

Appendix 7.1

Baseline Noise Review





North Killingholme
Power Project

**Non-Material Change to
Development Consent Order**

Environmental Report

**Appendix 7-1 – Baseline Noise
Assessment**

C.GEN Killingholme Limited

1 INTRODUCTION

1.1 Background

- 1.1.1 WSP has been appointed by C.GEN to undertake an updated baseline noise assessment to support the Non-material amendment to the Development Consent Order (DCO) amendments for the North Killingholme Power Project, hereafter referred to as the Scheme.
- 1.1.2 A noise assessment was originally undertaken as part of the Environmental Statement (ES) in March 2013, which was included within the DCO application.
- 1.1.3 This report describes the methodology and results of two updated baseline noise surveys carried out in June 2019 and March 2020. The results of these baseline surveys have enabled a comparison with the original noise assessment.
- 1.1.4 This report presents a discussion of the baseline noise level comparison informed by current standards and guidance.

1.2 Scope of Assessment

This baseline report addresses the following pertinent matters:

- National and local policy, guidance and standards, relevant to the assessment;
- The methodology and results of baseline noise surveys undertaken in June 2019 and March 2020;
- Discussion and evaluation of findings against the original ES noise assessment.

A glossary of acoustics terminology is presented in Appendix 7-1A.

2 POLICY, STANDARDS AND GUIDANCE

2.1 National Policy

National Planning Policy Framework, 2019 (NPPF)

- 2.1.1 The NPPF (revised February 2019 and amended June 2019) provides guidance and key objectives for local policy development. Relevant policies are outlined below:
- 2.1.2 Paragraph 11 states (inter alia):
- "Plans and decisions should apply a presumption in favour of sustainable development..."*
- For decision-taking this means: ...*
- c) approving development proposals that accord with an up-to-date development plan without delay; or*
- d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:*

i. the application of policies in this Framework [i.e. the NPPF] that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or

ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefit, when assessed against the policies in this Framework [i.e. the NPPF] taken as a whole"

2.1.3 Paragraph 170 (inter alia):

"Planning policies and decisions should contribute to and enhance the natural local environment by: ...

e) Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of...noise..."

2.1.4 Paragraph 180 (inter alia):

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".

Noise Policy Statement for England, 2010 (NPSE)

2.1.5 The Noise Policy Statement for England (NPSE) outlines central Government vision, aims and principles for managing and controlling environmental noise affecting people.

2.1.6 The NPSE describes key conceptual thresholds considered to represent the onset of the (adverse) effects of environmental noise:

- Lowest Observed Adverse Effect Level (LOAEL) – the level above which adverse effects on health and quality of life can be detected; below this threshold noise is considered to be in the No Observed Effect Level (NOEL) range.
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life can occur.

2.1.7 Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development, the three aims of the NPSE are defined as:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and

- Where possible, contribute to the improvement of health and quality of life.

2.2 Local Policy

North Lincolnshire Core Strategy Adopted, June 2011

- 2.2.1 The North Lincolnshire Local Development Framework (LDF) set out this Core Strategy document, which specifies the long-term spatial planning framework for the development of North Lincolnshire up to 2026. The document provides strategic policies and guidance, with a strong focus on the principles of sustainable development to deliver the scale and distribution of development, the provision of infrastructure to support it and the protection of natural and built environment.
- 2.2.2 A review of the document highlighted that there are no direct references to noise in relation to the area surrounding the Scheme, referred to within the Core Strategy as the South Humber Bank.
- 2.2.3 However, more generally, minimising pollution is considered as a theme throughout the document, as indicated in the following spatial objectives and policies:

Spatial Objective 10: Creating A Quality Environment

Spatial objective 10 states (inter alia):

"4.36 The design of new development will contribute to the future image and perception change of North Lincolnshire. It should make the best of its surroundings, be accessible to all sections of the community, contribute to an enhanced feeling of safety and security, maximise resource efficiency, minimise pollution and waste. Poor quality design will not be acceptable."

Policy CS5: Delivering Quality Design in North Lincolnshire

The accompanying text following policy CS5 states:

"As design is a major part of creating sustainable communities, it will have an important role with regard to landscape protection, biodiversity, natural resource use, energy efficiency, flood risk and pollution. When considering proposals for future developments, applicants should give close attention to other policies in the Core Strategy covering the natural environment and resource use as part of the design process."

North Lincolnshire Local Plan, May 2003

- 2.2.4 The North Lincolnshire Local Plan was adopted in May 2003 and is used to make planning decisions. This plan is gradually being replaced by the Local Development Framework. Some of its policies have been replaced following the adoption of the Core Strategy, however several saved policies remain.
- 2.2.5 Saved policies that relate to noise have been identified as follows:

Policy DS1 – General Requirements

- 2.2.6 Policy DS1 states (inter alia):

"A high standard of design is expected in all developments in both built-up areas and the countryside and proposals for poorly designed development

will be refused. All proposals will be considered against the criteria set out below:

...

Amenity

iii) No unacceptable loss of amenity to neighbouring land uses should result in terms of noise, smell, fumes, dust or other nuisance, or through the effects of overlooking or overshadowing..."

It goes on to state:

"17.4 The national guidelines for development of business, industry and housing, embodied in PPG1, require local plans to set out the criteria and standards against which all development proposals will be judged. These must specifically include concern for the protection of the environment, efficiency in provision of infrastructure, and matters of location, access, siting and design. Case law and Government regulations have in turn established issues of nature conservation, landscaping, amenity, nuisance, health hazard and pollution as areas of justifiable concern.

17.5 The purpose of Policy DS1 is to set out the generality of these environmental and other criteria and standards, which every planning application will be expected to meet, thus achieving economy, efficiency, convenience, amenity and safety in the development and use of land."

Policy DS11 – Polluting Activities

2.2.7 Policy DS11 states:

"Planning permission for development, including extensions to existing premises and changes of use, will only be permitted where it can be demonstrated that the levels of potentially polluting emissions, including effluent, leachates, smoke, fumes, gases, dust, steam, smell or noise do not pose a danger by way of toxic release; result in land contamination; pose a threat to current and future surface or underground water resources; or create adverse environmental conditions likely to affect nearby developments and adjacent areas."

2.3 Standards and Guidance

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142)

2.3.1 British Standard 4142 describes methods for rating and assessing the following:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and

- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.
- 2.3.2 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.
- 2.3.3 In accordance with the assessment methodology, the specific sound level ($L_{Aeq,T}$) of the noise source being assessed is corrected, by the application corrections for acoustic features, such as tonal qualities and / or distinct impulses, to give a "rating level" ($L_{Ar,Tr}$). The British Standard effectively compares and rates the difference between the rating level and the typical background sound level ($L_{A90,T}$) in the absence of the noise source being assessed.
- 2.3.4 The British Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) when the noise source in question is likely to operate or is proposed to operate in the future.
- 2.3.5 Comparing the rating level with the background sound level, BS 4142 states:
- "Typically, the greater this difference, the greater the magnitude of impact.*
- A difference of around +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.*
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233)

- 2.3.6 This British Standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.
- 2.3.7 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings exposed to steady external noise sources. It is stated in the British Standard that it is desirable for internal ambient noise level not to exceed the criteria set out in Table 2-1 below.

Table 2-1 - Summary of internal ambient noise level criteria for dwellings from BS 8233: 2014

Activity	Location	Period	
		0700 to 2300 Hours, i.e. Daytime	2300 to 0700 Hours, i.e. Night-time
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures (BS 7445)

- 2.3.8 BS 7445 defines best practice during measuring and reporting of environmental noise. It should be applied when making environmental noise measurements.
- 2.3.9 The standard advises that the instrumentation for measuring noise should comply with the specifications for sound level meters. Measurements of equivalent continuous A-weighted sound pressure levels should be carried out to describe the noise climate of the area.
- 2.3.10 The document advises that the information to be reported should include:
- Description of the sound propagation model;
 - Location and features characterising the noise sources;
 - Any noise attenuation features;
 - Conditions of sound propagation (i.e. ground absorption)
 - Meteorological conditions;
 - Location of receivers; and
 - Position and sound power of the noise sources.

3 NOISE SURVEY METHODOLOGY

3.1 Consultation with North Lincolnshire Council

- 3.1.1 We liaised with the Environmental Protection Officer at North Lincolnshire Council in April 2020 to provide a summary of our methodology and results of the baseline noise assessment.

3.2 Overview

- 3.2.1 Baseline noise surveys were conducted between the 17 to 20 June 2019 and 16 to 26 March 2020, to determine the prevailing noise climate at representative noise sensitive receptors (NSRs), as reported within the original ES as part of the

DCO application. The purpose of this survey was to compare the current baseline conditions with those reported in the ES.

