The Glassworks, Harton Quay in Newcastle

Noise impact assessment

8558.2

4th December 2020

Revision A

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Prepared for

Ryder Architecture
Cooper's Studios, 14-18 Westgate Road
Newcastle upon Tyne, NE1 3NN

Prepared by

[redacted]
Danuta Nabiałek, MSc MIOA

Checked by

[redacted]
Adam Cooke, MSc MIOA

Apex Acoustics Limited Reg. in England no. 05656507
Design Works, William Street, Gateshead, NE10 0JP

T 0191 620 0750
E info@apexacoustics.co.uk
W www.apexacoustics.co.uk

Contents

1 Summary

1.1 This report has been prepared in support of a Planning Application for the proposed office development known as The Glassworks at Harton Quay in South Shields.

1.2 The noise level limit of 5 dB below the representative background sound level at the noise sensitive receptor is proposed.

1.3 Background sound levels have been measured at the proxy positions considered as representative for the identified noise sensitive receptors NSR1 and NSR2.

1.4 Plant details have been identified by the mechanical engineers.

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

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

1.7 Based on current proposals, the rated plant sound impact is calculated to be 12 dB below the background sound level at the worst noise sensitive receptor.

1.8 It is calculated that the current proposals achieve the proposed noise limit without requiring an additional scheme for the mitigation of noise.

1.9 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 the NPSE aims.

3 Introduction

3.1 A development consisting of the office building known as The Glassworks has been proposed at Harton Quay in South Shields; the site location is shown in Figure 1.

3.2 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.

3.3 The scope of our instruction includes:

- Measurement of the existing noise environment over a 24-hour period at 2 locations representative of the nearest noise-sensitive receptors (NSR).
- Analysis of proposed source noise levels, using manufacturers' data provided by the mechanical engineers.
- Calculate noise propagation using proprietary noise modelling software to the noise-sensitive receptors and assess the impact in accordance with BS 4142: 2014, Reference 1.
- Advise on a scheme for noise mitigation to satisfy the proposed noise limit if necessary.

3.4 This report presents the evaluation of the potential noise impact from the plant associated with the proposed development on the identified NSR, in support of a Planning Application.

3.5 The NSR1 and NSR2 are identified as the residential properties on the first and the second floors of the buildings located on Mill Dam road, to the south of the proposed site.

