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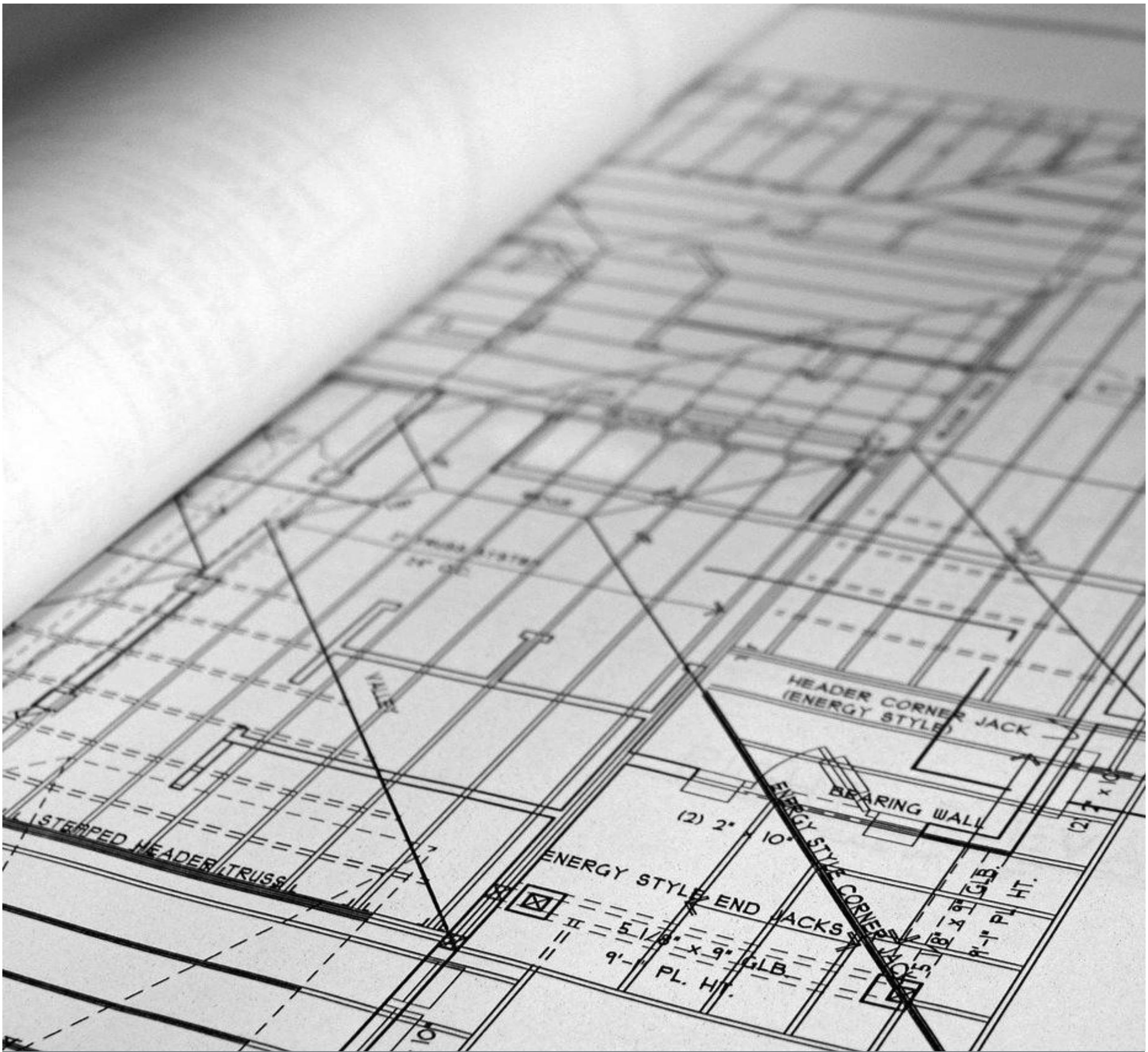

Brigg Power Station

Noise Impact Assessment Report

Client: Centrica DG Limited

Project Number: 0812023

Date: 22nd November 2023

REPORT ISSUE AND STATUS LOG

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1 INTRODUCTION

1.1 OVERVIEW

1.1.1 JPM Acoustics Ltd has been appointed by Centrica DG Limited (Centrica) to undertake a noise impact assessment to support three planning applications associated with the redevelopment of the Brigg Power Station site.

1.1.2 The proposed developments will help to stabilise the national grid and are also being used to trial the use of renewable hydrogen fuels. The developments are proposed to operate predominantly during the daytime when power demand is greatest. However, it is possible that the development could operate during the night-time in emergency situations.

1.1.3 This report presents an assessment of the potential noise impacts associated with the proposed developments on nearby sensitive receptors. The assessment has been undertaken with due consideration to relevant British Standards relating to noise.

