Uskmouth Power Station, Newport

Noise Assessment for Environmental Permitting

For SIMEC Uskmouth Power

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Quality Management				
Prepared by	Susan Hirst BSc (Hons), MIOA	Principal Consultant - Acoustics		28/11/2019
Reviewed, checked & authorised by	Phil Evans BSc (Hons), MSc, MIOA, FGS	Senior Director - Acoustics		28/11/2019
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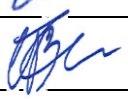
Prepared by	Susan Hirst BSc (Hons), MIOA	Principal Consultant - Acoustics		28/11/2019
Checked by	Charlotte Birch MSci, MSc, AMIOA	Consultant - Acoustics		28/11/2019

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1 Introduction

1.1 The Acoustics Team of RPS Planning and Environment (RPS) has been appointed SIMEC Uskmouth Power (SUP) to provide a noise assessment required as part of an application for an Environmental Permit (EP) for the re-establishment and extension of Uskmouth Power Station.

1.2 The permit includes the use of the existing plant and conveyors and the addition of a lorry unloading facility, extension of the existing rail unloading facility and addition of further conveyors with associated storage.

1.3 The assessment has been undertaken based upon appropriate information on the proposed development provided by the project team. RPS is a member of the Association of Noise Consultants (ANC), the representative body for acoustics consultancies, having demonstrated the necessary professional and technical competence. The assessment has been undertaken with integrity, objectivity and honesty in accordance with the Code of Conduct of the Institute of Acoustics (IOA) and ethically, professionally and lawfully in accordance with the Code of Ethics of the ANC.

1.4 The technical content of this assessment has been provided by RPS personnel, all of whom are members of the Institute of Acoustics (IOA) (the UK's professional body for those working in acoustics, noise and vibration). This report has been peer reviewed within the RPS team to ensure that it is technically robust and meets the requirements of our Integrated Management System.

2 Regulations, Standards and Guidance

Environmental Permitting Regulations

Control and Monitor Emissions for your Environmental Permit

2.1 The guidance on "Control and monitor emissions for your environmental permit" was introduced in February 2016. This covers a range of topic areas with noise being mentioned in the section on "Noise and vibration management plan". This guide is designed to provide advice on what you need to provide to apply for a permit or already have a permit.

2.2 The section on the noise and vibration management plan states that the plan should explain how you will prevent or minimise noise and vibration and the EA may ask for a plan if:

- they think there is a risk of noise and vibration pollution beyond the site boundary; and/or
- after getting a permit, you cause noise or vibration pollution but do not already have a noise and vibration management plan.

2.3 When applying for a bespoke permit, a noise and vibration management plan may need to be provided if the following apply:

- your activity uses noisy plant or machinery, for example cooling equipment or fans;
- there will be crushing, grinding or combustion, using trommels and conveyors or moving bulk materials;
- your activities are not contained within buildings;
- some of your activities take place at night;
- the area where you are planning to carry out your activity is sensitive to noise, for example rural areas may have quieter background noise levels than urban areas; and/or
- there are sensitive receptors close to the site, for example houses or habitats.

2.4 It then goes on to state that the noise assessment and management plan must be completed using an appropriate noise standard such as BS 4142:2014 (now BS 4142:2014+A1:2019) "Methods for rating and assessing industrial and commercial sound".

Horizontal Guidance - H3 Part 2 Noise Assessment and Control

2.5 The purpose of horizontal guidance is to provide information relevant to all sectors regulated under EPR on specific environmental aspects. For example, noise, odour, energy efficiency, or protection of land.

2.6 Horizontal guidance has been produced by collaboration between the Environment Agency (EA), Environment Agency Wales (EAW), the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS). The purpose of Horizontal Guidance Note H3 for Noise Assessment and Control is to provide supplementary information; describe the principles of noise measurement and prediction; and the control of noise by design, by operational and management techniques and abatement technologies. It assists in determining Best Available Techniques (BAT) for a given installation and also covers the basic physics associated with noise and vibration.

2.7 H3 suggests that an initial assessment of the risk to sensitive receptors be undertaken and, if shown to be necessary by the level of risk, a more detailed assessment of the impact should be undertaken. It states that the amount of detail and the effort expended should be proportionate to the degree of risk involved.

2.8 H3 provides a list and brief descriptions of British and International Standards and guidance that it considers relevant to measurement, prediction and assessment of noise. With regards to prediction, it states:

'For industrial noise it is preferable to use those following the principles of ISO 9613-2 1996.'

(N.B. ISO 9613-2 contains a method for the prediction of acoustic propagation outdoors.)

