Tetris Energy Pty Ltd

Tetris Energy Solar Farms Land: 3040 Harmony Way, Faraday, Victoria

Noise Impact Report

AC01

Issue | 7 June 2021

Job number 278118

Arup Australia Pty Ltd ABN 76 625 912 665

Arup
Sky Park
One Melbourne Quarter
699 Collins Street
Docklands Vic 3008
Australia
www.arup.com

ARUP

Document verification

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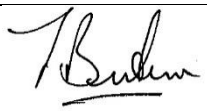
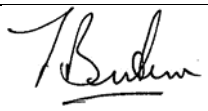
		Signature			
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Contents

Appendices

1 Introduction

Energy Forms Pty Ltd (Energy Forms) are seeking Planning Permit approval on behalf of Tetris Energy Pty Ltd for the operation of a 5 MW Solar Farm located at 3040 Harmony Way, Faraday (the 'Subject Site') approximately 800 m east of the Calder Freeway.

Arup Australia Pty Ltd (Arup) has been instructed by Energy Forms to prepare a noise impact report suitable for submission to the Responsible Authority. Arup has considered the following documents:

- *Solar Energy Facilities Design and Development Guideline*.
- Noise levels emanating from the premises must comply with *Noise from Industry in Regional Victoria* Publication 1411 (NIRV).

A desktop assessment of the noise impacts from the proposed development to nearest noise sensitive receivers has been conducted. This assessment has been based on manufacturer's noise levels, Arup's noise database, and noise calculations and predictions.

Acoustic terminology used throughout this report is provided in Appendix A.

2 Site Description

2.1 Site Surroundings

The Subject Site forms part of the land addressed as 3040 Harmony Way, Faraday which consists land parcels 4\TP8623 and 3\TP6612. It covers approximately 14 hectares and is bound by private property to the north, east and south, and Harmony Way to the west. A site plan of the proposed facility is presented in Appendix B.

The Subject Site is zoned Farming Zone (FZ) and is bound by the following:

- **To the North** – Farming Zone (FZ) with additional Farming Zone (FZ) located further to the north. The nearest identified residential property is located approximately 100 m from the Subject Site at 3060 Harmony Way, Faraday.
- **To the East** – Farming Zone (FZ) and residential receivers located on Musselwhite Drive. The nearest identified residential property is located approximately 150 m from the Subject Site at 67 Musselwhite Drive, Faraday.
- **To the South** – Farming Zone (FZ). The nearest identified residential property is located approximately 500 m from the Subject Site.
- **To the West** – Farming Zone (FZ), further Farming Zone (FZ) extends west. The nearest residential property in this direction is approximately 280 m from the Subject Site.

A planning map of the area surrounding the Subject Site is presented in Appendix C.

The nearest residential receivers are located to the north and east. The layout of the site and the location nearby noise-sensitive receivers are shown in Figure 1.

Figure 1: Location of subject site and surrounding noise-sensitive residential receivers.

2.2 Site Description

A 5 MW solar farm is proposed to be installed at the Subject Site. The Subject Site is approximately 14 ha (140,000 m²). Equipment specification for the plant is presented in Appendix D.

The solar farm consists of:

- Approximately 12,000 PV panels consisting of approximately 210 tracking modules.
- 2 x 2.5 MV A combined inverter and transformer units (combined into one unit).
- 4 x Battery energy storage stations, housed in shipping containers.
- Various cabling to supply electricity to the grid.

The main noise generating plant (the inverters, transformers, and battery storage systems) are located approximately 310 m from the residential receiver at 3040 Harmony Way and approximately 400 m from the residential receivers on Musselwhite Drive.

2.3 Operations

It is expected that the solar farm will operate during the night-period (before 7am) during summer, in addition it is expected that the battery storage system will discharge electricity during the night-period. Therefore, noise from the Subject Site will be assessed for the most sensitive night-time period.

3 Noise Criteria

The relevant noise criteria include:

- *Solar Energy Facilities Design and Development Guideline*.
- Noise levels emanating from the premises must comply with *Noise from Industry in Regional Victoria* Publication 1411(NIRV).

The *Solar Energy Facilities Design and Development Guideline* states that:

> *"A facility should keep its noise impacts at or below the levels in EPA Victoria's Noise from Industry in Regional Victoria guideline (NIRV).*

As such, the noise emissions will be assessed against NIRV noise limits.

3.1 Industry in Regional Victoria

Industry in Regional Victoria (NIRV) Publication 1411, dated October 2011 provides guidelines to set noise levels for industry in regional Victoria. For the purposes of the NIRV, areas outside the SEPP N-1 area of application are categorised as either 'major urban' or 'rural' areas. A rural area is defined as:

- Land in cities or towns with population below 7000; or
- Rural locations outside major urban areas.

