Noise Impact Assessment

Parc Adfer Carbon Capture

For enfinium

Report Quality Management			
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Assessment/Calculations Quality Management		
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Revision History		
Rev	**Date of Issue**	**Comment**
00	17/07/2025	First issue

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1 Introduction

1.1 The Acoustics, Noise and Vibration Team at Savills has been appointed by enfinium to undertake a noise impact assessment in relation to an 'Environmental Permit' (EP) application for a proposed carbon capture (CC) facility at the at the existing Parc Adfer 'Energy Recovery Facility' (ERF).

1.2 The assessment has been undertaken based upon information on the proposed development provided by the project team. The assessment considers potential adverse noise impacts affecting the 'nearest noise sensitive receptors' (NSRs) to the proposed development site. The assessment has been undertaken following a baseline noise survey and desktop assessment.

1.3 The technical content of this assessment has been provided by Savills personnel, all of whom are corporate members, i.e. Member (MIOA) or Fellow (FIOA), or Associate members (AIOMA), of the Institute of Acoustics (IOA), the UK's professional body for those working in acoustics, noise and vibration. The assessment has been undertaken with integrity, objectivity and honesty in accordance with the Code of Conduct of the IOA.

1.4 The Team is also a member of the Association of Noise Consultants (ANC) which seeks to raise the standards of acoustic consultancy and improve recognition of the vital role which good acoustics, and the management and mitigation of noise and vibration play in achieving good design and effective planning in the built and natural environment. Membership of the ANC indicates that the Team is sufficiently competent to pass the high standards for entry to the association.

1.5 This report and assessment has been peer reviewed within the Savills team to ensure that it is technically robust and meets the requirements of our Integrated Management System.

1.6 Personnel and individual qualifications are provided within the Quality Management table at the start of this report and in Appendix A in accordance with the requirement of Section 12 of British Standard (BS) 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (BS 4142) [1].

2 Assessment Methodology

2.1 BS 4142 primarily provides a numerical method by which to determine the significance of sound of a commercial and/or industrial nature, i.e. the 'specific sound', at NSR locations.

2.2 The specific sound level may then be corrected for the character of the sound, if appropriate, and is then termed the 'Rating Level'.

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

"Tonality

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 should 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."

2.4 The Rating Level is then compared to the background sound level, which should be representative of the period being assessed.

2.5 An initial estimate of the impact of the specific sound is obtained by subtracting the representative background sound level from the Rating Level.

2.6 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.

2.7 The lower the rating level is relative to the representative 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.

2.8 The significance of the effect of the noise in question should be determined on the basis of the significance of the initial estimate of impact from the BS 4142 assessment and after having considered the context of the sound at the receptor/s affected.

3 Baseline Noise Description

3.1 The nearest NSRs to the site are located between 1.8 and 2.6 km from the site, as summarised below.

- **Burton Point Farm** approx. 2.6 km to the north;
- **Burton Mere House** approx. 1.8 km to the north;
- **Barn Farm** approx. 2.2 km to the north;
- **Sealand Avenue** approx. 2.3 km to the south-east;
- **The Airfields** approx. 2.4 km to the south-east; and
- **Shotton** approx. 2.4 km to the south.

3.2 Baseline survey details are provided in Appendix B. Table 3.1 below provides a summary of representative baseline sound levels, based on the 25th percentile levels of long term data, used in this assessment.

Table 3.1: Representative Baseline Sound Levels

NSRs	Daytime		Night-time	
	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB $L_{Aeq,T}$	dB $L_{A90,T}$
Burton Point Farm Burton Mere House Barn Farm	42	37	37	33
Sealand Avenue The Airfields Shotton	48	44	44	41

4 Calculations and Modelling

4.1 In order to calculate specific sound levels associated with operation of the proposed Parc Adfer CC, a 3D sound model has been built using SoundPLAN v9.1 noise modelling software.

4.2 Full details are provided in Appendix C, with a summary of model results provided in Table 4.1 below. Modelled specific sound level for the existing and proposed situation and the difference between the two, are provided as figures at the end of the report.

Table 4.1 Predicted Specific Sound Levels

NSR Location	Floor	Specific Sound level dB $L_{Aeq,Tr}$
Burton Point Farm	Ground	24
	First	25
Burton Mere House	Ground	26
	First	26
Barn Farm	Ground	24
	First	24
Sealand Avenue	Ground	24
	First	26
The Airfields	Ground	23
	First	24
Shotton	Ground	26
	First	26

5 Assessment

5.1 An initial estimate of impact undertaken in accordance with BS 4142, is shown in Tables 5.1 and 5.2 below for the daytime and night-time periods respectively. Predicted specific sound levels for the day are at ground floor level with night-time level taken at first floor level, all free-field.

5.2 The subjective method for determining rating penalties has been used to determine appropriate corrections for each receptor and assessment period. It is considered that the specific sound from the combined sources of plant will not be characterised as intermittent or impulsive, given the nature of the noise sources, so no penalties have been applied for intermittency or impulsivity.

5.3 As it is considered that the only source of tonal noise from the proposed development is from the hybrid cooling system and the contribution from this source to the overall specific sound is negligible (16 dBA), it is most unlikely that noise levels at the nearby NSRs would be perceived or characterised as tonal. No tonality or noise from the hybrid cooling system equipment was perceptible at any of the NSRs. As such, no penalties have been applied for tonality or any other features.

