NOISE IMPACT ASSESSMENT

SOAY SOLAR FARM AND GREENER GRID PARK

STATKRAFT UK LTD

JULY 2022

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1 INTRODUCTION

Arcus Consultancy Services Ltd (Arcus) has been commissioned by Statkraft UK LTD (the Applicant) to undertake a noise assessment in relation to the development of a solar photovoltaic (PV) array/solar farm and installation of a Greener Grid Park comprising of synchronous compensators and a battery energy storage system (BESS) (the Development) to support the National Grid. The Development is proposed to be sited to the west of Thornton National Grid Substation (the existing Substation), northeast of Thornton, and southwest of Allerthorpe (the Site).

The aim of this assessment is to determine the existing acoustic climate, predict the sound levels due to the operation of the Development, and to assess these levels against relevant guidance.

Where appropriate, mitigation measures have been recommended to ensure that the amenity of residents in the locality of the Development is not unreasonably impacted by the Development.

The Application was submitted in December 2021, following which the layout and technical details of the Development have been amended to incorporate minor design changes. Due to design minor design changes associated with the Development, this Noise Impact Assessment has been updated in July 2022.

2 THE DEVELOPMENT

The local area is generally rural in nature, approximately 600 m north of Thornton, East Yorkshire.

The Development is intended to provide solar energy and services supporting the flexible operation of the National Grid and decarbonisation of electricity supply e.g., by stabilising the electricity network and balancing electricity supply and demand. The proposed batteries will store surplus electricity to be fed into the grid when required, while the synchronous compensators will reduce fluctuations, thus improving stability and reducing the risk of power failures.

The main items of noise generating plant are transformers, synchronous compensators, battery container cooling units, inverters, and other associated cooling plant.

Further details on the noise emitting plant are provided in Section 7 of this report. A figure detailing the Indicative Site Layout is presented in Appendix 1.

3 RELEVANT GUIDANCE

3.1 Overview

The following standards and guidance are considered relevant to this assessment;

- The National Planning Policy Framework (NPPF)[1];
- The Noise Policy Statement for England (NPSE)[2]; and
- BS 4142:2014+A1:2019 – 'Methods for rating and assessing industrial and commercial sound'[3].

[1] UK Government (2021) NPPF [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf (Accessed: 27/07/2021)

[2] DEFRA (201) Noise Policy Statement for England [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf (Accessed: 07/05/2021)

[3] BS4142: 2014 +A1: 2019 '*Methods for rating and assessing industrial and commercial sound'* BSI.

3.2 The National Planning Policy Framework

The NPPF sets out the Government's planning policies for England, providing a framework within which local policies can be developed. The key principle of the NPPF is a presumption in favour of sustainable development. With regards to noise, the NPPF states that sustainable development can be achieved by:

- Avoiding noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigating and reducing to a minimum other adverse impact on health and quality of life arising from noise from new development, including through the use of conditions; and
- Identifying and protecting areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.3 The Noise Policy Statement for England

The NPSE sets out the role and purpose of noise policy, together with the Government's Noise Policy Vision and Aims, consistent with the NPPF (National Planning Policy Framework).

The aims of the NPSE are that:

- Significant adverse effects on health and quality of life are avoided, while taking into account the guiding principles of sustainable development;
- Adverse impacts on health and quality of life are mitigated or minimised; and
- Where possible, noise management should seek to improve health and quality of life, within the context of Government policy on sustainable development.

Paragraph 2.24 of the NPSE states that in relation to minimising and mitigating adverse impacts:

"…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur."

3.4 BS 4142:2014+A1:2019

BS 4142:2014+A1:2019 ('BS 4142') describes methods for rating and assessing sound in order to provide an indication of its likely impact upon nearby premises (typically residential dwellings).

The specific sound emitted from the Development (dB, L_{Aeq}) is rated by taking into account both the level and character (i.e., tonal elements, impulsivity, intermittency and distinctiveness) of the sound. This is achieved by applying appropriate corrections to the specific sound level externally at the receptor location, which gives the rating level of the sound in question. This is then assessed against the existing prevailing background sound level (dB, L_{A90}) at that location in order to determine a likely level of impact.

The level by which the rating level exceeds the prevailing background sound level indicates the following potential impacts:

- A difference of 10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around 5 dB is likely to be an indication of an adverse impact, depending on the context; and
- Where the rating level does not exceed the background level, this is an indication of the specific sound source having a low impact, depending on the context.

4 CONSULTATION AND ASSESSMENT CRITERIA

Consultation was undertaken with the Environmental Health Department at East Riding of Yorkshire Council (ERYC) to agree the scope, methodology and assessment criteria for the development. The following methodology was proposed:

- Noise monitoring at 4 locations around the solar farm and Greener Grid Park, representative of the nearest noise sensitive receptors;
- Assessment of construction noise scoped out given temporary nature of impacts;
- Assessment undertaken to BS4142:2014+A1:2019 standard for industrial noise; and
- Design criterion of '*rating level no more than 5 dB above background'* adopted for day and night-time periods.

A response from the Senior Environmental Health Officer at ERYC was received on 17th June 2021, confirming that the approach summarised above is reasonable and appropriate. Based on the above, a design criterion mitigating any adverse impacts to '*rating level no more than 5 dB above background'* has been applied to this assessment.

5 BASELINE

5.1 Monitoring and Assessment Locations

Figure 1 below shows the location of the closest noise-sensitive receptors to the Development. As discussed in Section 4, monitoring locations were agreed with ERYC prior to being undertaken. In order to establish the background noise level, monitoring was undertaken at four locations, as shown in Figure 1.

Figure 1: Noise Monitoring location and Noise Receptors[4]

Monitoring location 1 was selected as representative of Willow Tree Farm, Pinewood Farm and Allerthrope Lake. It should be noted that the receptors at Allerthorpe Lake are holiday caravans, however these receptors have been included as part of this assessment to ensure

[4] Please note Figure 1 has not been updated since the December 2021 Application. The 'Site Boundary' has been updated for the July 2022 re-submission however, the Noise Monitoring Locations and Noise Receptors remain relevant.

adverse impacts are avoided. The equipment was placed on land within the red line boundary, approximately 5 m from Melbourne Road. While the monitoring location was close to hedges along Melbourne Road, it was noted during the site visit that Willow Tree and Pinewood Farm are both surrounded by tall trees. As such these locations are likely to be subject to background levels higher than those measured as part of this assessment. Main noise source at this location was vehicle movements on Melbourne Road. The existing substation was not audible.

Location 2 was selected as representative of Woodlands Farm. Due to access restrictions the equipment was placed in a field on the opposite side of Common Lane, approximately the same distance from the road as Woodlands Farm. Main noise source at this location was vehicle movements on Common Lane, and distant farm activities.

Location 3 was selected as representative of Thornton Lodge and Byholme Farm. Construction work at Thornton Lodge precluded monitoring closer to this receptor, as such the monitoring location was placed on a public footpath between the receptors, in a location where construction work was not audible. Main noise source at this location was traffic movements on Common Lane, and distant farm activities.