2.9 H3 acknowledges that community reaction to noise is complex to assess and affected by multiple factors both noise and non-noise related. It suggests that people are generally less tolerant of industrial and neighbour noise than transportation noise and that some of factors affecting community response are:

- hours of operation (day, night, 24hr, 7day);
- continuous or intermittent sources;
- nature of the noise (tones, clatters, hums and the like);
- whether or not the noise is "avoidable" as perceived by the community;
- community standing of the Operator (good/bad neighbour);
- response to complaints and other problems;
- odour/litter/traffic or other adverse environmental effects;
- good/bad employer; and
- nature of the area.

2.10 H3 does not contain recommendations for noise limits or criteria. H3 refers to process- or sector-specific guidance for determination of BAT in a general sense or at sector level.

British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

2.11 BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' [1] has recently been superseded by 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' [2]. Reference has therefore been made to the revised version of the standard in this assessment, although the changes are immaterial in the context of the comments made by the EA upon the EP variation.

2.12 BS 4142:2014+A1:2019 primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound'1 from the proposed development) at residential NSRs. The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the 'rating level', whether or not a rating penalty is applied. The 'residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

2.13 The specific sound levels should be determined separately in terms of the $L_{Aeq,T}$ index over a period of 1-hour during the daytime and 15-minutes during the night-time. For the purposes of the Standard, daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours.

2.14 With regards to the character correction, paragraph 9.2 of BS 4142:2014+A1:2019 states:

"Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention."

2.15 The commentary to paragraph 9.2 of BS 4142:2014+A1:2019 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

"Tonality

[1] equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr.

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a rating penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. … If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

2.16 BS 4142:2014+A1:2019 requires that the background sound levels[2] adopted for the assessment be representative for the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements.

2.17 It is particularly difficult to determine what is 'representative' of the night-time period is because it can be subject to a wide variation in background sound level between the shoulder night periods. The accompanying note to paragraph 8.1.4 states that:

"A representative level should account for the range of background sounds levels and should not automatically be assumed to be either the minimum or modal value."

2.18 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard,

[2] A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is the magnitude of the 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.

2.19 The significance of the effect of the noise in should be determined on the basis of the initial estimate of impact significance from the BS 4142:2014+A1:2019 assessment with reference to the context of the sound.

Guidelines for Community Noise

2.20 The World Health Organisation (WHO) published guidance on the desirable levels of environmental noise in 2000. In this document, Guidelines for Community Noise (GCN) [3], the authors consider that sleep disturbance criteria should be taken as an internal noise level of 30 dB LAeq,8hr or an external level of 45 dB LAeq,8hr, measured at 1 m from the façade. It is also suggested that internal LAmax levels of 45 dB and external LAmax levels of 60 dB, should not be exceeded.

2.21 The criteria for speech intelligibility and moderate annoyance during the daytime and evening should be taken as an internal noise level of 35 dB LAeq,16hr. For external daytime levels, it is considered that:

'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces, and outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.'

3 Baseline Survey

Site Location and Noise Sensitive Receptors

3.1 The site is located south of Newport to the south of the River Usk. The nearest noise sensitive receptor (NSR) to the site is Great House, located approximately 600 m to the south-east. There are several other individual NSRs located further to the east and the town of Nash is at a distance of approximately 1.1 km to the east. Locations of the NSRs are identified on Figure 1 at the end of the report and listed below:

- Great House, approx. 600 m to the south-east;
- Lowlands and Moorcroft Farm, approx. 800 m to the east;
- Ty-Portra, approx. 800 m to the east;
- Arch Cottage, approx. 1,100 m to the east; and
- Church House, Nash, approx. 1,100 m to the east.

3.2 A desktop review of the site indicated that the area was relatively rural, with minor roads, and some other industrial activities associated with the port. The NSRs are all in the same direction from the site and therefore likely subject to the same sources of sound. Therefore, it was considered that one long term baseline survey would be sufficient to represent all of the NSRs.

Long Term Survey

3.3 Representative baseline sound levels have been determined through a long term unattended sound level survey undertaken within the rear garden of Lowlands and Moorcroft Farm between 12:45 hours on Friday 4th September to 11:30 hours on Tuesday 11th September 2019.

3.4 Sound level measurements were carried out using a ‘Class 1’ Rion NL-52 sound level meter (SLM) in accordance with BS 7445-2:1991 [4], with the microphone mounted on a pole 1.2 m above local ground level.

3.5 Data were logged of the broadband, A-weighted sound pressure level in 100 ms samples with the required periods extracted in post-processing; in this instance 15-minute periods. The sound level meter was calibrated before use and the calibration checked after use and it was observed that no significant drift had occurred during the survey period.