Table 5.1: BS 4142:2014+A1:2019 Assessment (daytime)

NSR	Background (dB $L_{A90,T}$)	Specific (dB $L_{Aeq,T}$)	Correction (dB)	Rating (dB $L_{Ar,Tr}$)	Difference (dB)
Burton Point Farm	37	24	0	24	-13
Burton Mere House	37	26	0	26	-11
Barn Farm	37	24	0	24	-13
Sealand Avenue	44	24	0	24	-20
The Airfields	44	23	0	23	-21
Shotton	44	26	0	26	-18

Table 5.2: BS 4142:2014+A1:2019 Assessment (night-time)

NSR	Background (dB $L_{A90,T}$)	Specific (dB $L_{Aeq,T}$)	Correction (dB)	Rating (dB $L_{Ar,Tr}$)	Difference (dB)
Burton Point Farm	35	25	0	25	-10
Burton Mere House	35	26	0	26	-9
Barn Farm	35	24	0	24	-11
Sealand Avenue	42	26	0	26	-16
The Airfields	42	24	0	24	-18

NSR	Background (dB $L_{A90,T}$)	Specific (dB $L_{Aeq,T}$)	Correction (dB)	Rating (dB $L_{Ar,Tr}$)	Difference (dB)
Shotton	42	26	0	26	-16

5.4 The results of the initial estimate of impact in Tables 2 and 3 are described in the following paragraphs.

5.5 During the daytime period, the Rating Level is at least 11 dB below the background sound level at all NSRs. This is significantly (16 dB) below the threshold level at which a moderate impact may result (+5 dB).

5.6 At the most affected NSR (Burton Mere House), the resultant daytime ambient sound level would not increase and is less than 55 dB $L_{Aeq,T}$ (baseline residual sound level of 42 dB plus Rating Level of 26 dB is 42 dB $L_{Aeq,T}$). As such, the resulting magnitude of impact would be no change at this NSR. Similarly, at the other NSRs the resultant daytime ambient sound level would not change and would be less than 55 dB $L_{Aeq,T}$, and below the background sound level; as such, the resulting magnitude of impact would be no change at these NSRs too.

5.7 The results of the initial estimate of impact during the daytime therefore indicate negligible impacts / no change at all receptors.

5.8 During the night-time period, the Rating Level is at least 9 dB below the background sound level at all NSRs. This is significantly (14 dB) below the threshold level at which a moderate impact may result.

5.9 At the most affected NSR (Burton Mere House), the resultant night-time ambient sound level would be below 40 dB $L_{Aeq,T}$ (baseline residual sound level of 38 dB plus Rating Level of 26 dB is 38 dB $L_{Aeq,T}$); as such, the resulting magnitude of impact would be no change at this NSR. Similarly, at the other NSRs the resultant night-time ambient sound level would not change and would be less than 40 dB $L_{Aeq,T}$ where it currently is (Burton Point Farm, Burton Mere House, Barn Farm), and below the background sound level; as such, the resulting magnitude of impact would be no change at these NSRs too.

5.10 The results of the initial estimate of impact during the night-time are therefore indicative of no change adverse impacts at all receptors, depending on the context.

5.11 To accord with the guidance contained within BS 4142:2014+A1:2019 and provide a thorough assessment, consideration of the context of the scenario has been undertaken. Consideration of the context is provided in terms of the assessment of the absolute noise levels and the change in ambient sound due to the specific sound as addressed further on in this section.

Context

5.12 In this case consideration of context does not increase the risk for adverse impacts to occur. During the daytime and night-time periods period Rating Levels are significantly below the residual sound levels and would therefore not affect ambient sound levels.

5.13 Maximum Rating Levels of 26 dB $L_{Ar,Tr}$ are very low and unlikely to result in significant adverse impacts regardless of the difference to the background sound level, particularly at night.

5.14 The character of the specific noise would be broadband in nature and not contain any characteristics that would be distinguishable or otherwise considered incongruous. It is considered likely that the specific noise would not be dissimilar to the residual acoustic sound, which is affected by distant road traffic movements and other existing industrial activity in the area.

5.15 The Site is part of a long established industrial zone and noise associated with similar plant/activity would have historically affected the acoustic environment.

5.16 On the basis of the above it is considered that the specific sound would not be particularly noticeable and if specifically discernible, not considered to be incongruous compared to the baseline situation.

5.17 Furthermore, with regard to the night-time period, Rating Levels are based on plant operation at 100% capacity, including the cooling fans, which is unlikely to be the case at night due to lower ambient temperatures. Cooling fans operating at a reduced capacity would have lower noise emissions, potentially significantly by several dB, such that resultant Rating Levels would be even further below the background sound levels.

5.18 On the basis of the above, the impact of the sound is found to be no higher than initially predicted after consideration of the context of the sound, and the initial estimate of a change impact is not changed.

6 Uncertainty

6.1 In all assessments, it is good practice to consider uncertainty which can arise from a number of different aspects. There are degrees of uncertainty associated with: instrumentation used for surveying; measurement technique and the variables influencing the measurement results such as transmission path and weather conditions; source terms used for modelling; calculation uncertainty; assessment uncertainty; and the subjective response of residents to noise sources.

6.2 Uncertainty due to instrumentation has been significantly reduced with the introduction of more modern instrumentation and is reduced further by undertaking field calibration checks on sound level meters before and after each measurement period and ensuring that all instrumentation is within accepted laboratory calibration intervals.

6.3 Every effort has been made to reduce the uncertainty of the baseline sound level measurements. The duration of the baseline survey is considered to significantly reduce the uncertainty associated with the baseline sound levels. Based on professional judgement including substantial experience of acquiring and analysing baseline data for numerous sites in various locations, and a desk-based review of the site and surrounding area, it is considered that the baseline data acquired during the survey is typical of the area.

