Marie Curie Hospice, Hampstead

Plant Noise Impact Assessment

7577.1

31st May 2019

Revision A

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Revision	Description	Issued by	Date
A	First issue	SE	31st May 19

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2 Summary

2.1 This report has been prepared in support of a Planning Application for proposed rooftop condenser units at Marie Curie Hospice, Hampstead.

2.2 Background sound levels have been measured at positions considered representative of the identified noise-sensitive receptors.

2.3 Plant details have been identified by the mechanical engineers.

2.4 Noise emission from the proposed plant has been determined and noise propagation modelled with proprietary software CadnaA.

2.5 The potential noise impact is calculated and rated in accordance with BS 4142.

2.6 It is calculated that the current proposals do not satisfy the Local Authority requirements, and a scheme for noise mitigation is required.

2.7 Noise mitigation measures which involve the construction of a 2.2 metre high screen surrounding the 4 condenser units are required to reduce their noise impact at the nearest noise-sensitive receptors.

2.8 The acoustic specification for the required noise mitigation measures are detailed in Section 9.

2.9 Based on the proposed mitigation measures, the rated plant sound impact is calculated to be 11 dB below the background sound level at the nearest noise sensitive receptor.

2.10 Considering the context of the existing acoustic environment, the BS 4142 assessment results indicate the likelihood of a low impact. This impact is considered to be a LOAEL in alignment with National Guidance aims..

3 Scope of appointment

3.1 Apex Acoustics has been commissioned to undertake a noise survey and assessment of the noise from mechanical plant associated with the development in support of a Planning Application.

3.2 The scope of our instruction includes:

- Measurement of the existing noise environment at locations deemed representative of the nearest noise-sensitive receptors;
- Analysis of proposed source noise levels, using manufacturers' data provided by the mechanical engineer;
- Calculate noise propagation using proprietary noise modelling software to the noise-sensitive receptors and assess the impact in accordance with BS 4142: 2014; and
- Advise on a scheme for noise mitigation, if necessary, to satisfy Local Authority requirements

4 Introduction

4.1 This report presents the evaluation of the potential noise impact from air conditioning plant associated with the existing development on the identified nearest noise-sensitive receptors (NSRs), in support of a Planning Application.

4.2 The NSRs are shown in Figure 1 and have been identified as residential properties along Wedderburn Road and Lyndhurst Gardens, to the north, north-west and south of the site.

4.3 This assessment is based on the proposed plant details identified by the mechanical engineers.

4.4 The potential noise impact from the sources identified is calculated and rated according to the BS 4142 methodology, Reference 1.