1.1.4 This report is necessarily technical in nature. Therefore, to assist the reader, a glossary of acoustic terminology is provided in **Appendix A**.

1.2 LOCATION OF PROPOSED DEVELOPMENTS

1.2.1 The proposed developments are to be located on the Brigg Power Station site. The proposed developments considered in this report are as follows:

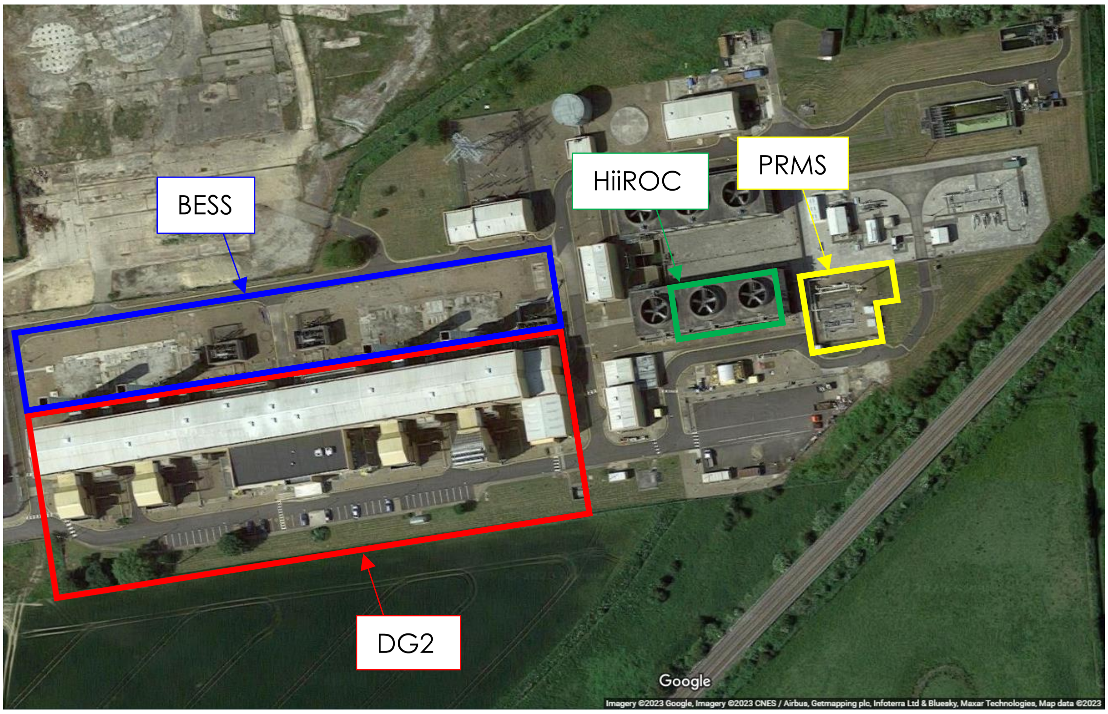
- Planning permission for proposed Gas Pressure Reduction and Metering Station, associated with gas engine development (below). Planning application to be submitted December 2024. Referred to hereafter as 'PRMS'.
- Planning permission to install four gas engines within a turbine hall, erection of four 30m chimney stacks and the provision of a reagent tank and two engine coolers (radiator units) and associated infrastructure. Planning Reference: PA/2023/734. Planning Decision: Currently being considered. Referred to hereafter as 'DG2'.
- Planning permission for the retention of a hydrogen pilot plant with perimeter fencing on land to the east of the former turbine hall of Brigg Power Station & associated ancillary works. Planning Reference: PA/2023/494. Planning Decision: Currently being considered. Referred to hereafter as 'HiiROC'. The HiiROC scheme

is to operate during the daytime (07:00 - 23:00) only, and a planning condition to this effect could be imposed on any planning consent.

- Planning permission to install 42 reservoir storage units (RSUs), 14 reservoir inverter units (RIUs) and associated works. Planning Reference: PA/2022/1705. Planning Decision: Approved with Conditions. Referred to hereafter as 'BESS'.

1.2.2 **Figure 1-1** shows the location of the proposed developments on the Brigg Power Station site.

Figure 1-1: Approximate Locations of Developments at Brigg Power Station



2 LEGISLATION AND GUIDANCE

2.1 BRITISH STANDARD 4142: 2014+A1:2019: METHODS FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND (BS 4142)

2.1.1 BS 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.

2.1.2 The method uses 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.

2.1.3 In accordance with the assessment methodology, the specific sound level (L_s) of the noise source being assessed is measured or predicted at a receptor location. A rating level ($L_{Ar,Tr}$) is then derived by adding a correction or penalty to the specific sound level for characteristic features, such as tonal qualities and/or distinct impulses, which make the source distinguishable against the residual noise climate. The British Standard effectively compares the difference between the rating level and the typical background sound level ($L_{A90,T}$) in the absence of the noise source being assessed.