6.4 Calculation uncertainty and assessment uncertainty have been reduced by peer review of all baseline data, model input data, model results and assessment calculations, and by using the appropriate level of precision at each stage of the assessment calculations.

6.5 A quantitative assessment has been undertaken based on information provided by the project team for the proposed development and professional judgement based on recognised and accepted empirical calculation methodologies. Where assumptions have been made, these have been informed through assessment and visiting many similar facilities, allowing for a reasonable and robust assessment.

6.6 With regards to subjective response, the noise standards adopted for the assessment will have been based upon the subjective response of the majority of the population or will be based upon the most likely response of the majority of the population. This is considered to be the best that can be achieved in a population of varying subjective response which will vary dependent upon a wide range of factors.

6.7 All areas and potential consequences of uncertainty have been minimised at every stage of the assessment process. On the basis of the above, and in the context of subjective response, the effects of uncertainty on the assessment are considered minimal.

7 Summary & Conclusions

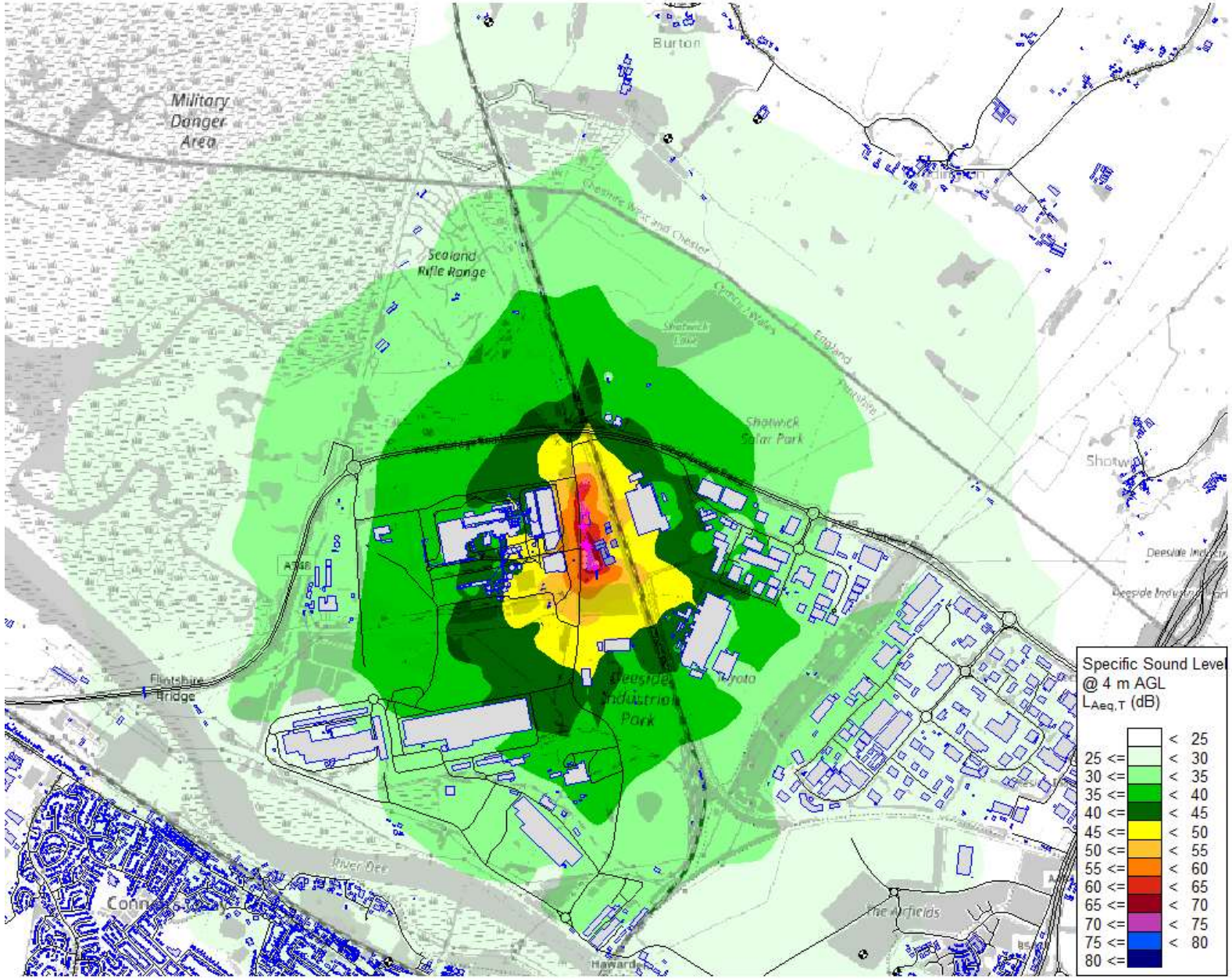
7.1 The Acoustics, Noise and Vibration Team at Savills has been appointed by enfinium to undertake a noise impact assessment in relation to an Environment Agency (EA), 'Environmental Permit' (EP) application for a proposed carbon capture (CC) facility at the at the existing Parc Adfer 'Energy Recovery Facility' (ERF).

7.2 Operation of the proposed Parc Adfer CC facility would result in very low Rating Levels of 26 dB $L_{Ar,Tr}$, causing impacts of no or negligible magnitude at 'noise sensitive receptors' (NSRs), with Rating Levels at all NSRs at least 9 dB below the background sound level at all times. Consequently, significant adverse impacts would be very unlikely.