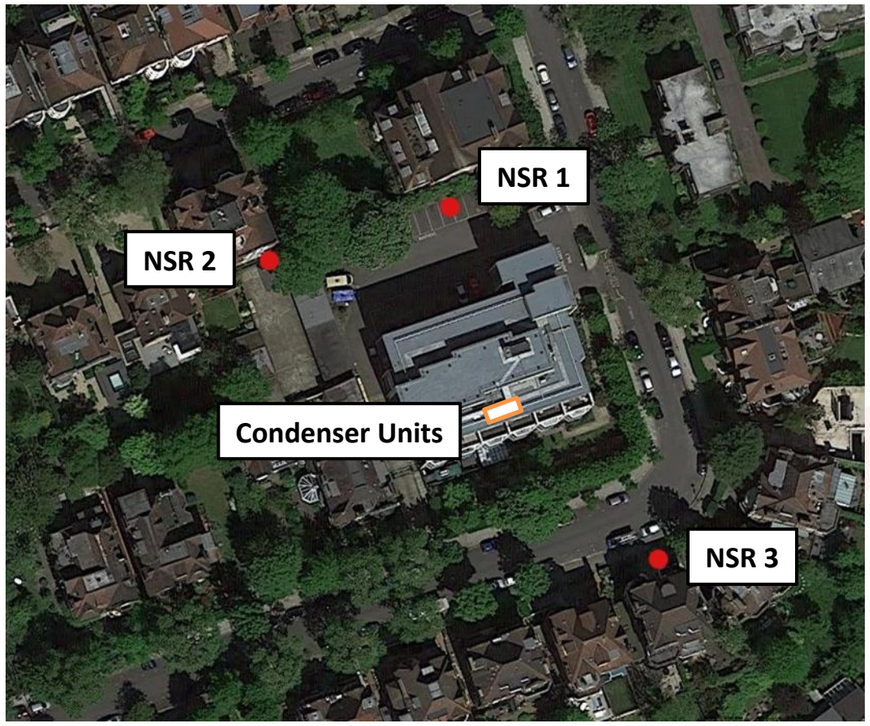

Figure 1: Plant location and identified NSRS

5 Planning policy and noise criteria

5.1 The National Planning Policy Framework (NPPF, 2018), Reference 2, sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced.

5.2 The Noise Policy Statement for England (NPSE, 2010), set out the long term vision of Government noise policy, "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development", Reference 3.

5.3 The terminology used in BS 4142: 2014 to describe the various levels of potential adverse impact is respect to the aims of the NPPF and NPSE, as summarised in Appendix A.

5.4 Further guidance on the various levels of adverse impact due to noise is provided in the Planning Practice Guidance notes, Reference 4.

5.5 **Local Authority Requirements**

5.6 Camden Council's Local Plan assigns three basic design criteria for proposed developments; 'Green', 'Amber' and 'Red', depending on the context, type of noise and sensitivity of the receptor. Green is applied where the noise is considered to be at an acceptable level, Amber for where noise is observed to be at an 'adverse effect' level but which may be considered acceptable when assessed in the context of other merits of the development, and Red for where noise is observed to have a 'significant adverse effect'.

5.7 The local authority guidance requires an assessment using BS4142:2014. Figure 2 below displays Table C of Appendix 3 of the Camden Local Plan.

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

Figure 2: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

6 Existing acoustic environment

6.1 The existing acoustic environment was measured between 14:00 and 13:00 hours from the 1st – 2nd May 2019.

6.2 The measurement locations are shown in Figure 3.

Figure 3: Noise monitoring locations

6.3 A one hour attended noise survey was carried out at Location 2 from 09:02 hours to 10:02 hours on the 2nd May 2019.

6.4 For both measurement locations the microphone was located 1.5 metres above ground level and away from other reflecting surfaces such that the measurements are considered free-field.

6.5 Data was recorded in single-octave band frequencies at one-second intervals throughout the survey.

6.6 The most significant noise sources at Location 1 were occasional traffic movements along Lyndurst Gardens / Wedderburn Road, birdsong, car park vehicle movements and cutting and sawing from a neighbouring property.

6.7 At location 2, the acoustic environment consisted of occasional traffic movements along Lyndurst Gardens, birdsong, pedestrians talking and occasional aircraft movements.

6.8 During the survey, weather conditions were mainly dry with occasional light rain showers, a temperature ranging from 13˚- 20˚ C with wind speeds of 0 – 2 m/s..

6.9 The equipment used is listed in Table 1.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-11084-E0
Calibrator	Larson Davis CAL 200	10665
Sound Level Meter	NTi XL2	A2A-11062-E0
Calibrator	Larson Davis CAL 200	13403

Table 1: Equipment used

6.10 Both meter and calibrator have current calibration certificates traceable to national standards. The sound level meter has been calibrated within the last two years and calibrator has been calibrated within the last year in accordance with the guidance of BS 4142; calibration certificates are available on request.

6.11 The equipment was field-calibrated before and after the measurements with no significant drift in sensitivity noted.

6.12 **Background sound level**

6.13 The background sound level, $L_{A90,\ 15min}$, at position 1 and 2 are summarised in Table 2.

Location	Time period (hh:mm)	$L_{A90,\ 15min}$(dB)
1	14:00 to 13:00	30-46
2	09:00 to 10:00	45

Table 2: Summary of the measured background sound levels

6.14 Statistical analysis is undertaken of the results of all the $L_{A90,\ 15min}$ data following the guidance of BS 4142, to determine a background sound level considered to be representative of the assessment period. Results of the analysis are shown in Appendix B.