- 3.2.2 The surveys were conducted with reference to BS 7445-1. A class 1 sound level meter as defined in BS EN 61672:2003 was used to measure L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} parameters at each measurement location. The sound level meter was positioned in free-field conditions at 1.5m above ground level and observations were noted for each measurement.
- 3.2.3 The surveys comprised a total of seven measurement locations; five attended short-terms and two unattended long-terms. Attended measurements at NSRs, representing those assessed in the original ES, were undertaken during day, evening and night-time periods for the 2019 and 2020 surveys, whereas unattended measurements were made during the 2020 survey only. Short-term measurements were generally taken for a duration of 10- to 15-minutes, and long-term measurements were recorded continuously over consecutive 15-minute periods; audio was also recorded to enable a qualitative review of audible noise sources throughout the long-term survey. Noise survey locations are presented in Appendix 7-1B.
- 3.2.4 All noise monitoring equipment was calibrated prior to and on completion of measurements, using a Rion NC-74 acoustic calibrator. Calibration levels showed no significant drift at the end of each survey period.
- 3.2.5 Wind conditions were measured using handheld anemometer for attended measurements, and a weather station was set up logging data continuously during unattended measurements. The survey periods were generally dry, with a few occurrences of light showers. Average wind speeds were generally below 5m/s, gust speeds occasionally exceeded 5m/s. Measurements during periods of inclement weather were omitted from the data analysis.
- 3.2.6 Noise monitoring forms containing the measured noise levels, locations, weather conditions and general observations are presented in Appendix 7-1C. Weather monitoring forms containing the detailed measured weather data are presented in Appendix 7-1D.

3.3 Measurement Locations

- 3.3.1 Table 3-1 presents the short-term attended measurement locations. These measurement locations were chosen since they correspond with an even distribution of NSRs reported in the original ES, it is noted that where possible the 'NSR ID' has been maintained from the original ES.

Table 3-1 – Short-term attended measurement locations (2019/20)

NSR ID	Description	Easting	Northing
1	Marsh Lane	515224	421136
3	Station Road	513980	420240
5	Swinster Lane	514276	419329
7	Brick Lane	514517	418794
8	Haven Pits SSSI Site	516596	419991

- 3.3.2 Table 3-2 presents the long-term unattended measurement locations. It is noted that measurements were not taken in these locations during previous baseline surveys, therefore a prefix of 'LT' indicates the long-term nature of these measurements.

Table 3-2 – Long-term unattended measurement locations (2020)

NSR ID	Description	Easting	Northing
LT 1	South of Site	515630	419657
LT 2	North of Site	515618	420760

- 3.3.3 A figure showing all the noise monitoring locations is presented in Appendix 7-1B.

3.4 Measurement Equipment

- 3.4.1 Table 3-3 presents the measurement equipment used for baseline noise surveys in June 2019 and March 2020.

Table 3-3 – Measurement equipment

Equipment	Sound Level Meter / Calibrator	Pre-amp	Microphone	Certificate No.
Rion NL-52 * ¹	320637	10645	5708	UCRT18/1069
Rion NL-52 * ²	1021288	21330	8198	UCRT19/1998
Rion NL-52 * ²	1021292	21334	4348	UCRT18/1885
Rion NL-52 * ²	1021291	21333	4347	UCRT19/1023
Rion NC-74 * ¹	830766	N/A	N/A	UCRT19/1013
Rion NC-74 * ²	34657202	N/A	N/A	UCRT19/1994
<u>Notes</u> * ¹ equipment used during 2019 survey * ² equipment used during 2020 survey				

- 3.4.2 Calibration certificates for the measurement equipment above are presented in Appendix 7-1E.

3.5 Short-term Baseline Data Processing

- 3.5.1 Short-term measurement data is presented in full within the noise monitoring forms in Appendix 7-1C.

- 3.5.2 The following data processing steps were undertaken for short-term noise monitoring locations, to derive a set of results for each NSR.

- Non-representative events during attended measurements were excluded from the data (e.g. due to dominant foliage noise or no presence of industrial noise, see paragraph 3.6.4).

- Daytime (0700-2300) and night-time (2300-0700) background noise levels (L_{A90}) were derived for each NSR location, by taking arithmetic average of the remaining measurements during each respective period.

3.6 Long-Term Baseline Data Processing

- 3.6.1 Long-term measurement data, including a complete time-history plot, is presented within the noise monitoring forms in Appendix 7-1C.
- 3.6.2 The survey undertaken in March 2020 comprised two unattended noise monitoring locations, with the aim to understand the regularity and nature of industrial noise forming part of the noise climate in the area. Audio was recorded at regular intervals such that a qualitative review of noise sources could be undertaken during post-processing.
- 3.6.3 Although the long-term measurement locations were not directly representative of residential receptors, it was considered that residential receptors would experience comparable industrial noise on/off conditions. The data was used to understand the frequency of occurrence for the representative background noise levels.
- 3.6.4 Furthermore, upon analysis of the recorded audio during long-term measurements it was found that industrial noise was always present as a part of the surrounding noise climate, even during the quietest daytime and night-time periods. However, it is noted that industrial noise was not always present at a constant level and this has been considered in our contextual discussion later in the report.

4 NOISE SURVEY RESULTS

4.1 Representative Background Noise Levels

- 4.1.1 This section presents the combined results of baseline surveys undertaken in June 2019 and March 2020, a comparison against the original ES is also provided.
- 4.1.2 The representative background L_{A90} noise level at each NSR location is summarised in Table 4-1 below.

Table 4-1 – Representative background L_{A90} noise levels at NSRs

NSR ID	Description	Daytime L_{A90} dB (0700 to 2300)	Night-time L_{A90} dB (2300 to 0700)
1	Marsh Lane	35	32
3	Station Road	38	33
5	Swinster Lane	40	34
7	Brick Lane	38	40
8	Haven Pits SSSI Site	46	44

- 4.1.3 Table 4-1 shows that:

- Representative background noise levels during the daytime range between 35 to 46 dB.

- Representative background noise levels during night-time range between 32 to 44 dB.
- Night-time noise levels are consistently lower than daytime levels, with exception to Brick Lane where the representative daytime level is 2 dB lower than night.

4.2 Comparison with Original ES Noise Assessment

4.2.1 Table 4-2 presents a comparison of the 2019/2020 baseline survey results, against the background noise levels reported within the original ES noise assessment.

Table 4-2 – Comparison of 2019/2020 baseline noise levels with original ES

NSR ID	ES Background Level, dB LA90	2019/20 Daytime		2019/20 Night-time	
		Background Level, dB LA90	Difference with ES, dB	Background Level, dB LA90	Difference with ES, dB
1	38.5	35	-3.5	32	-6.5
3	37.0	38	1.0	33	-4.0
5	39.4	40	0.6	34	-5.4
7	41.3	38	-3.3	40	-1.3
8	41.8	46	4.2	44	2.2

4.2.2 Table 4-2 shows that:

- During the 2019/2020 daytime, background noise levels at NSRs 1 and 7 are between 3 to 4 dB lower than those used within the ES noise assessment. Whereas NSRs 3, 5 and 8 are shown to be subject to higher background noise levels.
- During the 2019/20 night-time, background noise levels at NSRs 1, 3, 5 and 7 are between 1 and 6.5 dB lower than those used within the ES noise assessment. Whereas NSR 8 is shown to be subject to higher background noise levels.

4.2.3 Discussion is provided in the following section to understand the impact of these differences on the outcome of the original ES noise assessment, particularly where background noise levels are shown to be lower in 2019/2020 baseline surveys.

4.3 Discussion

4.3.1 This section provides discussion relating to the results presented in the above sections.

4.3.2 Noise levels associated with the operation of a generating station as an IGCC plant (referred to as 'Scenario E' within the original ES) has been considered as a worst case. Based on the updated background levels and operation of 'Scenario E', it was found that noise levels at NSRs 3, 5, 7 and 8 would not exceed the background noise level by more than 5 dB, thus not exceeding the significance threshold set out in the original ES assessment.

- 4.3.3 It was found that NSR 1 (Marsh Lane) would just exceed the threshold of 5 dB above background by 1 dB, due to the updated background noise levels being lower than the original ES. Taking into account guidance in BS 4142:2014, this is likely to be an indication of an adverse impact, depending on the context.
- 4.3.4 Contextual aspects for Marsh Lane are outlined below:
- An estimate of internal noise levels has been undertaken to consider a reasonable worst-case reduction of noise levels due to a partially open window. Based on the guidance, 12 dB(A) has been subtracted from the external specific noise level to represent the attenuation provided by an open window. This results in an internal noise level of 23 dB(A) which is within acceptable noise levels inside bedrooms, as indicated by BS 8233:2014. This indicates that the operational noise effect would be not significant.
 - A noise level of 32 dB L_{A90} has been identified as representative background noise level at NSR 1 (Marsh Lane) during the noise survey 2019/2020. Further processing shows that that the background noise levels at this location may be higher than 32 dB L_{A90} for approximately 70% of the time during the night-time, meaning 30% of the time background noise levels are less than or equal to 32 dB L_{A90} . This finding is contextually important as it demonstrates that 70% of the time NSR 1 will be subject to a less adverse noise impact.
- 4.3.5 Clause 20 of the DCO outlines that noise emitted from the authorised development following commissioning shall not exceed a noise level of 35 dB $L_{Aeq,1hr}$ during the daytime, or 35 dB $L_{Aeq,5min}$ during the night-time at any existing residential location. Compliance with this limit is deemed to be achieved through compliance with the boundary noise limits set out in the ES.
- 4.3.6 There is no change proposed to the operational noise limits as a result of the amendments described in this application. Taking into account the information outlined above, it is considered that no changes are needed to the DCO requirements in relation to noise as a result of changes to the baseline noise climate.