References

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

Figures



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Client: enfinium

Project: Parc Adfer CC

Job Ref: 641617

File location:

Date: 23/07/2025	Rev: 0
Drawn: PB	Checked:

Figure 1: GNM

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Appendices

Appendix A: BS 4142 Statements

Phil Evans: Director - Acoustics

BSc (Hons) Geology; MSc Acoustics, Vibration and Noise Control; Fellow of the Geological Society; Fellow of the Institute of Acoustics; Associate Member Acoustical Society of America

A.1 Phil is a Director and leads the Savills Acoustics Team. He is a specialist in environmental acoustics and is active on a number of committees including the Association of Noise Consultants' Vibration Working Group; British Standards Institution (BSi) Committee GME/21/6/4 - BS 6472: Guide to Evaluation of Human Exposure to Vibration in Buildings; BSi Committee B/564/01 on BS 5228: Noise and Vibration Control on Construction and Open Sites which has now also revised and issued BS 8233:2014 Guidance on sound insulation and noise reduction in buildings. He has been a corporate Member of the Institute of Acoustics (MIOA) for over 20 years.

A.2 Phil has over 25 years' experience in the project management of, and technical input to, environmental noise and vibration impact assessments for major developments. He is an expert in the industrial/commercial, transportation and construction sectors including the measurement, calculation, evaluation and mitigation of environmental noise and vibration. Phil has significant experience in the preparation and presentation of technical evidence and reports for public inquiries and planning applications. He is experienced in consultation and liaison with government departments, local authorities and other statutory bodies. He is an experienced expert witness. He has a Continuous Professional Development Record to support this competency and experience.

A.3 Phil has been involved in many BS 4142 noise assessments for both the previous and current 2014 version of BS 4142. He has given evidence at public inquiries where BS 4142 has been the primary assessment methodology. He is very familiar with the Standard and attended the joint ANC/BSi launch of the 2014 version of the Standard. On the basis of Phil's overall experience in acoustics combined with particular focus on BS 4142, he is deemed competent for BS 4142 assessments.

A.4 For this project, Phil as taken on the role of Project Director and has been responsible for overseeing and delivering the project.

Peter Barling: Associate - Acoustics

BSc (Hons) Physics; PGDip Environmental Assessment and Management; Member of the Institute of Acoustics

A.6 Peter is an Associate Consultant in Acoustics and environmental acoustics specialist with nine years' experience. He has a Degree in Physics and also has a Post Graduate Diploma in Environmental Assessment and Management. He has been a member of the Institute of Acoustics since 2013.

A.7 Peter has project managed and undertaken noise assessments for a variety of developments, including: large scale mixed-use developments, incorporating commercial, retail, leisure and residential elements; on-shore substations for off-shore windfarms; energy from waste facilities; manufacturing facilities; distribution centres; retail units; minerals extraction and exploration; solar farms; and petrol service filling stations. He has provided input into Environmental Impact Assessments (EIAs) and undertaken noise assessments to support planning applications and discharge planning conditions. He has a Continuous Professional Development (CPD) Record to support this competency and experience.

A.8 Peter has undertaken BS 4142 noise assessments for both the previous and current 2014 version of BS 4142. He is familiar with the Standard and has attended and participated in internal and external CPD training seminars regarding the revised 2014 version of the Standard. On the basis of Peter's overall experience in acoustics, combined with particular focus on BS 4142, he is deemed competent for BS 4142 assessments.

A.9 Peter was responsible for undertaking the baseline acoustic survey and review of the assessment and report.

Appendix B: Baseline Data

Appendix 9.1: Baseline Sound Monitoring Report

1.1.1 The Savills Acoustics Team has been commissioned by Enfinium to undertake baseline sound monitoring to inform the noise impact assessment for the proposed Parc Adfer Carbon Capture project.

1.1.2 This report provides the results of baseline sound measurements undertaken to characterise the sound environment in the vicinity of the nearest Noise and Vibration Sensitive Receptors (NSRs) to the Proposed Development. These baseline levels have been used in the assessment of effects for the operational and construction noise and vibration assessments in Chapter 9 of the Environmental Statement (ES).

1.1.3 This appendix provides a summary of the survey data for each survey location. Survey sheets indicating details and locations of noise monitoring equipment are provided in Annex A.

1.2 Survey locations

1.2.1 Survey locations were chosen to characterise baseline conditions in the vicinity of the nearest noise sensitive receptors to the Proposed Development and based on their proximity to the Site. The proposed monitoring were as follows:

- LT1: RSPB Burton Mere Wetlands, Puddington Lane, Burton, Neston, CH64 5SF. This location is approximately 2.1 km north of the proposed development boundary and representative of the nearest NSRs to the north of the development; and
- LT2: Hurlbutts Drive, Deeside CH5 1SF. This location is approximately 2.7 km south-east of the proposed development boundary and representative of the nearest NSRs to the south and south-east of the development.

1.3 Baseline survey procedure

1.3.1 Long term unattended baseline sound level monitoring was undertaken at three locations using sound level meters. Measurements were undertaken between 01 March and 08 March 2024 at the three locations which were in closest proximity to the Proposed Development.

1.3.2 Sound level monitoring was carried out using ‘Class 1’ Rion NL-52 and Convergence Instruments NSRT_mk3 sound level meters (SLM). Each SLM was checked for calibration prior to and immediately following the survey with no significant deviation found. At the long term monitoring locations, continuous data was logged of the fast time weighted, A-weighted, broadband sound pressure levels in 100 ms periods.