3.6 Weather data were monitored during the survey using a meteorological mast to monitor wind speeds and a rain gauge to monitor rainfall. Periods of high wind and heavy rainfall were removed from the data set. Conditions were mainly dry with some periods of rain, which were removed from

the dataset. Wind speeds were mainly low and were below 5 m/s throughout the survey, with the prevailing wind direction being south-westerly. Therefore, no data have been removed from the dataset due to wind.

3.7 An analysis has been carried out of the measured baseline sound levels in 15-minute periods. These analyses are provided in Table 3.1. Data are rounded to the nearest whole number. Further survey details, photographs and a location plan of the survey, and graphical plots of the survey data are provided in Appendix A.

Table 3.1 15-minute Baseline Sound Level Data (whole period)

Value	Daytime (07:00 to 19:00 hours)		Evening (19:00 to 23:00 hours)		Night-time (23:00 to 07:00 hours)	
	Residual Sound Level (dB $L_{Aeq,T}$)	Background Sound Level (dB $L_{A90,T}$)	Residual Sound Level (dB $L_{Aeq,T}$)	Background Sound Level (dB $L_{A90,T}$)	Residual Sound Level (dB $L_{Aeq,T}$)	Background Sound Level (dB $L_{A90,T}$)
Range	42 - 69	30 - 49	40 - 54	33 - 46	39 - 61	34 - 46
25th Percentile	49	40	43	40	42	40
Median	51	43	45	42	43	41
75th Percentile	52	44	46	43	45	43
Average	52	41	45	42	46	41
Standard deviation	3	4	2	2	4	2

3.8 BS 4142:2014+A1:2019 requires that the background sound levels adopted for the assessment are representative of the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated.

3.9 However, the Standard states that there is no ‘single’ background sound level that can be derived from such measurements. It is particularly difficult to determine what is ‘representative’ of the night-time period because it can be subject to a wide variation in background sound level between the beginning and end of the night period, and the quieter middle part of the night period. The accompanying note states that “a representative level should account for the range of background sounds levels and should not automatically be assumed to be either the minimum or modal value”.

3.10 In this instance, the 25th percentile from the monitoring has been used to characterise the baseline sound environment. This is not the lowest sound level encountered but is lower than that obtained using the average. It therefore represents somewhere in the range of lower sound levels that are likely to be encountered and provides a precautionary assessment. Use of the 25th percentile ensures that any periods when higher wind speeds could have affected the measured baseline sound levels do not unduly affect the analysis.

3.11 Similarly, representative baseline residual levels have been based on the 25th percentile levels.

3.12 On the basis of the above, representative baseline background sound levels are 40 dB LA90,T for the daytime, evening and night-time periods, and representative baseline residual sound levels are 49, 43 and 40 dB LAeq,T for the daytime, evening and night-time periods respectively.

4 3D Sound Model & Assessment

3D Sound Model

4.1 In order to calculate specific sound levels at NSRs associated with operation of the facility a 3D model has been built using SoundPLAN v8.1 noise modelling software.

4.2 The model predicts sound levels under light down-wind conditions based on hemispherical sound propagation with corrections for atmospheric absorption, ground effects, screening and directivity based on the procedure detailed in ISO 9613-2:1996 'Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation' [5].

4.3 Acoustic data have been obtained from information provided by the project team and RPS' experience of other similar sites. As the previously operational power station has long been out of use, it has been considered appropriate to assess the site as one proposal with both the existing and new sources of sound. A summary of the model input data has been provided in Appendix B.

4.4 The following assumptions have been incorporated into the noise model:

- the topography of the site and the surrounding area has been obtained from site surveyed topographical data and Ordnance Survey (OS) open data (Terrain 50);
- the effect of screening from solid structures (buildings) has been incorporated into the modelling process by importing OS Open Data 'Settlement Area' shape file data into the model; and
- the ground type in the model has been set to soft (G=1).

Assessment

4.5 The noise assessment has been carried out for the daytime (07:00 hrs to 19:00 hrs), evening (19:00 hrs to 23:00 hrs) and night-time (23:00 hrs to 07:00 hrs) periods. It is noted that these hours vary from those provided in BS 4142:2014+A1:2019 as they split the daytime period between daytime and evening. This allows for separate consideration of the evening period, which is generally considered to be more sensitive.

4.6 The majority of plant and processes that will occur within buildings could operate continuously and have therefore been included in all three assessment periods. Deliveries to the site by road going HGVs are likely to occur during daytime hours only and have therefore only been included within the daytime assessment. Details of operational periods of plant are included in Appendix B.

4.7 Tables 4.1, 4.2 and 4.3 provide the initial estimate of the noise impact at the nearest NSRs due to the operation of the facility in accordance with BS 4142:2014+A1:2019 for the daytime, evening

and night-time periods respectively. The predicted specific sound levels are also presented graphically in Figures 2 and 3.