The Subject Site is in a rural area, outside the major urban area of Melbourne and there are no SEPP N-1 boundaries in the vicinity of the Subject Site. As a result, the Subject Site falls outside the SEPP N-1 boundary and noise limits shall be set in accordance with the NIRV.

The NIRV guidelines are non-statutory. However, in the absence of specific legislative noise requirements, the subject site has been assessed in accordance with the NIRV.

The noise limits defined in the NIRV are based on the time periods detailed in State Environment Protection *Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* (SEPP N-1) and are presented in Table 1.

Table 1: Time periods for SEPP N-1 and NIRV assessment

Period	Day of week	Time period
Day	Monday – Friday	07:00 – 18:00 hrs
	Saturday	07:00 – 13:00 hrs
Evening	Monday – Friday	18:00 – 22:00 hrs
	Saturday	13:00 – 22:00 hrs
	Sunday, Public Holidays	07:00 – 22:00 hrs
Night	Monday – Sunday	22:00 – 07:00 hrs

The assessment of noise emissions under the NIRV is based on the calculation of a noise limit at the receiver position, taking into account the land use in the surrounding area and the ambient noise level.

The NIRV noise limit is defined in Table 1 of the NIRV. The noise limit may be adjusted appropriately depending on the background noise level and propagation distance between the noise source and the noise sensitive receiver.

The first step in the NIRV is to determine the zoning levels of the Subject Site and the surrounding noise sensitive receivers. The following zone has been identified:

- Farming Zone (FZ)

The land is not required to be re-zoned as part of the planning process, with the majority of solar farms in Victoria being located on Farming Zoned land.

The NIRV noise limits are presented in Table 2.

Table 2: NIRV noise limits for dwellings on land located in Farming Zone, dB(A)

SEPP N-1/NIRV Assessment Period	**Farming Zone**
Day	46
Evening	41
Night	36

These limits form the basis for assessing the impact of industrial noise to noise sensitive receivers in the vicinity of the Subject Site. The Planning Zone Map for the Subject Site is provided in Appendix C.

Demonstrating compliance with the noise limits at the closest receivers during the night-time period demonstrates compliance with other receivers, for other time-periods.

4 Noise Assessment

The following noise sources have been assessed:

- Noise from the combined transformer and inverter units (Sungrow SG4950HV-MV inverter/transformer).
- Battery storage system (Sungrow Li-ion system).
- Tracking solar panel motors (NEXTracker motor).

Noise data was obtained from the manufacturer and supplemented by noise data from Arup's database. Appendix D presents the specification from the equipment suppliers.

The noise spectrum from Arup's database levels of transformers/inverters has been adjusted match the broadband noise level for the proposed equipment. The noise levels for the equipment are provided in Table 3.

Table 3: Noise levels of proposed solar farm plant.

Equipment	**Leq dB(A)**	**Sound Power Level, dB re 1 pW Octave Band Centre Frequency, Hz**						
		63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Combined inverter and transformer (each)r	89	83	87	93	86	82	78	70
Battery Energy Storage System (each)	86	91	93	88	83	80	75	68
Solar Panel tracking motor (each)	57	44	47	49	52	52	51	46

4.1 Noise to nearest affected residential properties

Operational noise to the nearest affected residential properties has been considered in accordance with NIRV criteria. A 2 dB(A) penalty has been applied to account for any tonality present in the noise from the operation of the generator/inverter.

Distance propagation formulae and atmospheric attenuation (as per ISO 9613.2[1]) have been applied to predict noise levels at the nearest impacted residential properties. Noise from all operating equipment (listed in Table 3) has been considered.

The predicted noise levels at the nearest affected residential receivers with the solar farm operating at full capacity are presented in Table 4.

[1] ISO 6613.2 *Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation.*

Table 4: Predicted noise levels at residential receivers, night-time.

Location	Noise limit Night, Leq dB(A)	Predicted noise level, L_{eq} dB(A)	Complies?
3060 Harmony Way	36	34	✓
67 Musselwhite Drive	36	29	✓
49 Musselwhite Drive	36	29	✓

Arup's assessment demonstrates that operational noise from the Subject Site complies with the NIRV noise limits at the nearest affected residential properties.

Compliance with the night-time noise-limits demonstrates compliance with the daytime and evening time noise limits. While operating at full capacity the solar farm is expected to be compliant with NIRV noise limits for all time periods.

5 Summary

Arup has completed a noise assessment to understand the current noise environment and establish noise limits for noise emitted from the subject site. Noise limits have been determined through the following documents:

- *Solar Energy Facilities Design and Development Guideline*.
- Noise levels emanating from the premises must comply with *Noise from Industry in Regional Victoria* Publication 1411 (NIRV).