2.1.4 It is advised 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.

2.1.5 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."

3 Baseline Noise Survey

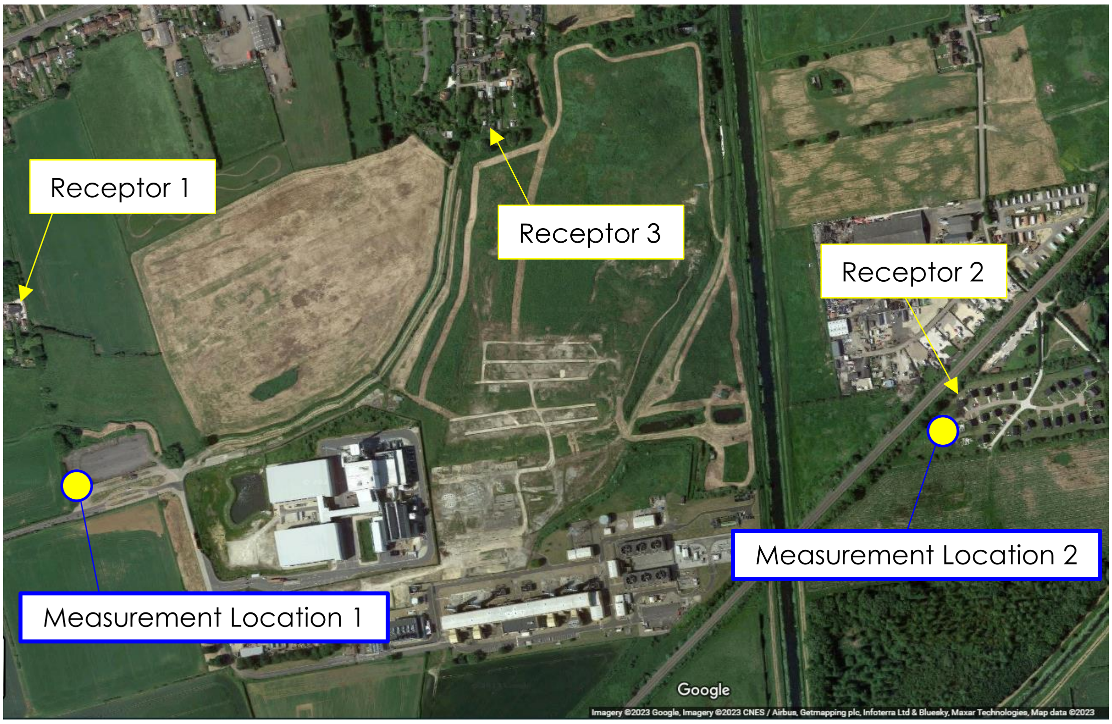
3.1 OVERVIEW

3.1.1 A baseline noise survey was undertaken at locations representative of the nearest noise sensitive receptors as part of the Noise Impact Assessment prepared for the BESS planning application, which was subsequently consented. Noise monitoring was undertaken at locations representative of the nearest receptors by RPS between the 6th and 13th April 2022.

3.1.2 These survey results have been adopted for this assessment to ensure consistency with the assessment work previously undertaken, with regard to background noise levels at the nearest receptors.

3.1.3 The nearest noise sensitive receptors and the measurement locations adopted during the baseline noise survey are shown in **Figure 3-1**.

Figure 3-1: Baseline Noise Survey Measurement Locations



3.2 RESULTS

3.2.1 A summary of relevant survey results is presented in **Table 3-1**. Full details of the survey can be found in the BESS planning report undertaken by RPS.

Table 3-1: Summary of Measured Sound Pressure Levels

Measurement Location	Period	Nearest Receptor	Measured Sound Pressure Levels	
			dB $L_{Aeq,T}$	dB $L_{A90,T}$
1	Daytime (07:00 – 23:00)	1 and 3	53	44
	Night-time (23:00 – 07:00)		51	42
2	Daytime (07:00 – 23:00)	2	48	38
	Night-time (23:00 – 07:00)		48	37