1.3.3 The long term surveys were established during the day and observations made of sources and other conditions in accordance with the requirements of British Standard BS 4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’ (British Standards Institution (BSI), 2019). As a minimum, L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} parameters were recorded.

1.3.4 Long term surveys were undertaken following guidance contained in BS 7445 2:1991 ‘Description and measurement of environmental noise, Part 2: Guide to the acquisition of data pertinent to land use’ (BSI, 1991).

1.3.5 Meteorological conditions were monitored during the long term surveys.

1.4 Baseline survey details and results

1.4.1 Survey record sheets for each location detailing the position of the noise monitors are presented in Annex A. Time histories of the measured sound levels and meteorological conditions during the survey period are presented in Annex A.

1.5 Determining representative baseline levels

1.5.1 To ascertain the typical sound levels at the measurement locations, time history plots have been produced and presented for each long term monitoring position. These are presented with the summary results tables in Annex B. The summaries of results in Annex B are based on analysis of the measured sound level processed into 15-minute samples.

1.5.2 Representative baseline sound levels have been determined from the long term monitoring survey locations. The data obtained have been analysed and compared against other datasets in order to obtain a representative baseline sound level.

1.6 Operational noise assessment

1.6.1 The BS 4142:2013+A1:2019 methodology requires that the background sound levels adopted for the assessment are 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. 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 levels between the shoulder night periods. The accompanying note states that:

“*a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or model value”.*

1.6.2 In determining representative baseline noise levels for receptors identified within the ES and Environmental Statement, it will be necessary to analyse each location individually to ensure the most representative level is considered. BS 4142:2014+A1:2019 states that:

“In using the background sound level in the method for rating and assess industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

1.7 Construction noise assessment

1.7.1 To determine the most representative ambient sound levels, the equivalent continuous A-weighted sound pressure level, L_{Aeq}, was calculated based on standard construction hours and presented as a logarithmic average of the 15-minute period data over the relevant time period.

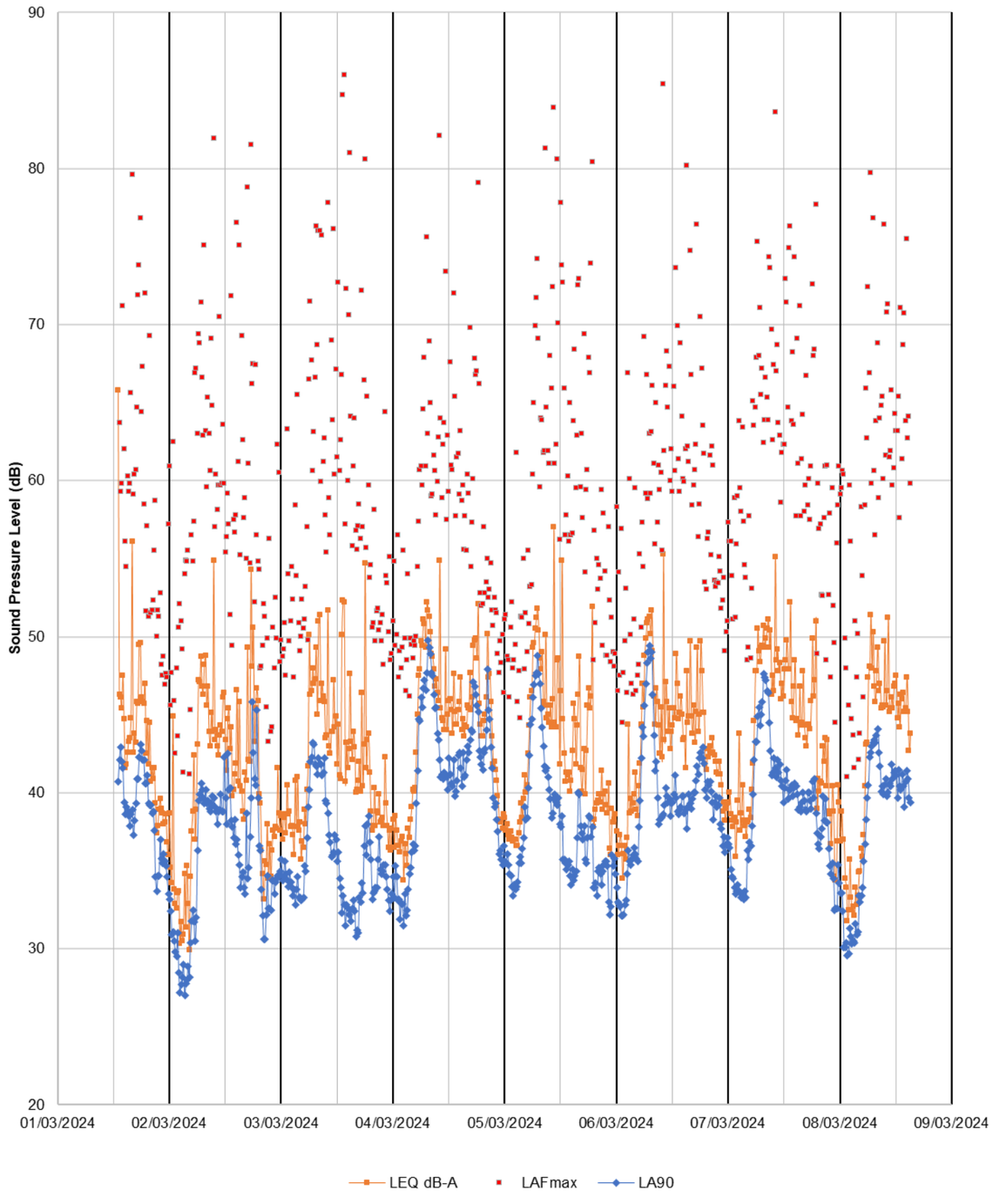
Project Name and Number			Parc Adfer	
Location			LT1	
Purpose of Monitoring			Baseline	
Relevant Guidance / Standard			BS 4142:2019	
Sound Measurement System				
ID	Manufacturer / Model		Serial Number	
-	Rion NL-52		LT1	
Microphone Height	Façade / Freefield	Measurement Interval	Filename	
2	Freefield	125 ms	1	
		START	**END**	
Personnel		JT	JT	
Date / time		01/03/2024 13:05	08/03/2024 15:05	
Calibrator	Reference level	94.0	94.0	
	Meter reading	94.0	93.8	