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

3.7 The potential noise impact from the sources identified is calculated and rated according to the BS 4142 methodology.

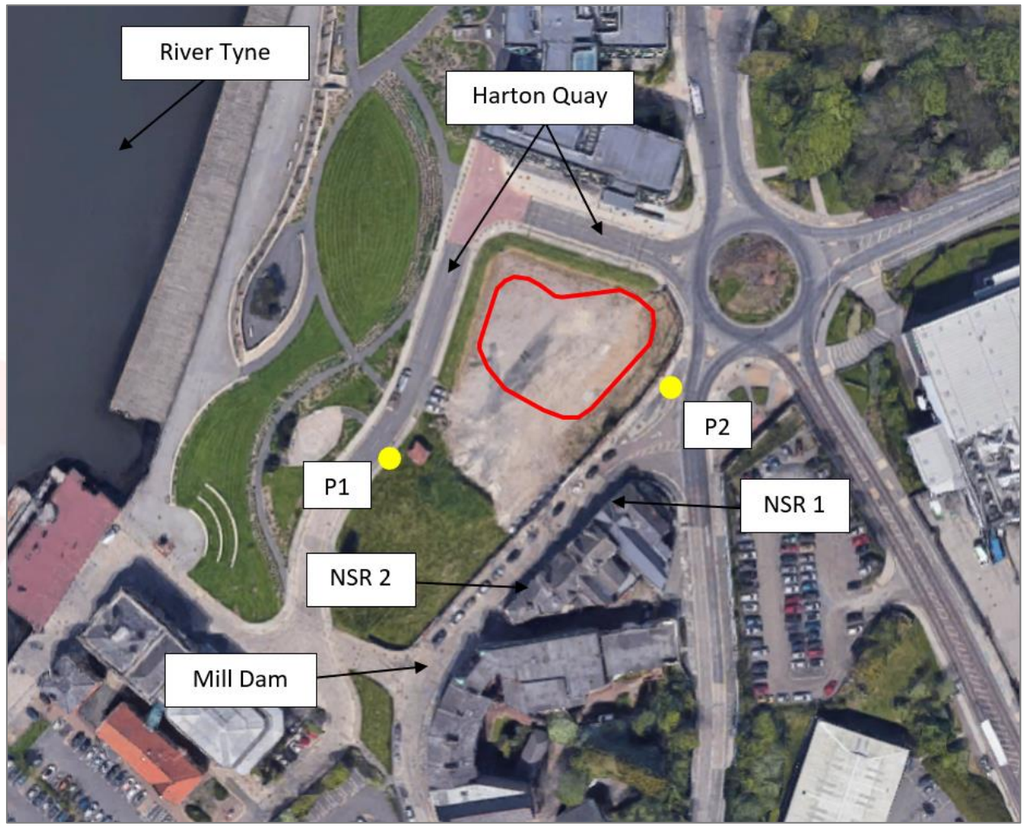


Figure 1: Proposed site outlined in red, measurement positions indicated in yellow, and NSR identified

4 Planning policy and noise criteria

4.1 **National Planning Policy Framework (NPPF)**

4.2 The National Planning Policy Framework (NPPF) 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. In respect of noise, Paragraph 170, 180 and 182 of the NPPF states the following:

4.3 Paragraph 170: "e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution…"

4.4 Paragraph 180: "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) 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;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; … "

Paragraph 182: "Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

4.5 **Noise Policy Statement for England (NPSE)**

4.6 The Noise Policy Statement for England, Reference 3, states three policy aims as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life."

4.7 The NPSE defines adverse noise impact as follows:

- No Observed Effect Level (NOEL) - this 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.
- Lowest Observed Adverse Effect Level (LOAEL) - this is the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL) - this is the level above which significant adverse effects on health and quality of life occur

The first two aims of the NPSE require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement: "… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

4.8 **Planning Practice Guidance – Noise**

4.9 Further Government guidance on how planning can manage potential noise impact in new development is outlined in Planning Practice Guidance (PPG-N) notes on the Government website: www.gov.uk/guidance/noise--2

4.10 **BS 4142**

4.11 The terminology used in BS 4142 to describe the various levels of potential adverse impact is respect to the PPG-N noise hierarchy, are summarised Appendix A.

4.12 **Noise criteria**

4.13 It is proposed that the plant noise impact should not exceed the level 5 dB below background sound level representative at identified noise sensitive receptor.

5 Existing acoustic environment

5.1 The existing acoustic environment was measured at two positions, indicated with yellow markers in Figure 1, for over a 24-hour period from 11:03 hours on 22nd October 2020.

5.2 Proxy positions were selected to be representative of the existing acoustic environment at the NSR1 and NSR2:

- Sound levels measured at P1 include a sporadic vehicle movements on Harton Quay road; and continuous but distant road traffic from Commercial Road. The sound environment at P1 is therefore considered representative of the façade at NSR 2 which is exposed to sporadic noise impact from Mill Dam road and is shielded from the continuous road traffic noise from the roundabout.
- Sound levels measured at P2 are determined by a continuous road traffic noise impact from the roundabout and Commercial Road. This is considered as a representative sound environment at the façade of NSR 1 which located in close proximity to the roundabout. It should be noted that the shielding effect of the façade from surrounding buildings that may reduce the noise impact is much smaller than for NSR2 case.

5.3 The microphones were located 3.5 metres above ground level and away from other reflecting surfaces such that the measurements are considered free-field.

5.4 A picture of the measurement in progress is shown in Figure 2.

Figure 2 Measurements in progress: P1 and P2

5.5 Data was recorded in single-octave band frequencies at one-second intervals throughout the 24-hour measurement period.

5.6 The most significant noise source identified during the survey was road traffic noise.

5.7 It is anticipated that the noise from the existing entertainment venues located at the proximity to the NSR1 and NSR2 is likely to be present during the evenings (due to Covid-19 restrictions, pubs were not operating during the noise survey).

