



PREPARED: Friday, 06 December 2019

Unit 1, Acre Rd, Reading Noise Impact Assessment

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LIST OF ATTACHMENTS

AS10501/SP2	Indicative Site Plan
AS10501/TH1	Environmental Noise Time Histories
APPENDIX A	Acoustic Terminology
APPENDIX B	Acoustic Calculations
	Noise Report Audit Sheet

Project Ref:	AS10501	Title:	Unit 1, Acre Rd, Reading
Report Ref:	AS10501.191129.NIA	Title:	Noise Impact Assessment
Client Name:	Ceramex Ltd		
Project Manager:	Daniel Saunders		
Report Author:	Daniel Saunders		
Clarke Saunders Acoustics Winchester SO22 5BE		This report has been prepared in response to the instructions of our client. It is not intended for and should not be relied upon by any other party or for any other purpose.	

1.0 EXECUTIVE SUMMARY

- 1.1 Clarke Saunders Associates has been commissioned to undertake an assessment of the proposed new external cooling plant at Unit 1, Acre Rd, Reading. The assessment has been undertaken in accordance with the planning requirements of Reading Borough Council.
- 1.2 An environmental noise survey has been undertaken at the application site to establish the baseline noise climate. The survey data has been used in the assessment of potential noise impact of new plant to the nearest noise sensitive receptor. Noise data for the proposed unit has been confirmed by the manufacturer and the assessment has been based on drawings provided by the mechanical services engineers at the time of writing.
- 1.3 It has been demonstrated that the predicted noise levels associated with the operation of the selected plant are likely to be controlled to target levels, provided that acoustically specified attenuators are installed as indicated in this report. No additional mitigation measures are, therefore, expected to be required for the control of external noise emissions from the proposed units.

2.0 INTRODUCTION

- 2.1 Planning approval is being sought for the installation of new plant at roof level of the existing building at Unit 1, Acre Rd, Reading, RG2 0RJ.
- 2.2 Clarke Saunders Associates has been commissioned by Ceramex Ltd to undertake an environmental noise survey in order to establish the prevailing background noise levels at site. The data will be used to determine the daytime, evening and night-time noise emission limits for new building services plant in accordance with the planning requirements of Reading Borough Council.

3.0 SURVEY PROCEDURE & EQUIPMENT

- 3.1 An attended short-term survey of the existing noise levels was undertaken at the location shown in the attached site plan ASI0501/SP2.
- 3.2 Measurements of consecutive 5-minute L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels were taken between 00:15 hours and 01:05 hours on Friday 29th November 2019.
- 3.3 The following equipment was used during the course of the survey:
 - 1 no. Rion data logging sound level meter type NA28;
 - Rion sound level calibrator type NC-74.
- 3.4 The calibration of the sound level meter was verified before and after use. No significant calibration drift was detected.
- 3.5 The weather during the survey was generally humid with spells of rain but the overall conditions were considered suitable for establishing typical background sound levels at the nearest noise sensitive receptors to the application site..
- 3.6 Measurements were made following procedures in BS 7445:1991 (ISO1996-2:1987) Description and measurement of environmental noise Part 2- Acquisition of data pertinent

to land use and where appropriate, BS4142:2014 +A1:2019 *Methods for rating and assessing industrial and commercial sound*.

- 3.7 Please refer to Appendix A for details of the acoustic terminology used throughout this report.

4.0 RESULTS

- 4.1 Figure ASI0501/TH1 shows the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels as a time history at the automated survey position.
- 4.2 The site is primarily affected by noise from road traffic from the surrounding road traffic network with some contribution from existing plant associated with the Acre Road industrial estate.
- 4.3 A secure location for monitoring equipment was not available. On this basis, it was confirmed by the relevant authority of Reading Borough Council that a short-term survey at an appropriate time to reflect operational hours would be sufficient to establish a representative background sound level.
- 4.4 The measured minimum background and average noise levels from the survey are shown in table below.