Noise levels from Arup's database and noise levels supplied by the manufacturer have been used to predict compliance of noise limits.

The proposed plant is predicted to comply with NIRV noise limits for all time periods.

The proposed operation of the solar farm at the Subject Site is expected to continuously comply with noise limits associated with the Planning Permit approval process.

Appendix A

Acoustic Glossary

Ambient Noise Level

The ambient noise level is the overall noise level measured at a location from multiple noise sources. When assessing noise from a particular development, the ambient noise level is defined as the remaining noise level in the absence of the specific noise source being investigated. For example, if a fan located on a city building is being investigated, the ambient noise level is the noise level from all other sources without the fan running. This would include sources such as traffic, birds, people talking and other nearby fans on other buildings.

Background Noise Level

The background noise level is the noise level that is generally present at a location at all or most times. Although the background noise may change over the course of a day, over shorter time periods (e.g. 15 minutes) the background noise is almost-constant. Examples of background noise sources include steady traffic (e.g. motorways or arterial roads), constant mechanical or electrical plant and some natural noise sources such as wind, foliage, water and insects.

Decibel

The decibel scale is a logarithmic scale which is used to measure sound and vibration levels. Human hearing is not linear and involves hearing over a large range of sound pressure levels, which would be unwieldy if presented on a linear scale. Therefore a logarithmic scale, the decibel (dB) scale, is used to describe sound levels.

An increase of approximately 10 dB corresponds to a subjective doubling of the loudness of a noise. The minimum increase or decrease in noise level that can be noticed is typically 2 to 3 dB.

dB(A)

dB(A) denotes a single-number sound pressure level that includes a frequency weighting (“A-weighting”) to reflect the subjective loudness of the sound level.

The frequency of a sound affects its perceived loudness. Human hearing is less sensitive at low and very high frequencies, and so the A-weighting is used to account for this effect. An A-weighted decibel level is written as dB(A).

Some typical dB(A) levels are shown below.

Sound Pressure Level dB(A)	Example
130	Human threshold of pain
120	Jet aircraft take-off at 100 m
110	Chain saw at 1 m
100	Inside nightclub

Sound Pressure Level dB(A)	Example
90	Heavy trucks at 5 m
80	Kerbside of busy street
70	Loud stereo in living room
60	Office or restaurant with people present
50	Domestic fan heater at 1m
40	Living room (without TV, stereo, etc)
30	Background noise in a theatre
20	Remote rural area on still night
10	Acoustic laboratory test chamber
0	Threshold of hearing

L_{90}

The L_{90} statistical level is often used as the "average minimum" or "background" level of a sound level that varies with time.

Mathematically, L_{90} is the sound level exceeded for 90% of the measurement duration. As an example, 45 dB $L_{A90,15min}$ is a sound level of 45 dB(A) or higher for 90% of the 15 minute measurement period.

L_{eq}

The 'equivalent continuous sound level', L_{eq}, is used to describe the level of a time-varying sound or vibration measurement.

L_{eq} is often used as the "average" level for a measurement where the level is fluctuating over time. Mathematically, it is the energy-average level over a period of time (i.e. the constant sound level that contains the same sound energy as the measured level). When the dB(A) weighting is applied, the level is denoted dB $L_{Aeq.}$ Often the measurement duration is quoted, thus $L_{Aeq,15\ min}$ represents the dB(A) weighted energy-average level of a 15 minute measurement.

Frequency

Frequency is the number of cycles per second of a sound or vibration wave. In musical terms, frequency is described as "pitch". Sounds towards the lower end of the human hearing frequency range are perceived as "bass" or "low-pitched" and sounds with a higher frequency are perceived as "treble" or "high pitched".

Sound Power and Sound Pressure

The sound power level (L_w) of a source is a measure of the total acoustic power radiated by a source. The sound pressure level (L_p) varies as a function of distance from a source. However, the sound power level is an intrinsic characteristic of a

source (analogous to its mass), which is not affected by the environment within which the source is located.

Appendix B

Site Plan

GENERAL NOTES:1.LAYOUT AND SITE BOUNDARY BASED ON APPROXIMATE SATELLITE IMAGE NOT ACTUAL SURVEY DATA.