4.8 With reference to BS 4142:2014+A1:2019, a character correction may need to be applied to the specific sound level depending on the acoustic characteristics of the sound. In RPS' experience of similar sites, noise from the site is likely to be of a broadband nature and would not be impulsive or readily distinctive. The plant is likely to operate on a continual basis and not regularly switch on/off. In addition, the predicted specific sound levels are well below the background sound levels. Therefore, in this instance it is not considered appropriate to apply any corrections for the acoustic character of the plant.

Table 4.1 BS 4142:2014+A1:2019 Assessment for Daytime

Noise Sensitive Receptor	Background Sound Level, $L_{A90,T}$ dB	Residual Sound Level, $L_{Aeq,T}$ dB	Specific Sound Level, $L_{Aeq,T}$ dB	Character Correction	Rating Level, $L_{Ar,Tr}$ dB	Rating Level minus Background Sound Level dB	Total Ambient Sound Level (Specific Plus Residual), $L_{Aeq,T}$ dB	Change in Ambient Sound Level dB
Arch Cottage	40	49	26	0	26	-14	49	0
Church House, Nash	40	49	27	0	27	-14	49	0
Great House	40	49	34	0	34	-6	49	0
Lowlands / Moorcroft Farm	40	49	31	0	31	-9	49	0
Ty-Portra	40	49	30	0	30	-10	49	0

Table 4.2 BS 4142:2014+A1:2019 Assessment for Evening

Noise Sensitive Receptor	Background Sound Level, $L_{A90,T}$ dB	Residual Sound Level, $L_{Aeq,T}$ dB	Specific Sound Level, $L_{Aeq,T}$ dB	Character Correction	Rating Level, $L_{Ar,Tr}$ dB	Rating Level minus Background Sound Level dB	Total Ambient Sound Level (Specific Plus Residual), $L_{Aeq,T}$ dB	Change in Ambient Sound Level dB
Arch Cottage	40	43	28	0	28	-13	43	0
Church House, Nash	40	43	28	0	28	-12	43	0
Great House	40	43	35	0	35	-6	44	1
Lowlands / Moorcroft Farm	40	43	32	0	32	-8	44	0
Ty-Portra	40	43	32	0	32	-9	44	0

Table 4.3 BS 4142:2014+A1:2019 Assessment for Night-time

Noise Sensitive Receptor	Background Sound Level, $L_{A90,T}$ dB	Residual Sound Level, $L_{Aeq,T}$ dB	Specific Sound Level, $L_{Aeq,T}$ dB	Character Correction	Rating Level, $L_{Ar,Tr}$ dB	Rating Level minus Background Sound Level dB	Total Ambient Sound Level (Specific Plus Residual), $L_{Aeq,T}$ dB	Change in Ambient Sound Level dB
Arch Cottage	40	42	28	0	28	-12	42	0
Church House, Nash	40	42	28	0	28	-11	42	0
Great House	40	42	35	0	35	-5	43	1
Lowlands / Moorcroft Farm	40	42	32	0	32	-7	42	0
Ty-Portra	40	42	32	0	32	-8	42	0

4.9 BS 4142:2014+A1:2019 states the following with regards to the difference between the rating and background sound level:

- 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.

4.10 From Tables 3.1, 3.2 and 3.3, the rating levels are well below the background sound levels across all periods of the daytime, evening and night time, with the highest level difference being -5 dB at Great House during the night-time period. On this basis, it is likely that the noise impact would be low or even negligible, depending on the context.

4.11 The specific sound levels range from 26 to 34 dB $L_{Aeq,T}$ during the daytime and 28 to 35 dB $L_{Aeq,T}$ during the evening and night-time. These levels are well below the criteria for speech intelligibility and moderate annoyance during the daytime and sleep disturbance during the night-time provided in the WHO GCN. In the majority of locations, the specific sound levels are sufficiently below residual sound levels that they would not cause an increase to the overall ambient sound levels. At Great House, an increase in the ambient of 1 dB is estimated during the evening and night-time periods. However, as the overall sound level is well below the threshold at which sleep disturbance would occur, this increase is not significant. There are other industrial activities in the vicinity, some of which were audible at the baseline sound monitoring location. Noise emissions from the development are therefore not dissimilar to other existing sources of sound in the area.

4.12 Therefore, with consideration of the context, the noise impact of the site is considered to be negligible. As such no specific mitigation measures for noise are expected to be required, although as a matter of best practice BAT would still need to be applied as per the requirements of the permit.

4.13 On the basis of the above assessment, there is no reason with respect to noise why the application for the environmental permit for the site should not be granted.