Monitoring equipment at Location 4 was placed in the field to the front of Warren Farm. Main noise sources at this location were rustling trees and some distant road noise. It was not possible to monitor at Tank Cottage or Waplington Hall, however given the similar environments, the noise levels measured at Location 4 are considered representative of those at Tank Cottage and Waplington Hall.

Provided that appropriate sound levels are achieved at these closest receptors, the impact at more distant receptors would also be acceptable.

5.2 Background Noise Survey

To establish the sound environment in the locality of the Development, a background noise survey was undertaken between 11th and 15th June 2021, at Monitoring Locations 1 -3. The fourth location was measured from 15th to 17th June 2021 at Warren House.

The monitoring equipment consisted of Class 1 sound level meters, calibrated to traceable standards, and housed in all-weather cases with long-life batteries. The microphones were positioned at a height of 1.4 m above ground level, with suitable proprietary windshields. The meters were field-calibrated at the start and end of the survey period; no significant calibration drift was found.

Various indices were measured by the equipment during the survey period, including $L_{A90,15mins}$. The L_{A90} index represents the A-weighted sound pressure level exceeded for 90% of a time period, in this case 15 minutes (i.e., the background sound level).

Survey record sheets showing specific details of the monitoring location and photograph of equipment in situ can be found in Appendix 2.

A weather station was installed at Location 1, however an equipment fault resulted in no data being collected. As such, weather data was sourced from the Weather Underground website, with data from the nearest weather station (IYORK145[5]) used for analysis. Periods of rain, or wind speeds exceeding 5 m/s have been excluded from further analysis.

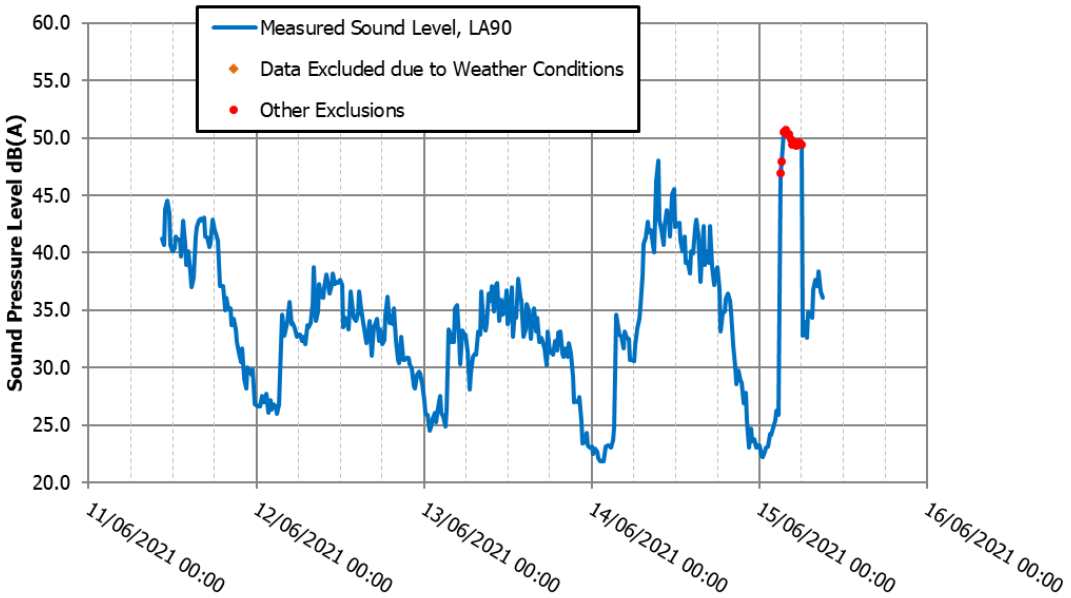
[5]Weather Underground (2021) [Online] Available at: https://www.wunderground.com/dashboard/pws/IYORK145/table/2021-06-11/2021-06-11/daily (Accessed 18/06/2021)

6 MEASUREMENT RESULTS

6.1 Location 1

Chart 1 provides a summary of the background sound levels measured during the survey period, detailing $L_{A90,\ 15min}$ sound levels at location 1.

Chart 1: Sound Levels at Location 1



As can be seen, the sound environment follows a diurnal pattern typical of a rural area with a reduction in sound levels during the night-time period. The large peak in noise recorded during the night of the 15th June has been omitted. It is likely this was caused by farm operations.

BS 4142 advises against assuming that typical daytime and night-time levels can be determined using any single approach (e.g., mean, median, mode etc.). To determine the prevailing background noise levels for the purposes of the assessment, Charts 2 and 3 therefore present the range of $L_{A90,15min}$ noise levels recorded, along with the percentage of periods for which they occurred, for daytime (0700-2300) and night time (2300-0700) periods respectively.