PROJECT SPECIFICATIONS

AC CAPACITY AT POINT OF CONNECTION	4.95	MWac
INSTALLED AC CAPACITY	4.95	MWac
DC CAPACITY AT STC	7.13	MWdc
DC:AC RATIO	1.44	
TRACKER CONFIGURATION	1P	
3-STRING TRACKER DIMENSIONS(75 MODULE)	92*2.47	m
2-STRING TRACKER DIMENSIONS(50 MODULE)	61*2.47	m
1-STRING TRACKER DIMENSIONS(25 MODULE)	31*2.47	m
TRACKER PITCH	5	m
TRACKER AZIMUTH	0	Deg
INVERTER CAPACITY	4.95	MWac
MODULE TYPE	Mono Bi-Facial	
MODULE POWER	600	W
MODULES PER STRING	25	
MODULES PER TRACKER	25/50/75	
TOTAL PCU WITH 2 INVERTER	1	
TOTAL INVERTER	2	
TOTAL TRACKERS(75 MODULE)	16	
TOTAL TRACKERS(50 MODULE)	181	
TOTAL TRACKERS(25 MODULE)	65	
TOTAL MODULES	11875	
FENCE AREA	15.1	Ha
SITE PERIMETER	1832	m
HEIGHT OF MODULES AND TRACKERS	MAX 2.85	m
HEIGHT OF PCU WITH 2 INVERTER	2.9	m
FENCE HEIGHT	2.3	m

LEGEND:

- GATE
- CAR PARK SPACE
- LAY DOWN AREA FOR CONSTRUCTION
- MVPS (MEDIUM VOLTAGE POWER STATION)
- BESS (BATTERY ENERGY STORAGE SYSTEM)
- MVSS (MEDIUM VOLTAGE SWITCHING STATION)
- ACCESS ROAD
- 3M WIDE LANDSCAPING ZONE
- POINT OF CONNECTION
- CADASTRAL BOUNDARY
- FENCE
- PV ARRAY SETBACK LINE
- 22KV CABLE TRECH
- 37 DIMENSION (M)

REV.	DATE	DRAWN	CHECKED	APPROVED	DESCRIPTION
D	02 JUN 2021	E.T	P.M	R.S	FOR SUBMISSION
C	24 MAY 2021	E.T	P.M	R.S	FOR SUBMISSION
B	21 DEC 2020	E.T	P.M	J.M	FOR SUBMISSION

PROJECT: FARADAY SOLAR FARM - HARMONY WAY, VIC 3451

FOR SUBMISSION

	NAME	DATE
APPROVED	J.M	21 DEC 2020
CHECKED	P.M	21 DEC 2020
DRAWN	E.T	20 DEC 2020

mpower
LEVEL 4, 15 BOURKE ROAD
MASCOT NSW 2020
AUSTRALIA
Ph: 02 8788 4600
www.mpower.com.au

TITLE:
SITE LAYOUT AND DETAIL (10M/30M SETBACK)

ALTERNATE DRAWING NUMBER:

DRAWING NUMBER: JM-E2010010-B01-XX

A1

SCALE: N/A | WEIGHT: N/A | SHEET 1 OF 1 | REVISION: D

Appendix C

Planning Map

PLANNING PROPERTY REPORT

Environment, Land, Water and Planning

From www.planning.vic.gov.au at 08 December 2020 01:20 PM

PROPERTY DETAILS

Address:	**3040 HARMONY WAY FARADAY 3451**
Lot and Plan Number:	**More than one parcel - see link below**
Standard Parcel Identifier (SPI):	**More than one parcel - see link below**
Local Government Area (Council):	**MOUNT ALEXANDER** www.mountalexander.vic.gov.au
Council Property Number:	**9984**
Planning Scheme:	**Mount Alexander** Planning Scheme - Mount Alexander
Directory Reference:	**Vicroads 59 F2**

This property has 2 parcels. For full parcel details get the free Property report at Property Reports

UTILITIES

Rural Water Corporation:	**Goulburn-Murray Water**
Urban Water Corporation:	**Coliban Water**
Melbourne Water:	**Outside drainage boundary**
Power Distributor:	**POWERCOR**