MONITORING PERIOD	TYPICAL $L_{A90, 5MIN}$
23:00 - 07:00 hours	38 dB

5.0 DESIGN CRITERIA

5.1 LOCAL AUTHORITY REQUIREMENTS

- 5.2 Telephone liaison with Jodie Wilson, Environmental Protection Officer at Reading Borough Council, confirmed the above manual survey and assessment methodology.
- 5.3 The following recommended condition, relating to the application site, has been proposed by Reading BC:

"No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by this Council. The assessment shall be carried out for in accordance with BS4141[sic]:2014 methodology. The predicted specific sound level ($L_{Aeq,TR}$) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The predicted rating level, $L_{A,r,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall not exceed the existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment".

5.4 EXTERNAL NOISE EMISSIONS CRITERIA

- 5.4.1 It is not expected that tonal characteristics will be generated by the proposed plant unit and so the plant noise emissions criteria that should not be exceeded at the nearest noise sensitive receiver should be set to the proposed levels detailed in the table below:

24-HOURS CRITERION
L_{Aeq} 28dB

[dB re. 20μPa]

5.5 BS8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

- 5.5.1 The guidance in this document indicates acceptable noise levels for various activities within residential dwellings.
- 5.5.2 The relevant section of this Standard is shown in the following table:

ACTIVITY	LOCATION	07:00 TO 23:00	23:00 TO 07:00
Resting	Living Room	35dB L_{Aeq} , 16 hour	-
Dining	Dining Room	40dB L_{Aeq} , 16 hour	-
Sleeping	Bedroom	35dB L_{Aeq} , 16 hour	30dB L_{Aeq} , 8 hour

6.0 PREDICTED NOISE IMPACT

6.1 PROPOSED PLANT

- 6.1.1 The selected plant to be installed has been confirmed as follows:
- 1 no. Dust Extraction System
 - 2 no. Moist Air Systems
- 6.1.2 The approximate location of the plant to be installed is shown in site plan ASI0501/SP2.
- 6.1.3 The highest sound power level generated by the plant has been confirmed by the manufacturer as follows:

FREQUENCY (HZ)	63	125	250	500	1K	2K	4K	8K	dB(A)
Dust EF	116	109	113	102	101	97	88	81	118
Moist EF 1	107	99	102	92	87	82	79	71	109
Moist EF 2	109	100	105	94	90	84	81	72	111

[dB re. 1pPa]

6.2 PREDICTED NOISE LEVELS

- 6.2.1 Following an inspection of the site and its environs, the nearest noise sensitive receptor has been determined as the residential properties at 505-519 Basingstoke Road located approximately 300m away from the proposed plant location.

- 6.2.2 It is noted that there is a Holiday Inn around 300 metres to the south-east but this benefits from shielding of the plant by the office building to the south of the application site. Sound levels at this location would be lower than at the assessment location.
- 6.2.3 The sound level at the above location, based on the plant being installed, has been calculated using the noise data at paragraph 6.1.3 above.
- 6.2.4 Initial calculations indicate that mitigation measures in the form of acoustically specified attenuators are required in order to meet the design criterion. Indicative values of insertion losses for the selected plant items are given below.

FREQUENCY (HZ)	63	125	250	500	1K	2K	4K	8K
Insertion Loss for Dust EF	4	9	17	26	31	30	23	16
Insertion Loss for Moist EF 1	2	5	11	17	20	19	12	10
Insertion Loss for Moist EF 2	3	7	14	21	27	26	17	12

- 6.2.5 The overall predicted level, after allowance for the addition mitigation, is shown in the table below, along with the design criterion:

PREDICTED NOISE LEVEL AT 1M FROM WINDOW	ASSESSMENT CRITERION
L_{Aeq} 28dB	24-hours L_{Aeq} 28dB

6.3 COMPARISON TO BS8233:2014 CRITERIA

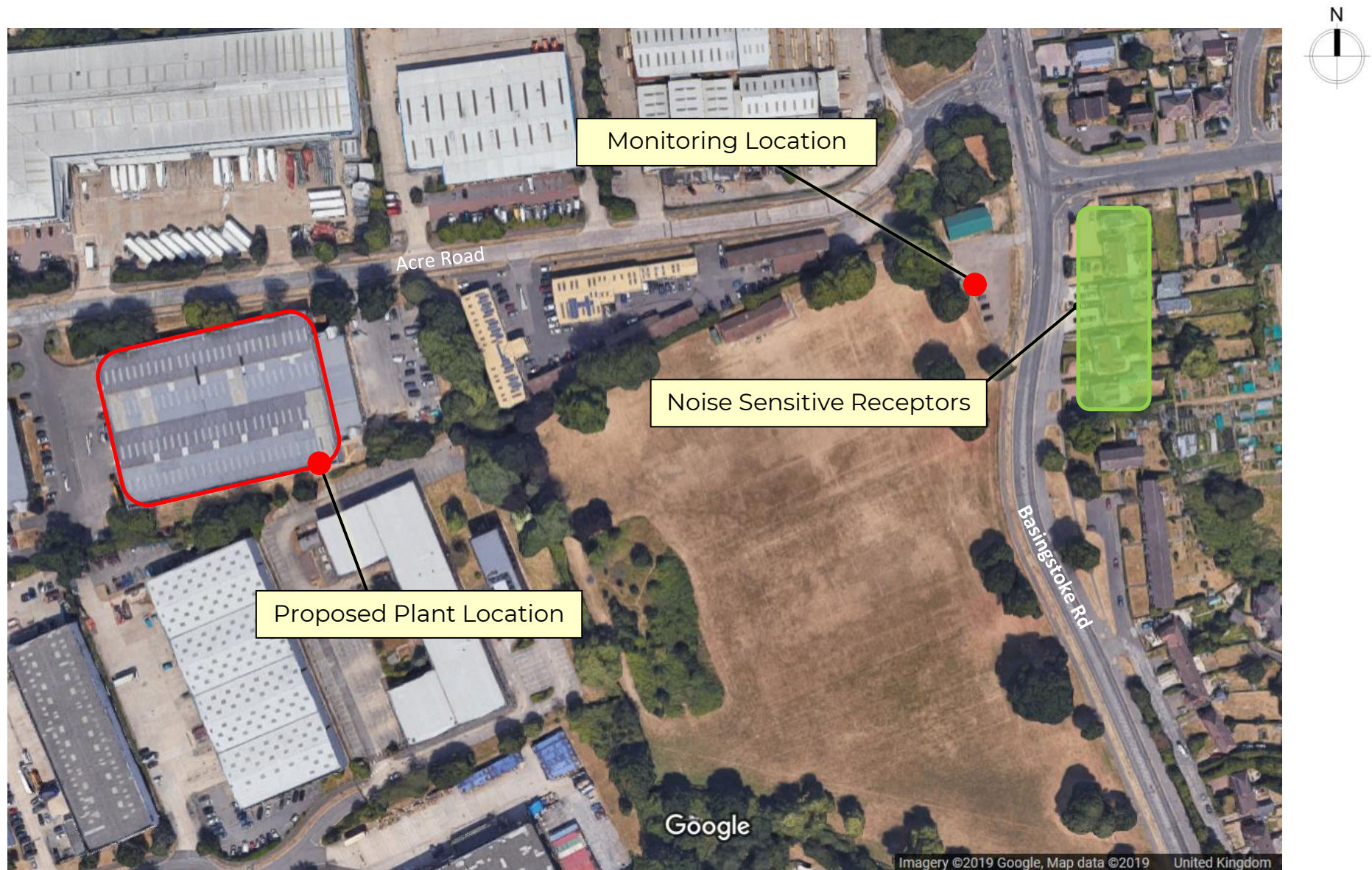
- 6.3.1 BS8233 assumes a loss of approximately 15dB for a partially open window. The external noise levels shown in the table at paragraph 6.2.3 would result in internal noise levels that would be below the BS8233:2014 target internal noise levels.

7.0 CONCLUSIONS

- 7.1 A short term environmental sound survey has been undertaken at Unit 1, Acre Road, Reading, on Friday 29th November 2019 in order to establish the existing background noise climate at the site. This has enabled a suitable design criterion to be set for the control of plant noise emissions to noise sensitive properties, in accordance with the requirements of Reading Borough Council.
- 7.2 Data for a proposed new plant item has been used to predict the potential noise impact on neighbouring noise sensitive properties.
- 7.3 Compliance with the noise emission design criterion has been demonstrated provided that the proposed mitigation measures are applied as indicated in this report. No additional mitigation measures are, therefore, expected to be required.