Chart 2: Daytime Background Statistical Analysis – Location 1

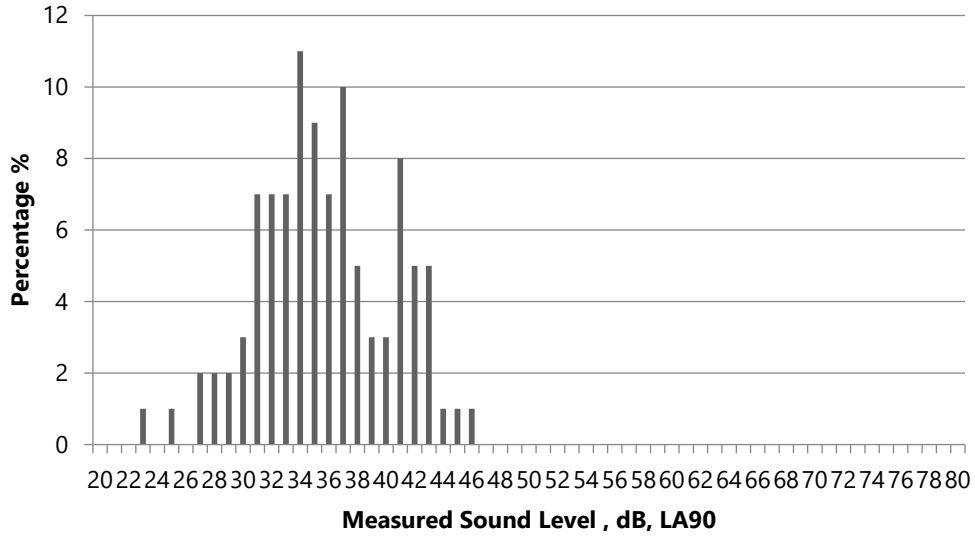


Chart 3: Night-time Background Statistical Analysis – Location 1

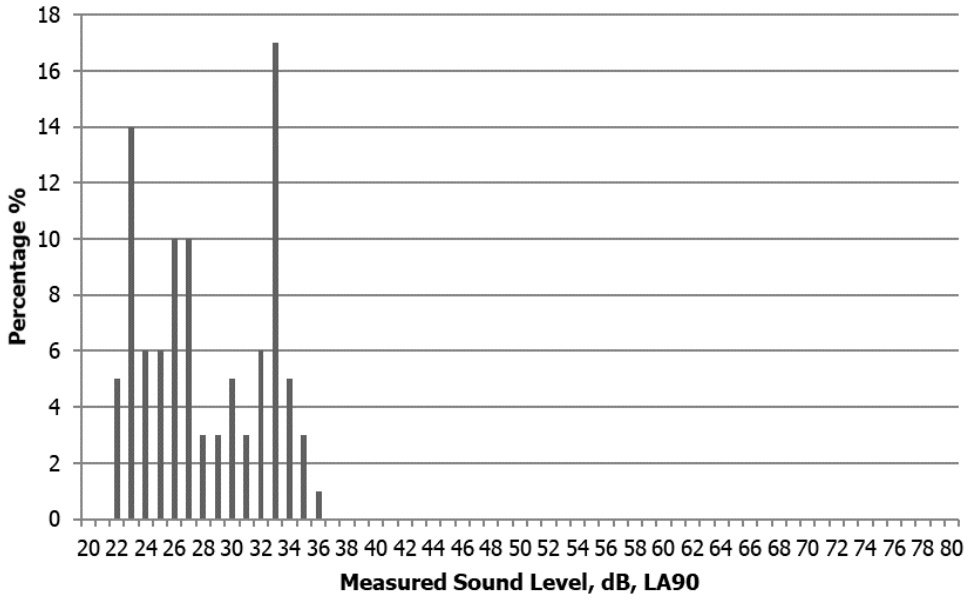


Table 3 presents the mode, median and mean averages of the above dataset.

Table 1: Background Sound Survey Results (Night-time) – Location 1

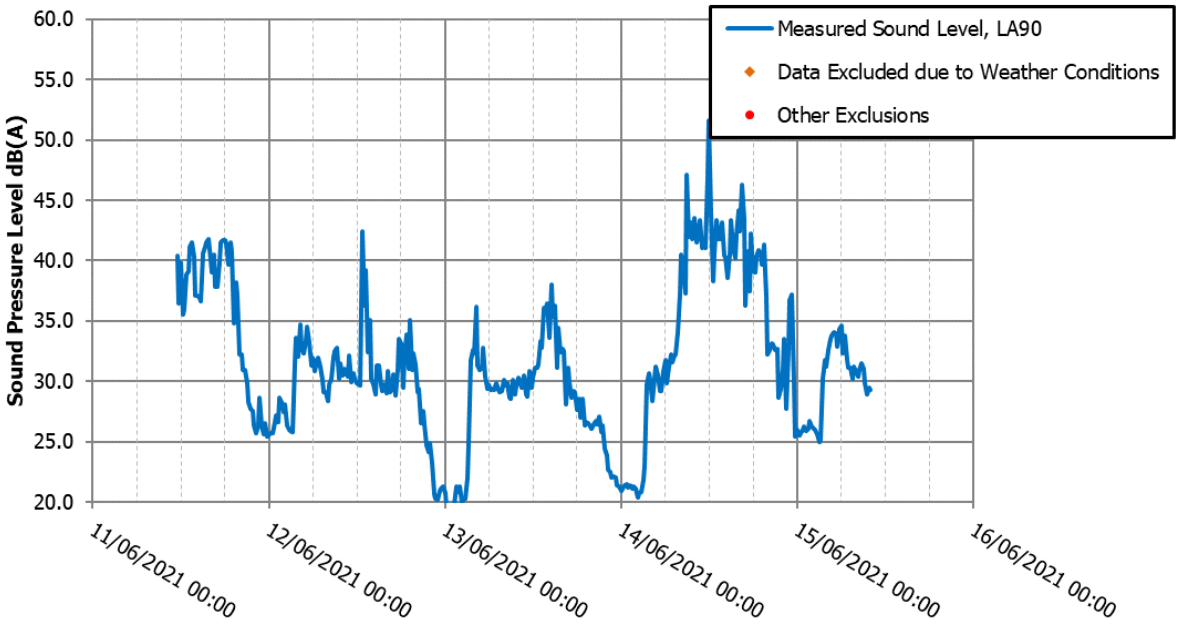
Period	Mode	Median	Mean	Representative
Day	34	35	36	35
Night	33	27	28	30

Based upon the results presented in chart 1, along with the spread of data presented in Table 3, a daytime background noise level of 35 dB, L_{A90} and a night-time background noise level of 30 dB, L_{A90} is taken as an average of the methods and is representative of the of the night time.

6.2 Location 2

Chart 4 provides a summary of the background sound levels measured during the survey period, detailing $L_{A90,\ 15min}$ sound levels at location 2.

Chart 4: Sound Level vs Time History at Location 2



As can be seen, the sound environment follows a diurnal pattern with a reduction in sound levels during the night-time period.

Charts 5 and 6 present the range of $L_{A90,15min}$ noise levels recorded, along with the percentage of periods for which they occurred, for daytime (0700-2300) and night time (2300-0700) periods respectively.