View location in VicPlan

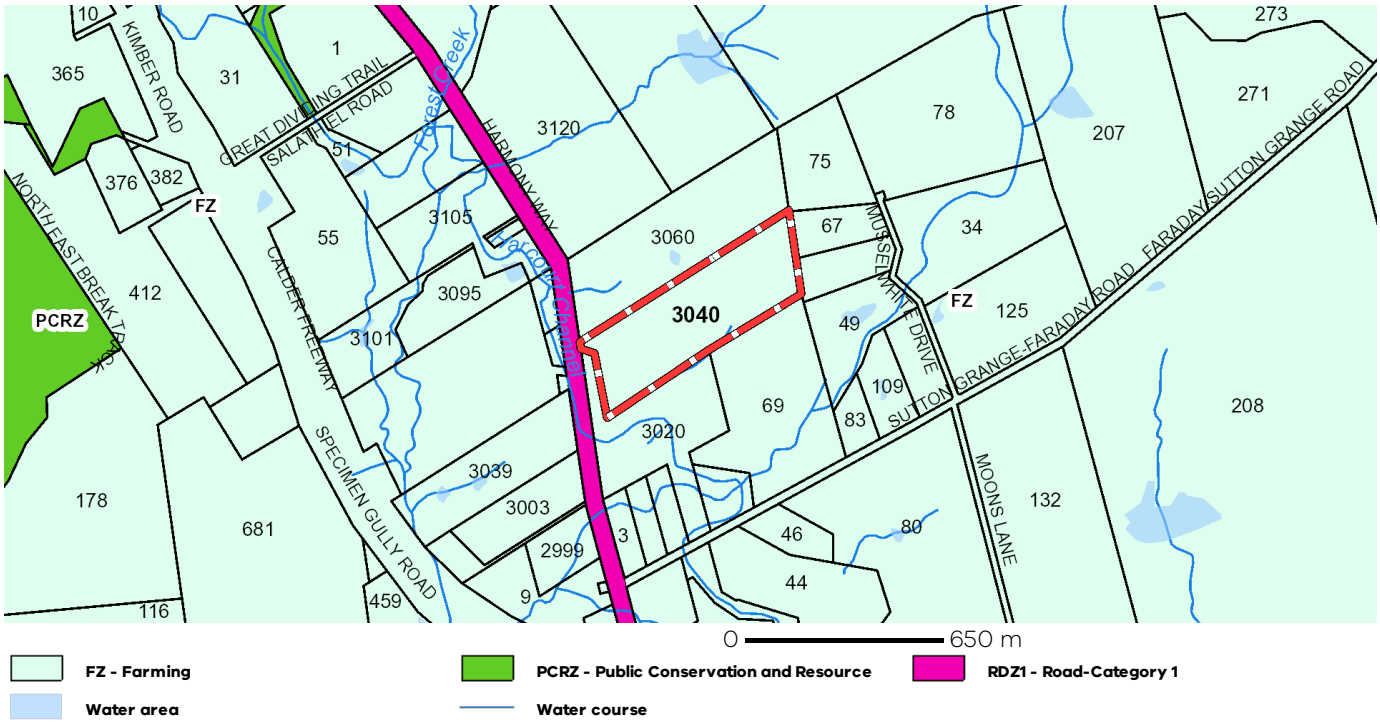
STATE ELECTORATES

Legislative Council:	**NORTHERN VICTORIA**
Legislative Assembly:	**BENDIGO WEST**

Planning Zones

FARMING ZONE (FZ)

SCHEDULE TO THE FARMING ZONE (FZ)



FZ - Farming | PCRZ - Public Conservation and Resource | RDZ1 - Road-Category 1

Water area | Water course

Note: labels for zones may appear outside the actual zone - please compare the labels with the legend.