5 CONCLUSION

- 5.1.1 Updated noise monitoring has been undertaken to support the non-material amendment to the DCO amendments for the North Killingholme Power Project.
- 5.1.2 The noise monitoring, reporting and discussion has taken account of current guidance and has considered the potential noise effects that may arise due to the Proposed Scheme at NSRs as detailed in the original DCO application.
- 5.1.3 The assessment has concluded that a likely adverse impact is predicted at NSR 1. However, contextual considerations have been assessed in line with BS 4142:2014, indicating that external noise levels will be compliant with the DCO, and internal noise levels would be within BS 8233:2014 guideline levels, furthermore, the distribution of background noise levels shows that the representative background noise level used within the assessment may be higher than those reported for 70% of the time during the night-time.

APPENDIX 7-1A

ACOUSTIC GLOSSARY OF TERMS

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

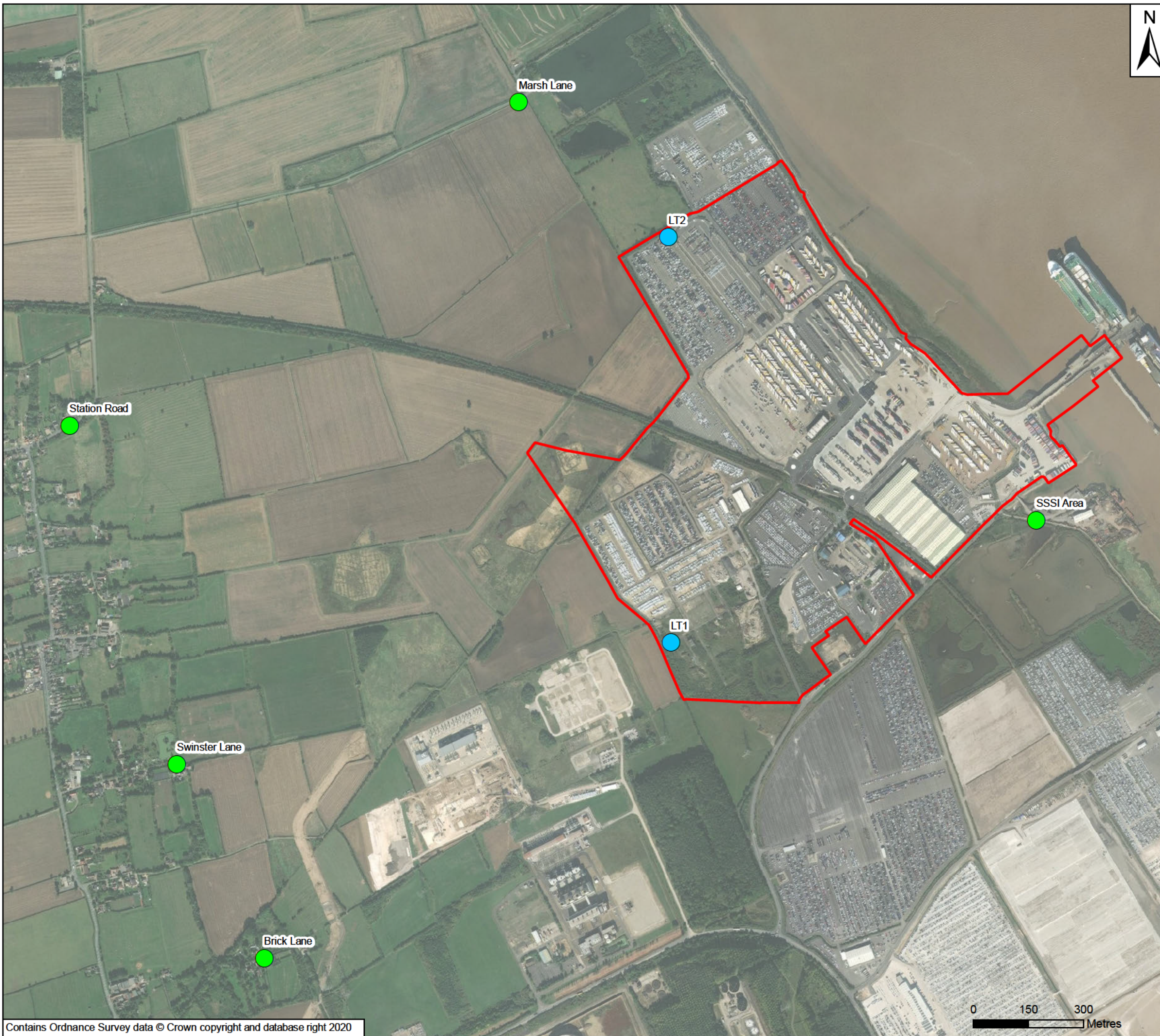
The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology	
dB (decibel)	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value and the scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A-weighted sound pressure level measured over the period stated. L_{Amax} is sometimes used in assessing

	environmental noise where occasional loud noises occur, which may have little effect on the overall L_{Aeq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' time weighting.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Fast	A time weighting with a 125 millisecond time constant
Slow	A time weighting with a 1000 millisecond time constant.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1 m in front of a large sound reflecting object such as a building façade.
Ambient Noise Level	The all-encompassing noise level measured in $L_{Aeq,T}$. The Ambient Noise Level incorporates background sounds as well as the industrial source noise under consideration.
Residual Noise Level	The Ambient Noise Level in the absence of the industrial source noise under consideration, measured in $L_{Aeq,T}$.
Specific Noise Level	The noise level measured in $L_{Aeq,T}$ attributed to the industrial noise source under consideration alone.
Background Noise Level	The noise level in the absence of the industrial source noise under consideration, measured in L_{A90} .
Noise Rating Curves (NR)	Graphical method for assigning a single-number rating to a noise spectrum. It can be used to specify the maximum acceptable level in each octave band of a frequency spectrum, or to assess the acceptability of a noise spectrum for a particular application.
Octave Band Spectrum	Frequency band in which the upper limit is twice the frequency of the lower limit, used to analyse the frequency composition of a sound field or specific noise source.
Break-in	Noise transmission into a structure from outside.


APPENDIX 7-1B

NOISE MONITORING LOCATIONS



- Key
- Red Line Boundary
 - Short-term Measurement Locations
 - Long-term Measurement Locations



Client:		
Project:	NORTH KILLINGHOLME POWER PROJECT	
Title:	BASELINE NOISE SURVEY MEASUREMENT LOCATIONS	
Drawing No:	Appendix 7-1B	Drawn: LT
Date:	06/04/2020	Checked: EO
Scale:	10,000 @ A3	Approved: EO

0 150 300
Metres

APPENDIX 7-1C

NOISE MONITORING FORMS

Noise Monitoring Form



Project Name	North Killingholme Power Project	Project No	70055743
Location	Marsh Lane	Engineer	Leonard Terry
Equipment	Rion NL-52	General Weather Description	2019: Dry and overcast conditions, wind speeds less than 5m/s. 2020: Dry and overcast conditions, average wind approximately 3-4 m/s, gusts above 5m/s at control position.
Pre-Calibration Level	94.0		
Post-Calibration Level	94.0		

Additional Comments: Industrial noise, when operational at night, was generally perceived to propagate from the south and was continuous/broadband in nature, unless stated otherwise.

Measurement Period		Weather		Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed Avg / Max (m/s)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
17/06/2019 20:09	10.00	2 / -	11	42.8	70.3	40.2	34.2	Industrial activity at port - moving plant/horns, distant road traffic noise, birdsong
18/06/2019 10:26	15.00	1 / -	16	47.8	78.5	42.2	33.4	Occasional farm activity, birdsong
18/06/2019 12:14	15.00	1 / -	16	39.8	63.6	41.9	32.8	Distant road traffic noise, aeroplanes, birdsong
18/06/2019 14:56	15.00	1 / -	16	51.1	75.1	45.6	35.9	Distant road traffic noise, aeroplanes, birdsong
18/06/2019 23:48	10.00	0 / -	14	35.5	50.0	37.1	33.0	Industrial noise
19/06/2019 01:16	10.00	0 / -	14	34.4	54.7	34.9	32.4	Industrial noise
19/06/2019 13:15	15.00	1 / -	16	48.1	75.5	45.9	29.9	Industrial activity at port, distant road traffic noise, aeroplanes, birdsong
19/06/2019 15:06	15.00	1 / -	16	47.8	71.1	44.1	32.9	Industrial activity at port, distant road traffic noise, aeroplanes, birdsong
19/06/2019 21:02	10.00	1 / -	15	35.7	56.8	37.2	33.0	Industrial noise and distant road traffic noise
19/06/2019 22:57	5.00	1 / -	15	34.9	52.7	37.0	31.9	Industrial noise and distant road traffic noise
19/06/2019 23:03	10.00	1 / -	15	31.7	51.0	32.8	30.0	Industrial noise and distant road traffic noise
20/06/2019 01:29	10.00	1 / -	15	27.0	58.3	26.0	23.0	No dominant noise source
17/03/2020 01:10	15.00	3 / 6	5	50.1	70.7	52.9	41.2	Foliage movement, industry operational but not audible
17/03/2020 12:00	15.00	3 / 6	8	52.9	77.4	55.2	40.7	Aircraft overhead, birdsong, slight foliage movement and watercourse
17/03/2020 12:16	15.00	3 / 6	8	47.7	63.5	51.2	40.2	Aircraft overhead, birdsong, slight foliage movement and watercourse
17/03/2020 15:46	15.00	3 / 7	9	51.3	70.5	54.4	42.1	Industrial activity and horns, vehicle passby, slight foliage movement and watercourse
17/03/2020 16:02	15.00	3 / 7	9	50.2	69.1	53.5	42.1	Industrial activity and horns, vehicle passby, slight foliage movement and watercourse
17/03/2020 21:35	15.00	4 / 10	6	52.5	72.9	55.8	43.0	Foliage and wind noise dominant
18/03/2020 08:48	15.00	3 / 5	10	47.4	77.1	43.5	31.9	Highly perceptible 30 second ferry siren, otherwise no industrial noise



Noise Monitoring Form



Project Name	North Killingholme Power Project	Project No	70055743
Location	Station Road	Engineer	Leonard Terry
Equipment	Rion NL-52	General Weather Description	2019: Dry and overcast conditions, wind speeds less than 5m/s. 2020: Dry and overcast conditions, average wind approximately 3-4 m/s, gusts above 5m/s at control position.
Pre-Calibration Level	94.0		
Post-Calibration Level	94.0		

Additional Comments: Industrial noise, when operational at night, was generally perceived to propagate from the south and was continuous/broadband in nature.