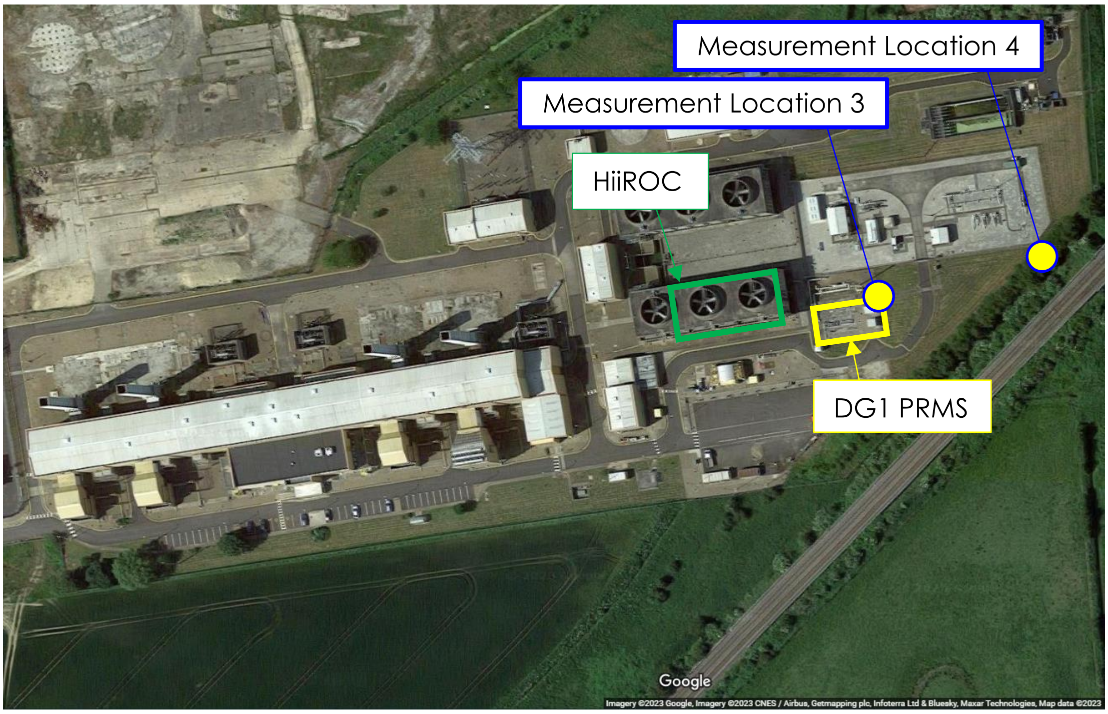
3.3 NOISE SOURCE SURVEY

3.3.1 A further survey was undertaken on the site to measure noise levels from the HiiROC development, which is now operational, and from the PRMS associated with the existing DG1 development on the Brigg Power station site, referred to hereafter as the 'DG1 PRMS'. The proposed PRMS for DG2 is similar to the DG1 PRMS.

3.3.2 Monitoring was undertaken over a 45-minute period starting at 15:00 on 16th October 2023 during the operation of the DG1 PRMS and then the HiiROC equipment.

3.3.3 Two measurement locations were adopted on the site to measure noise emissions from the DG1 PRMS and HiiROC. The microphones were at 1.5 m height in free-field conditions. **Figure 3-2** shows the measurement locations adopted during the noise source survey.

Figure 3-2: Measurement Locations for Noise Source Survey



3.3.4 **Table 3-2** details the Class 1 noise measurement equipment used during the noise source survey.

Table 3-2: Equipment Details, Noise Source Survey

Location	Equipment	Make and Model	Serial Number	Calibration due Date
3	Sound Level Meter	01 dB Fusion	11327	06/09/2025
	Microphone	Grass 40CE	259479	
	Preamplifier	01 dB PRE 22	1605201	
4	Sound Level Meter	SVAN 971	80344	26/05/2024
	Microphone	ACO 7052E	69566	
	Preamplifier	SV18	71577	
3 and 4	Calibrator	01dB-Stell Cal 21	34675335	06/09/2024

3.3.5 **Table 3-3** and **Table 3-4** show the noise levels measured during the noise source measurements at measurement locations 3 and 4 respectively.

Table 3-3: Measurement Results, Noise Source Survey at Measurement Location 3, 16/10/2023

Comment	Start Time	Sound Pressure Level ($L_{eq,15min}$ dB) per Octave Band (Hz)									dB(A)
		31.5	63	125	250	500	1000	2000	4000	8000	
DG1 PRMS in Isolation	15:00	58	56	54	53	51	65	69	66	55	73
DG1 PRMS and HiiROC	15:15	58	58	57	51	53	64	69	66	56	73
HiiROC in Isolation	15:30	57	58	53	49	48	51	51	50	39	57

Table 3-4: Measurement Results, Noise Source Survey at Measurement Location 4, 16/10/2023

Comment	Start Time	Sound Pressure Level ($L_{eq,15min}$ dB) per Octave Band (Hz)									dB(A)
		31.5	63	125	250	500	1000	2000	4000	8000	
DG1 PRMS in Isolation	15:00	58	54	54	51	43	43	49	46	37	53
DG1 PRMS and HiiROC	15:15	56	55	56	47	43	43	48	46	34	53
HiiROC in Isolation	15:30	56	55	50	45	40	36	35	29	23	43