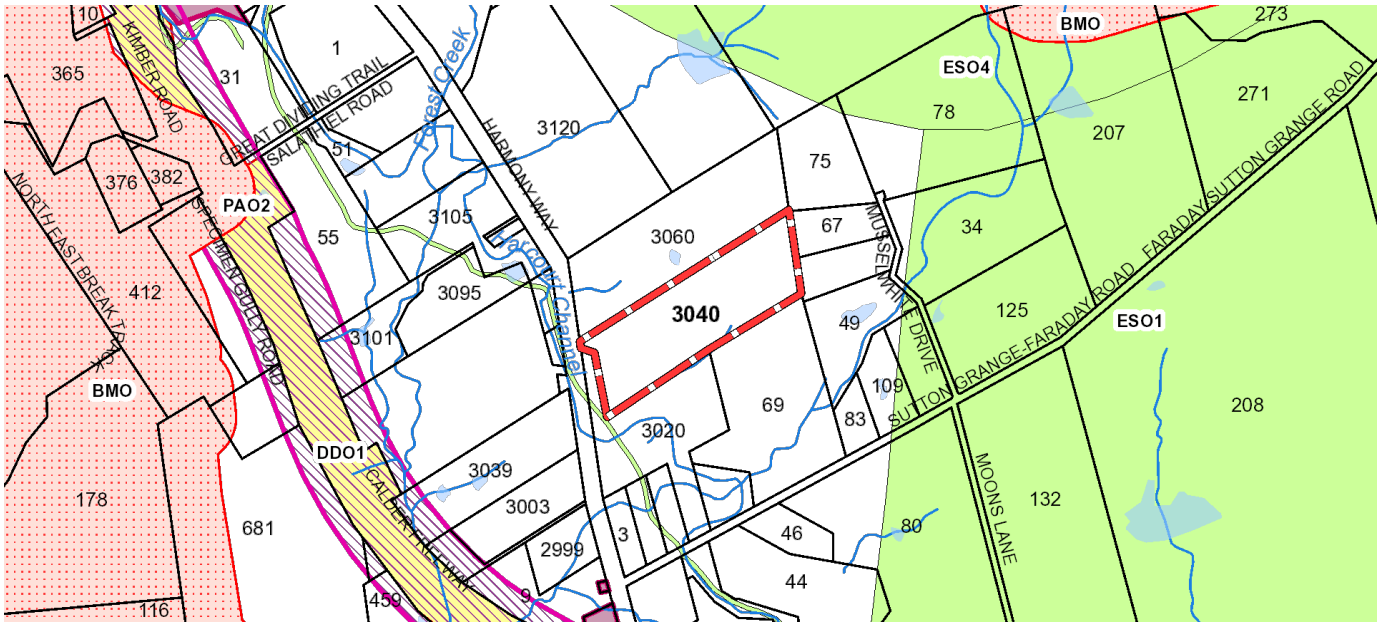
PLANNING PROPERTY REPORT

Environment, Land, Water and Planning

Planning Overlay

None affecting this land - there are overlays in the vicinity

BUSHFIRE MANAGEMENT OVERLAY (BMO)
DESIGN AND DEVELOPMENT OVERLAY (DDO)
ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO)
HERITAGE OVERLAY (HO)
PUBLIC ACQUISITION OVERLAY (PAO)



Note: due to overlaps, some overlays may not be visible, and some colours may not match those in the legend

Further Planning Information

Planning scheme data last updated on 4 December 2020.

A **planning scheme** sets out policies and requirements for the use, development and protection of land.
This report provides information about the zone and overlay provisions that apply to the selected land.
Information about the State and local policy, particular, general and operational provisions of the local planning scheme that may affect the use of this land can be obtained by contacting the local council or by visiting https://www.planning.vic.gov.au

This report is NOT a **Planning Certificate** issued pursuant to Section 199 of the ***Planning and Environment Act 1987.***
It does not include information about exhibited planning scheme amendments, or zonings that may abut the land.
To obtain a Planning Certificate go to Titles and Property Certificates at Landata - https://www.landata.vic.gov.au

For details of surrounding properties, use this service to get the Reports for properties of interest.

To view planning zones, overlay and heritage information in an interactive format visit https://mapshare.maps.vic.gov.au/vicplan

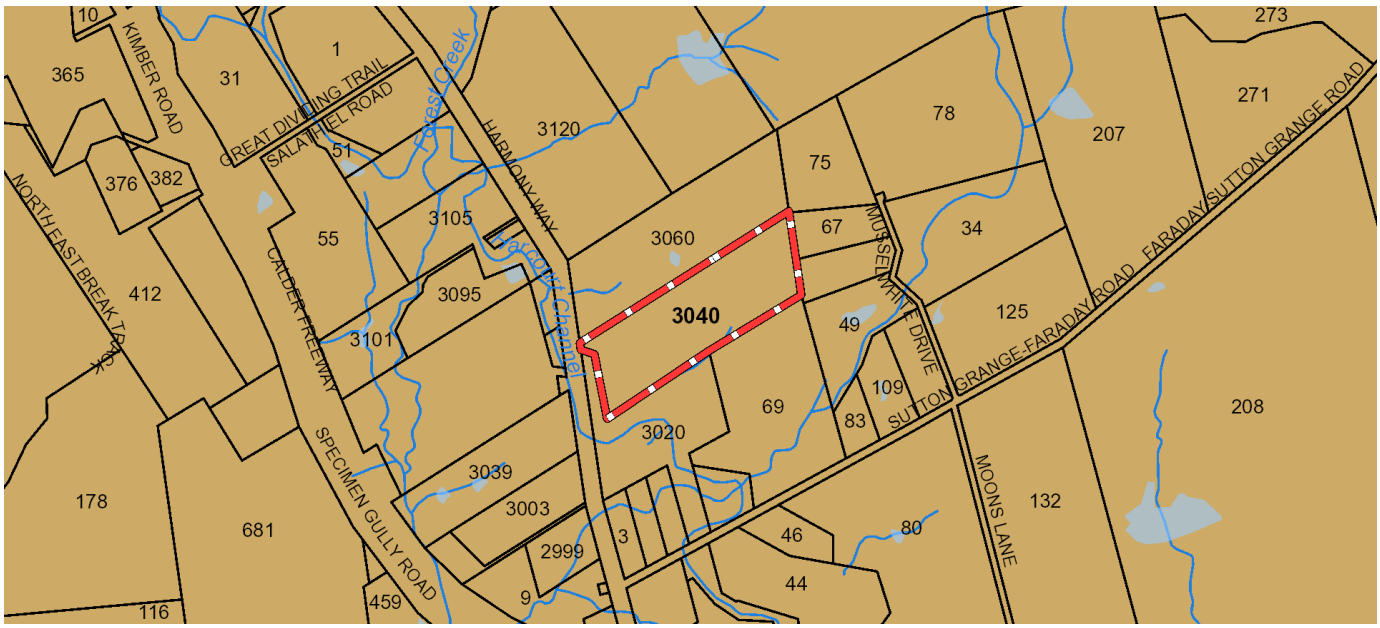
For other information about planning in Victoria visit https://www.planning.vic.gov.au