Measurement Period		Weather		Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed Avg / Max (m/s)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
17/06/2019 19:54	10.00	2 / -	11	51.8	72.2	53.7	39.2	Distant industrial and road traffic noise, local vehicle passes, dogs barking
18/06/2019 10:02	15.00	1 / -	16	55.2	81.0	51.6	35.9	Distant road traffic noise, aeroplanes, local vehicle passes
18/06/2019 11:53	15.00	1 / -	16	50.0	70.3	52.5	37.1	Distant road traffic noise, aeroplanes
18/06/2019 14:31	15.00	1 / -	16	56.3	73.5	59.4	37.3	Distant road traffic noise, aeroplanes, local vehicle passes
18/06/2019 23:33	10.00	0 / -	14	51.5	76.0	34.9	29.7	Industrial noise, occasional distant road traffic noise
19/06/2019 01:00	10.00	0 / -	14	35.4	61.2	35.0	31.8	Industrial noise, occasional distant road traffic noise
19/06/2019 12:56	15.00	1 / -	16	45.7	74.2	48.7	32.1	Distant road traffic noise, aeroplanes
19/06/2019 14:46	15.00	1 / -	16	49.8	73.0	49.3	35.0	Distant road traffic noise, aeroplanes
19/06/2019 21:19	10.00	1 / -	15	51.1	66.2	54.7	35.6	Industrial noise, aeroplanes
19/06/2019 22:49	5.00	1 / -	15	30.0	57.9	30.3	23.8	No dominant noise sources, occasional distant road traffic noise
19/06/2019 23:18	10.00	1 / -	15	27.6	48.0	30.0	24.3	No dominant noise sources, occasional distant road traffic noise
20/06/2019 01:14	10.00	1 / -	15	24.0	51.6	22.1	19.3	No dominant noise sources, occasional distant road traffic noise
17/03/2020 00:50	15.00	3 / 8	5	46.0	68.8	48.3	38.6	Slight foliage movement
17/03/2020 11:24	15.00	3 / 8	8	54.3	73.7	57.8	40.2	Occasional car passby, occasional aircraft, slight foliage movement, birdsong
17/03/2020 11:39	15.00	3 / 6	8	55.4	77.6	57.9	39.5	Occasional car passby, occasional aircraft, slight foliage movement, birdsong
17/03/2020 15:01	15.00	3 / 8	9	54.4	79.1	55.7	44.7	Occasional car passby, occasional aircraft, slight foliage movement, garden activity, birdsong
17/03/2020 15:25	15.00	3 / 8	9	52.6	72.5	55.4	41.8	Occasional car passby, occasional aircraft, slight foliage movement, garden activity, birdsong
17/03/2020 21:16	15.00	4 / 9	6	50.4	75.2	52.5	44.8	Foliage movement dominant
18/03/2020 09:07	15.00	3 / 4	10	53.7	80.8	52.5	34.7	Occasional car passby, occasional aircraft overhead, slight foliage movement, birdsong



Noise Monitoring Form



Project Name	North Killingholme Power Project	Project No	70055743
Location	Swinster Lane	Engineer	Leonard Terry
Equipment	Rion NL-52	General Weather Description	2019: Dry and overcast conditions, wind speeds less than 5m/s. 2020: Dry and overcast conditions, average wind approximately 3-4 m/s, gusts above 5m/s at control position.
Pre-Calibration Level	94.0		
Post-Calibration Level	94.0		

Additional Comments: Industrial noise, when operational at night, was generally perceived to propagate from the south and was continuous/broadband in nature.

Measurement Period		Weather		Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed Avg / Max (m/s)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
17/06/2019 19:40	10.00	2 / -	11	46.2	61.6	49.4	40.0	Occasional distant road traffic noise, aeroplanes, birdsong, foliage movement
18/06/2019 09:41	15.00	1 / -	16	43.5	66.9	47.1	36.5	Distant road traffic noise, horse livery activity, birdsong
18/06/2019 11:34	15.00	1 / -	16	47.4	64.8	50.4	36.5	Distant road traffic noise, aeroplanes, birdsong
18/06/2019 14:10	15.00	1 / -	16	45.6	70.0	48.4	38.7	Distant road traffic noise, aeroplanes, birdsong
18/06/2019 23:18	10.00	0 / -	14	35.9	56.4	37.2	33.4	Industrial noise, distant reverse signals audible
19/06/2019 00:45	10.00	0 / -	14	36.2	58.0	36.9	34.2	Industrial noise
19/06/2019 12:36	15.00	1 / -	16	47.1	71.7	50.3	35.7	Distant road traffic noise, aeroplanes, birdsong, nearby gardening activity
19/06/2019 14:26	15.00	1 / -	16.1	48.5	71.5	49.8	38.1	Distant road traffic noise, aeroplanes, birdsong
19/06/2019 21:33	10.00	1 / -	15	41.5	60.0	44.5	36.0	Industrial noise, occasional distant road traffic noise
19/06/2019 22:40	5.00	1 / -	15	32.4	48.1	35.0	28.1	No dominant noise sources, occasional distant road traffic noise
19/06/2019 23:34	10.00	1 / -	15	30.5	59.5	32.1	23.5	No dominant noise sources, occasional distant road traffic noise
20/06/2019 00:59	10.00	1 / -	15	30.9	46.7	34.3	22.3	No dominant noise sources, occasional distant road traffic noise, distant aeroplane
17/03/2020 00:30	15.00	3 / 7	5	47.2	60.9	49.5	44.5	Foliage movement dominant
17/03/2020 10:50	15.00	3 / 6	8	53.8	71.2	55.9	42.8	Distant road traffic noise, aircraft and helicopter overhead, slight foliage movement, birdsong
17/03/2020 11:05	15.00	3 / 6	8	56.3	72.9	59.6	44.8	Distant road traffic noise, aircraft and helicopter overhead, slight foliage movement, birdsong
17/03/2020 14:22	15.00	3 / 7	9	52.2	68.9	55.4	44.2	Distant road traffic noise, slight foliage rustle, moved to proxy location due to garden activity
17/03/2020 14:38	15.00	3 / 8	9	50.6	66.9	52.6	45.6	Distant road traffic noise, slight foliage rustle, moved to proxy location due to garden activity
17/03/2020 20:56	15.00	4 / 8	6	48.6	68.5	51.3	44.9	Foliage movement dominant
18/03/2020 09:26	15.00	3 / 5	10	48.7	71.2	51.3	38.6	Distant road traffic noise, birdsong



Noise Monitoring Form



Project Name	North Killingholme Power Project	Project No	70055743
Location	Brick Lane	Engineer	Leonard Terry
Equipment	Rion NL-52	General Weather Description	2019: Dry and overcast conditions, wind speeds less than 5m/s. 2020: Dry and overcast conditions, average wind approximately 3-4 m/s, gusts above 5m/s at control position.
Pre-Calibration Level	94.0		
Post-Calibration Level	94.0		

Additional Comments: Industrial noise, when operational at night, was generally perceived to propagate from the south and was continuous/broadband in nature.

