply
4) Efficiency measured at inverter with internal power supply

Technical data	MVPS 4400-S2	MVPS 4600-S2
Input (DC)		
Available inverters	1 x SC 4400 UP or 1 x SCS 3800 UP or 1 x SCS 3800 UP-XT	1 x SC 4600 UP or 1 x SCS 3950 UP or 1 x SCS 3950 UP-XT
Max. input voltage	1500 V	1500 V
Number of DC inputs	Depending on selected inverter	
Integrated zone monitoring	○	
Output (AC) on the medium-voltage side		
Nominal power at SC UP (from -25°C to +35°C / 40°C; optional 50°C)[1]	4400 kVA / 3960 kVA	4600 kVA / 4140 kVA
Nominal power at SCS UP (from -25°C to +25°C / 40°C; optional 50°C)[1]	3800 kVA / 3230 kVA	3960 kVA / 3365 kVA
Charging power at SCS UP-XT (from -25°C to +25°C / 40°C; optional 50°C)[1]	3949 kVA / 3302 kVA	4129 kVA / 3453 kVA
Discharging power at SCS UP-XT (from -25°C at +25°C / 40°C; optional 50°C)[1]	4400 kVA / 3740 kVA	4600 kVA / 3910 kVA
Typical nominal AC voltages with a tolerance of +/-10%	10 kV to 35 kV	10 kV to 35 kV
AC power frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Transformer vector group Dy11 / YNd11 / YNy0	● / ○ / ○	● / ○ / ○
Transformer cooling method	KNAN[2]	KNAN[2]
Transformer standby power losses, industry standard / Eco design 1 / Eco design 2	● / ○ / ○	● / ○ / ○
Transformer short-circuit losses, industry standard / Eco design 1 / Eco design 2	● / ○ / ○	● / ○ / ○
Max. total harmonic distortion	< 3 %	
Reactive power feed-in (up to max. 60% of nominal power)	○	
Power factor at rated power / adjustable displacement power factor	1 / 0.8 overexcited to 0.8 underexcited	
Inverter efficiency		
Max. efficiency[3] / Europ. efficiency[3] / CEC efficiency[4]	98.8 % / 98.7 % / 98.5 %	98.8 % / 98.7 % / 98.5 %
Protective devices		
Input-side disconnection point	DC load-break switch	
Output-side disconnection point	Medium-voltage vacuum circuit breaker	
DC overvoltage protection	Surge arrester, type I	
Galvanic isolation	●	
Arc fault resistance medium-voltage control room (according to IEC 62271-202)	IAC A 20 kA 1 s	
General data		
Dimensions (W / H / D)	6058 mm / 2896 mm / 2438 mm	
Weight	< 18 t	
Self-consumption (max. / partial load / average)[1]	< 8.1 kW / < 1.8 kW / < 2.0 kW	
Self-consumption (stand-by)[1]	< 370 W	
Ambient temperature -25°C to +45°C / -25°C to +55°C / -35°C to +55°C / -40°C to +45°C	● / ○ / ○ / ○	
Degree of protection according to IEC 60529	Control rooms IP23D, inverter electronics IP54	
Environment: standard/extreme	● / ○	
Maximum permissible value for relative humidity	95% (for 2 months/year)	
Max. operating altitude above MSL 1000 m / 2000 m	● / ○	
Inverter fresh air consumption	6500 m³/h	
Equipment		
DC connection	Lug	
AC connection	Outer-cone angle plug	
Tap changer for MV voltage transformer: without/with	● / ○	
Shield winding for MV transformer: without/with	● / ○	
Monitoring package	○	
Station enclosure color	RAL 7004	
Transformer for external loads: without / 10 / 20 / 30 / 40 / 50 / 60 kVA	● / ○ / ○ / ○ / ○ / ○ / ○	
MV switchgear: without / 1 panel / 3 panels 2 cable panels with load-break switch, 1 transformer panel with circuit breaker, arc fault resistance IAC A FL 20 kA 1 s to IEC 62271-200	● / ○ / ○	
MV switchgear short-circuit current capability (20 kA 1 s / 20 kA 3 s / 25 kA 1 s)	● / ○ / ○	
Accessory for MV switchgear: without / auxiliary contacts / motor for transformer panel / cascade control / monitoring	● / ○ / ○ / ○ / ○	
Integrated oil spill containment: without/with	● / ○	
Industry standards (other industry standards: see inverter datasheet)	IEC 60076, IEC 62271-200, IEC 62271-202, EN50588-1, CSC certificate	
Type designation	MVPS-4400-S2-10	MVPS-4600-S2-10