PLANNING PROPERTY REPORT

Environment, Land, Water and Planning

Designated Bushfire Prone Areas

This property is in a designated bushfire prone area.
Special bushfire construction requirements apply. Planning provisions may apply.



Designated bushfire prone areas as determined by the Minister for Planning are in effect from 8 September 2011 and amended from time to time.

The Building Regulations 2018 through application of the Building Code of Australia, apply bushfire protection standards for building works in designated bushfire prone areas.

Designated bushfire prone areas maps can be viewed on VicPlan at https://mapshare.maps.vic.gov.au/vicplan or at the relevant local council.

Note: prior to 8 September 2011, the whole of Victoria was designated as bushfire prone area for the purposes of the building control system.

Further information about the building control system and building in bushfire prone areas can be found on the Victorian Building Authority website https://www.vba.vic.gov.au

Copies of the Building Act and Building Regulations are available from http://www.legislation.vic.gov.au

For Planning Scheme Provisions in bushfire areas visit https://www.planning.vic.gov.au

Appendix D

Manufacturer Data

SUNGROW
Clean power for all

LFP Li-ion Battery System New

Over 1 hour

EFFICIENT & HIGH YIELD

- 20-year service life, 8000+ times system-level cycle life
- Support 1500V system, reduce AC side loss by 60%
- Deep charge & discharge design, initial investment saves more than 5%

INTELLIGENT & FRIENDLY

- 40-foot container can hold 4.4MWh, compatible downwards
- Oneline estimation of SOC & SOH based on scenes and big data
- Support cloud platform, remote real-time monitoring and fault identification

SAFE & RELIABLE

- Two-level short-circuit protection, graded fast current limiting
- Fool-proof, anti-reverse connection design, safer installation and maintenance
- Patented air duct and intelligent air cooling design, temperature difference < 3℃
- Meet global high standard authoritative certification requirements

Item	Specification
Model	M2L-M143
Charge&discharge rate	≤ 1C
Cell type	LFP 280Ah
Configuration	1P16S
Capacity	280 Ah
Nominal energy	14.3 kWh
Charging&discharging power	≤ 14.3 kW
Nominal voltage	51.2 V
Operating voltage range	43.2 V–58.4 V
Dimensions (W*H*D)	455*230*760mm
Weight	105 kg

Item	Specification
Model	M2L-R372
Charge&discharge rate	≤ 1C
Cell type	LFP 280Ah
Configuration	1P416S
Key component	PACK*26+SG*1
Capacity	280 Ah
Nominal energy	372,7 kWh
Charging&discharging power	≤ 372.7 kW
Nominal voltage	1331.2 V
Operating voltage range	1123.2V–1497.6 V
Dimensions (W*H*D)	1500*2285*760 mm

SG4950HV-MV Preliminary

SUNGROW
Clean power for all

Turnkey Station for 1500 Vdc System MV Transformer Integrated

HIGH YIELD

- Up to 4 MPPTs
- Effective cooling, full power operation at 50 ℃
- Max. DC/AC ratio up to 1.8

EASY O&M

- Integrated zone monitoring function
- Modular design, easy for maintenance
- Convenient external touch screen

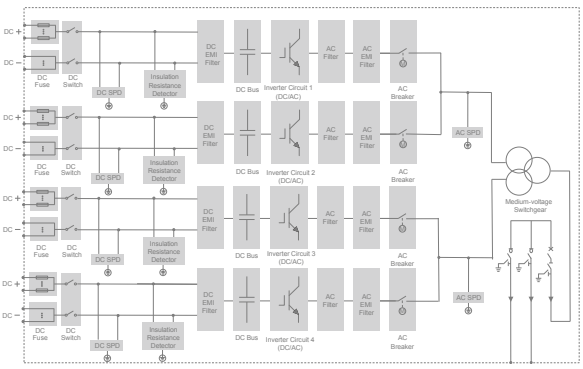
SAVED INVESTMENT

- Low transportation and installation cost due to 40-foot container design
- Integrated MV transformer, switchgear, and LV auxiliary power supply
- Night Static Var Generator (SVG) function
- Q at night function optional