5.8 The equipment used is listed in Table 1.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-05832-E0
Calibrator	Larson Davis CAL 200	9462
Sound Level Meter	NTi XL2	A2A-09585-E0
Calibrator	Larson Davis CAL 200	12573

Table 1: Equipment used

5.9 Both meters and calibrators 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.

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

5.11 **Residual sound level, L_r**

5.12 As the specific sound source under assessment is not yet operating on-site, the existing acoustic environment measured during the survey period is the L_r. A time history of the measured L_r is shown in Appendix B.

5.13 **Background sound level**

5.14 Statistical analysis is undertaken of the results of all the $L_{A90,\ 1\ hr}$ 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.

5.15 Based on the statistical analysis results, the background sound level considered representative of the daytime assessment periods are shown in Table 2.

Assessment period	Location	L_{A90} (dB)
Daytime (07:00 – 23:00 hrs)	NSR1	60
	NSR2	48

Table 2: Background sound levels representative of the assessment periods

6 Noise sources

6.1 Proposed plant and associated noise levels

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

6.3 The location of the all the units have been taken from the mechanical engineers' drawings, Reference 4.

6.4 The proposed plant is understood to comprise of that summarised in Table 3.

Plant	Manufacturer	Model	No. proposed	Operation time
Air handling unit (AHU)	IVProdkt	Envistar Top 12	1	Intermittent usage between 8:00 - 18:00
Fan (F)	Nuaire	AVTCP6-R	1	08:00 - 20:00
	Nuaire	AVTCP9-R	1	08:00 - 20:00
Generator (G)	FG Wilson	P200-3	1	Plant operating during emergency situation and monthly testing (30-50% of load for max 30 mins), therefore is not considered in further calculations
Condenser unit (CU)	Mitsubishi Electric	PUZ-M100YKA	1	Intermittent usage between 8:00 and 18:00
Air source heat pump (P)	Mitsubishi Electric	CAHV-P500YB-HPB	2	08:00 - 20:00
Air cooled heat pump chiller (CH)	Mitsubishi Electric	EAHV-P1800YBL-N	2	08:00 - 20:00

Table 3: Proposed plant

6.5 Manufacturer supplied sound power levels, L_w, are shown in Table 4.

Plant	Parameter description	Total L_w (dB)	Single-octave band centre frequency (Hz) Linear sound power levels (dB)						
			63	125	250	500	1k	2k	4k
AHU	Supply air outdoor, L_W	60	52	54	54	54	47	44	38
AHU	Exhaust air L_W	76	61	64	71	67	69	66	62
AHU	Total surroundings L_W	62	59	59	51	41	40	37	34
F	Fan outlet (for hemi-spherical) L_W	86	81	79	80	78	72	70	68
F	Induct inlet (for hemi-spherical) L_W	84	81	78	76	72	62	61	61
F	Fan outlet (for hemi-spherical) L_W	84	80	81	75	71	63	61	57
F	Induct inlet (for hemi-spherical) L_W	86	80	82	79	77	73	70	64
CU	L_W	70	Data not available						
P		71							
CH		86							

Table 4: Manufacturers noise levels

6.6 To determine sound power levels for the plant measured in the free-field, the following equation has been used:

$$L_w = L_p + 20\log_{10}(r) + 8$$

Where r is the distance (m) from the unit specified with the supplied sound pressure level (L_p).

6.7 If plant emitting higher noise levels than those accounted for in this report is proposed, or additional plant also proposed, the impact should be reassessed.

6.8 Other information and assumptions

6.9 It is understood that the plant units will be shielded by barriers/louvres, however at the time of writing this assessment the construction details are unknown. Therefore, it is assumed that the potential sound reduction due to barrier will be insignificant. This is a prudent assumption.

6.10 All plant is proposed to operate as shown in Table 3. For further calculations and analysis, it is assumed that all plant units operate simultaneously and continuously during the daytime; this is a prudent assumption.