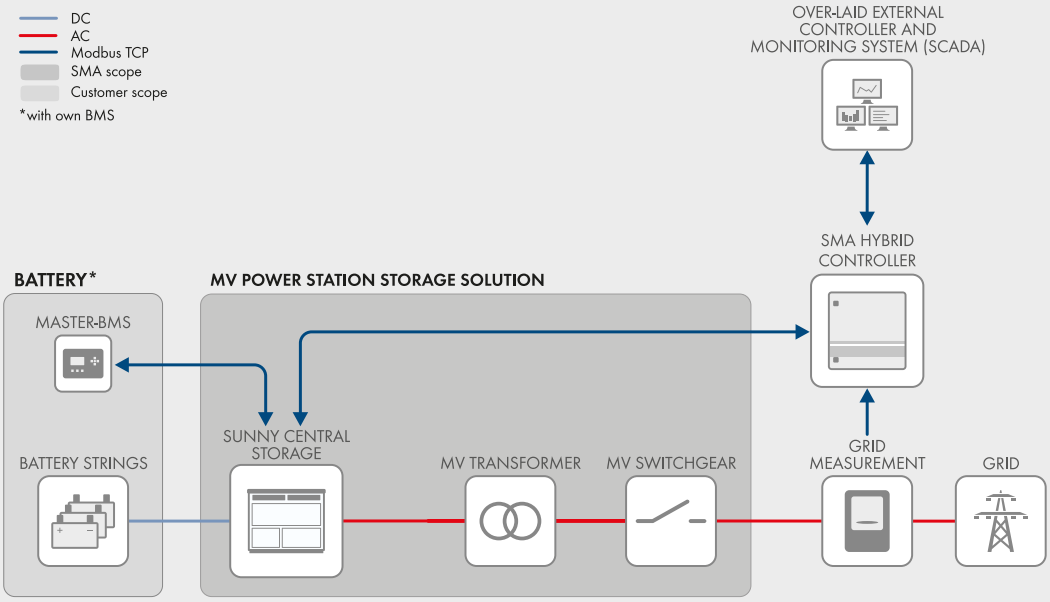
● Standard features ○ Optional features – Not available

1) Data based on inverter Further details can be found in the inverter datasheet.
2) KNAN = ester with natural air cooling
3) Efficiency measured at inverter without internal power supply
4) Efficiency measured at inverter with internal power supply

Plant diagram with Sunny Central UP



Plant diagram with Sunny Central Storage UP



/ SC 4000 UP / SC 4200 UP / SC 4400 UP

Sunny Central UP

The new Sunny Central: more power per cubic meter

Efficient
- Up to 4 inverters can be transported in one standard shipping container
- Overdimensioning up to 200% is possible
- Full power at ambient temperatures of up to 35 °C

Robust
- Intelligent air cooling system OptiCool for efficient cooling
- Suitable for outdoor use in all climatic ambient conditions worldwide

Flexible
- One device for all applications
- PV application with DC-coupled battery-storage system and charging from the AC utility as an option

Easy to Use
- Improved DC connection area
- Connection area for customer equipment
- Integrated voltage support for internal and external loads

With an output of up to 4400 kVA and system voltages of 1500 V DC, the SMA central inverter allows for more efficient system design and a reduction in specific costs for PV and battery power plants.

A separate voltage supply and additional space are available for the installation of customer equipment. True 1500 V technology and the intelligent cooling system OptiCool ensure smooth operation even in extreme ambient temperature as well as a long service life of 25 years.