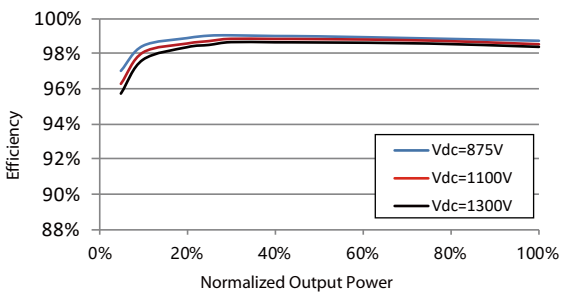
GRID SUPPORT

- Compliance with standards: IEC 61727, IEC 62116
- Low/High voltage ride through (L / HVRT)
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM



EFFICIENCY CURVE（SG2475HV）



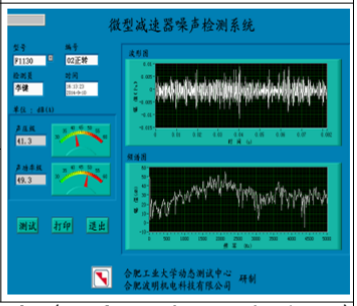
Type designation	SG4950HV-MV
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage / Start-up input voltage	800 V / 940 V
MPP voltage range for nominal power	800 – 1300 V
No. of independent MPP inputs	4
No. of DC inputs	32 / 36 / 40 / 44
Max. PV input current	3500A * 2
Max. DC short-circuit current	10000A * 2
PV array configuration	Negative grounding or floating
Output (AC)	
AC rated power	4950 kVA
AC voltage range	10 – 35 kV
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
THD	< 3 % (at nominal power)
DC current injection	< 0.5 % In
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading – 0.8 lagging
Feed-in phases / connection phases	3 / 3
Efficiency	
Inverter max. efficiency	99.0 %
Inverter Euro. efficiency	98.7 %
Transformer	
Transformer rated power	5000 kVA
LV / MV volatage	0.55 kV / 10 – 35 kV
Transformer vector	Dy11y11
Transformer cooling type	ONAN (Oil-natural, air-natural)
Oil type	Mineral oil (PCB free) or degradable oil on request
Protection	
DC input protection	Load break switch + fuse
Inverter output protection	Circuit breaker
AC MV output protection	Circuit breaker
Overvoltage protection	DC Type I + II / AC Type II
Grid monitoring / Ground fault monitoring	Yes / Yes
Insulation monitoring	Yes
Overheat protection	Yes
Q at night function	Optional
General Data	
Dimensions (W * H * D)	12192 * 2896 * 2438 mm
Weight	27 T
Degree of protection	IP65 (Inverter) / IP54 (Others)
Auxiliary power supply	5 kVA (optional: max. 40 kVA)
Operating ambient temperature range	-35 to 60 ℃ (> 50 ℃ derating)
Allowable relative humidity range	0 – 100 %
Cooling method	Temperature controlled forced air cooling
Max. operating altitude	1000 m (standard) / > 1000 m (optional)
Display	Touch screen
Communication	Standard: RS485, Ethernet; Optional: optical fiber
Compliance	CE, IEC 62109, IEC 61727, IEC 62116, IEC 62271
Grid support	Q at night (optional), L / HVRT, active & reactive power control and power ramp rate control

NEXTracker Motor Sound Test Summary

Each NEXTracker row uses a small 24V DC motor powered by a NEXTracker controller. To track the row, the motor runs for five to ten seconds every few minutes. The noise level of the motors is tested by the manufacturer. Test reports from the manufacturer show that the sound power level is ~50dB. The sound level produced is very low and essentially inaudible to surrounding site noises such as wind or generators.

Sound testing report

applying date: Sep, 10th, 2014 report NO.: 2014091001

Sample from	Reducer department	P/N	BL-65150-710/5	Applying department	Quality department
Sample	Motor reducer	NO.	02（CW）	QTY	2Pcs
purpose	check the sound of motor reducer in no-load condition				
Testing environment	1、anechoic chamber inner size: **2850x2750x2100mm**; 2、anechoic chamber LF cut-off frequency about **100Hz**; 3、inside background noise during work: about **26dB(A)**以下; 4、outside vibration transmission less than **5%**; 5、motor reduce was under no-load condition when testing.				
level	Conform to standard **GB/T3767-1996、ISO3744-1994**				
oscillogram					
spectrogram					
Testing result (away from sound source by 1 meter) unit:db(A)					
Sound power level			49.30		

Manufacturer sound test report

Inverse distance law for acoustics shows sound decrease with distance:

Distance	Sound Level	Equivalent sound
3 m (9.8 ft)	~ 40 dB	Library
30 (98 ft)	~20 dB	Rustling leaves
300 m (980 ft)	~0 dB	Inaudible