5 Summary & Conclusions

5.1 The Acoustics Team of RPS Planning and Environment (RPS) has been appointed SIMEC Uskmouth Power (SUP) to provide a noise assessment required as part of an application for an Environmental Permit (EP) for the re-establishment and extension of Uskmouth Power Station.

5.2 The permit includes the use of the existing plant and conveyors and the addition of a lorry unloading facility, extension of the existing rail unloading facility and addition of further conveyors with associated storage.

5.3 An assessment of the noise from the facility has been carried out in accordance with BS 4142:2014, as amended 2019, which is the cited standard to use in the Environmental Permitting Regulations. A baseline acoustic survey was undertaken and an acoustic model was built of the proposed facility. Predicted operational noise levels at NSRs are well below the prevailing background sound levels; are well below the thresholds at which critical health effects would occur according to guidance published by the World Health Organisation; and would only result in a small increase to existing baseline ambient sound levels at one location. Furthermore, noise from the development would be similar in character to other operational facilities in the vicinity. On this basis, the noise impacts are anticipated to be negligible.

5.4 On the basis of the assessment, there is no reason with respect to noise why the application for the environmental permit for the plant should not be granted.

References

1 British Standards Institution. British Standard 4142:2014. Methods for rating and assessing industrial and commercial sound.

2 British Standards Institution. British Standard 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound.

3 Berglund, B. et al. Guidelines for Community Noise. World Health Organisation. 2000.

4 British Standards Institution. British Standard 7445-2:1991. Description and measurement of environmental noise - Part 2: Guide to the acquisition of data pertinent to land use.

5 ISO. International Standard ISO 9613-2:1996. Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation.

Figures

Key

Noise Sensitive Receptor

Notes
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MAKING COMPLEX EASY

6-7 Lovers Walk
Brighton East Sussex BN1 6AH

T 01273 546800 F 01273 546801
E rpsbn@rpsgroup.com W rpsgroup.com

Client: For SIMEC Uskmouth Power

Project: Uskmouth Power Station Noise Assessment for Environmental Permitting

Job Ref: JAE10555

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Figure 1: Noise Sensitive Receptors

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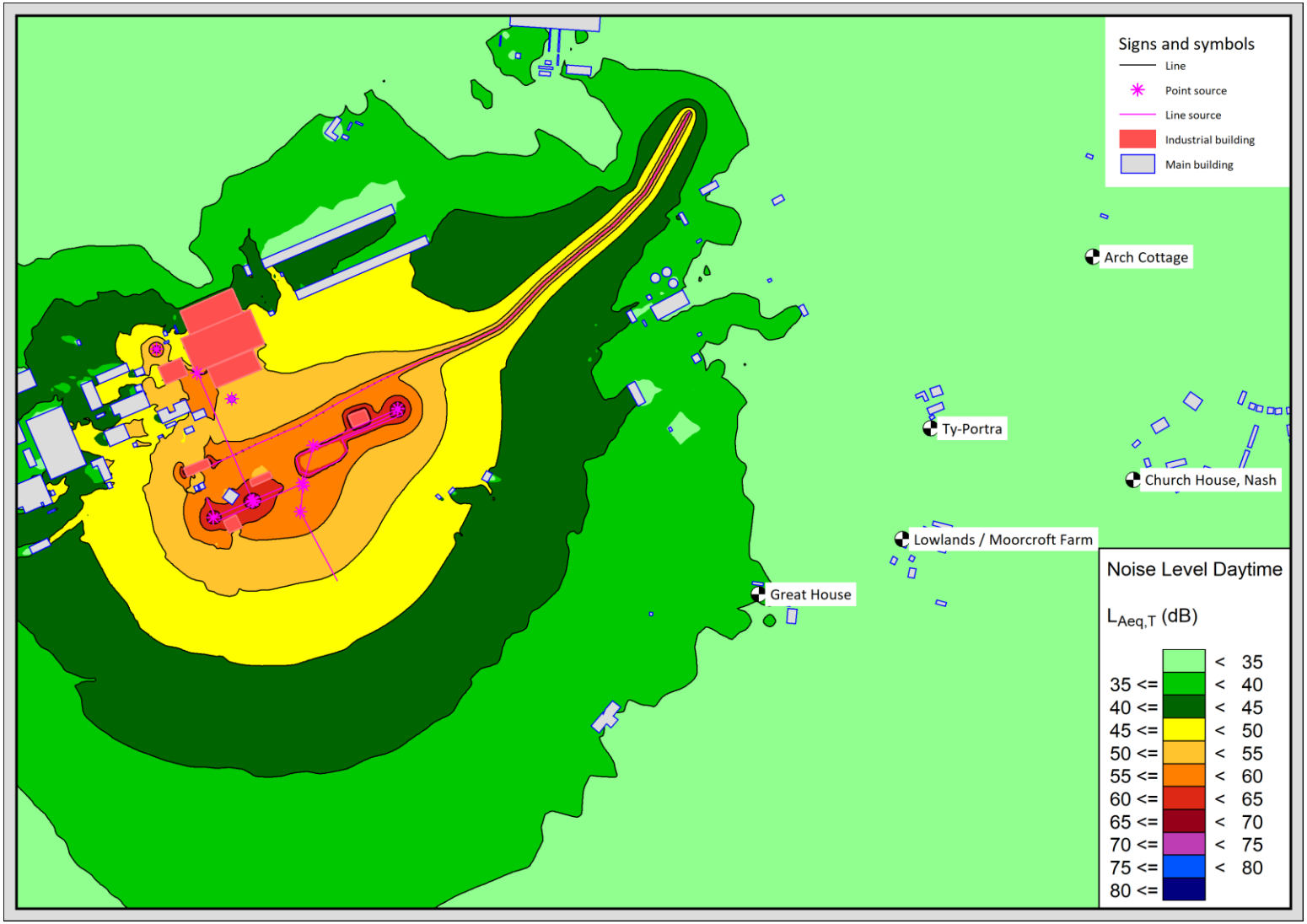