Measurement Period		Weather		Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed Avg / Max (m/s)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
17/06/2019 19:26	10.00	2 / -	11	41.7	61.6	43.4	38.5	Distant road traffic noise, birdsong, foliage movement
18/06/2019 09:22	15.00	1 / -	16	50.2	71.7	51.8	34.4	Distant road traffic noise, aeroplanes, birdsong
18/06/2019 11:15	15.00	1 / -	16	42.7	61.2	45.5	36.4	Distant road traffic noise, birdsong
18/06/2019 13:41	15.00	1 / -	16	47.6	68.4	49.7	38.7	Distant road traffic noise, birdsong
18/06/2019 23:02	10.00	0 / -	14	43.3	64.2	44.3	38.0	Prominent industrial noise, reverse signals audible, distant road traffic noise
19/06/2019 00:28	10.00	0 / -	14	41.0	55.8	42.2	39.2	Prominent industrial noise, occasional distant road traffic noise
19/06/2019 12:10	15.00	1 / -	16	42.2	71.4	44.7	34.0	Distant industrial and road traffic noise, aeroplanes, birdsong
19/06/2019 14:05	15.00	1 / -	16	50.3	70.0	52.5	33.8	Distant industrial and road traffic noise, aeroplanes, birdsong
19/06/2019 21:46	10.00	1 / -	15	45.4	61.9	49.2	36.1	Prominent industrial noise, occasional distant road traffic noise
19/06/2019 22:32	5.00	1 / -	15	38.0	65.4	38.3	30.1	Faint industrial noise, occasional distant road traffic noise
19/06/2019 23:48	10.00	1 / -	15	29.2	46.6	30.9	22.4	No dominant noise sources
20/06/2019 00:44	10.00	1 / -	15	32.5	42.7	37.2	24.3	No dominant noise sources, faint construction activity on nearby closed road
17/03/2020 00:08	15.00	3 / 6	5	43.6	59.0	44.8	42.1	Distant industrial hum, foliage movement
17/03/2020 10:11	15.00	3 / 6	8	47.3	69.7	48.8	43.7	Distant industrial hum, road traffic noise, faint construction activity, aircraft overhead, birdsong
17/03/2020 10:26	15.00	3 / 7	8	47.9	66.2	49.4	43.4	Distant industrial hum, road traffic noise, faint construction activity, aircraft overhead, birdsong
17/03/2020 13:31	15.00	3 / 7	9	45.4	58.8	47.1	43.2	Distant industrial hum, road traffic noise, aircraft overhead, birdsong
17/03/2020 13:47	15.00	3 / 7	9	46.9	58.0	49.4	43.6	Distant industrial hum, road traffic noise, aircraft overhead, birdsong
17/03/2020 20:35	15.00	4 / 9	6	50.7	62.4	52.5	48.2	Industry appears active but not audible above dominant foliage movement
18/03/2020 09:45	15.00	2 / 5	10	45.3	61.8	48.8	37.0	Industry hardly perceptible, distant road traffic noise, aircraft



Noise Monitoring Form



Project Name	North Killingholme Power Project	Project No	70055743
Location	SSSI Area	Engineer	Leonard Terry
Equipment	Rion NL-52	General Weather Description	2019: Dry and overcast conditions, wind speeds less than 5m/s. 2020: Dry and overcast conditions, average wind approximately 2-4 m/s, gusts above 5m/s at control position.
Pre-Calibration Level	94.0		
Post-Calibration Level	94.0		

Additional Comments: Industrial noise, when operational at night, was generally perceived to propagate from the south-west and was continuous/broadband in nature, unless stated otherwise.

Measurement Period		Weather		Statistical Noise Levels / dB				Description of Audible Noise
Date/Time	Elapsed Minutes	Wind Speed Avg / Max (m/s)	Temperature (°C)	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
17/06/2019 19:04	10.00	2 / -	11	48.1	66.5	48.5	43.0	Nearby industrial activity - moving plant/horns, HGV road traffic noise, foliage movement
18/06/2019 08:57	15.00	1 / -	16	47.3	65.9	48.4	43.4	Nearby industrial activity, HGV road traffic noise, birdsong
18/06/2019 10:53	15.00	1 / -	16	48.0	64.6	49.7	45.5	Nearby industrial activity, HGV road traffic noise, birdsong
18/06/2019 12:38	15.00	1 / -	16	49.9	67.3	52.1	44.3	Nearby industrial activity, HGV road traffic noise, birdsong
18/06/2019 22:44	10.00	0 / -	14	44.8	58.2	45.3	43.9	Industrial noise, distant water trickling
19/06/2019 00:10	10.00	0 / -	14	44.2	55.6	45.6	42.5	Industrial noise, distant water trickling
19/06/2019 11:42	15.00	1 / -	16	53.2	75.0	54.4	43.8	Nearby industrial activity, HGV road traffic noise, birdsong
19/06/2019 13:42	15.00	1 / -	16	52.1	70.8	55.8	44.7	Nearby industrial activity, HGV road traffic noise, birdsong
19/06/2019 22:09	10.00	1 / -	15	44.7	59.0	47.2	40.5	Industrial noise, water trickling not present
20/06/2019 00:10	10.00	1 / -	15	40.8	57.7	42.0	39.3	Distant road traffic noise, distant water trickling
20/06/2019 00:20	10.00	1 / -	15	41.4	55.6	44.3	38.1	Distant road traffic noise, distant water trickling
16/03/2020 23:44	15.00	3 / 7	5	50.8	74.7	51.9	45.6	Distant broadband industrial hum, foliage movement, aircraft overhead
17/03/2020 09:34	15.00	3 / 6	8	54.5	80.3	55.2	47.3	Industrial shipping activities, horns, aircraft, distant road traffic, slight watercourse and birdsong
17/03/2020 09:49	15.00	2 / 7	8	49.3	66.8	50.9	46.9	Industrial shipping activities, horns, aircraft, distant road traffic, slight watercourse and birdsong
17/03/2020 12:54	15.00	3 / 7	9	50.7	65.7	52.7	47.6	Industrial shipping activities, horns, aircraft, distant road traffic, slight watercourse and birdsong
17/03/2020 13:10	15.00	3 / 6	9	50.3	65.8	52.2	47.6	Industrial shipping activities, horns, aircraft, distant road traffic, slight watercourse and birdsong
17/03/2020 20:12	15.00	4 / 8	6	50.2	65.0	52.5	47.6	Distant broadband industrial hum, foliage movement, slight watercourse
18/03/2020 10:08	15.00	2 / 5	10	55.4	71.5	57.2	51.0	Industrial shipping activities, horns



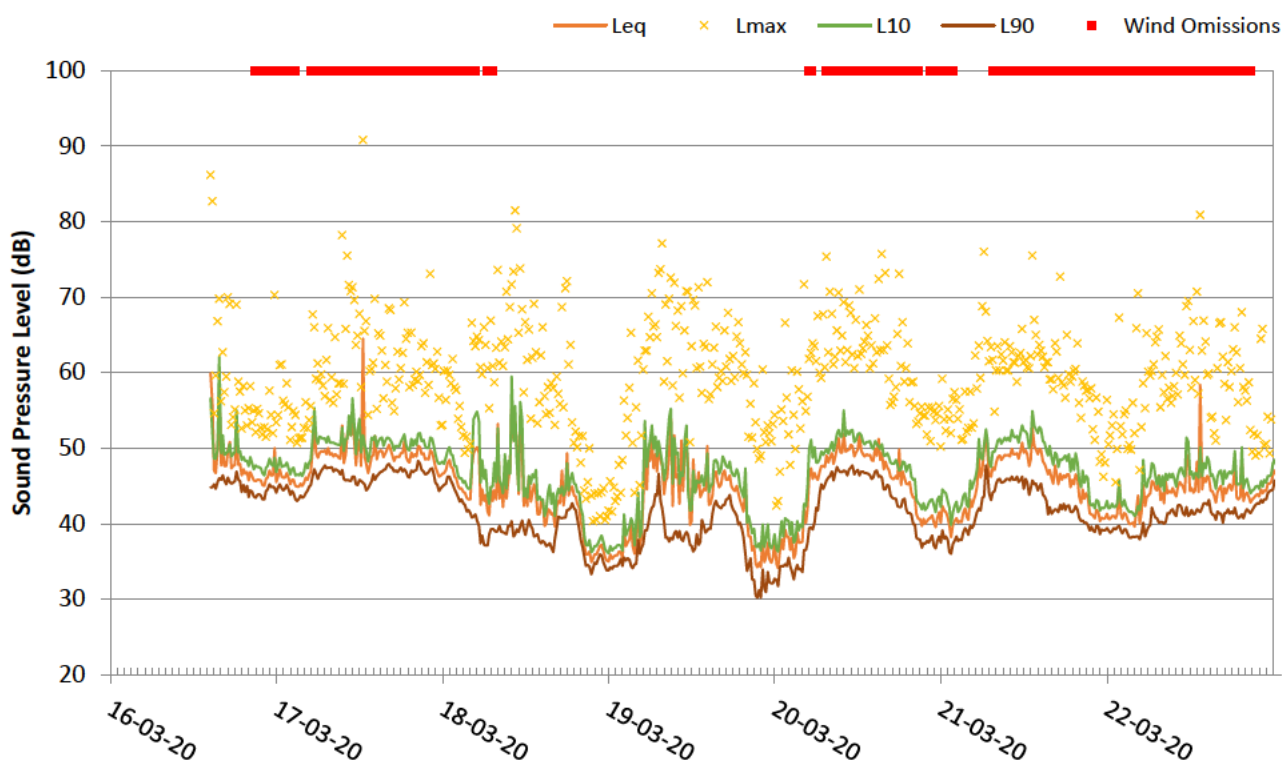
Noise Monitoring Form



Project Name:	North Killingholme Power Project	Project No:	70055743
Location:	LT 1 - South of Site	Engineer:	Leonard Terry
Equipment:	Rion NL-52	Weather:	Dry and overcast, with mixed wind conditions; average wind speed generally below 5m/s and gust speed often exceeding 5m/s. Wind omissions based on average wind speed > 5m/s and gust speed > 6m/s. See weather monitoring form for more detail.
Pre-Calibration Level:	94.0		
Post-Calibration Level:	94.0		

