# SUNNICA ENERGY FARM

# Preliminary Environmental Information Report

Appendix 11D: Operational Noise Modelling

## Sunnica Ltd

## AUGUST 2020

## Quality information

| Prepared by | Checked by | Verified by | Approved by |
|---|---|---|---|
| Various | Colin O'Connor<br>Principal Acoustics Consultant | Yuyou Liu<br>Acoustics Regional Manager | Neil Titley<br>Technical Director |

## Revision History

| Revision | Revision date | Details | Authorized | Name | Position |
|---|---|---|---|---|---|
| 1 | September 2020 | For issue | YL | Yuyou Liu | Acoustics Regional Manager |

Prepared for:

Sunnica Ltd.

Prepared by:

AECOM Infrastructure & Environment UK Limited
Unit 1 Wellbrook Court
Girton
Cambridge CB3 0NA
United Kingdom

T: +44 1223 488 000
aecom.com

# 11D Operational Noise Modelling

11.1.1 Sound level data for proposed inverters, transformers, and battery units have been provided by the client, and are summarised below.

## 11.2 Inverters

11.2.1 Quoted sound pressure levels for the inverters are 78 to 79 dB(A) at a measurement distance of 1m.

11.2.2 Using formula $L_w = L_p + 10.\log(A)$

11.2.3 Where $L_w$ = sound power level

$L_p$ = sound pressure level at measurement distance 1m

A = exposed surface area of plant item

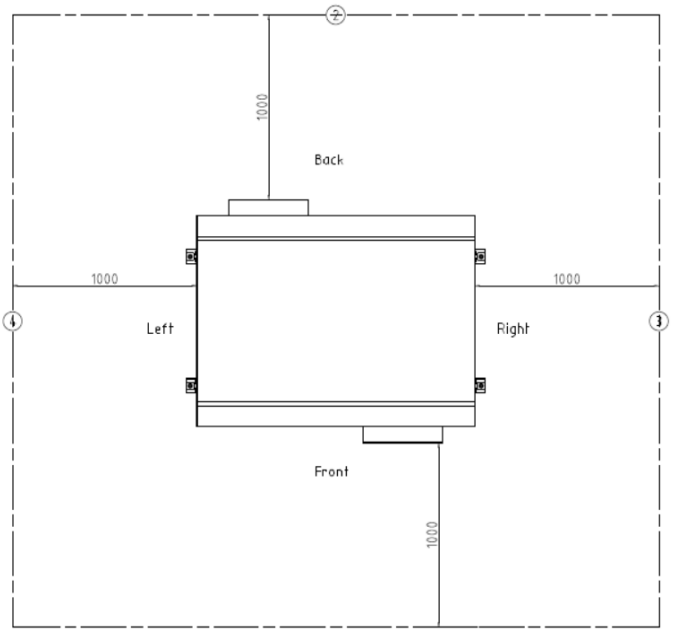
The equivalent sound power level is calculated to be 90 dB(A).

| | | |
|---|---|---|
| **ENVIRONMENT** | Degree of protection | NEMA3R - IP54 |
| | Permissible Ambient Temperature | -35°C to +60°C / >50°C Active Power derating |
| | Relative Humidity | 4% to 100% non condensing |
| | Max. Altitude (above sea level) | 2000m; >2000m power derating (Max. 4000m) |
| | Noise level [4] | < 79 dBA |
| **CONTROL INTERFACE** | Interface | Graphic Display |
| | Communication protocol | Modbus TCP |
| | Plant Controller Communication | Optional |
| | Keyed ON/OFF switch | Standard |
| **PROTECTIONS** | Ground Fault Protection | GFDI and Isolation monitoring device |
| | General AC Protection | Circuit Breaker |
| | General DC Protection | Fuses |
| | Overvoltage Protection | AC, DC Inverter and auxiliary supply type 2 |
| **CERTIFICATIONS** | Safety | UL1741, CSA 22.2 No.107.1-01, UL62109-1, IEC62109-1, IEC62109-2 |
| | Compliance | NEC 2014 / NEC 2017 (optional) |
| | Utility interconnect | EEE 1547.1-2005 / UL1741SA-Sept. 2016 |

[1] Values at 1.00•Vac nom and cos Φ= 1.
Consult Power Electronics for derating curves.
[2] Consult Power Electronics for other configurations.
[3] Consult P-Q charts available: $Q(kVAr)=\sqrt{(S(kVA)^2-P(kW)^2)}$.
[4] Readings taken 1 meter from the back of the unit.