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MAKING COMPLEX EASY
6-7 Lovers Walk
Brighton East Sussex BN1 6AH

T 01273 546800 F 01273 546801
E rpsbn@rpsgroup.com W rpsgroup.com

Client: For SIMEC Uskmouth Power

Project: Noise Assessment of New Cooling Towers Noise Assessment for Environmental Permitting

Job Ref: 28/11/2019

File location:

Date: 28/11/2019	Rev:1
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Figure 2: Predicted Specific Sound Levels – Daytime (07:00 – 19:00) at 1.5 m AGL

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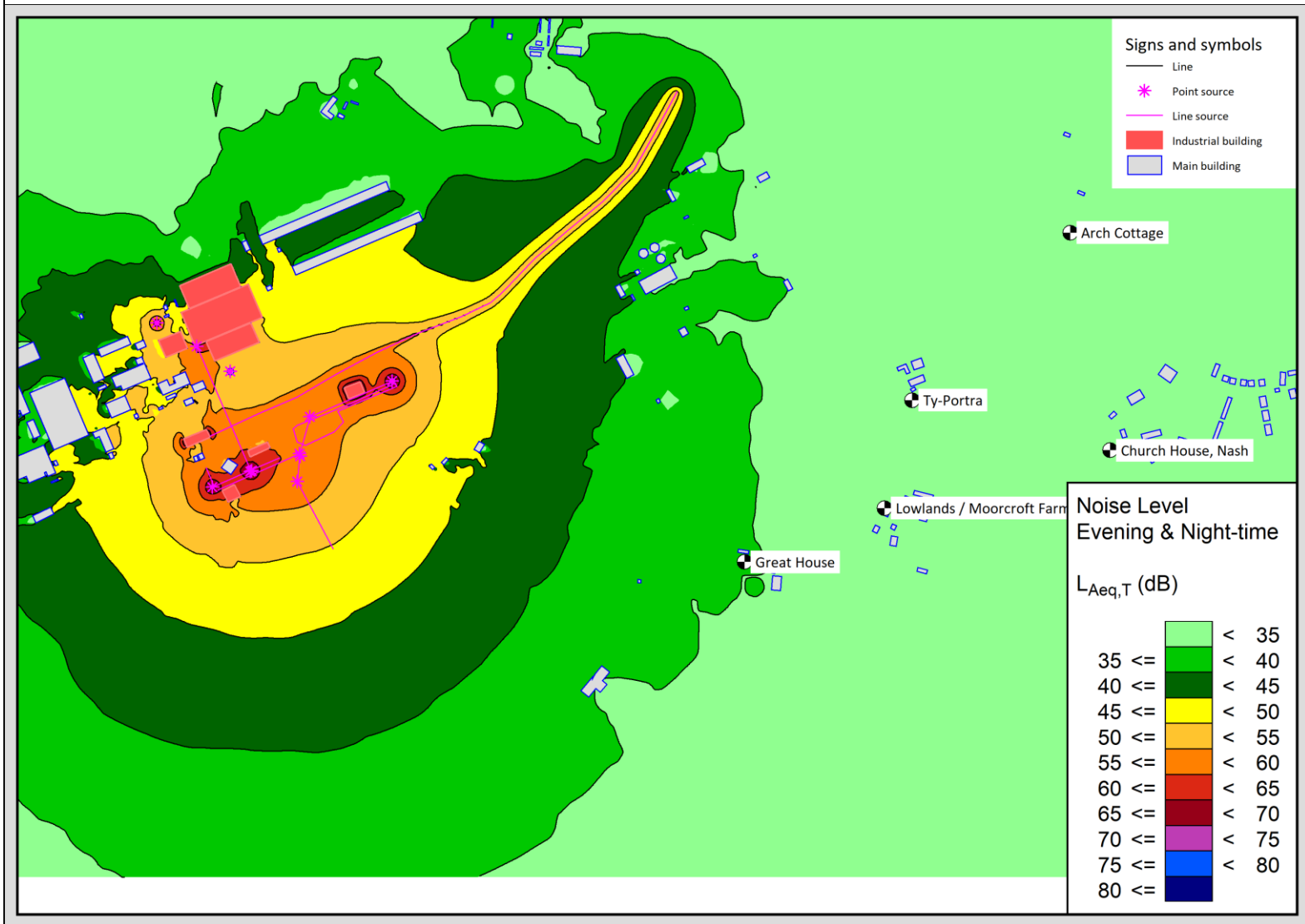