Photographs of Measurement Location

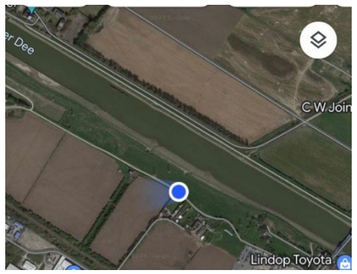
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))

Description of sound environment (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)

Period	Background Sound Levels (dB $L_{A90,15min}$)					Residual Sound Levels (dB $L_{Aeq,15min}$)				
	Min	25th %[1]	50th %	75th %	Max	Min	25th %	50th %	75th %	Max
07:00 to 23:00	31	37	40	41	50	33	42	45	47	66
23:00 to 07:00	27	33	35	37	49	30	37	38	41	51



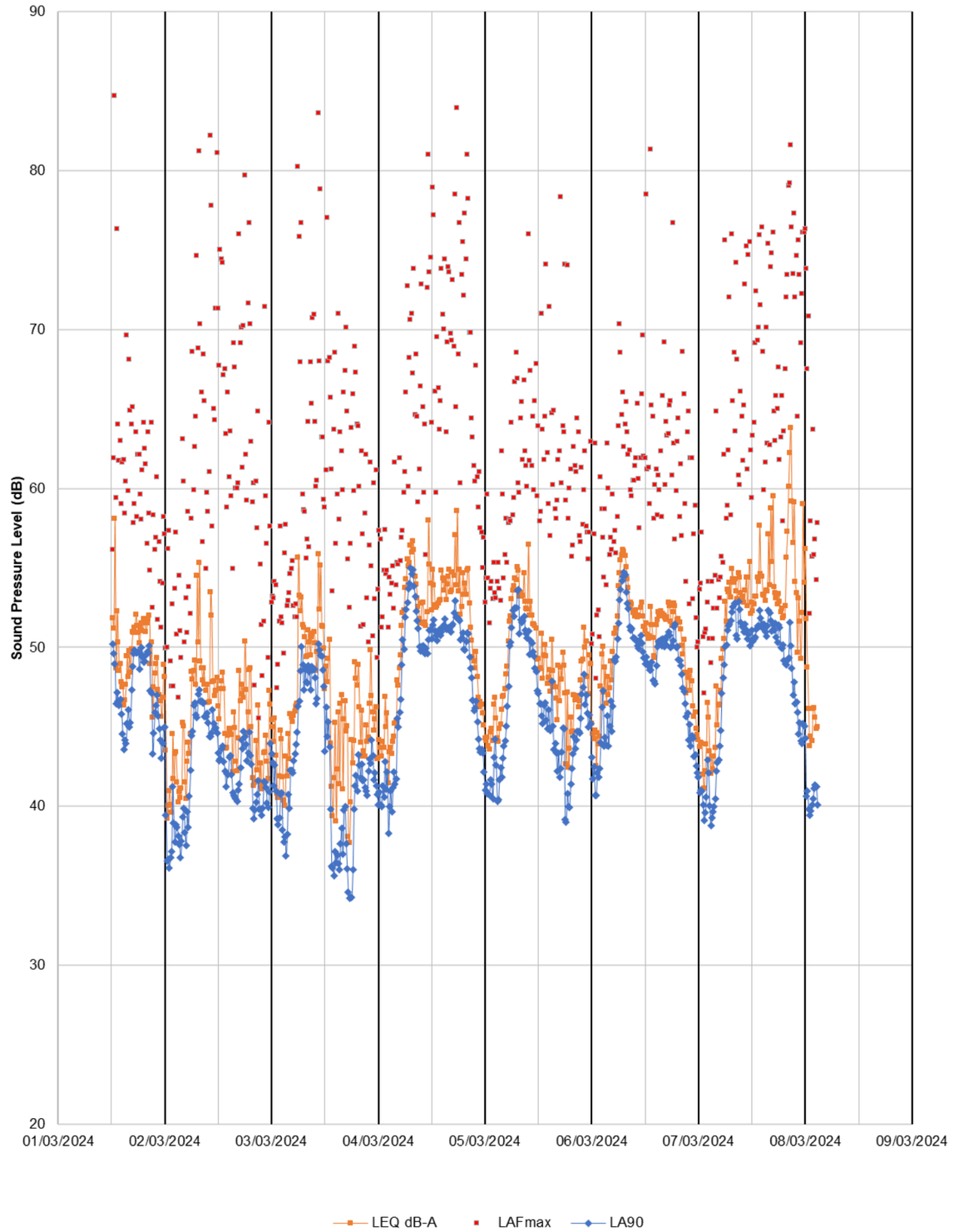
Relevant Guidance / Standard		BS 4142:2019	
Sound Measurement System			
ID	Manufacturer / Model	Serial Number	
-	LT2		
Microphone Height	Façade / Freefield	Measurement Interval	Filename
2	Freefield	125 ms	1
		START	**END**
Personnel		JT	JT
Date / time		01/03/2024 12:15	08/03/2024 14:00
Calibrator	Reference level	94.0	94.0
	Meter reading	94.0	93.8
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))