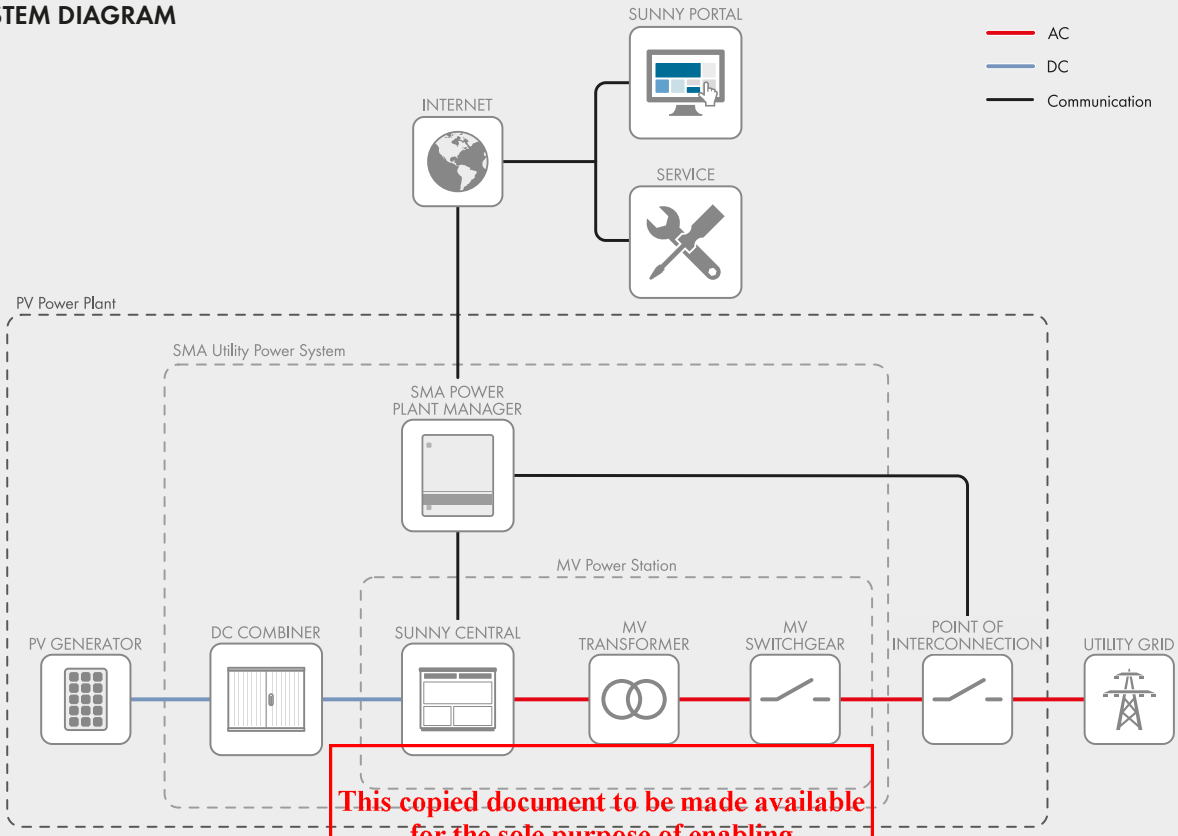
SUNNY CENTRAL UP

Technical Data	SC 4000 UP	SC 4200 UP
DC side		
MPP voltage range V_{DC} (at 25 °C / at 50 °C)	880 to 1325 V / 1050 V	921 to 1325 V / 1050 V
Min. DC voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	849 V / 1030 V	891 V / 1071 V
Max. DC voltage $V_{DC, max}$	1500 V	1500 V
Max. DC current $I_{DC, max}$	4750 A	4750 A
Max. short-circuit current $I_{DC, SC}$	8400 A	8400 A
Number of DC inputs	Busbar with 26 connections per terminal, 24 double pole fused (32 single pole fused)	
Number of DC inputs with optional DC coupled storage	18 double pole fused (36 single pole fused) for PV and 6 double pole fused for batteries	
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm²	
Integrated zone monitoring	○	
Available PV fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Available battery fuse size (per input)	750 A	
AC side		
Nominal AC power at cos φ =1 (at 35 °C / at 50 °C)	4000 kVA[12] / 3600 kVA	4200 kVA[12] / 3780 kVA
Nominal AC active power at cos φ =0.8 (at 35 °C / at 50 °C)	3200 kW[12] / 2880 kW	3360 kW[12] / 3024 kW
Nominal AC current $I_{AC, nom}$ (at 35 °C / at 50 °C)	3850 A / 3465 A	3850 A / 3465 A
Max. total harmonic distortion	< 3% at nominal power	< 3% at nominal power
Nominal AC voltage / AC voltage range[1] [8]	600 V / 480 V to 720 V	630 V / 504 V to 756 V
AC power frequency / range	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz	
Min. short-circuit ratio at the AC terminals[9]	> 2	
Power factor at rated power / displacement power factor adjustable[8] [10]	1 / 0.8 overexcited to 0.8 underexcited	
Efficiency		
Max. efficiency[2] / European efficiency[2] / CEC efficiency[2]	98.8% / 98.8% / 98.5%	98.8% / 98.7% / 98.5%
Protective Devices		
Input-side disconnection point	DC load break switch	