Chart 5: Daytime Background Statistical Analysis – Location 2

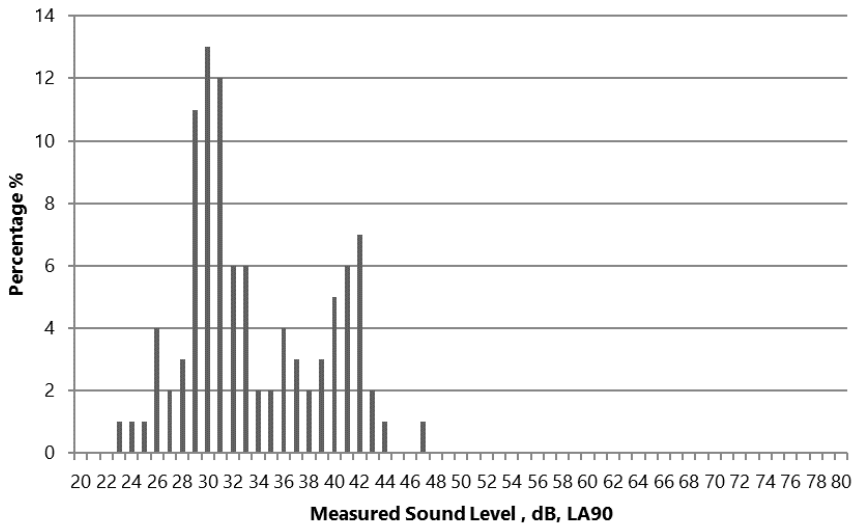


Chart 6: Night-time Background Statistical Analysis – Location 2

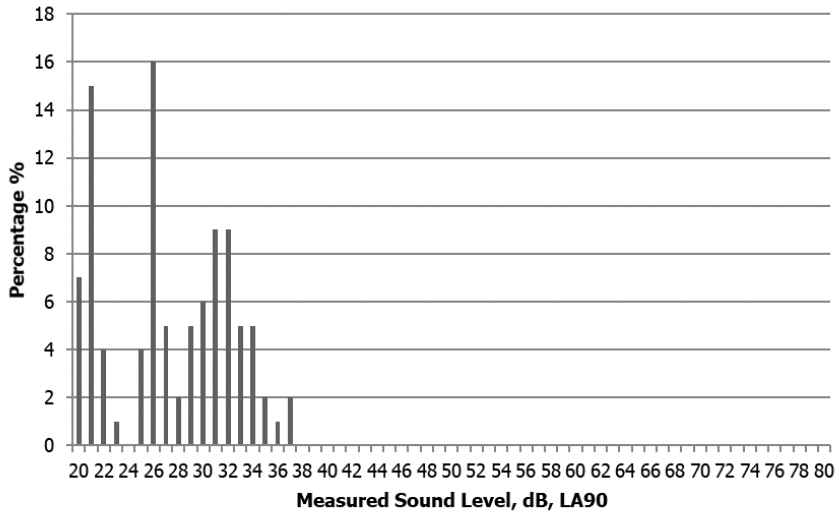


Table 4 presents the mode, median and mean averages of the above dataset.

Table 4: Background Sound Survey Results – Location 2

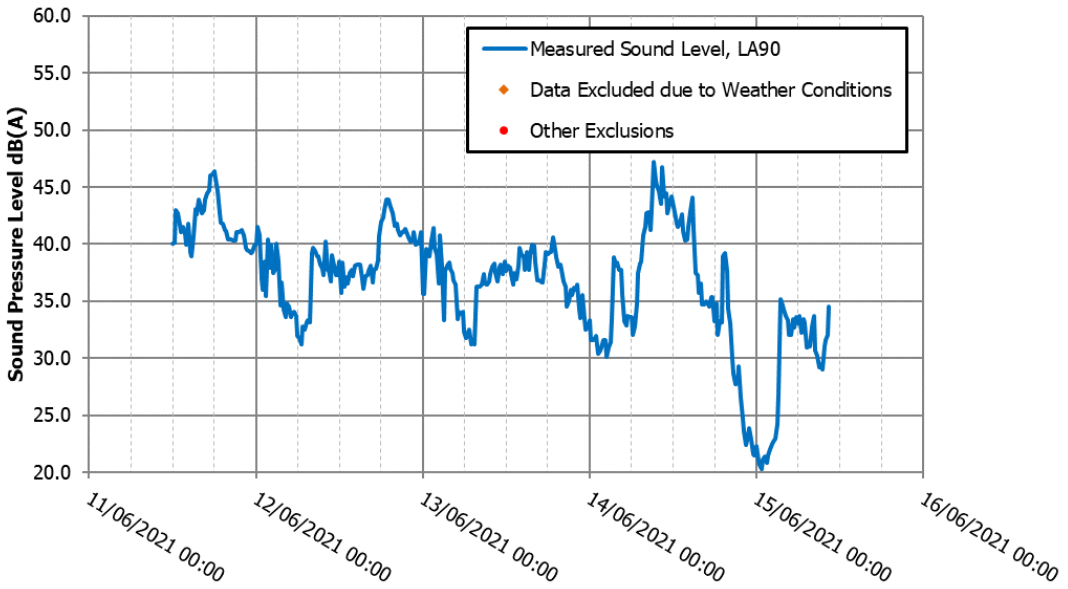
Period	Mode	Median	Mean	Representative
Day	30	32	34	32
Night	26	27	27	27

Based upon the results presented in Chart 4, along with the spread of data presented in Table 3, a daytime background noise level of 32 dB, L_{A90} and a night-time background noise level of 27 dB, L_{A90} is taken as a conservative approach, representative of the quieter time of the night.

6.3 Location 3

Chart 7 provides a summary of the background sound levels measured during the survey period, detailing $L_{A90,\ 15min}$ sound levels at location 3.

Chart 7: Sound Level vs Time History at Location 3



As can be seen, the sound environment follows a diurnal pattern with a reduction in sound levels during the night-time period.

Charts 8 and 9 present the range of $L_{A90,15min}$ noise levels recorded, along with the percentage of periods for which they occurred, for daytime (0700-2300) and night time (2300-0700) periods respectively.

Chart 8: Daytime Background Statistical Analysis – Location 3

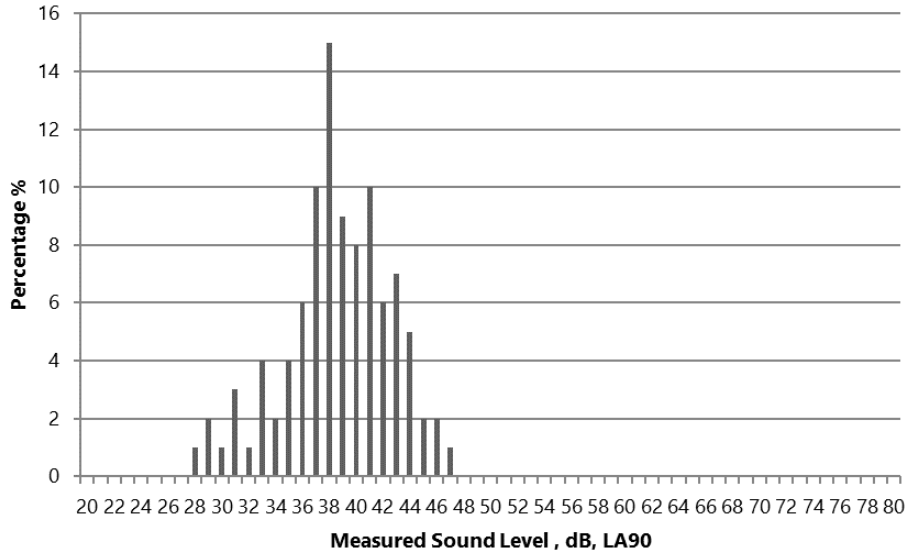


Chart 9: Night-time Background Statistical Analysis – Location 3

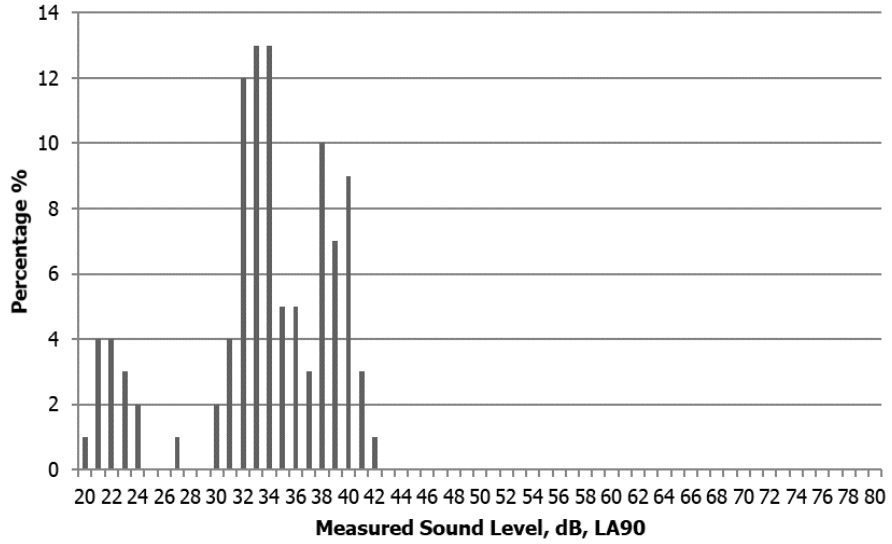


Table 4 presents the mode, median and mean averages of the above dataset.