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MAKING COMPLEX EASY
6-7 Lovers Walk
Brighton East Sussex BN1 6AH

T 01273 546800 F 01273 546801
E rpsbn@rpsgroup.com W rpsgroup.com

Client: For SIMEC Uskmouth Power

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Figure 3: Predicted Specific Sound Levels – Evening (19:00 – 23:00) and Night-time (23:00 – 07:00) at 4 m AGL

Appendices

Appendix A: Survey Data

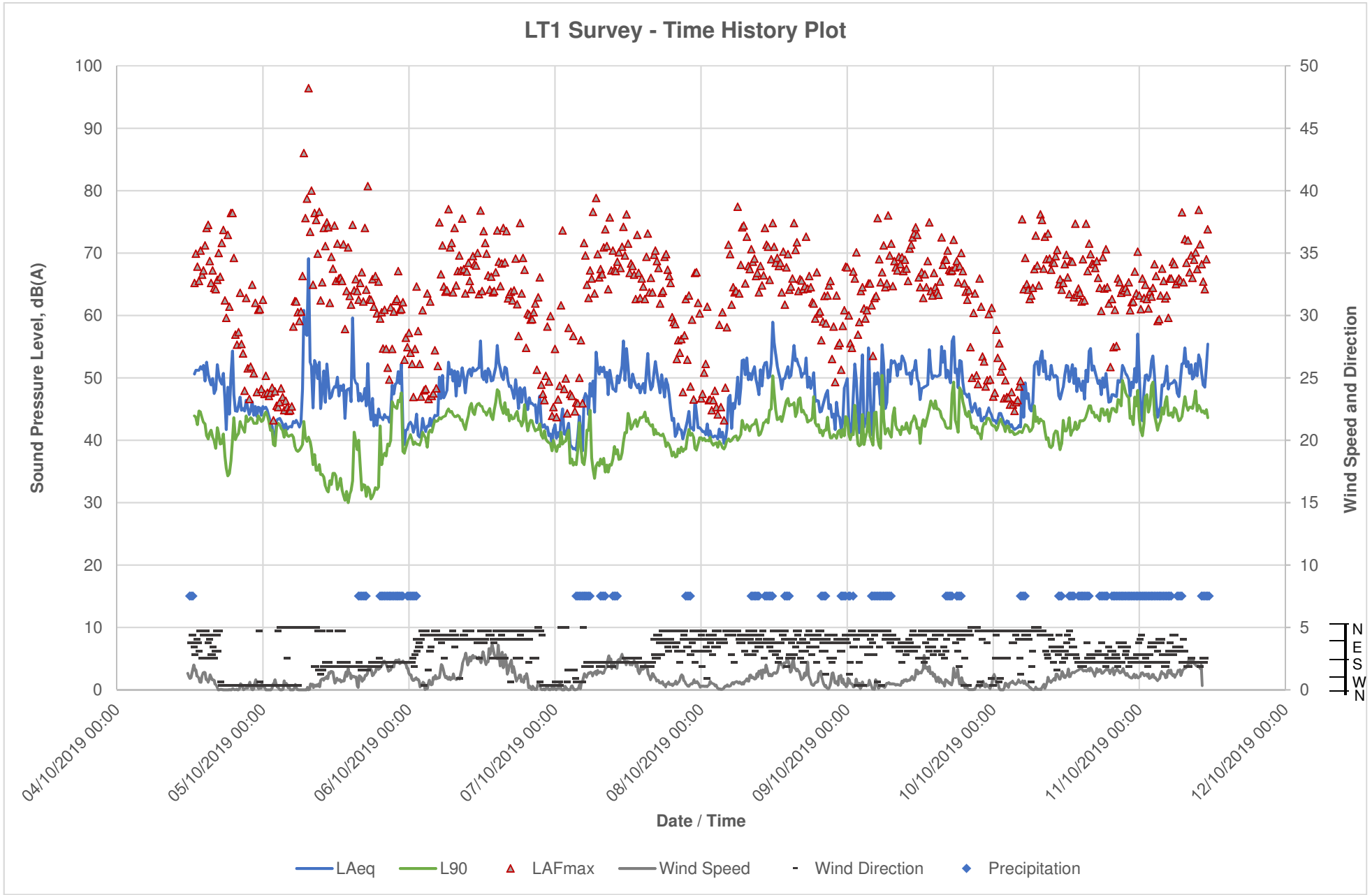
Sound Level Survey Record (Long Term Survey)