Output-side disconnection point	AC circuit breaker	
DC overvoltage protection	Surge arrester, type I & II	
AC overvoltage protection (optional)	Surge arrester, class I & II	
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III	
Ground-fault monitoring / remote ground-fault monitoring	○ / ○	
Insulation monitoring	○	
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP54 / IP34 / IP34	
General Data		
Dimensions (W / H / D)	2815 / 2318 / 1588 mm (110.8 / 91.3 / 62.5 inch)	
Weight	< 3700 kg / < 8158 lb	
Self-consumption (max.[4] / partial load[5] / average[6])	< 8100 W / < 1800 W / < 2000 W	
Self-consumption (standby)	< 370 W	
Internal auxiliary power supply	○ Integrated 8.4 kVA transformer	
Operating temperature range (optional)[8]	(−40 °C) −25 °C to 60 °C / (−40 °F) −13 °F to 140 °F	
Noise emission[7]	65.0 dB(A)	
Temperature range (standby)	−40 °C to 60 °C / −40 °F to 140 °F	
Temperature range (storage)	−40 °C to 70 °C / −40 °F to 158 °F	
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month/year) / 0% to 95%	
Maximum operating altitude above MSL[8] 1000 m / 2000 m[11] / 3000 m[11]	● / ○ / ○	● / ○ / –
Fresh air consumption	6500 m³/h	
Features		
DC connection	Terminal lug on each input (without fuse)	
AC connection	With busbar system (three busbars, one per line conductor)	
Communication	Ethernet, Modbus Master, Modbus Slave	
Enclosure / roof color	RAL 9016 / RAL 7004	
Supply for external loads	○ (2.5 kVA)	
Standards and directives complied with	AR-N 4110, AR-N 4120, Arrêté du 23/04/08, CE, IEC / EN 62109-1, IEC / EN 62109-2, IEEE1547, UL 840 Cat. IV	
EMC standards	IEC 55011, IEC 61000-6-2, FCC Part 15 Class A	
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001	
● Standard features ○ Optional – not available		
Type designation	SC 4000 UP	SC 4200 UP