Table 5: Background Sound Survey Results – Location 3

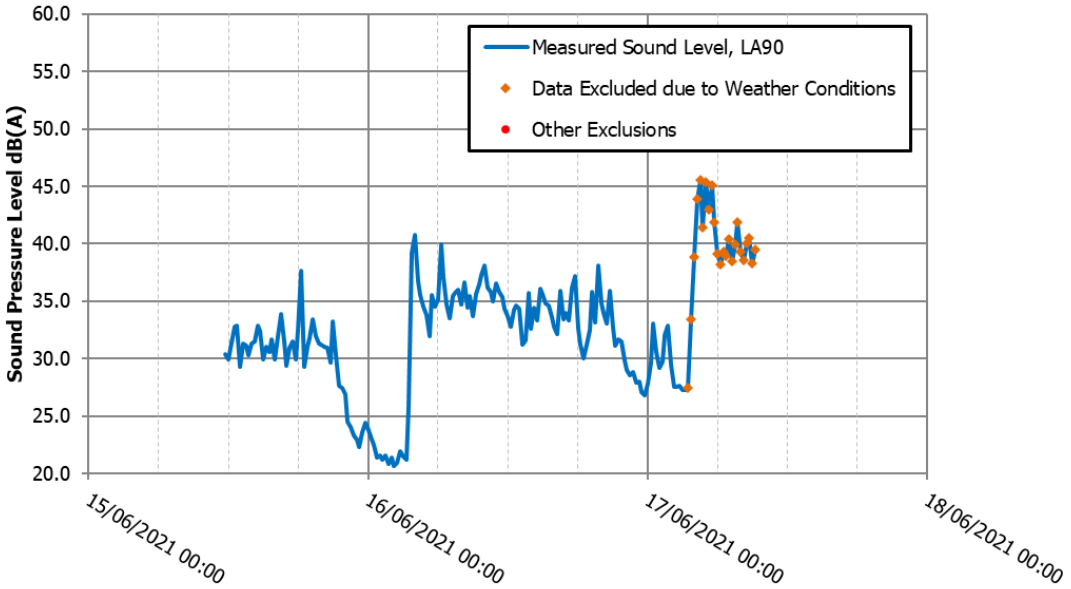
Period	Mode	Median	Mean	Representative
Day	38	38	38	38
Night	33	34	34	33

Based upon the results presented in Chart 7, along with the spread of data presented in Table 5, a daytime background noise level of 38 dB, L_{A90} and a night-time background noise level of 33 dB, L_{A90} is taken as a conservative approach, representative of the quieter time of the night.

6.4 Location 4

Chart 10 provides a summary of the background sound levels measured during the survey period, detailing $L_{A90, 15min}$ sound levels at location 4.

Chart 10: Sound Level vs Time History at Location 4



As can be seen, the sound environment follows a diurnal pattern with a reduction in sound levels during the night-time period.

Periods of rain occurred on the night of the 17th June until the end of the survey. As such all data recorded during this period has been omitted from further analysis.

Charts 11 and 12 present the range of $L_{A90,15min}$ noise levels recorded, along with the percentage of periods for which they occurred, for daytime (0700-2300) and night time (2300-0700) periods respectively.

Chart 11: Daytime Background Statistical Analysis – Location 4

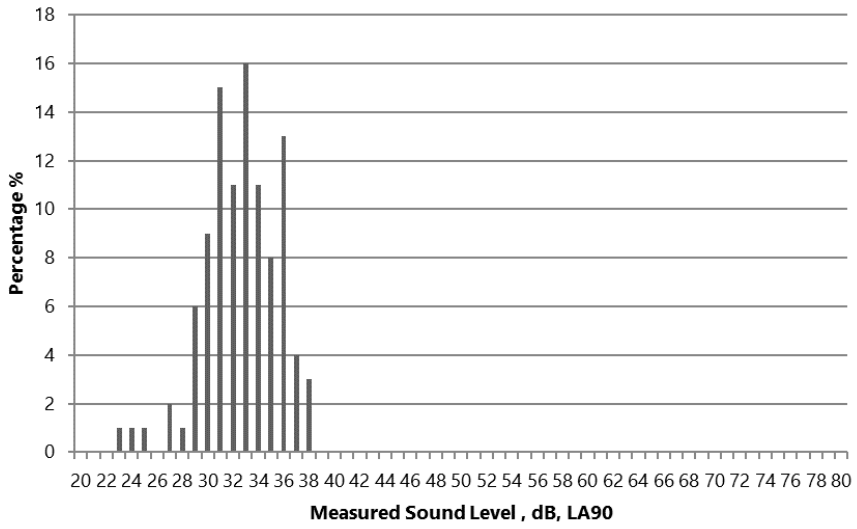


Chart 12: Night-time Background Statistical Analysis – Location 4

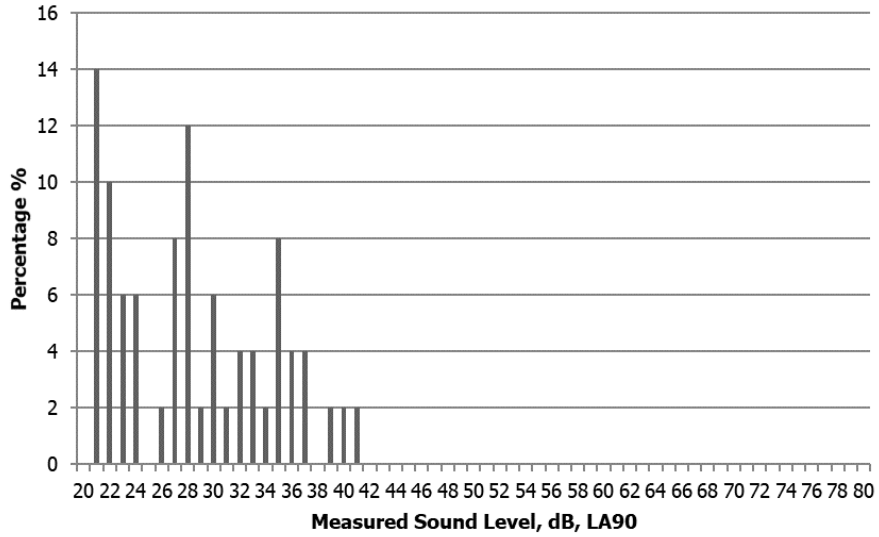


Table 6 presents the mode, median and mean averages of the above dataset.