Additional Comments: Sheet 1 of 2

Measurement Period			Description of Audible Noise
Date	Start / Stop Time	Measurement Intervals	Industrial noise in surrounding environment and distant road traffic noise; industrial noise comprises distinctive broadband low frequency hum and occasional vehicle movements relating to port site activity.
16/03/2020	14:30	15 min	
26/03/2020	10:15		



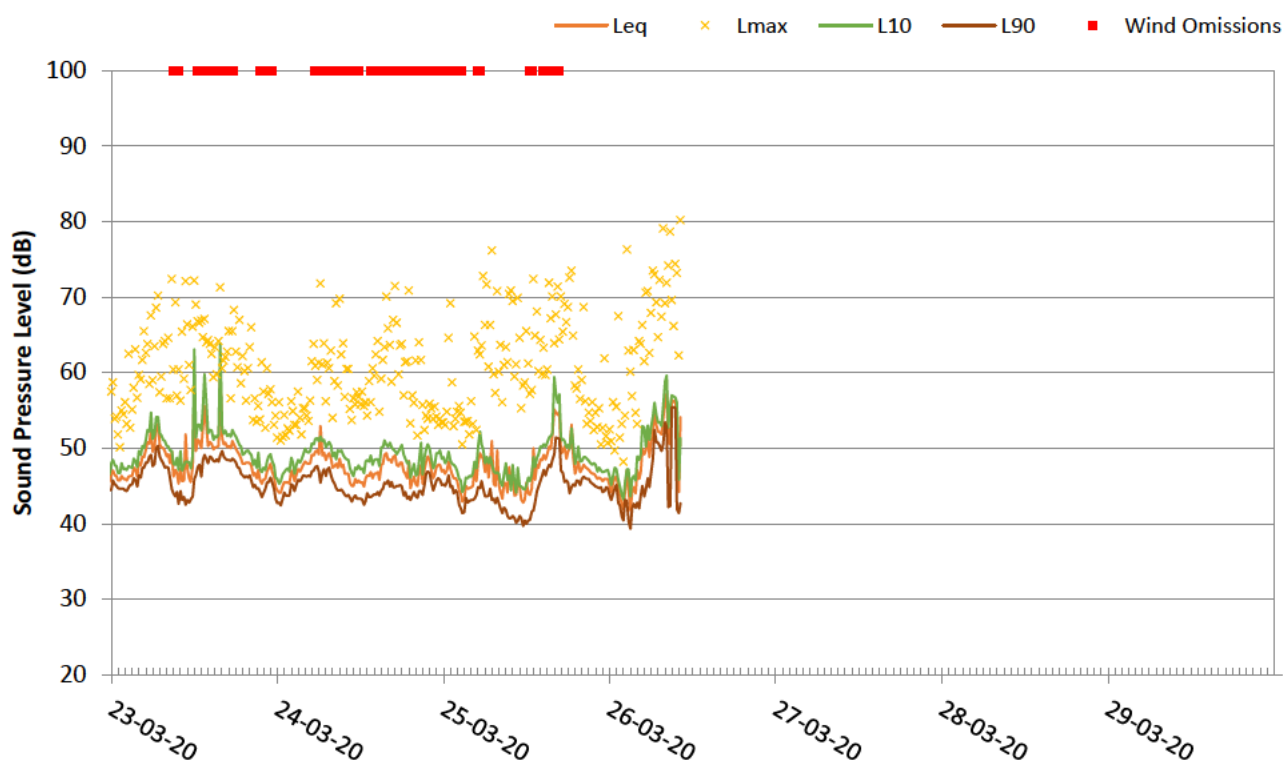
Noise Monitoring Form



Project Name:	North Killingholme Power Project	Project No:	70055743
Location:	LT 1 - South of Site	Engineer:	Leonard Terry
Equipment:	Rion NL-52	Weather:	Dry and overcast, with mixed wind conditions; average wind speed generally below 5m/s and gust speed often exceeding 5m/s. Wind omissions based on average wind speed > 5m/s and gust speed > 6m/s. See weather monitoring form for more detail.
Pre-Calibration Level:	94.0		
Post-Calibration Level:	94.0		

Additional Comments: Sheet 2 of 2

Measurement Period			Description of Audible Noise
Date	Start / Stop Time	Measurement Intervals	Industrial noise in surrounding environment and distant road traffic noise; industrial noise comprises distinctive broadband low frequency hum and occasional vehicle movements relating to port site activity.
16/03/2020	14:30	15 min	
26/03/2020	10:15		

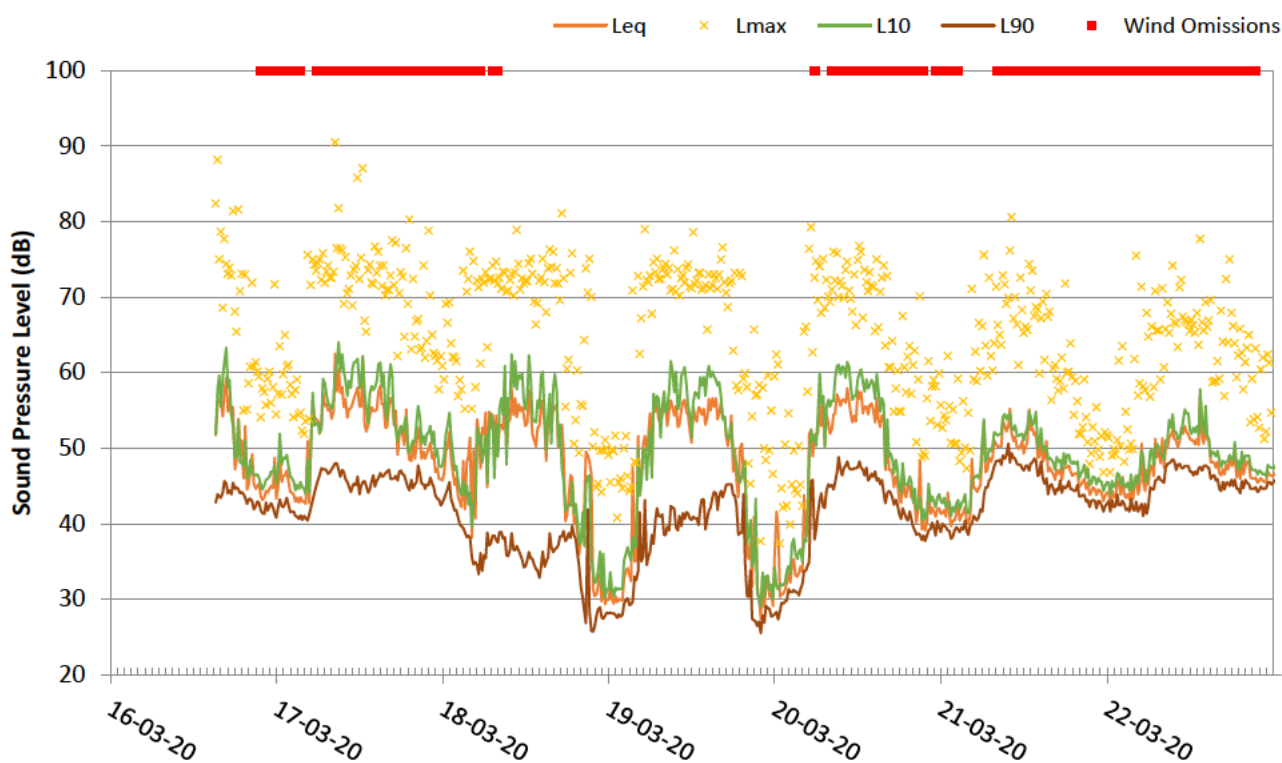


Noise Monitoring Form

Project Name:	North Killingholme Power Project	Project No:	70055743
Location:	LT 2 - North of Site	Engineer:	Leonard Terry
Equipment:	Rion NL-52	Weather:	Dry and overcast, with mixed wind conditions; average wind speed generally below 5m/s and gust speed often exceeding 5m/s. Wind omissions based on average wind speed > 5m/s and gust speed > 6m/s. See weather monitoring form for more detail.
Pre-Calibration Level:	94.0		
Post-Calibration Level:	94.0		

Additional Comments: Sheet 1 of 2

Measurement Period			Description of Audible Noise
Date	Start / Stop Time	Measurement Intervals	Industrial noise in surrounding environment and distant road traffic noise; industrial noise comprises distinctive broadband low frequency hum and occasional vehicle movements relating to port site activity.
16/03/2020	15:15	15 min	
26/03/2020	10:45		