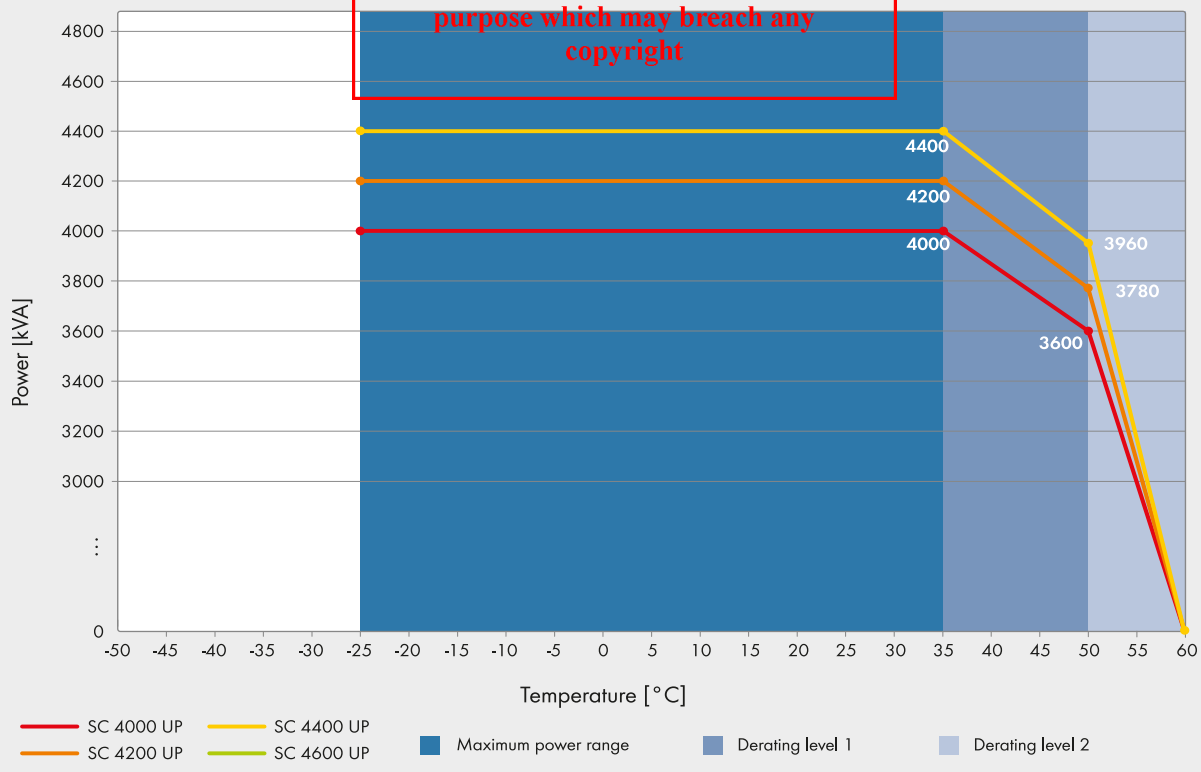
Technical Data	SC 4400 UP
DC side	
MPP voltage range V_{DC} (at 25 °C / at 50 °C)	962 to 1325 V / 1050 V
Min. DC voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	934 V / 1112 V
Max. DC voltage $V_{DC, max}$	1500 V
Max. DC current $I_{DC, max}$	4750 A
Max. short-circuit current $I_{DC, SC}$	8400 A
Number of DC inputs	Busbar with 26 connections per terminal, 24 double pole fused (32 single pole fused)
Number of DC inputs with optional DC coupled storage	18 double pole fused (36 single pole fused) for PV and 6 double pole fused for batteries
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm²
Integrated zone monitoring	○
Available PV fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A
Available battery fuse size (per input)	750 A
AC side	
Nominal AC power at cos φ =1 (at 35°C / at 50°C)	4400 kVA[13] / 3960 kVA
Nominal AC active power at cos φ =0.8 (at 35°C / at 50°C)	3520 kW[13] / 3168 kW
Nominal AC current $I_{AC, nom}$ (at 35°C / at 50°C)	3850 A / 3465 A
Max. total harmonic distortion	< 3% at nominal power
Nominal AC voltage / AC voltage range[1] [8]	660 V / 528 V to 759 V
AC power frequency / range	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz
Min. short-circuit ratio at the AC terminals[9]	> 2
Power factor at rated power / displacement power factor adjustable[8] [10]	● 1 / 0.8 overexcited to 0.8 underexcited
Efficiency	
Max. efficiency[2] / European efficiency[2] / CEC efficiency[2]	98.8% / 98.7% / 98.5%
Protective Devices	
Input-side disconnection point	DC load break switch
Output-side disconnection point	AC circuit breaker
DC overvoltage protection	Surge arrester, type I & II
AC overvoltage protection (optional)	Surge arrester, class I & II
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III
Ground-fault monitoring / remote ground-fault monitoring	○ / ○
Insulation monitoring	○
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP54 / IP34 / IP34
General Data	
Dimensions (W / H / D)	2815 / 2318 / 1588 mm (110.8 / 91.3 / 62.5 inch)
Weight	< 3700 kg / < 8158 lb
Self-consumption (max.[4] / partial load[5] / average[6])	< 8100 W / < 1800 W / < 2000 W
Self-consumption (standby)	< 370 W
Internal auxiliary power supply	○ Integrated 8.4 kVA transformer
Operating temperature range (optional)[8]	(−40 °C) −25°C to 60°C / (−40 °F) −13°F to 140°F
Noise emission[7]	65.0 dB(A)
Temperature range (standby)	−40°C to 60°C / −40°F to 140°F
Temperature range (storage)	−40°C to 70°C / −40°F to 158°F
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month/year) / 0% to 95%
Maximum operating altitude above MSL[8] 1000 m / 2000 m[11] / 3000 m[11]	● / ○ / –
Fresh air consumption	6500 m³/h
Features	
DC connection	Terminal lug on each input (without fuse)
AC connection	With busbar system (three busbars, one per line conductor)
Communication	Ethernet, Modbus Master, Modbus Slave
Enclosure / roof color	RAL 9016 / RAL 7004
Supply for external loads	○ (2.5 kVA)
Standards and directives complied with	AR-N 4110, AR-N 4120, Arrêté du 23/04/08, CE, IEC / EN 62109-1, IEC / EN 62109-2, IEEE1547, UL 840 Cat. IV
EMC standards	IEC 55011, IEC 61000-6-2, FCC Part 15 Class A
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001
● Standard features ○ Optional – not available	
Type designation	SC 4400 UP