6.11 It is considered that no plant units associated with the proposed development operate during the night-time, hence the assessment is undertaken for a daytime period only.

6.12 Noise transmission and propagation

6.13 Noise transmission and propagation is modelled to the NSR based on the noise source data detailed, using proprietary software, CadnaA, Reference 6. The details regarding the model methodology, parameters and assumptions are summarised in Appendix C.

7 Assessment results – based on mechanical engineers' proposals

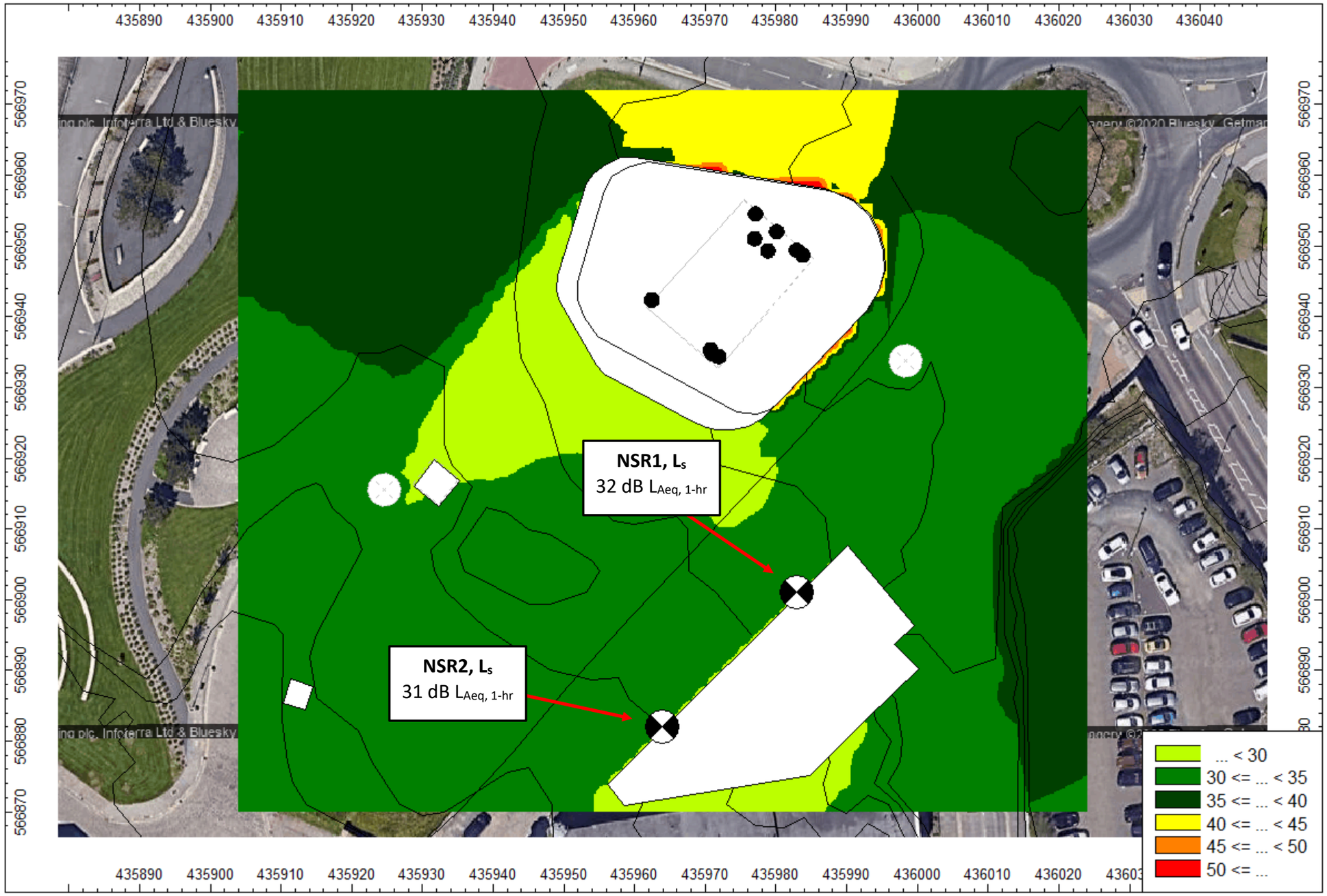


Figure 3: Sound contours at 11 m, showing the calculated specific sound level, $L_{Aeq\ 1\ hr}$ based on current proposals