| Specifications | |
|---|---|
| **Topology** | Modularized three-level |
| **Rated Power** | 800kW |
| **DC Voltage Range** | 630~850V |
| **Rated AC Voltage** | 400V |
| **Max. AC Current** | 1155A |
| **THD** | ≤3% full power |
| **Overload Capacity** | 1.1 times continuous operation |
| **European Efficiency** | 98.2% |
| **Enclosure Protection Grade** | IP54 |
| **Permissible Environment Temperature** | -25℃~+50℃ |
| **Noise** | <78dBA |
| **Dimension (W/D/H)** | 1510mm/1250mm/2300mm |
| **Weight** | 1300kg |
| **Design Life** | 25 years |

| 位置 | 噪音值dB(A) |
|---|---|
| ① | 74.9 |
| ② | 74.4 |
| ③ | 73.7 |
| ④ | 74.6 |
| | |



## 11.3 Transformers

11.3.1 Quoted sound power level for the transformers are 74 dB(A).

| | | *Tolerances* |
|---|---|---|
| P.E.I | >99,465% | 0% |
| No load losses | 2750W | 0% |
| Load losses | 37000W | 0% |
| Total losses | 39750W | 0% |
| Impedance voltage at 75C | 7% | +/- 10% |
| Acoustic power level | <74 dB(A) | 0% |

11.3.2 Sound power level of transformers at the Burwell Substation Extension is based on a transformer on a previous project by the manufacturer (400/132kV, 240MVA), as below. As a transformer around 400/600MVA is required, a sound power level of 95 dB has been applied.

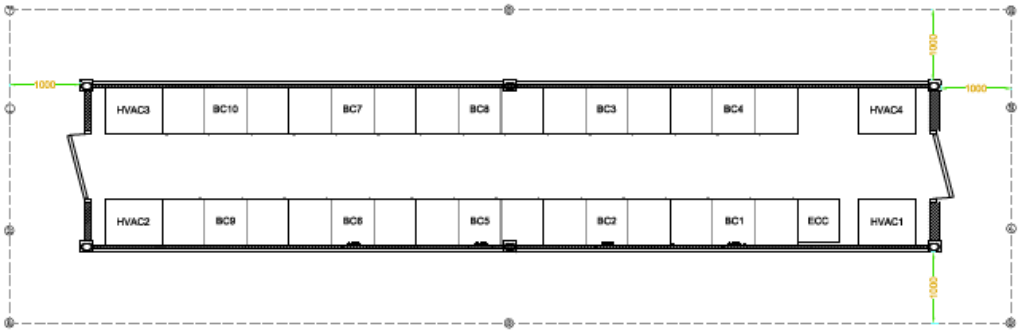
***Guaranteed "Sound Power" level;***

| | | | |
|---|---|---|---|
| Transformer Main Tank | dB(A) | 90 / 92 | at 100% Un / at 102% Un + 50% Load |
| Cooling Plant | dB(A) | 84 | |

## 11.4 Batteries Containers

11.4.1 Quoted sound pressure level for the battery unit is 75 dB(A) at a measurement distance of 1m.

11.4.2 Using formula $L_w = L_p + 10.\log(A)$, the equivalent sound power level is calculated to be 94 dB(A).




| 序号 | 噪音值/dB |
|---|---|
| ① | 73.5 |
| ② | 72.8 |
| ③ | 63.4 |
| ④ | 73.2 |
| ⑤ | 73.6 |
| ⑥ | 63.8 |
| ⑦ | 71.2 |
| ⑧ | 71.5 |
| ⑨ | 72.1 |
| ⑩ | 71.9 |

**GENERAL NOTES:**

1.ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

ECC - ELECTRICAL CONTROL CABINET
BC - BATTERY CABINET

| | | | | | |
|---|---|---|---|---|---|
| | | | | | SYSTEM INTERNAL LAYOUT |
| | | | | | |
| MARKS | AREA | REVISED NO. | | SIGNATURE | DATE |
| SIGNATURE | | DATE | SIGNATURE | | DATE |
| DESIGNER | ZHANG PENGHUI | 2019/09/19 | STANDARD | | |
| CHECK | | | APPROVAL | | CUBE |
| TECHNICIS | | | | | |