1) At grid voltage lower than nominal AC voltage, the nominal AC power decreases in the same proportio
2) Efficiency measured without internal power supply
3) Efficiency measured with internal power supply
4) Self-consumption at rated operation
5) Self-consumption at < 75% Pn at 25°C
6) Self-consumption averaged out from 5% to 100% Pn at 25°C
7) Sound pressure level at a distance of 10 m
8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.
9) A short-circuit ratio of < 2 requires a special approval from SMA
10) Depending on the DC voltage
11) Earlier temperature-dependent de-rating and reduction of DC open-circuit voltage
12) Nominal AC power at 35°C achievable up to a maximum of 1050 V_{DC}

SYSTEM DIAGRAM



TEMPERATURE BEHAVIOR (at 1000 m)



/ SCS 4400 UP-S / SCS 4600 UP-S

Sunny Central Storage UP-S

Extended grid-feed power

Battery inverter for large-scale storage systems

Efficient
- Up to 4 inverters can be transported in one standard shipping container
- Higher power density
- Higher power in grid feed direction
- Higher short circuit contribution

Robust
- Intelligent air cooling system OptiCool for efficient cooling
- Suitable for outdoor use in all climatic ambient conditions worldwide

Flexible
- One device for all applications
- Stand-alone device or turnkey solution with SMA medium-voltage system
- Optional Silencer Kit reduces the noise emission by > 6 dB(A)

Versatile
- Integrated battery communication
- Customized monitoring and control of inverters
- Grid management functions for dynamic grid support
- Integrated voltage supply for internal consumption and external loads

With a max. output of up to 4600 kVA and system voltages up to 1500 V DC, the SMA Sunny Central Storage allows for more efficient and flexible system design for battery power plants.

The SCS UP-S versions allow a system design with higher output power and higher short-circuit current contribution. The intelligent cooling system OptiCool ensure smooth operation even in extreme ambient temperature.