6.15 Based on the statistical analysis results, the background sound level considered representative of the night time assessment periods are shown in Table 3.

Assessment period	L_{A90} (dB)
Night time (23:00 – 07:00 hrs)	30

Table 3: Background sound levels representative of the assessment period

7 Noise sources

7.1 Proposed plant and associated noise levels

7.2 The mechanical plant is assessed based on plant details supplied by the mechanical engineers.

7.3 The location of the all the units have been taken from the mechanical engineers' drawings, Reference 5.

7.4 The proposed plant is understood to comprise of that summarised in Table 4.

Plant	Manufacturer	Model	No. proposed
Condenser Unit	Mitsubishi Electric	PUMY-P200YKM2	4

Table 4: Proposed plant

7.5 Manufacturer supplied noise levels are shown in Table 5.

Plant	Data type	dB(A)
Condenser Unit (standard cooling mode)	L_{wA}	75
Condenser Unit (low noise mode)	L_{wA}	72

Table 5: Manufacturers noise levels

7.6 Operation times

7.7 The plant is understood to operate continuously. As such, it is assessed for a night time period, with the plant operating in low noise mode.

7.8 Noise transmission and propagation

7.9 Noise transmission and propagation is modelled to the NSR based on the noise source data detailed, using proprietary software, CadnaA, Reference 7.