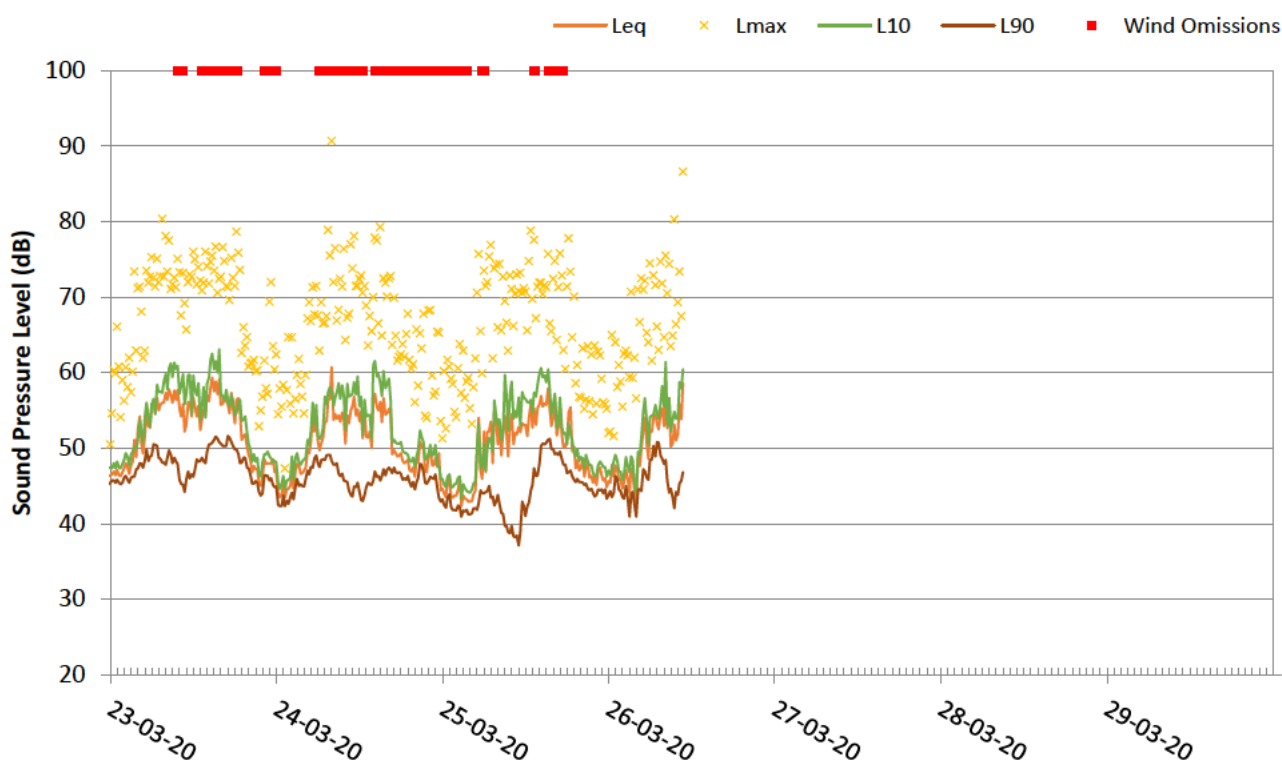


Noise Monitoring Form

Project Name:	North Killingholme Power Project	Project No:	70055743
Location:	LT 2 - North of Site	Engineer:	Leonard Terry
Equipment:	Rion NL-52	Weather:	Dry and overcast, with mixed wind conditions; average wind speed generally below 5m/s and gust speed often exceeding 5m/s. Wind omissions based on average wind speed > 5m/s and gust speed > 6m/s. See weather monitoring form for more detail.
Pre-Calibration Level:	94.0		
Post-Calibration Level:	94.0		

Additional Comments: Sheet 2 of 2

Measurement Period			Description of Audible Noise
Date	Start / Stop Time	Measurement Intervals	Industrial noise in surrounding environment and distant road traffic noise; industrial noise comprises distinctive broadband low frequency hum and occasional vehicle movements relating to port site activity.
16/03/2020	15:15	15 min	
26/03/2020	10:45		



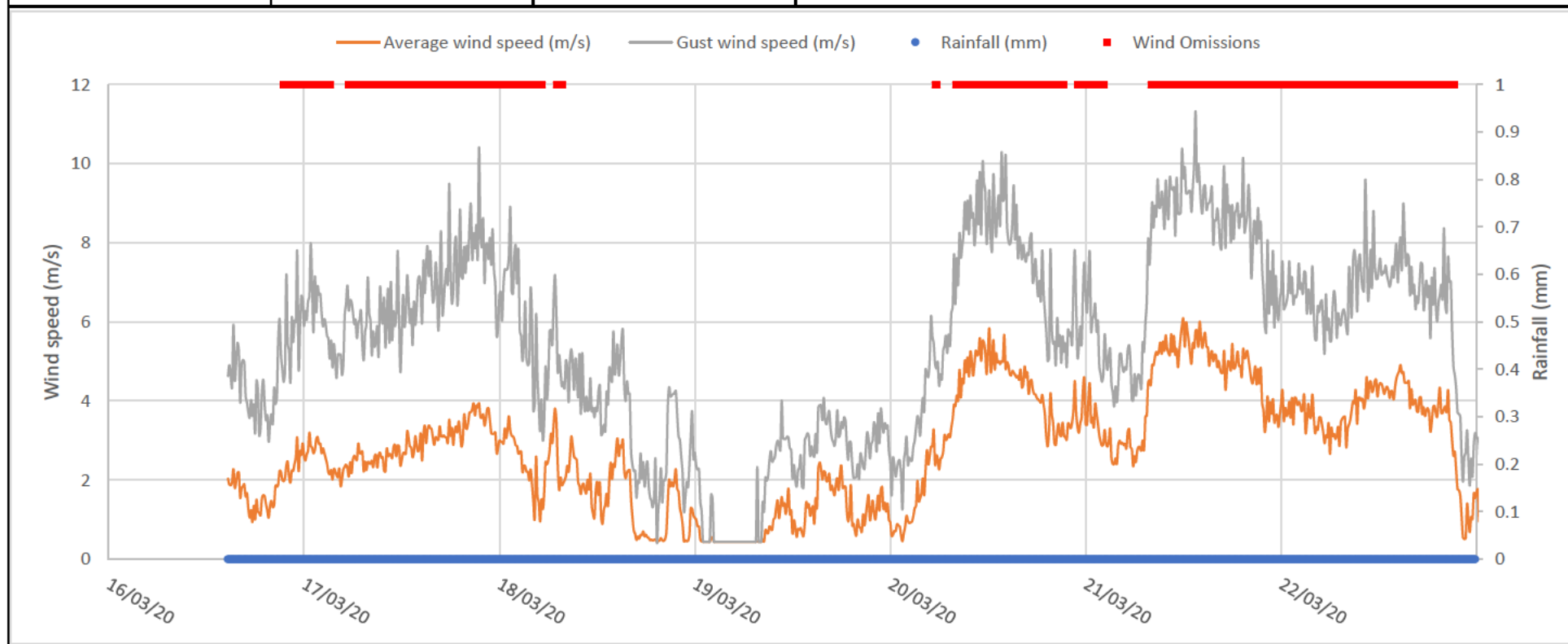
APPENDIX 7-1D

WEATHER MONITORING FORMS



Weather Monitoring Form

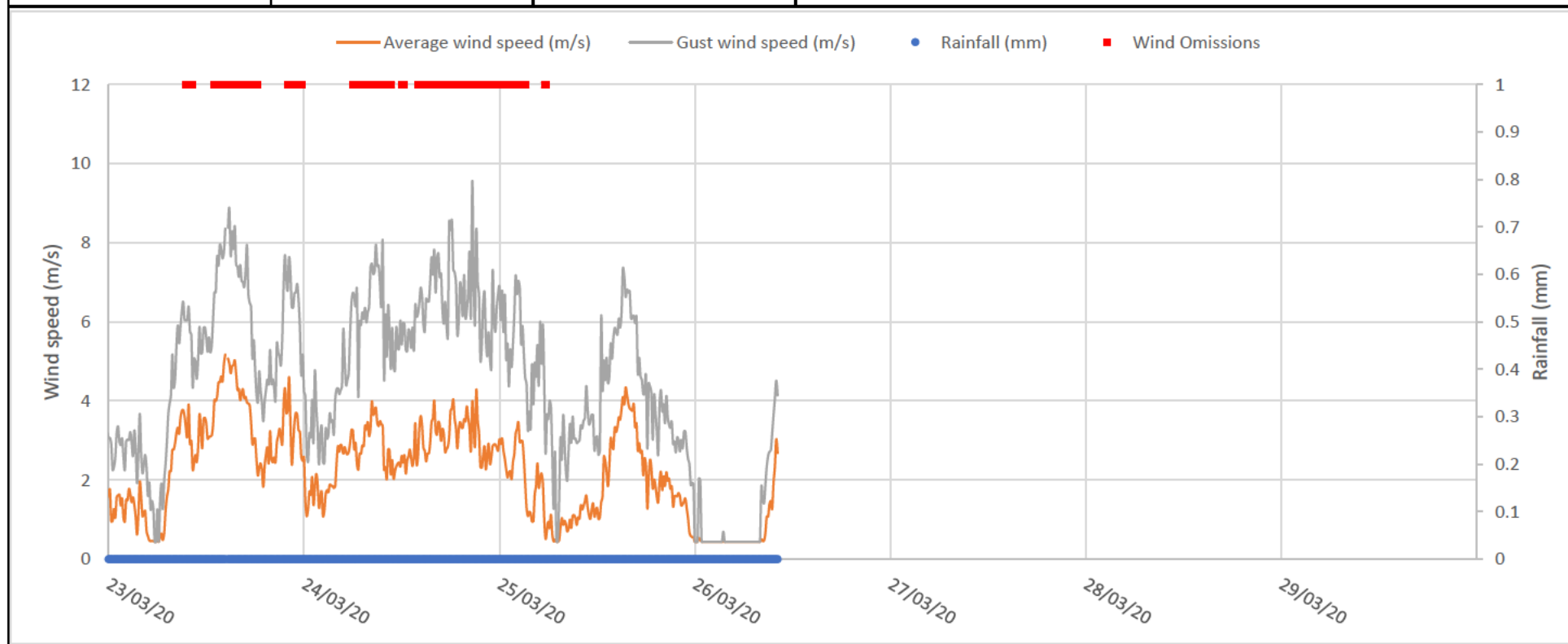
Project Name: North Killingholme Power Project			Project No: 70055743
Location: LT 1 - South of Site			Engineer: Leonard Terry
Additional Comments: Sheet 1 of 2			
Measurement Period			Equipment
Date	Start / Stop Time	Measurement Intervals	Logic Energy Anemometer and Rain Gauge. Weather station placed in representative location adjacent to long term noise monitoring postion LT 1.
16/03/2020	14:40	10 min	
26/03/2020	10:10		