4 ASSESSMENT

4.1 NOISE MODELLING

4.1.1 A digital noise model of the site has been generated to predict noise levels from the proposed developments at the nearest noise sensitive receptors. The noise model was generated applying the following methodology:

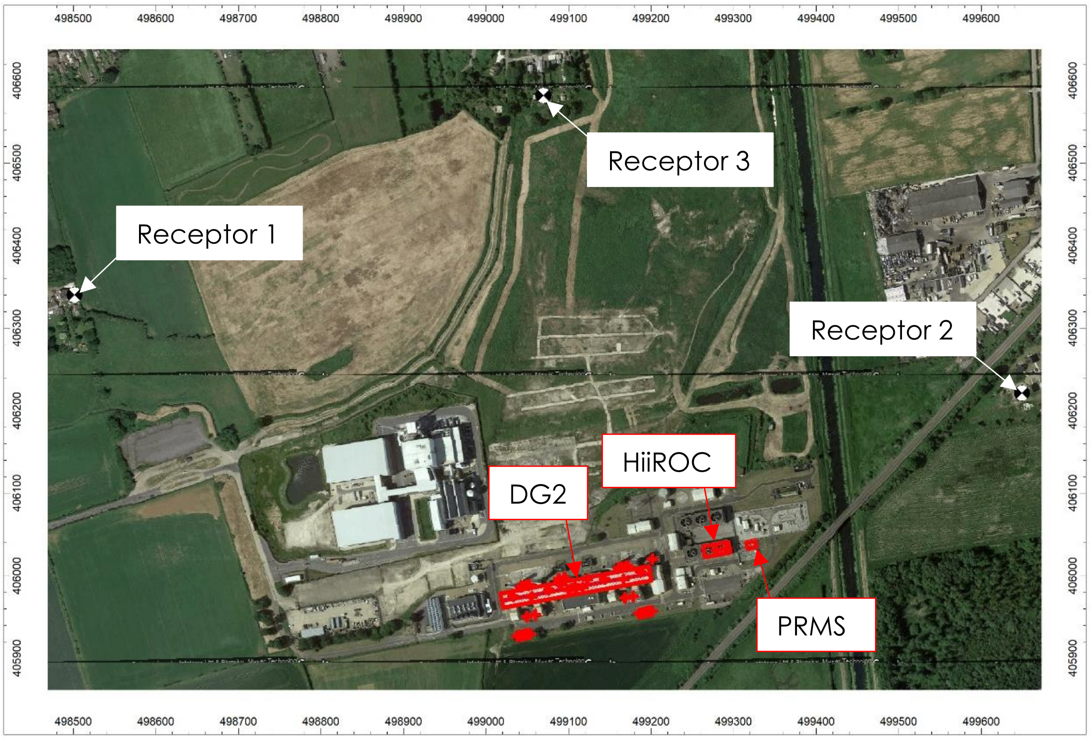
- The model was generated using the PC based CadnaA® noise modelling package.
- The noise model was set to apply the noise prediction methodology from ISO 9613-2: *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*.
- The model included existing buildings in the vicinity of the site, to account for acoustic screening and reflection.
- The model was set to include reflected noise from solid structures with buildings being modelled with an absorption coefficient of 0.2 in accordance with Table 4 from ISO 9613-2 (corresponding to a reduction of approximately 1 dB per reflection) with the maximum order of reflections set to 1.
- Ground absorption was set to G=0 (100% acoustically reflective ground) for areas of concrete and G=1 (100% acoustically absorptive ground) for areas of grass;
- The model included topographical data for the site and surrounding area.
- Noise emissions from fixed plant associated with the PRMS and HiiROC were calibrated based on the measured noise levels at Measurement Locations 3 and 4. An additional noise source was included for the HiiROC development to account for forklift movements on the site. The forklift movements were modelled assuming a sound power level of 99 dB(A) and operation periods of 20 minutes in a worst-case 1-hour period.
- Noise emissions from the HiiROC were included during the daytime only, as this development is not proposed to operate at night.
- The manufacturers' noise emission data for noise sources associated with the DG2 development are included in **Appendix B**.
- The noise breakout from the DG2 turbine hall building has been calculated in accordance with BS EN ISO 12354-4:2017: *Building acoustics - Estimation of acoustic performance of buildings from the performance of elements* - Part 4: *Transmission of indoor sound to the outside*.

- The receptor height in the noise model was 1.5 m, to allow a direct comparison with the background sound levels measured at Measurement Locations 1 and 2.