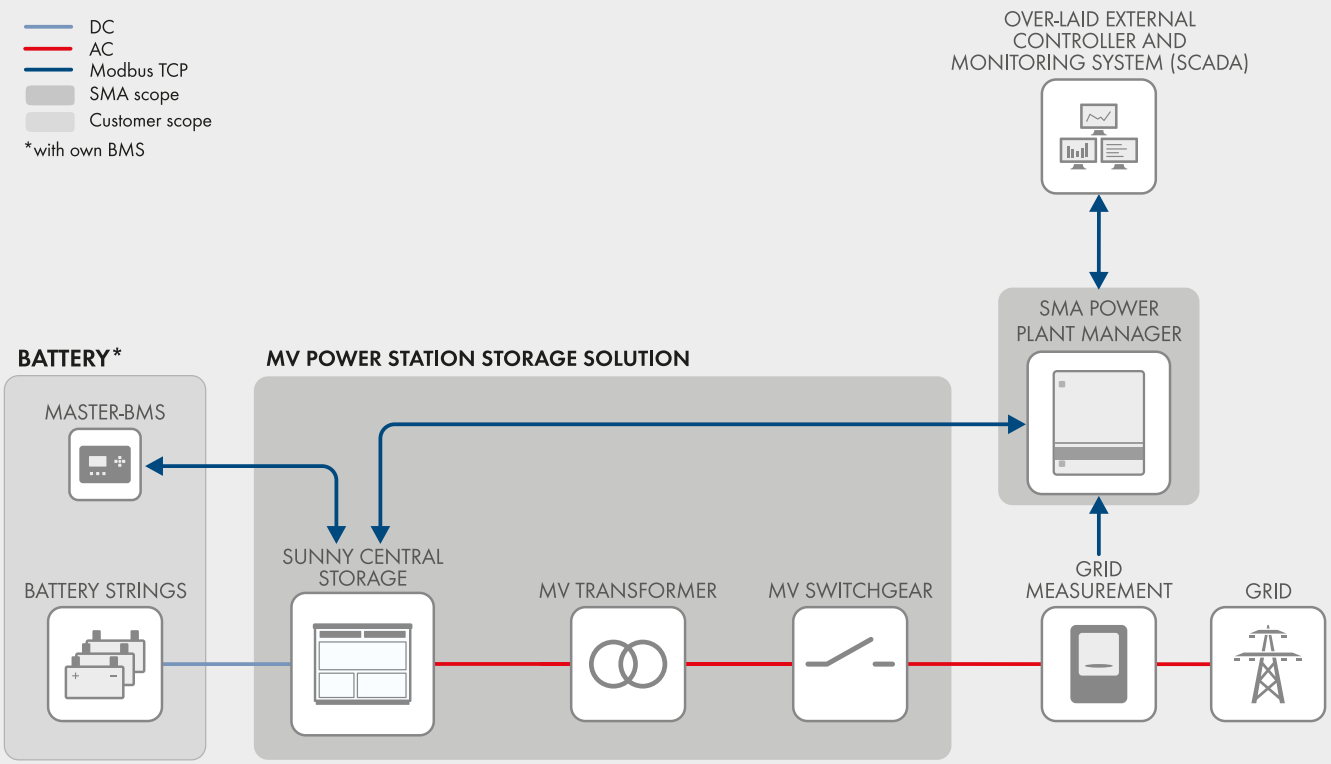
Use the SMA Silencer Kit to significantly reduce the noise emission of the device.