Table 6: Background Sound Survey Results – Location 4

Period	Mode	Median	Mean	Representative
Day	33	33	33	33
Night	21	28	28	28

Based upon the results presented in Chart 10, along with the spread of data presented in Table 6, a daytime background noise level of 33 dB, L_{A90} and a night-time background noise level of 28 dB, L_{A90} is taken as representative of the quieter time of the night.

7 NOISE MODELLING

7.1 Overview

The specific sound level[6] at the nearest noise-sensitive receptors has been calculated in SoundPlan 8.2, using the environmental noise propagation model ISO 9613-2:1996 – Acoustics; '*Attenuation of sound during propagation outdoors – Part 2: General method of calculation*'[7].

The ISO 9613-2 method predicts the level of sound at a receptor by taking the octave-band sound power level spectrum of the source, and applying a number of attenuation factors that determine the resulting rating level at the receptor location. The following parameters were used in the prediction model and are considered to provide a conservative prediction of the noise levels likely to be experienced in practice:

- Atmospheric conditions of 10°C and 70% relative humidity;
- A ground factor of G=1 (soft ground) and G=0 (hard ground) for hardstanding areas;
- A receiver height of 1.5 m (approximating head height at the closest external façade of each assessed dwelling).

Whilst the PV panels themselves make no noise, they will act as noise barriers, reducing noise levels at receptor locations by differing amounts, dependent upon the positioning of panels relative to the noise sources and receptor locations. As a worst-case, no PV panels have been included within the noise model.

7.2 Noise Sources

The Development will comprise the following noise sources:

- Field Inverter-transformers for Solar PV Panel arrays;
- Battery storage containers with two AC units and one inverter-transformer;
- Energy Management (EM) buildings housing one synchronous condenser and an external HVAC unit each;
- External Chiller units;
- 400kV Primary Transformers; and
- Auxiliary Transformers.

The EM buildings were modelled with radiating facades, accounting for the synchronous condenser noise inside the building and the noise reduction afforded by the building envelope.

Additional plant is located within containers such as, control rooms, communication unit, switchgear containers, etc., however given the attenuation afforded to the internal sources by the container envelope itself, any noise associated with the internal plant is considered to be negligible relative to the external noise emitting items specified above.

The sound-emitting plant included in the noise model is presented in Table 7 (over).

[6] The sound level produced by a source, without corrections for acoustic features as discussed in Section 7.2.

[7] ISO 9613-2:1996 Acoustics; Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

Table 7: Noise Emitting Plant - Sound Power Levels and Spectra

Item	Sound Power Level dB(A)	Octave Band Centre Frequency, Hz (A-weighted)							
		63	125	250	500	1k	2k	4k	8k
Synchronous Condenser	101	92	99	90	87	86	84	80	73
Primary Transformer	95	74	80	87	90	90	85	79	73
External Chiller	89	75	78	81	84	83	78	73	66
EM Building HVAC Unit	69	64	63	61	60	58	54	55	46
BESS Inverter (with Silencer)	84	59	69	76	79	76	76	75	68
Battery storage AC units	75	58	68	62	67	69	68	66	59
Auxiliary Transformer	78	57	63	71	73	73	68	62	57
Field Inverter-Transformer	67	55	65	54	60	57	54	43	37

The acoustic performance of the Energy Management Building is detailed in Table 8, as taken from the SoundPlan library of building materials. At this stage modelling does not include for doors / apertures in the EM building. In the absence of any further information, any doors / apertures should be designed to achieve the reduction specified in Table 8 below.

Table 8: Sound Reduction Index of Building Envelope

Building Envelope (example)	SRI, dB, RW	Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8K
Double Corrugated Steel Sheet with mineral wool – 190 mm thickness (Walls and Roof)	41	20	20	29	43	48	56	57	57

A noise map illustrating the noise emission and propagation across the Development is presented in Appendix 3.

7.3 Rating Level Corrections

BS 4142 states that corrections should be applied to account for certain acoustic features which have the potential to increase the level of noise impact at nearby dwellings.

The acoustic features to be considered in the application of rating corrections are as follows:

- Impulsivity: No impulsive characterises are anticipated from the Development;
- Tonal Elements: The sound emitted by the Development is likely to be characterised by the AC plant and cooling fans, and is therefore considered to be broadband, and non-tonal;
- Intermittency: The Applicant has advised that the plant will operate 24/7 and will therefore not have "identifiable on / off conditions" in terms of BS 4142:2014; no correction for intermittency is therefore required.
- Distinctiveness: The predicted Specific Level due to the Development is low, and the primary sources of noise (AC plant and Cooling Fans) are broadband, meaning the sound unlikely to be distinctive.

Based on the above, no correction for acoustic features has been applied; the rating level at the receptor location is therefore the same as the specific level.

8 ASSESSMENT OF IMPACT

8.1 BS4142 Assessment

An assessment of the likely impact has been made based upon the difference between the predicted Rating level and background levels for daytime and night-time periods, as detailed in Section 6.

It should be noted that the modelling assumes all plant operating simultaneously and at maximum power as a worst case. As such, noise levels in practice are likely to be lower than presented during typical operation, especially at night when the lower temperatures will reduce the requirement for the cooling systems.

Table 9: Updated Assessment of Impact

Receptor Location	Specific Level, dB, L_{Aeq}	Rating Level, dB(A)	Background Sound Level, dB, L_{A90}		Difference, dB	
			Daytime	Night-time	Daytime	Night-time
Willow Tree Farm	34	34	35	30	-1	4
Allerthorpe Lake	34	34	35	30	-1	4
Waplington Hall	32	32	33	28	-1	4
Pinewood Farm	33	33	35	30	-2	3
Thornton Lodge	35	35	38	33	-3	2
3 Warren House	29	29	33	28	-4	1
Byholme Farm	33	33	38	33	-5	0
Tank Cottage	26	26	33	28	-7	-2
Woodlands Farm	23	23	32	27	-9	-4

As Table 9 above shows, the Rating levels meet the design criterion of 'no more than 5 dB above the background sound level' at the nearest receptors, and therefore all noise-sensitive receptors. As such, the Development is considered to be acceptable in terms of BS4142:2014 guidance.

The Development is located adjacent to an existing substation, and as such is not out of context for the area. Predicted noise levels during daytime periods (i.e., when residents are most likely to be using outdoor spaces) are generally well below background levels, and as such at most locations are unlikely to be audible. Overall, it is considered that the context of the site will not affect the overall impact presented in Table 9.

8.2 Uncertainty

Background noise levels were monitored at four locations representative of nearby dwellings, and excluded all data from periods potentially affected by adverse weather conditions. It should also be noted that whilst monitoring was not undertaken during full Covid-19 lockdown conditions, a number of restrictions were in place at time, likely resulting in reduced levels of road traffic in particular, and therefore reduced background noise levels. As such, the use of these background levels is a conservative approach.