Parameter	Daytime assessment NSR 1	Daytime assessment NSR 2	Relevant clause of BS 4142	Commentary
Measured residual sound level L_r,	68 dB $L_{Aeq,\ 16\ hr}$	56 dB $L_{Aeq,\ 16\ hr}$	7.3.2	The L_r were measured at proxy locations, where the L_r is considered representative of the assessment position.
Background sound level	60 dB $L_{A90,\ 1\ hr}$	48 dB $L_{A90,\ 1\ hr}$	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	32 dB $L_{Aeq,\ 1\text{-}hr}$	31 dB $L_{Aeq,\ 1\ hr}$	7.2 7.3.6	The calculated L_s contours across the site due to all sources during the assessment period are shown in Figure 3; the L_s assessed is the highest calculated level at NSR 1 and NSR 2.
Acoustic feature correction	0 dB	0 dB	9.2	A subjective assessment to determine acoustic features is undertaken, and the following penalties are considered applicable: Tonality – 0 dB; Impulsivity – 0 dB; Intermittency – 0 dB; Other – 0 dB;
Rating level, $L_{Ar,Tr}$	32 dB	31 dB		
Uncertainty of assessment	--	--	10	The background sound 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	-28 dB	-17 dB	11	Considering the context of the existing environment (continuous road traffic noise as a main noise source affecting the residential buildings, adjacency of the entertainment venues) the **assessment result indicates the likelihood of a low impact.**
Excess of $L_{Ar,Tr}$ over noise limit ($L_{A90,\ 1\ hr}$ - 5 dB)	-23 dB	-12 dB	12	

Table 5: BS 4142 assessment results, based on current proposals

8 Conclusion

8.1 Based on the current development proposals it is calculated that the noise limits are met.

8.2 The calculated BS 4142 Rating level at the most affected NSR is 12 dB below the background level, and therefore complies with the noise limits.

8.3 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.

9 References

1 BS 4142 2014: A1+2019, Method for rating and assessing industrial and commercial sound.

2 National Planning Policy Framework, Ministry of Housing, Communities & Local Government, February 2019.

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

4 Mechanical engineers drawings: P20102-BWE-XX-RF-DR-M-57201_Vent Plant, P20102-BWE-XX-RF-DR-M-55201_Space Conditioning Plant, P20102-BWE-XX-RF-DR-E-61201_Elec plant, Nuaire-FanDataSheets-AVTCP9-R, Nuaire-FanDataSheets-AVTCP6-R, Mitsubishi Electric-PUZ-M100YKA, Mitsubishi Electric-e-series_Product_Information_Sheet_2018, Mitsubishi Electric-CAHV_Product_Information_Sheet_2020, IVProdkt-L04 Conference Room HRU - Acoustic Data, FG Wilson - 200kVA Gen Set P200-3 – Technical, FG Wilson - 200kVA Gen Set P200-3 – Acoustics.

5 Fläkt Woods, Practical guide to noise control, Fifth Edition, published by Fläkt Woods Limited

6 CadnaA environmental noise modelling software, version 2020, Datakustik GmbH.

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

8 Architects drawings: HTQ-RYD-00--01-DR-A-3000-2-P7-Level -01 GA Plan, HTQ-RYD-00-01-DR-A-3002-S2-P7-Level 01 GA Plan, HTQ-RYD-00-02-DR-A-3003-S2-P7-Level 02 GA Plan, HTQ-RYD-00-03-DR-A-3004-S2-P7-Level 03 GA Plan, HTQ-RYD-00-04-DR-A-3005-S2-P8-Level 04 GA Plan, HTQ-RYD-00-ZZ-DR-A-3001-S2-P7-Level 00 GA Plan, HTQ-RYD-00-ZZ-DR-A-3800-S2-P3-GA Section 01, HTQ-RYD-00-ZZ-DR-A-3801-S2-P3-GA Section 02, Ryder_Architecture_HQ_Design_Report.