7.10 This models noise propagation outdoors according to ISO 9613, Reference 8.

8 Assessment results – based on mechanical engineers proposals

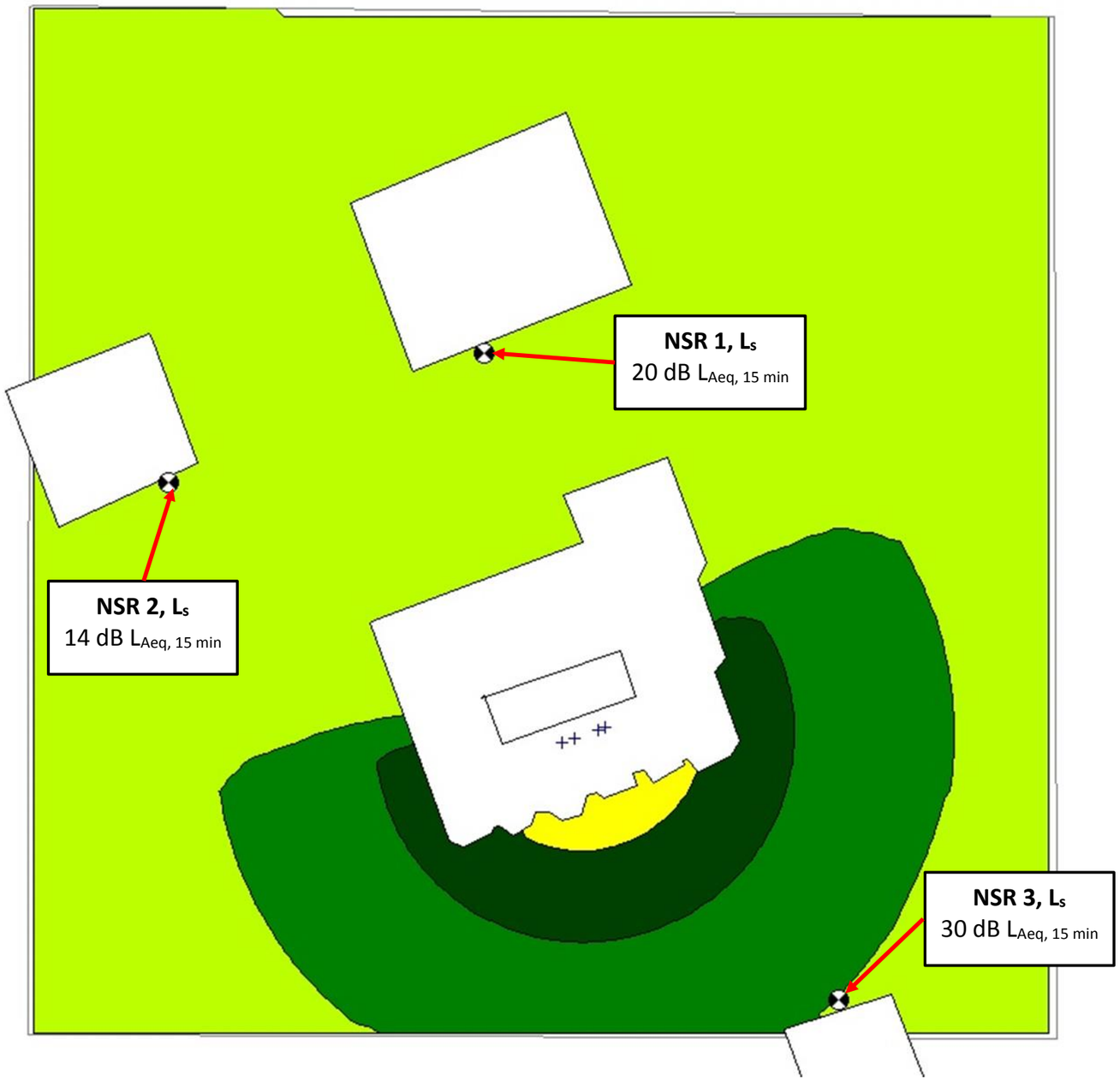

Figure 4: Sound contours at 12 m, showing the calculated specific sound level, $L_{Aeq,15\ min}$ based on current proposals

Parameter	XX Night-time assessment XX	Relevant clause of BS 4142	Commentary
Background sound level	30 dB $L_{A90,\ 15\ min}$	8.1.4	Considered representative of the assessment period based on statistical analysis detailed in Appendix B.
Specific sound level L_s, due to all sources for the required assessment interval	30 dB $L_{Aeq,\ 15\text{-}min}$	7.2 7.3.6	The on-time for the sources during the assessment period are discussed in Section 7.7. The calculated L_s contours across the site due to all sources during the assessment period are shown in Figure 4; the L_s assessed is the highest calculated level at NSR 3.
Acoustic feature correction	0 dB	9.2	The dominant noise sources for this assessment are the condenser units, which generally emit broadband noise without tonal elements, therefore no acoustic feature correction is to be applied
Rating level, $L_{Ar,Tr}$	30 dB		
Uncertainty of assessment		10	The background data was obtained over a 24-hr period, accounting for the changing acoustic environment Uncertainty in the calculated impact has been reduced by the use of a calculation method in accordance with ISO 9613-2.
Excess of $L_{Ar,Tr}$ over background sound level	0 dB	11	The assessment result indicates the likelihood of low impact, but it does not meet with the local authority preferred requirement of 10 dB below background level.

Table 6: BS 4142 assessment results, based on current proposals

9 Noise mitigation measures

9.1 This section details the proposed noise control measures required to mitigate and reduce to a minimum the impacts, in order to satisfy the Local Authority requirements

9.2 **Condenser Units**

9.3 A 2.2 m high 'U-shaped' solid barrier is proposed at the location shown in Figure 5.

9.4 To be effective in practice, a barrier should have no cracks or gaps, be continuous to the ground, and have a surface density of at least 10 kg/m2, such as a timber fence with overlapping boards or a steel panel construction.