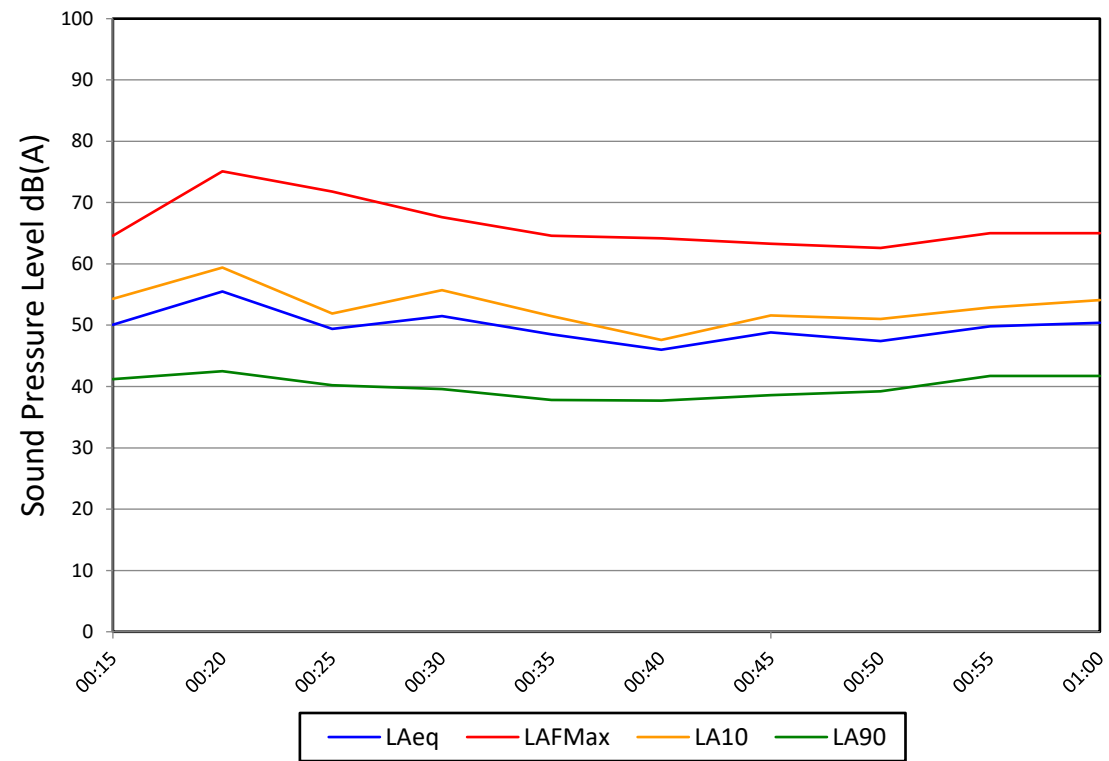


Daniel Saunders MIOA
CLARKE SAUNDERS ACOUSTICS



Unit 1, Acre Road, Reading

Environmental Noise Time History



Friday 29 November 2019

Figure AS10501/TH1

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A .
L_{eq}:	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90}:	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max}:	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000
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1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

INTERPRETATION

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

AS10501 UNIT 1, ACRE RD, READING

APPENDIX B

PLANT NOISE ASSESSMENT

APPENDIX B
AS10501 - Unit 1, Acre Road, Reading
Plant Noise Assessment
To Residential Properties to the East

Dust Extraction System		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Induct Level	Lw	116	109	113	102	101	97	88	81	108
Duct Length Losses		-1	-1	-1	-1	-1	-1	-1	-1	
End Reflection		-7	-3	-1	0	0	0	0	0	
Attenuation		-4	-9	-17	-26	-31	-30	-23	-16	
Total Emissions		104	96	94	75	69	66	64	64	87
Propagation Loss		-11	-11	-11	-11	-11	-11	-11	-11	
Directivity		0	0	0	0	-4	-7	-7	-7	
Distance Loss	300m	-50	-50	-50	-50	-50	-50	-50	-50	
Specific Plant Noise Level at Receiver	L_{eq}	43	35	34	14	5	-1	-3	-3	27