Modelling of the proposed plant has been undertaken on a worst-case basis, and assume the plant is operating at maximum power during both daytime and night-time periods. With particular regard to the cooling plant, these items are speed-controlled; noise levels are therefore likely to be lower than presented during typical operation.

It is considered that the assumptions made in this assessment are likely to result in an over-prediction of the level of impact in practice; where there is uncertainty a conservative approach has been taken.

9 CONCLUSION

Arcus Consultancy Services Ltd was commissioned by Statkraft UK LTD to undertake a noise assessment in relation to the development of a solar farm and Greener Grid Park on land west of Melbourne Road, immediately to the west and northwest of Thornton National Grid Substation, northeast of Thornton, and southwest of Allerthorpe.

The Application was originally submitted in December 2021, following which the layout and technical details of the Development have been amended to incorporate minor design changes. Following the design changes, it has been found that noise levels are 1 dB lower than predicted as part of the initial noise assessment.

Noise levels will be less than 5 dB above background levels at the nearest receptor, and therefore all noise-sensitive receptors. As such, the Development would meet the assessment criteria agreed with ERYC.

10 GLOSSARY OF TERMS

Background Sound: The background sound level is the underlying level of noise present at a particular location for the majority (usually 90%) of a period of time.

Decibel (dB): The decibel is the basic unit of noise measurement. It relates to the cyclical changes in pressure created by the sound and operates on a logarithmic scale, ranging upwards from 0 dB. 0 dB is equivalent to the normal threshold of hearing at a frequency of 1000 Hertz (Hz). Each increase of 3 dB on the scale represents a doubling of the Sound Pressure, and is typically the minimum noticeable change in sound level under typical listening conditions.

dB(A): Environmental noise levels are usually discussed in terms of dB(A). This is known as the A-weighted sound pressure level, and indicates that a correction factor has been applied, which corresponds to the human ear's response to sound across the range of audible frequencies. The ear is most sensitive in the middle range of frequencies (around 1000-3000 Hz), and less sensitive at lower and higher frequencies. The A weighted noise level is derived by analysing the level of a sound at a range of frequencies and applying a specific correction factor for each frequency before calculating the overall level. In practice this is carried out automatically within noise measuring equipment by the use of electronic filters, which adjust the frequency response of the instrument to mimic that of the ear.

Frequency: The frequency of a sound is equivalent to its pitch in musical terms. The units of frequency are Hertz (Hz), which represents the number of cycles (vibrations) per second.

$L_{A90,t}$: This term is used to represent the A-weighted sound pressure level that is exceeded for 90% of a period of time, t. This is used as a measure of the background noise level.

$L_{Aeq,t}$: This term is known as the A-weighted equivalent continuous sound pressure level for a period of time, t. It is similar to an average, and represents the sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound in question.

Noise: Unwanted sound. May refer to both natural (e.g. wind, birdsong etc.) and artificial sounds (traffic, industrial noise, aircraft etc.).

Rating Level: Sound levels which have been corrected for certain acoustic features, as required under BS4142 methodology.

Sound pressure (P): The fluctuations in pressure relative to atmospheric pressure, measured in Pascals (Pa).

Sound pressure level (L_p): Sound pressure measured on the decibel scale, relative to a sound pressure of 2 x 10-5 Pa.

Specific Level: In terms of BS4142 methodology, the specific level is the sound level produced by a source, without corrections for acoustic features.

Time Weighting: Time weightings determine how quickly the sound level meter responds to changes in noise level, and is generally set to 'Fast' or 'Slow'. A fast time weighting resulting in in the sound level meter sampling every 1/8th second: a slow time weighting results in a sample measurement being taken by the sound level meter every 1 second.

APPENDIX 1 – DEVELOPMENT LAYOUT

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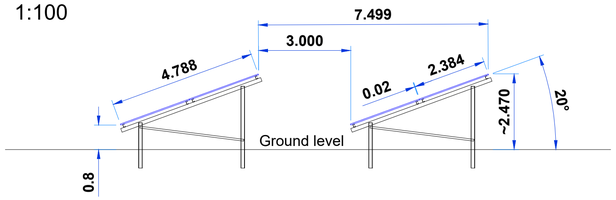
Side elevation
1:100



Public Right of Way with 12.5m buffer

Temporary construction compound to be replaced with solar panels once complete

Overhead Line with 9m buffer

Excluded area for existing property

Land boundary

Perimeter fence

Field Transformer

Battery storage

Temporary construction compound to be replaced with batteries once complete

Pond with 100m buffer

Root protection areas

Ditches with 6m buffer

Overhead Line with 14m buffer

Water crossing

A B C D E F G H I J K L M N O P Q R S

1 2 3 4 5 6 7 8 9 10 11 12 13

0m 50m 100m 150m 200m 250m 300m

SUMMARY NOTES

PV SYSTEM SUMMARY	
GEOGRAPHICAL COORDINATES	53.911847,-0.839986
LAND OWNERSHIP AREA (GROSS)	148.00ha
FENCED PV AREA	88.26ha
MAXIMUM AC CAPACITY	49.99MWac
PV MODULE TYPE	Crystalline
STRUCTURE TYPE	Fixed-tilt
MAX TABLE HEIGHT	2.470m

LEYEND

- Site Boundary
- Full table
- Half table
- Deer Fence
- Temporary Construction Compound
- Field Transformer
- Proposed Access Track
- Existing Onsite Access Track
- Existing Public Road
- 66kV Overhead Line
- 400kV Overhead Line
- 6m Buffer of Ditch
- 12m Buffer of Public Rights of Way
- Root protection area
- Pond with 100m buffer
- Existing property area
- Public Right of Way
- Gates
- CCTV

GREENER GRID PARK KEY

- 2.40 m High Palisade Fencing (With 1m high of electric fence above)
- Battery Container
- Inverter
- Energy Management Building
- Energy Management System
- Transformer
- Cooler
- Indicative Sustainable Urban Drainage System Pond
- Transformer
- Battery Container 1
- Uninterrupted Motor Drive Inverter Container
- AC/DC Distribution Container
- Static Frequency Converter and Excitation Container
- Control and Protection Container
- Battery Container 2
- High Voltage Infrastructure
- Switchgear Container
- 6m Security Column
- Emergency Back-up Diesel Tank
- Emergency Back-up Generator
- Welfare Unit
- Comms Unit
- National Grid Relay Room
- Location of Existing Ditch
- Crushed Stone
- Gate
- Non-operational National Grid Land
- Water Crossing

PROJECT: Soay (Thornton)

CODE: SCUKX-SOAY-000 PVL-100

CLIENT:

LOCATION:

PROPOSAL ONLY

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REV	DATE	DESCRIPTION	DRAWN	APPRV
F	06/07/2022	Fence revised	AM	AP

General PV Layout	SCALE 1:5000 A1
SCUKX-SOAY-000 PVL-100 F	SHEET 1 of 1

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APPENDIX 2 – SURVEY RECORD SHEETS