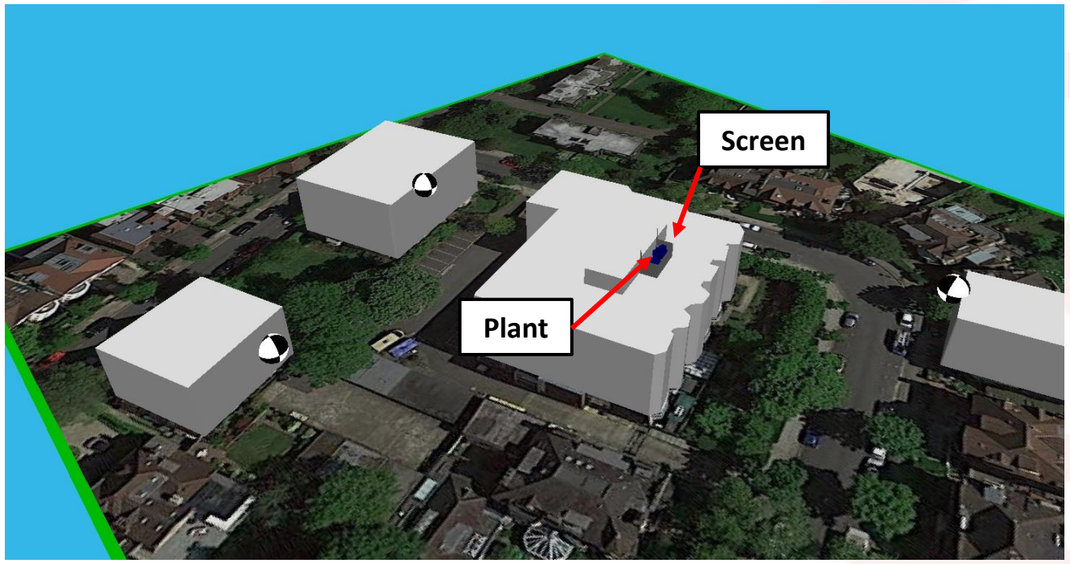

Figure 5: Isometric view with screen in place

10 Assessment results – with proposed noise control measures

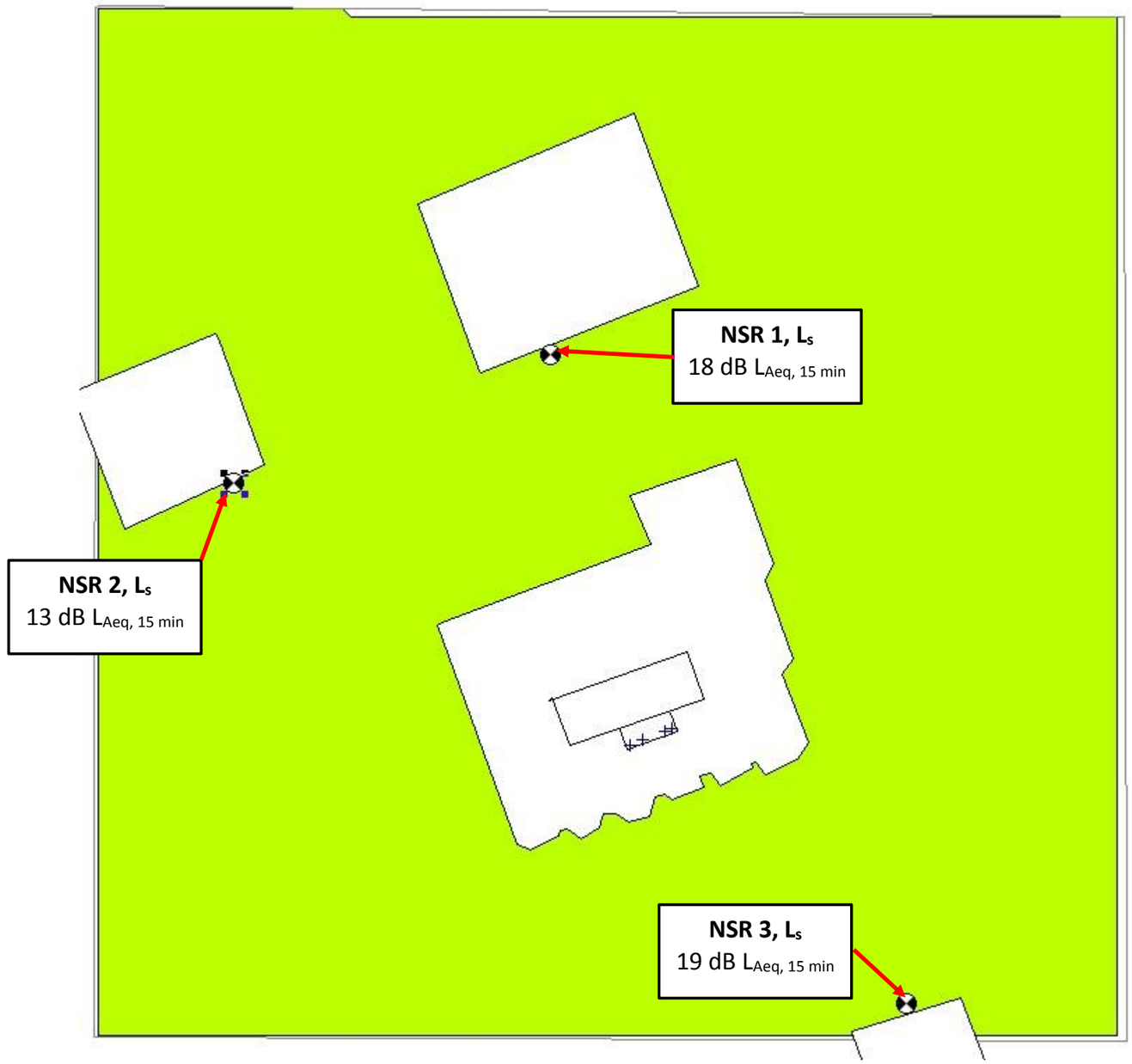

Figure 6: Sound contours at a height of 12 m, showing the calculated specific sound level, $L_{Aeq\ 15\ min}$ with proposed mitigation measures

Parameter	Night-time assessment	Relevant clause of BS 4142	Commentary
Background sound level	30 dB $L_{A90,\ 15\ min}$	8.1.4	Considered representative of the assessment period based on statistical anabasis detailed in Appendix B.
Specific sound level $L_{s,}$ due to all sources for the required assessment interval	19 dB $L_{Aeq,\ 15\text{-}min}$	7.2 7.3.6	The on-time for the sources during the assessment period are discussed in Section 7.7. The calculated L_s contours across the site due to all sources during the assessment period are shown in Figure 66; the L_s assessed is the highest calculated level at NSR 3.
Acoustic feature correction	0 dB	9.2	The dominant noise sources for this assessment are the condenser units, which generally emit broadband noise without tonal elements, therefore no acoustic feature correction is to be applied
Rating level, $L_{Ar,Tr}$	19 dB		
Uncertainty of assessment		10	The background data was obtained over a 24-hr period, accounting for the changing acoustic environment Uncertainty in the calculated impact has been reduced by the use of a calculation method in accordance with ISO 9613-2.
Excess of $L_{Ar,Tr}$ over background sound level	-11 dB	11	The assessment result indicates the likelihood of a low impact and meets the local authority requirements of 10 dB below background.

Table 7: BS 4142 assessment results, with proposed mitigation measures

11 Conclusion

11.1 Based on the mitigation measures detailed in Section 9, the calculated BS 4142 rating level at the NSR is 11 dB below the measured background levels.

11.2 Considering the context of the existing acoustic environment the assessment result indicates the likelihood of a low impact, on the basis of implementing the proposed noise control measures. This impact is considered to be a LOAEL in alignment with the NPPF and NPSE aims and meets with the local authority preferred criteria of 10 dB below background.

12 References

1 BS 4142: 2014, Method for rating and assessing industrial and commercial sound.

2 National Planning Policy Framework, Ministry of Housing, Communities & Local Government, July 2018.

3 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.

4 Planning Practice Guidance: http://planningguidance.planningportal.gov.uk/blog/guidance/noise/noise-guidance/

5 Camden Local Plan 2017.

6 Sine Consulting drawings. Drawing no. 1133-A –M-AC-001

7 CadnaA environmental noise modelling software, version 2017, Datakustik GmbH.

8 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.