Description of sound environment (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)

Period	Background Sound Levels (dB $L_{A90,15min}$)					Residual Sound Levels (dB $L_{Aeq,15min}$)				
	Min	25th %[1]	50th %	75th %	Max	Min	25th %	50th %	75th %	Max
07:00 to 23:00	34	44	49	51	55	38	48	51	53	64
23:00 to 07:00	36	41	42	45	54	39	44	46	49	59



Appendix C: Model Data

Appendix 9.3 Operational Noise Assessment Methodology and Results

1.1 Calculation and Modelling Inputs

1.1.1 This appendix describes the approach and presents the results of modelling the operational noise sources of the Parc Adfer Carbon Capture project. The environmental effects of the noise levels predicted by the modelling are assessed in Chapter 9: Noise and Vibration.

1.2 Data sources

1.2.1 Noise source data for the assessment has been based on design information regarding the primary noise generating plant provided as agreed with the project engineers (WSP) and reference to manufacturers' data and data previously obtained by member of the Savills Acoustics, Noise & Vibration Team when assessing similar CCS and industrial schemes.

1.2.2 In order to determine the specific sound levels resulting from the operation of the proposed development, a noise model has been built using SoundPLAN v9.1 noise modelling software. The model predicts noise levels under light down-wind conditions based on hemispherical propagation, atmospheric absorption, ground effects, screening and directivity based on the procedure detailed in ISO 9613-2:2024.

1.3 Description of sound sources

ITEM	DESCRIPTION	Location	Sound Pressure Level (Lp)	Broadband dBA Level
1	PIPE RACK		L'w'	76 dBA per unit length (assumes 200 mm cladding)
2	NEW OR MODIFIED ROADS		-	
3	CARBON CAPTURE PROCESS COLUMNS		L'w'	81 dBA
4	CARBON CAPTURE PROCESS, COMPRESSION AND TREATMENT BUILDING		Lp	88 dBA internal reverberant SPL
5	ELECTRIC THERMAL RECLAIMER UNIT (TRU)		L'w'	100 dBA
6	CHEMICAL UNLOADING/LOADING & STORAGE AREA		-	
7	ABOVE GROUND INSTALLATION (AGI)		Lp	88 dBA reverberant SPL
8	BACK PRESSURE TURBINE (BPT), PRDS, SAMPLING AND INSTRUMENT AIR BUILDING		Lp	84 dBA internal reverberant SPL
9	FLUE GAS HEAT EXCHANGER		L'w'	106 dBA
10	CARBON CAPTURE PLANT FLUE GAS STACK		L'w'	91 dBA
11	CONTINUOUS EMISSIONS MONITORING SYSTEM EQUIPMENT		L'w'	97 dBA
12	DRY COOLING TOWER		L'w'	107 dBA
13	WET COOLING TOWER		L'w'	110 dBA
14	WET COOLING TOWER PUMPS		L'w'	85 dBA
15	COOLING WATER CIRCULATION PUMPS		L'w'	85 dBA
16	PLATE HEAT EXCHANGERS		-	
17	CONDENSATE STORAGE TANK		-	
18	CONDENSATE RETURN PUMPS		L'w'	85 dBA
19	EFFLUENT TREATMENT PLANT		L'w'	85 dBA
20	HYDROGEN TUBE TRAILER		-	
21	WELFARE AND CONTROL FACILITIES (UPPER FLOOR)		-	
22	ELECTRICAL EQUIPMENT ROOM		-	
23	ELECTRICAL TRANSFORMERS		L'w'	85 dBA
24	TREATED WATER BUFFER STORAGE TANK		-	

1.3.1 All plant has been set with an on-time of 100%, representing a worst case scenario. However, the cooling fans would operate at a reduced capacity/speed when ambient temperatures are cooler, i.e. at night. It is considered likely that fan sound power levels would be 10 dB lower at night.

1.3.2 Based on professional experience and review of available data, all sound sources are considered to produce sound with broadband frequency content.

1.3.3 The specific details of the plant items would, at a detailed design stage in due course, be designed to not exceed the overall rating level for operation that is established through this assessment.

1.4 Results

1.4.1 The predicted specific sound levels at the identified most affected NSRs (and other NSR in similar locations/areas) due to the operation of Parc Adfer Carbon Capture project are provided in Table 1 below. Note that receptors representative of groups of properties are named for one property.

Table 1 Predicted specific sound levels at NSR Locations

NSR Location	Floor	Specific Sound level dB $L_{Aeq,Tr}$
Burton Point Farm	GF	24
	FF	25
Burton Mere House	GF	26
	FF	26
Barn Farm	GF	24
	FF	24
Sealand Avenue	GF	24
	FF	26
The Airfields	GF	23
	FF	24
Shotton	GF	26
	FF	26

1.5 Assessment

1.5.1 An initial estimate of impact undertaken in accordance with BS 4142, is shown in Tables 4 to 6 below for the daytime for each of the three potential scenarios. Tables 7 to 9 below are provided for the night-time for each of the three potential scenarios. Predicted specific sound levels for the day are at ground floor level with night time level taken at first floor level, all free-field.