Moist Air System 1		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Induct Level	Lw	107	99	102	92	87	82	79	71	96
Duct Length Losses		-1	-1	-1	-1	-1	-1	-1	-1	
End Reflection		-9	-5	-2	-1	0	0	0	0	
Attenuation		-2	-5	-11	-17	-20	-19	-12	-10	
Total Emissions		95	89	88	74	66	62	66	60	82
Propagation Loss		-11	-11	-11	-11	-11	-11	-11	-11	
Directivity		0	0	0	0	-4	-7	-7	-7	
Distance Loss	300m	-50	-50	-50	-50	-50	-50	-50	-50	
Specific Plant Noise Level at Receiver	L_{eq}	35	28	28	13	1	-5	-1	-7	21

Moist Air System 2		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Induct Level	Lw	109	100	105	94	90	84	81	72	99
Duct Length Losses		-1	-1	-1	-1	-1	-1	-1	-1	
End Reflection		-10	-6	-2	-1	0	0	0	0	
Attenuation		-3	-7	-14	-21	-27	-26	-17	-12	
Total Emissions		95	86	88	71	62	57	63	59	80
Propagation Loss		-11	-11	-11	-11	-11	-11	-11	-11	
Directivity		0	0	0	0	-4	-7	-7	-7	
Distance Loss	300m	-50	-50	-50	-50	-50	-50	-50	-50	
Specific Plant Noise Level at Receiver	L_{eq}	34	26	27	11	-3	-10	-4	-8	20

Cumulative Noise Level		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
All Plant		44	37	35	18	7	0	2	-1	28

24-Hours Criterion 28dB(A)

NOISE REPORT AUDIT SHEET

This initiative was developed by representatives of the Hampshire and IOW Environmental Control Advisory Committee (ECAC) and Institute of Acoustics Southern Branch.
As part of this pilot initiative, Clarke Saunders is including this audit sheet for all planning related acoustic reports.

Client Brief

Brief Description	Assessment of new external plant serving Unit 1 at Acre Rd, Reading
Design Input	Noise impact assessment to specify noise mitigation measures and confirm compliance with Local Authority's criteria.

Liaison with LA

Liaison with LA (Name/Date)	N/A
Principles Agreed	No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by this Council. The assessment shall be carried out for in accordance with BS4141[sic]:2014 methodology. The predicted specific sound level (LAeq,Tr) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The predicted rating level, LAr,Tr (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall not exceed the existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The plant shall

Check List	Page No(s)	Compliance		
		Y	N	N/A
Full site description/map provided	Attached site plan AS10501/SP1	Y		
Site history provided	N/A			N/A
Current and potential future acoustic environment identified	3,4	Y		
Identification of relevant legislative framework	1 - 3	Y		
Conceptual model fully justified	1 - 4	Y		
Inclusion of reporting elements of BS4142:2014 (Para 12 a to j)	N/A			N/A
Monitoring data fully representative	2	Y		
Raw data presented	Attached time history AS10501/TH1	Y		
ADS included (where ProPG relevant)	N/A			N/A
Calculations and assumptions fully presented and justified	Appendix B	Y		
Uncertainty assessment provided	(Not BS4142)			N/A
Clear recommendations and conclusions	4	Y		
Executive summary included	1	Y		

Professional Statement - This report has been prepared independent of influence by the person(s) or instructing party, such that the technical content can be relied upon without knowingly containing altered, manipulated, fabricated or misrepresented data and it has been interpreted using reasonable care, professional knowledge and skill. The report adheres with the principles required by the Institute of Acoustics in their Code of Conduct, and the work is within the author's (including secondary author if relevant) own area of knowledge and expertise. Where opinions have been expressed these represent true and complete professional opinions on the matters to which they refer.

Signed	Position	Dated
Daniel Saunders	Director	06/12/2019