Location			West Nash Road			
Purpose of Monitoring			Baseline			
Relevant Guidance / Standard			BS 7445-1:2003 / BS 7445-2:1991 / BS 4142:2014			
Sound Measurement System						
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID
125	Rion NL-52		164422	03/03/2016	Auto_0001	
Microphone Height	Measurement Interval	Dynamic Range	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?
1.5 m	100 ms	25 - 138	Fast	A	Freefield	x

		START	END
Personnel			CB
Date / time		04/10/2019 12:33	11/10/2019 11:30
Calibrator	RPS ID		143
	Manufacturer / Model	B&K 4231	B&K 4231
	Serial Number	2393954	2393954
	Date last verification	30/09/2019	30/09/2019
	Reference level	94	94
	Meter reading	94	94
Weather	Cloud cover (100%= 8 oktas)	Not recorded	8
	Temperature (degrees Celsius)	Not recorded	12
	Subjective description / additional details	Not recorded	Chilly, dark, light drizzle

Photographs of Measurement Location

Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))
Long term on the edge of a garden southeast of W Nash Road. Ground is soft between the meter and the road
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)
Occasional passbys on local road dominates, else distant road traffic. Distant plant/machinery audible, with hammering and chains moving. Wind in vegetaion and birdsong.


LT1 Survey - Time History Plot
Sound Pressure Level, dB(A)
Wind Speed and Direction
Date / Time
100
90
80
70
60
50
40
30
20
10
0
50
45
40
35
30
25
20
15
10
5
0
N
E
S
W
N
04/10/2019 00:00
05/10/2019 00:00
06/10/2019 00:00
07/10/2019 00:00
08/10/2019 00:00
09/10/2019 00:00
10/10/2019 00:00
11/10/2019 00:00
12/10/2019 00:00
LAeq
L90
LAFmax
Wind Speed
Wind Direction
Precipitation

Appendix B: Noise Model Input Data

Internal Areas	Height of Building (m)	Period of Use	Internal Reverberant Sound Pressure Level L_{PA} dB	Octave Bands dB(A)							
				63	125	250	500	1k	2k	4k	8k
Turbine House	28	All periods	91	60	70	77	79	89	83	80	74
Boiler House	46	All periods	90	65	74	80	84	85	84	78	69
FDG Plant	34	All periods	84	58	67	74	78	79	78	72	63
Emulsifier / pump house	7.5	All periods	85	59	68	75	79	80	79	73	64
Ash Treatment Facility	7.5	All periods	75	49	58	65	69	70	69	63	54

Internal Point Source	Height AGL (m)	Period of Use	Sound Power Level L_{WA} dB	Octave Bands dB(A)							
				63	125	250	500	1k	2k	4k	8k
360 Unloading Trains	2	All periods	93	73	71	74	76	81	84	89	87
De-dusting plant	2	All periods	93	70	76	76	83	82	85	85	89
Lorry Unloading Facility	2	Daytime (07:00 - 19:00 hrs)	105	85	91	95	98	100	98	95	88

External Plant	Height AGL (m)	Period of Use	Sound Power Level L_{WA} dB	Octave Bands dB(A)							
				63	125	250	500	1k	2k	4k	8k
Sub-station	2	All periods	87	57	72	78	84	81	77	72	63
Conveyors (x6)	Varies accor	All periods	68	47	51	58	55	58	58	63	61
Conveyor Drive Units (feed hop	Varies accor	All periods	97	73	80	81	88	94	91	87	78
Stack	123	All periods	91	85	88	83	71	78	75	75	80
Ash Treatment Facility	2	All periods	93	70	76	76	83	82	85	85	89
HGVs	1	3 per hour, Daytime (07:00 -	105	93	91	96	99	99	98	93	88

Contact

RPS Consulting Services Ltd
6-7 Lovers Walk
Brighton
T: +44(0) 1273 546 800
susan.hirst@rpsgroup.com