Appendix A Planning policy aims and BS 4142

Noise Policy Statement for England aims	National Planning Policy Framework	BS 4142: 2014 assessment of impact
Avoid significant adverse impacts on health and quality of life. *"Significant adverse" - Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life occur.*	Preventing new development from contributing to … unacceptable levels of soil, air, water or noise pollution	Significant adverse impact Typically, the greater the difference between measured background sound level and the calculated rating level, provides an initial estimate of the impact, where the difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
Mitigate and minimise adverse impacts on health and quality of life. *"Adverse" - Between the SOAEL and the Lowest Observed Adverse Effect Level (LOAEL). The LOAEL is the level above which adverse effects on health and quality of life can be detected.*	"mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;" "Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established"	Adverse impact A difference of around + 5dB 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.
Where possible, contribute to the improvement of health and quality of life *A No Observed Effect Level (NOEL) is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*	" identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"	Low impact Where the rating level does not exceed the background sound level, this is an indication of the specific source having a low impact, depending on the context.

Table 8: Planning policy aims and alignment with BS 4142 assessment methods

Appendix B Residual and background sound levels

B.1 Background sound level data, $L_{A90,\ 15min}$

B.2 The measured night time $L_{A90,15min}$ levels are shown in Table 9.

Time (hh:mm)	$L_{A90,\ 15min}$ (dB)	Time (hh:mm)	$L_{A90,\ 15min}$ (dB)	Time (hh:mm)	$L_{A90,\ 15min}$ (dB)
23:00	**33**	02:00	**30**	05:00	**39**
23:15	**33**	02:15	**30**	05:15	**38**
23:30	**32**	02:30	**30**	05:30	**35**
23:45	**32**	02:45	**30**	05:45	**38**
00:00	**32**	03:00	**30**	06:00	**40**
00:15	**33**	03:15	**31**	06:15	**40**
00:30	**31**	03:30	**31**	06:30	**39**
00:45	**32**	03:45	**32**	06:45	**40**
01:00	**31**	04:00	**33**		
01:15	**30**	04:15	**36**		
01:30	**30**	04:30	**37**		
01:45	**30**	04:45	**40**		

Table 9: Measured background sound levels, $L_{A90,\ 15min}$

B.3 Analysis to determine the typical background sound level representative of the night-time period is undertaken following the guidance of BS 4142, with results shown in Figure 7.

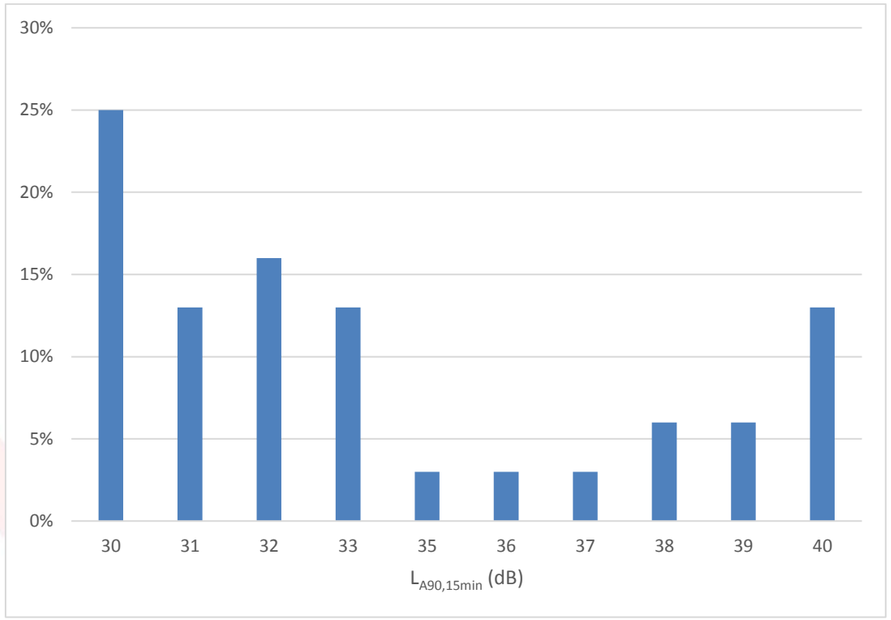

Figure 7: Analysis of night-time background levels, $L_{A90,\ XX}$