Arcus Consultancy Services 1C Swinegate Court East, 3 Swinegate, York, YO1 8AJ

Noise Survey Record Sheet

Project No.	4259	**Project Name:**	Thornton
Location (x of y)	1	**Installed By:**	MS
Lat/Long	53.89765, -0.82016	**Location Name**	Melbourne Road
Start Date	11/06/2021	**Start Time**	1030

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	709257
Calibrator:	Rion NC-74	35105087
Source of Equipment:		Arcus
Meter Timestamp (Start/End, GMT/BST):		Start BST

Location / Source:	In field opposite houses on Melbourne road. Approximately same distance from road as property amenity space.
Distance from façade::	N/A
Noise sources observed:	Road noise on Melbourne road. Vehicles pass at speed. Wind in trees. No sound from existing substation audible. Occasional farm noise
Weather Conditons:	Overcast, slight breeze,
Additional notes:	0

Installation (Visit 1)

Date:	11/06/2021	**Time:**	1030
Filename:	101	**Calibration level:**	94
Range setting:	20-130	**Meas. period:**	15min
Freq weighting:	A	**Weather Station:**	Weather Station
Lp Logging?	No	**Audio / Octave?**	No
Notes:	0		

Visit 2

Date:	15/06/2021	**Time:**	1045
Visited by:	MS	**Calibration level:**	94
Level pre-calibration	0	**Batts replaced?**	0
Equipment Removed?			YES
Notes:	0		

Arcus Consultancy Services 1C Swinegate Court East, 3 Swinegate, York, YO1 8AJ

Noise Survey Record Sheet - Photos

Project No.	4259	**Location (x of y)**	1

Arcus Consultancy Services 1C Swinegate Court East, 3 Swinegate, York, YO1 8AJ

Noise Survey Record Sheet

Project No.	4259	**Project Name:**	Thornton
Location (x of y)	2	**Installed By:**	MS
Lat/Long	53.91256, -0.85449	**Location Name**	Common lane
Start Date	11/06/2021	**Start Time**	1130

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	510131
Calibrator:	Rion NC-74	35105087
Source of Equipment:		Arcus
Meter Timestamp (Start/End, GMT/BST):		Start BST

Description of Sound Sourc	Field on opposite side of road to houses
Distance from façade::	N/A
Noise sources observed:	Wind in trees, occasional car passing, birds
Weather Conditons:	Overcast, slight breeze
Additional notes:	0

Installation (Visit 1)

Date:	11/06/2021	**Time:**	1130
Filename:	201	**Calibration level:**	94
Range setting:	20-130	**Meas. period:**	15min
Freq weighting:	A	**Weather Station:**	No
Lp Logging?	No	**Audio / Octave?**	No
Notes:	0		

Visit 2

Date:	15/06/2021	**Time:**	1015
Visited by:	MS	**Calibration level:**	94
Level pre-calibration	0	**Batts replaced?**	0
Equipment Removed?			YES
Notes:	0		

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Noise Survey Record Sheet - Photos

Project No.	4259	Location (x of y)	2

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Noise Survey Record Sheet

Project No.	4259	**Project Name:**	Thornton
Location (x of y)	3	**Installed By:**	MS
Lat/Long	53.89673, -0.83373	**Location Name**	Byholme Farm
Start Date	11/06/2021	**Start Time**	1200

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-31	593610
Calibrator:	Rion NC-74	35105087
Source of Equipment:		Arcus
Meter Timestamp (Start/End, GMT/BST):		Start BST

Description of Sound Sourc	On public footpath, approx same distance from road between farms
Distance from façade::	N/A
Noise sources observed:	Birds in trees, road noise
Weather Conditons:	Overcast, slight breese
Additional notes:	0

Installation (Visit 1)

Date:	11/06/2021	**Time:**	1200
Filename:	301	**Calibration level:**	94
Range setting:	20-110	**Meas. period:**	15min
Freq weighting:	A	**Weather Station:**	No
Lp Logging?	No	**Audio / Octave?**	No
Notes:	0		

Visit 2

Date:	15/06/2021	**Time:**	1030
Visited by:	MS	**Calibration level:**	94
Level pre-calibration	0	**Batts replaced?**	0
Equipment Removed?			Yes
Notes:	0		

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Noise Survey Record Sheet - Photos

Project No.	4259	Location (x of y)	3

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Noise Survey Record Sheet

Project No.	4259	**Project Name:**	Thornton
Location (x of y)	4	**Installed By:**	Ms
Lat/Long	53.90801, -0.84062	**Location Name**	Warren Lodge
Start Date	15/06/2021	**Start Time**	11:45

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	709257
Calibrator:	Rion NC-74	35105087
Source of Equipment:		Arcus
Meter Timestamp (Start/End, GMT/BST):		Start BST

Description of Sound Sourc	On public footpath, approx same distance from road between farms
Distance from façade:	N/A
Noise sources observed:	Birds in trees, road noise
Weather Conditons:	Overcast, slight breese
Additional notes:	0

Installation (Visit 1)

Date:	15/06/2021	**Time:**	1145
Filename:	401	**Calibration level:**	94
Range setting:	20-120	**Meas. period:**	15min
Freq weighting:	A	**Weather Station:**	No
Lp Logging?	No	**Audio / Octave?**	No
Notes:	0		

Visit 2

Date:	17/06/2021	**Time:**	915
Visited by:	MS	**Calibration level:**	94
Level pre-calibration	0	**Batts replaced?**	0
Equipment Removed?			YES
Notes:	0		

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Noise Survey Record Sheet - Photos

Project No.	4259	**Location (x of y)**	4

APPENDIX 3 - NOISE MAP

Customer: Statkraft UK LTD
Project: Soay Solar Farm and Greener Grid Park
Project-No. 3404

Appendix

3

Revisede_Soay_NoiseMap
Result number 9
Calculation in 1.5 m above ground

Project engineer: BA
Created: 21/06/2022
Processed with SoundPLAN 8.2, Update 16/01/2020

Specific Levels
in dB(A)

<	35
35 -	37
37 -	39
39 -	41
41 -	43
43 -	45
45 -	47
47 -	49
49 -	51
51 -	53
53 -	55
55 -	57
57 -	59
59 -	61
61 -	63
>=	63

Signs and symbols

- Main building
- Point receiver
- Point Source
- Area Source
- Industrial building; Roc
- Plant source
- Foliage

Pond with 100m buffer
Root protection areas
Ditches with 6m buffer
Overhead Line with 14m buffer
Water crossing
Overhead Line with 9m buffer
Excluded area for existing property
Land boundary
Perimeter fence
Power Station
Battery storage
Temporary construction compound to be replaced with batteries once complete

A B C D E F G H I J K L1 L2 M1 M2 N3 O P Q

Length scale 1:8890
0 50 100 200 300 400 m

N

ARCUS

C:\Users\bilal.ahmed\Desktop\3404 Soay Revised Layout\\NoiseMap_Revised.sgs