1.5.2 The subjective method for determining rating penalties has been used to determine appropriate corrections for each receptor and assessment period. It is considered that the specific sound from the combined sources of plant will not be characterised as intermittent or impulsive, so no penalties have been applied for intermittency or impulsivity. As it is considered that the only source of tonal noise from the proposed development is from the turbine and the contribution from this source to the overall specific sound is negligible (23 dBA), it is most unlikely that noise levels at the nearby NSRs would be perceived or characterised as tonal. As such, no penalties have been applied for tonality or any other features.

Table 2 BS 4142 assessment of impact (daytime)

NSR	Background (dB $L_{A90,T}$)	Specific (dB $L_{Aeq,T}$)	Correction (dB)	Rating (dB $L_{Ar,Tr}$)	Difference (dB)
Burton Point Farm	37	24	0	24	-13
Burton Mere House	37	26	0	26	-11
Barn Farm	37	24	0	24	-13
Sealand Avenue	44	24	0	24	-20
The Airfields	44	23	0	23	-21
Shotton	44	26	0	26	-18

Table 3 BS 4142 assessment of impact (night-time)

NSR	Background (dB $L_{A90,T}$)	Specific (dB $L_{Aeq,T}$)	Correction (dB)	Rating (dB $L_{Ar,Tr}$)	Difference (dB)
Burton Point Farm	35	25	0	25	-10
Burton Mere House	35	26	0	26	-9
Barn Farm	35	24	0	24	-11
Sealand Avenue	42	26	0	26	-16
The Airfields	42	24	0	24	-18
Shotton	42	26	0	26	-16

1.5.3 The results of the initial estimate of impact in Tables 2 and 3 are described in the following paragraphs.

1.5.4 During the daytime period, the Rating Level is at least 11 dB below the background sound level at all NSRs. This is a significant 16 dB below the threshold level at which a moderate impact may result (+5 dB).

1.5.5 At the most affected NSR (Burton Mere House), the resultant daytime ambient sound level would not increase and be less than 55 dB $L_{Aeq,T}$ (baseline residual sound level of 42 dB plus Rating Level of 26 dB is 42 dB $L_{Aeq,T}$). As such, the resulting magnitude of impact would be no change at this NSR. Similarly, at the other NSRs, the resultant daytime ambient sound level would not change and be less than 55 dB $L_{Aeq,T}$, and below the background sound level; as such, the resulting magnitude of impact would be no change at these NSRs too.

1.5.6 The results of the initial estimate of impact during the daytime are therefore indicative of negligible impacts / no change at all receptors, depending on the context.

1.5.7 During the night-time period, the Rating Level is at least 9 dB below the background sound level at all NSRs. This is a significant 14 dB below the threshold level at which a moderate impact may result.

1.5.8 At the most affected NSR (Burton Mere House), the resultant night-time ambient sound level would be below 40 dB $L_{Aeq,T}$ (baseline residual sound level of 38 dB plus Rating Level of 26 dB is 38 dB $L_{Aeq,T}$); as such, the resulting magnitude of impact would be no change at this NSR. Similarly, at the other NSRs the resultant night-time ambient sound level would not change and be less than 40 dB $L_{Aeq,T}$ where it currently is (Burton Point Farm, Burton Mere House, Barn Farm), and below the background sound level; as such, the resulting magnitude of impact would be no change at these NSRs too.

1.5.9

1.5.10 The results of the initial estimate of impact during the night-time are therefore indicative of no change adverse impacts at all receptors, depending on the context.

1.5.11 To accord with the guidance contained within BS 4142:2014+A1:2019 and provide a thorough assessment, consideration of the context of the scenario has been undertaken. Consideration of the context is provided in terms of the assessment of the absolute noise levels and the change in ambient sound due to the specific sound as addressed further on in this section.

Context

1.5.12 In this case consideration of context does not increase the risk for adverse impacts to occur. During the daytime and night-time periods period Rating Levels are significantly below the residual sound levels and would therefore not affect ambient sound levels.

1.5.13 The character of the specific noise would be broadband in nature and not contain any characteristics that would be distinguishable or otherwise considered incongruous. It is considered likely that the specific noise would not be dissimilar to the residual acoustic sound, which is affected by distant road traffic movements and other industrial activity in the area.

1.5.14 The Site is part of a long established industrial zone and noise associated with similar plant/activity would have historically affected the acoustic environment.

1.5.15 On the basis of the above, the specific sound would likely not be particularly noticeable and if specifically discernible, not considered to be incongruous compared to the baseline situation.

1.5.16 Furthermore, with regard to the night-time period, Rating Levels are based on plant operation at 100% capacity, including the cooling fans, which is unlikely to be the case at night due to lower ambient temperatures. Cooling fans operating at a reduced capacity would have lower noise emissions, potentially significantly by several dB, such that resultant Rating Levels would not exceed the background sound levels.

1.5.17 On the basis of the above, the impact of the sound is found to be no higher than initially predicted after consideration of the context of the sound, and the initial estimate of a change impact is not changed.

1.5.18 Table 4 below provides a summary of the final consideration of the maximum magnitude of impact at each NSR for the daytime and night-time periods.

Table 4: BS 4142:2014+A1:2019 assessment of impact

NSR	Daytime	Night-time
Burton Point Farm	No Change	No Change
Burton Mere House	No Change	No Change
Barn Farm	No Change	No Change
Sealand Avenue	No Change	No Change
The Airfields	No Change	No Change
Shotton	No Change	No Change