4.2 BS 4142 ASSESSMENT AT RESIDENTIAL RECEPTORS

4.2.1 Three receptor locations were included in the noise model to be representative of the worst affected residential receptors. **Figure 4-1** below shows the source and receptor locations adopted in the noise model.

Figure 4-1: Source and Receptor Locations



4.2.2 **Table 4-1** shows the predicted specific sound levels at the nearest receptors from the proposed developments on the Brigg Power Station site.

Table 4-1: Predicted Specific Sound Levels

Development	Period	Predicted Specific Sound Level, dB [A]	Background Noise Level, L_{A90} dB [B]	Difference [A]-[B]=[C]
Receptor Location 1				
DG2	Daytime (07:00 – 23:00)	36	44	-8
	Night-time (23:00 – 07:00)	35	42	-7
PRMS	Daytime (07:00 – 23:00)	24	44	-20
	Night-time (23:00 – 07:00)	24	42	-18
HiiROC	Daytime (07:00 – 23:00)	19	44	-25
	Night-time (23:00 – 07:00)	N/A	42	N/A
BESS	Daytime (07:00 – 23:00)	35[1]	44	-9
	Night-time (23:00 – 07:00)	35[1]	42	-7
Cumulative	Daytime (07:00 – 23:00)	39	44	-5
	Night-time (23:00 – 07:00)	38	42	-4
Receptor Location 2				
DG2	Daytime (07:00 – 23:00)	38	38	0
	Night-time (23:00 – 07:00)	36	37	-1
PRMS	Daytime (07:00 – 23:00)	34	38	-4
	Night-time (23:00 – 07:00)	34	37	-3
HiiROC	Daytime (07:00 – 23:00)	29	38	-9
	Night-time (23:00 – 07:00)	N/A	37	N/A
BESS	Daytime (07:00 – 23:00)	35[1]	38	-3
	Night-time (23:00 – 07:00)	35[1]	37	-2
Cumulative	Daytime (07:00 – 23:00)	41	38	3
	Night-time (23:00 – 07:00)	40	37	3
Receptor Location 3				
DG2	Daytime (07:00 – 23:00)	36	44	-8
	Night-time (23:00 – 07:00)	35	42	-7
PRMS	Daytime (07:00 – 23:00)	24	44	-20
	Night-time (23:00 – 07:00)	24	42	-18
HiiROC	Daytime (07:00 – 23:00)	23	44	-21
	Night-time (23:00 – 07:00)	N/A	42	N/A
BESS	Daytime (07:00 – 23:00)	38[1]	44	-6
	Night-time (23:00 – 07:00)	38[1]	42	-4
Cumulative	Daytime (07:00 – 23:00)	40	44	-4
	Night-time (23:00 – 07:00)	40	42	-2
[1] Predicted noise levels taken from RPS planning report for BESS development.				

4.2.3 It can be seen from **Table 4-1** that the predicted specific sound levels from each development individually are equal to or less than the prevailing background noise levels at the nearest receptors. The cumulative noise levels are also predicted to be less than or equal to the prevailing background sound levels at Receptors 1 and 3.

4.2.4 At Receptor 2 the predicted cumulative specific sound level is 3 dB above background during the daytime and night-time.

4.2.5 At Receptor 2, DG2 is the dominant noise source, and it is not anticipated that noise from DG2 will be tonal or impulsive, therefore, the predicted cumulative rating level at Receptor 2 would be 3 dB above background. This is below the point at which an adverse impact would be indicated in accordance with guidance from BS 4142.

4.2.6 For Receptors 1 and 3 the predicted cumulative specific sound level is at least 2 dB below the background noise level and the BESS and DG2 developments are the dominant noise sources. Therefore, if a 2 dB penalty were to be applied for tonality which is just perceptible at the nearest receptors, the predicted rating levels would be less than or equal to the prevailing background noise level. As such, a low impact would be indicated in accordance with BS 4142.

4.2.7 As the predicted cumulative rating level was above the background sound level at Receptor 2, consideration has been given to mitigation measures in the following section.

5 MITIGATION

5.1.1 It was identified in the previous section that the cumulative noise level at Receptor 2 was 3 dB above background. Although this is below the point at which an adverse impact would be indicated in accordance with BS 4142, it is prudent to consider whether the noise level could be reduced at this receptor.

5.1.2 The DG2 development already benefits from the following mitigation measures, as detailed in **Appendix B**:

- High performing acoustic enclosures around the proposed engines.
- Reactive and absorptive silencers on the engine exhausts.
- Silencers on the enclosure ventilation intakes/outlets and engine charge intakes.

5.1.3 It can be seen from the above that the noise sources associated with DG2 (the dominant noise source at Receptor 2) already benefit from extensive mitigation, and construction of the BESS is largely complete. Therefore, further effective mitigation measures for these developments are not considered feasible.