Technical Data	SCS 4400 UP-S	SCS 4600 UP-S
Battery side (DC)		
Operating DC voltage range V_{DC}	962 V to 1500 V	1003 V to 1500 V
Max. DC current $I_{DC, max}$	4750 A	
Max. DC Short-curcuit current[14]	over 500 kA	
Fused split DC busbar 6/6/6 connections per pole / fused single DC busbar 22 connections per pole [13]	○ / ●	
DC connection	with terminal lug	
Grid side (AC)		
Nominal AC power at 1200 Vdc and cos φ =1.0 (at 35°C)[12]	4400 kW	4600 kW
Grid-Feed mode: AC apparent power at 1200 Vdc (at 35°C / at 40°C / at 50°C)[3][12][13]	4400 kVA / 4253 kVA / 3960 kVA	4600 kVA / 4447 kVA / 4140 kVA
Charging mode: AC apparent power at 1200 Vdc (at 35°C / at 40°C / at 50°C)[3][12][13]	4400 kVA / 4253 kVA / 3960kVA	4600 kVA / 4447 kVA / 4140 kVA
Max. AC current $I_{AC, max}$ (at 35°C / at 40°C / at 50°C)	3850 A / 3721 A / 3464 A	
Max. total harmonic distortion	< 3% at nominal power	
Nominal AC voltage / AC voltage range[1][8]	660 V / 528 V to 792 V	690 V / 552 V to 828 V
AC power frequency / range	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz	
Min. short-circuit ratio at the AC terminals[9]	> 2	
Cos Phi at rated power / displacement Cos Phi adjustable[8][10]	1 / 0.0 overexcited to 0.0 underexcited	
AC connection	with busbar system (three busbars, one per line conductor)	
Efficiency		
Max. efficiency[2]	99.2%	
Protective Devices		
Input-side disconnection point	DC load break switch	
Output-side disconnection point	AC circuit breaker	
DC overvoltage protection	Surge arrester, type I	
AC overvoltage protection (optional)	Surge arrester, class I	
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III	
Insulation monitoring	●	
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP54 / IP34 / IP34	
General Data		
Dimensions (W / H / D)	2815 / 2318 / 1588 mm (110.8 / 91.3 / 62.5 inch)	
Weight	< 3700 kg / < 8200 lb	
Self-consumption (max.[4] / partial load[5] / average[6])	< 8100 W / < 1800 W / < 2000 W	
Self-consumption (standby)	< 370 W	
Internal (8.4 kVA transformer) / external auxiliary power supply	● / ○	
Sound power LWA with rated power inverter / inverter + Silencer Kit[7]	91 dB(A) / 85 dB(A)	
Operating temperature range (optional)[8]	(−40°C) −25°C to 60°C / (−40°F) −13°F to 140°F	
Temperature range (standby)	−40°C to 60°C / −40°F to 140°F	
Temperature range (storage)	−40°C to 70°C / −40°F to 158°F	
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month/year) / 0% to 95%	
Maximum operating altitude above MSL[8] 1000 m / 2000 m[11]	● / ○	
Fresh air consumption	6500 m³/h	
Features		
Grid forming / black start ready	○ / ○	
Communication	Ethernet, Modbus Master, Modbus Slave	
Communication with SMA string monitor (transmission medium)	Modbus TCP / Ethernet (FO MM, Cat-5)	
Enclosure / roof color	RAL 9016 / RAL 7004	
Supply transformer for external loads	○ (2.5 kVA)	
Standards and directives complied with	CE, IEC / EN 62109-1/-2, AR-N 4110 / 4120 / 4130, Arrêté du 23/04/08	
EMC standards	IEC 61000-6-2, EN 55011, CISPR11, FCC Part 15 Class A	
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001	
Type designation	SCS 4400 UP-S	SCS 4600 UP-S

● Standard features ○ Optional – Not available

1) Below nominal AC voltage, AC power decreases in the same proportion
2) Efficiency measured without internal power supply
3) AC apparent power at higher dc voltages on request
4) Self-consumption at rated operation
5) Self-consumption at < 75% Pn at 25°C
6) Self-consumption averaged out from 5% to 100% Pn at 25°C
7) Detailed information on the sound power is available under NDA.
8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets
9) A short-circuit ratio of < 2 requires a special approval from SMA
10) Max. power values (S/P/Q) can be requested based on project specific design
11) Earlier temperature-dependent de-rating and reduction of DC open-circuit voltage
12) Depending on the ratio of reactive power (cos φ), an extended power derating may occur.
13) Fused DC input equipped with optional 900 A, 1000 A, 1100 A or 1250 A fuses
14) The time constant τ = L/R (tau) of t he DC circuit must be <=1ms. Project configurations for DC short-circuit currents exceeding 500kA require special approval from SMA.

SYSTEM DIAGRAM



Grid-connected functions

- Setpoints for active and reactive power
- Static grid support Q(U), P(f)
- Dynamic grid support (FRT)
- Active islanding detection (AID)
- High compatibility with different battery types

Grid-forming features

- Island grids / microgrids
- Synchronous grid forming - grid-parallel operation

Compatible with energy management system functionalities

- External static grid supporting functions
- Ramp-rate control of PV power
- Peak shaving
- Energy shifting
- Genset optimization control
- Reducing necessary spinning reserve of gensets
- Battery start-up and stop sequence
- Operates the battery within optimal operation window
- Black Start

ENERGY
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CHANGES