Weather Monitoring Form

Project Name: North Killingholme Power Project			Project No: 70055743		
Location: LT 1 - South of Site			Engineer: Leonard Terry		
Additional Comments: Sheet 2 of 2					
Measurement Period			Equipment		
Date		Start / Stop Time	Measurement Intervals		
			Logic Energy Anemometer and Rain Gauge. Weather station placed in representative location adjacent to long term noise monitoring postion LT 1.		
16/03/2020		14:40			
26/03/2020		10:10			
			10 min		



APPENDIX 7-1E

CALIBRATION CERTIFICATES

Date of Issue: 25 January 2018

Certificate Number: UCRT18/1069

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page	1	of	2	Pages
Approved Signatory				
K. Mis				

Customer WSP
3rd floor
Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 20060836

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	00320637
	Rion	Firmware		1.8
	Rion	Pre Amplifier	NH-25	10645
	Rion	Microphone	UC-59	05708
	Rion	Calibrator	NC-74	00830766
		Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 17 January 2018

ANV Job No. UKAS18/01034

Date Calibrated 25 January 2018

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	18 January 2016	UCRT16/1036	76223

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

Certificate Number

UCRT18/1069

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	18 January 2018	
Calibrator cert. number	UCRT18/1044	
Calibrator cal cert issued by	0653	
Calibrator SPL @ STP	93.98	dB Calibration reference sound pressure level
Calibrator frequency	1002.70	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.86	22.78	± 0.30 °C
Humidity	46.2	44.3	± 3.00 %RH
Ambient Pressure	99.49	99.48	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.0	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -	UR = Under Range indicated			
Weighting	A	C	Z	
	10.8	15.7	20.9	dB UR

Uncertainty of the electrical self generated noise ±	0.12	dB
--	------	----

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

R 2

Additional Comments

Prior to calibration, instrument's damaged connector was replaced.

Date of Issue: 09 September 2019

Certificate Number: UCRT19/1998

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

K. Mistry

Customer

WSP UK Limited

Kings Orchard

1 Queen Street

Bristol

BS2 0HQ

Order No.

20098757

Description

Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01021288
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	21330
Rion	Microphone	UC-59	08198
Rion	Calibrator	NC-74	34657202
	Calibrator adaptor type if applicable		NC-74-002

Performance Class

1

Test Procedure

TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002

YES

Approval Number

21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received

04 September 2019

ANV Job No.

UKAS19/09589

Date Calibrated

09 September 2019

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate

Dated

12 September 2017

Certificate No.

UCRT17/1777

Laboratory

0653

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CERTIFICATE OF CALIBRATION

Certificate Number

UCRT19/1998

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	06 September 2019	
Calibrator cert. number	UCRT19/1994	
Calibrator cal cert issued by	0653	
Calibrator SPL @ STP	94.02	dB Calibration reference sound pressure level
Calibrator frequency	1002.65	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	23.00	23.24	± 0.30 °C
Humidity	46.4	45.8	± 3.00 %RH
Ambient Pressure	100.20	100.18	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.0	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -					UR = Under Range indicated					
Weighting		A			C			Z		
		11.5	dB	UR	18.1	dB	UR	22.8	dB	UR
Uncertainty of the electrical self generated noise ±							0.12	dB		

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Bogdan

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

R 2



CERTIFICATE OF CALIBRATION



Date of Issue: 28 August 2018

Certificate Number: UCRT18/1885

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way


Milton Keynes MK5 8HL

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E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory

J. Harriman

Customer WSP UK Ltd
3rd Floor, Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 20075476
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01021292
Rion	Firmware		1.8
Rion	Pre Amplifier	NH-25	21334
Rion	Microphone	UC-59	04348
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 23 August 2018

ANV Job No. UKAS18/08547

Date Calibrated 28 August 2018

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	06 September 2016	TCRT16/1239	ANV Measurement Systems

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CERTIFICATE OF CALIBRATION

Certificate Number

UCRT18/1885

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	06 August 2018	
Calibrator cert. number	UCRT18/1784	
Calibrator cal cert issued by	0653	
Calibrator SPL @ STP	93.99	dB Calibration reference sound pressure level
Calibrator frequency	1001.97	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	21.81	22.05	± 0.30 °C
Humidity	57.8	55.1	± 3.00 %RH
Ambient Pressure	100.73	100.66	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.0	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -	UR = Under Range indicated			
Weighting	A	C	Z	
	11.2	15.6	20.9	
	dB	dB	dB	
	UR	UR	UR	

Uncertainty of the electrical self generated noise ±	0.12	dB
--	------	----

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

Additional Comments

None

R 1

CERTIFICATE OF CALIBRATION



0653

Date of Issue: 07 January 2019

Certificate Number: UCRT19/1023

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

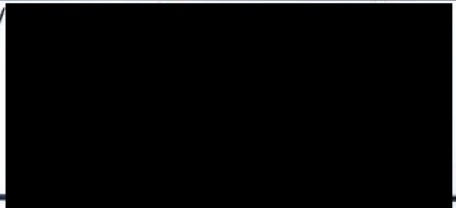
Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page	1	of	2	Pages
Approved Signatory				
K. Mistry				

Customer WSP UK Ltd
3rd Floor, Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 20084040
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01021291
Rion	Firmware		1.8
Rion	Pre Amplifier	NH-25	21333
Rion	Microphone	UC-59	04347
Rion	Calibrator	NC-74	35125825
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 03 January 2019

ANV Job No. UKAS19/01011

Date Calibrated 07 January 2019

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	10 January 2017	UCRT17/1010	7623

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CERTIFICATE OF CALIBRATION

Certificate Number

UCRT19/1023

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable	N/A	
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Customers Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	04 January 2019	
Calibrator cert. number	UCRT19/1014	
Calibrator cal cert issued by	0653	
Calibrator SPL @ STP	94.00	dB Calibration reference sound pressure level
Calibrator frequency	1001.96	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Wind Shield WS-10

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	23.61	23.46	± 0.40 °C
Humidity	36.6	40.6	± 3.00 %RH
Ambient Pressure	102.17	102.06	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.3	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -		UR = Under Range indicated			
Weighting	A	C	Z		
	10.6	16.2	21.3	dB	UR
Uncertainty of the electrical self generated noise ±		0.12	dB		

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: A Patel

Additional Comments

None

R 1

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 04 January 2019

Certificate Number: UCRT19/1013

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

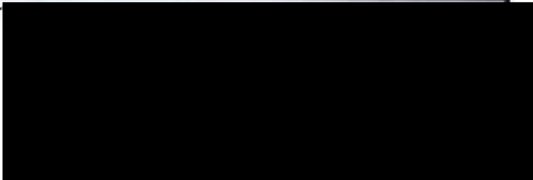
Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

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Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page	1	of	2	Pages
Approved Sign				
K. Mistry				

Customer WSP UK Ltd
3rd Floor, Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 20084040

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Rion	Calibrator	NC-74	00830766

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS19/01011

Date Received 03 January 2019

Date Calibrated 04 January 2019

Previous Certificate	Dated	18 January 2018
	Certificate No.	UCRT18/1044
	Laboratory	0653

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CERTIFICATE OF CALIBRATION

Certificate Number

UCRT19/1013

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

93.99 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	1002.65 Hz	±	0.13 Hz
The total distortion was	1.25 %	±	6.7 % of Reading

During the measurements environmental conditions were

Temperature	23	to	24 °C
Relative Humidity	29	to	36 %
Barometric Pressure	103.2	to	103.3 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

END

Note:

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

Additional Comments

None

Calibrated by: B. Bogdan

R 2



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 06 September 2019

Certificate Number: UCRT19/1994

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page	1	of	2	Pages
Approved Signator				
K. Mistry				

Customer WSP UK Limited
Kings Orchard
1 Queen Street
Bristol
BS2 0HQ

Order No. 20098757

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Rion	Calibrator	NC-74	34657202

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS19/09589

Date Received 04 September 2019

Date Calibrated 06 September 2019

Previous Certificate	Dated	26 September 2018
	Certificate No.	UCRT18/1981
	Laboratory	0653

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CERTIFICATE OF CALIBRATION

Certificate Number

UCRT19/1994

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

94.02 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	1002.65 Hz	±	0.13 Hz
The total distortion was	1.01 %	±	6.9 % of Reading

During the measurements environmental conditions were

Temperature	23	to	24 °C
Relative Humidity	44	to	50 %
Barometric Pressure	101.0	to	101.1 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

END

Note:

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

Calibrated by: AE & BB

R 1