5.1.4 Given the above, consideration has been given to the noise level reduction that could be afforded by including a noise barrier between the PRMS and Receptor 2. **Figure 5-1** shows the alignment of a 3.8 m barrier that was included in a further modelling exercise.

Figure 5-1: Barrier Alignment

5.1.5 The predicted noise levels at Receptor 2 accounting for the performance of the above barrier are shown in **Table 5-1**.

Table 5-1: Predicted Noise Levels at Receptor 2, Accounting for 3.8 m Barrier Around PRMS

Development	Period	Predicted Specific Sound Level, dB [A]	Background Noise Level, L_{A90} dB [B]	Difference [A]-[B]=[C]
Receptor Location 2				
DG2	Daytime (07:00 – 23:00)	38	38	0
	Night-time (23:00 – 07:00)	36	37	-1
PRMS	Daytime (07:00 – 23:00)	28	38	-10
	Night-time (23:00 – 07:00)	28	37	-9
HiiROC	Daytime (07:00 – 23:00)	28	38	-10
	Night-time (23:00 – 07:00)	N/A	37	N/A
BESS	Daytime (07:00 – 23:00)	35[1]	38	-3
	Night-time (23:00 – 07:00)	35[1]	37	-2
Cumulative	Daytime (07:00 – 23:00)	40	38	2
	Night-time (23:00 – 07:00)	39	37	2

[1] Predicted noise levels taken from RPS planning report for BESS development.

5.1.6 It can be seen from **Table 5-1** that, accounting for the 3.8 m barrier, the contribution from the PRMS and HiiROC developments at Receptor 2 are more than 10 dB below the cumulative specific sound level i.e. the contribution from these developments at the receptor is negligible. The barrier will also reduce noise levels from the existing DG1 PRMS.

5.1.7 To ensure the acoustic integrity of the proposed acoustic barrier, it should be continuous, imperforate (i.e. no holes/perforations), sealed at the base, installed along the stated alignments with stated heights, and with a mass per unit area of at least 15 kg/m^2.

5.1.8 DG2 is the dominant noise source at Receptor 2 and, as outlined previously, it is not anticipated that noise from DG2 will be tonal or impulsive. As such, no penalty for tonality or impulsivity is considered necessary. As such, the cumulative rating level at Receptor 2 is 2 dB above background when accounting for the barrier, this is 3 dB below the point at which an adverse impact would be indicated in accordance with BS 4142. Therefore, further mitigation measures are considered unwarranted.

5.1.9 To provide context to the above assessment, it should be noted that the worst affected receptor (Brigg Marina) is used for Holiday lets and therefore it is unlikely that the site will be occupied year-round. It should also be recognised that DG2 will typically only operate during the daytime and will only occasionally run during the night-time. As such, the cumulative 2 dB above background noise level is considered to be acceptable.

6 CONCLUSION

6.1.1 JPM Acoustics Ltd has been appointed by Centrica DG Limited to undertake a noise impact assessment to support three planning applications associated with the redevelopment of the Brigg Power Station site.

6.1.2 The proposed developments will help to stabilise the national grid and are also being used to trial the use of renewable hydrogen fuels. The developments are proposed to operate predominantly during the daytime when power demand is greatest. However, it is possible that the development could operate during the night-time in emergency situations.

6.1.3 This report presents an assessment of the potential noise impacts associated with the proposed developments on nearby sensitive receptors. The assessment has been undertaken with due consideration to relevant British Standards relating to noise.

6.1.4 Drawing on the results of a baseline noise survey undertaken at locations representative of the nearest noise sensitive receptors, and with consideration to the results of a detailed noise modelling exercise, the assessment did not indicate an adverse impact from the cumulative operation of the proposed developments at the nearest receptors.

6.1.5 Consideration was given to mitigation measures to reduce the noise levels from the proposed developments, as far as is reasonably practicable. It was identified that a noise barrier around the PRMS development could further reduce cumulative noise levels at the worst affected receptor by 1 dB and reduce contributions from the PRMS development by circa 6 dB. The resulting cumulative rating level was 2 dB above the prevailing background sound level.

6.1.6 DG2 will typically only operate during the daytime and will only occasionally run during the night-time. As such, the cumulative 2 dB above background noise level is considered to be acceptable.

6.1.7 Given that an adverse impact is not predicted at the nearest receptors from the cumulative operation of the proposed developments, it is considered that noise need not be a determining factor in granting consent for the proposed developments.

APPENDIX A: TECHNICAL GLOSSARY

Term	Descriptions
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20 μPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds S1 and S2 is given by 20 $\log_{10}$ (S1/S2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m.
Façade	At a distance of 1 m in front of a large sound reflecting object such as a building façade.
Fast/Slow Time Weighting	Averaging times used in sound level metres.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.

APPENDIX B: MANUFACTURERS' DATASHEETS

Doc. Name	Noise Data Sheet Brigg 2 4xW20V31SG		
Doc. ID	DESA00021011	**Revision**	-
Doc. Type	Data Sheet	**Pages**	1 (4)
Author	Agbenyoh, Godwin - Energy Business	**Status**	Approved
Reviewed by **Approved by**	Swarnkar, Sudhir - 23 Jan. 23 Agbenyoh, Godwin - 23 Jan. 23		

Noise Data Sheet Brigg 2 4xW20V31SG

1. Engine

a. Sound power level

A-weighted Sound power level of the engine, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level L_{wA} [dB]	79	103	108	112	119	122	118	116	112	**126**

Sound power level is based on measurement made according to standard ISO 9614-2:1996 Acoustics -- Determination of sound power levels of noise sources using sound intensity -- Part 2: Measurement by scanning. This is to be treated as primary noise data for engine.

b. Spatial averaged sound pressure level

Typical spatial averaged A-weighted sound pressure level inside engine hall is 110 dB(A). The spatial average sound pressure value represents noise incident on engine hall walls and could then be used for power plant structure acoustic design.

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Spatial average A-weighted sound pressure level $L_{p,A}$ [dB]	59	79	87	96	102	104	104	105	96	**110**

c. Surface averaged sound pressure level

Typical surface averaged A-weighted sound pressure level of Wärtsilä genset is 115 dB(A) at 1 m distance. In case of separate concrete engine cell installation, absorption material may be needed in the engine cell to reduce unnecessary reflections and reach the stated value.

Attenuation: Octave-band transmission loss of double steel sandwich panel wall

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**R_w**
TL [dB]	30	36	42	58	71	70	74	82	82	**66**

2. Exhaust gas outlet

Exhaust gas outlet A-weighted sound power level without silencer, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level $L_{w,A}$ [dB]	81	99	112	120	125	124	126	120	-*	**131**

One outlet per engine.

*) Due to measurement uncertainty no value can be presented for the 8000 Hz octave band. Note that it cannot be treated as zero.

Attenuation: Octave-band transmission loss of exhaust gas stack silencer + 30 dB(A) absorptive silencer

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000
Stack silencer TL [dB]	21	28	28	21	6	6	5	5	5
30 dB(A) silencer TL [dB]	4	6	14	23	26	30	32	30	26

3. Insulated exhaust gas ducting

Exhaust gas ducting A-weighted sound power level without silencer, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level $L_{w,A}$ [dB/m]	62	68	71	76	80	90	79	70	61	**91**

Sound power level per meter length of the source.

Attenuation: Octave-band transmission loss of 30 dB(A) absorptive silencer

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000
30 dB(A) silencer TL [dB]	4	6	14	23	26	30	32	30	26

4. Charge air intake

Charge air intake A-weighted sound power level without silencer, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level $L_{w,A}$ [dB]	75	93	102	106	111	114	122	138	136	**140**

Two intakes per engine.

Attenuation: Octave-band transmission loss of charge air silencer 35 dB(A) + 1200 mm baffles

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000
35 dB(A) silencer TL [dB]	2	3	9	24	40	40	50	50	41
1200 mm baffles TL [dB]	2	6	12	23	40	51	51	41	29

5. Ventilation intake

Ventilation intake A-weighted sound power level, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level $L_{w,A}$ [dB]	61	69	80	78	82	80	79	73	65	**87**

One unit per engine.

To include additional 2.8 m attenuator, see data in following section.

6. Ventilation outlet

Ventilation outlet A-weighted sound power level, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level $L_{w,A}$ [dB]	-*	84	91	100	105	105	106	106	100	**112**

One outlet per engine.

*) Due to measurement uncertainty no value can be presented for the 31.5 Hz octave band. Note that it cannot be treated as zero.

Attenuation: Silencer, L = 2800 mm

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000
Attenuation [dB]	-	5	14	29	37	37	22	15	14

7. Step-up transformer

A-weighted sound power level per unit, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level $L_{w,A}$ [dB]	26	44	69	81	74	65	61	42	31	**82**

One unit.

8. Compressor

A-weighted sound power level per unit, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level $L_{w,A}$ [dB]	44	59	80	83	88	86	85	87	96	**98**

Two units.

9. Noise level 3, 3-fan cooling radiator

A-weighted sound power level for one radiator unit, ref. 1pW:

Frequency [Hz]	31.5	63	125	250	500	1000	2000	4000	8000	**Total**
Sound power level L_w [dB]	-*	70	80	89	90	88	86	82	70	**95**

Four radiator units per engine.

*) Due to measurement uncertainty no value can be presented for the 31.5 Hz octave band. Note that it cannot be treated as zero.