9 ISO 12913-1:2014 Acoustics, Soundscape, Part 1: Definition and conceptual framework.

Appendix A Noise exposure hierarchy

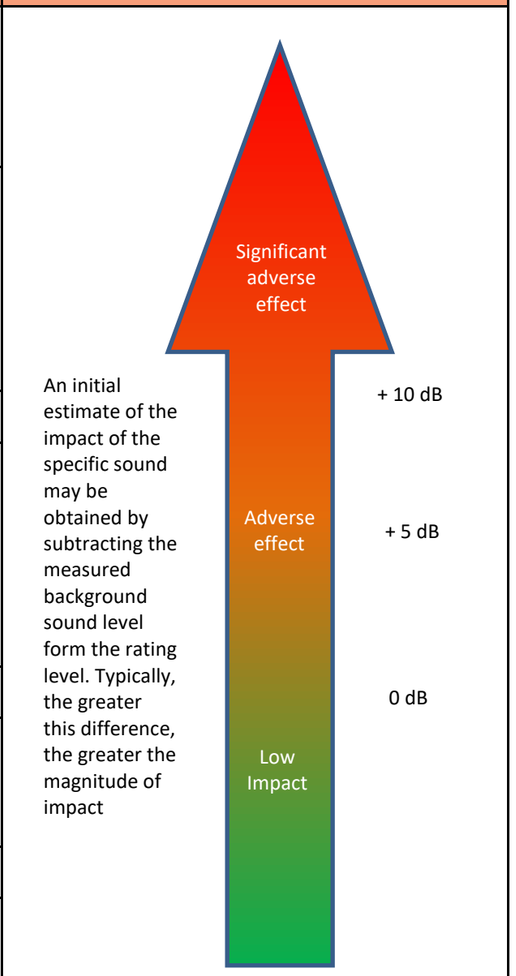
Planning Practice Guidance - Noise				BS 4142: Initial estimate of external noise risk significance
Noise	***Example of outcomes***	***Increasing effect level***	***Action***	
Present and very distributive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	**Prevent**	
Present and distributive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	**Avoid**	
Significant Observed Adverse Effect Level (SOAEL)				
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	**Mitigate and reduce to a minimum**	
Lowest Observed Adverse Effect Level (LOAEL)				
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	**No specific measures required**	
No Observed Adverse Effect Level (NOAEL)				
Not present	No effect	No Observed Effect	**No specific measures required**	
No Observed Effect Level (NOEL)				

Table 6: PPG-N Noise Exposure Hierarchy and BS 4142 initial estimate of impact

Appendix B Residual and background sound levels

B.1 Residual sound level time history, $L_{Aeq,\ 1\ sec}$ is shown in Figure 4 and Figure 5 for position P1 and P2 respectively.

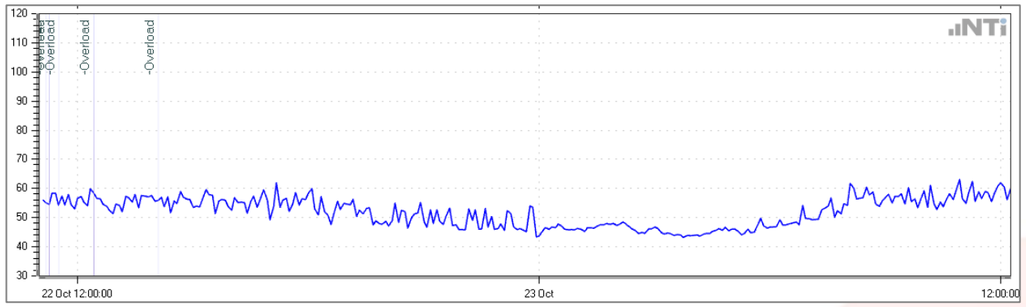


Figure 4: Residual sound level time history, $L_{Aeq,\ 1\ sec}$ (dB) shown as blue – position P1

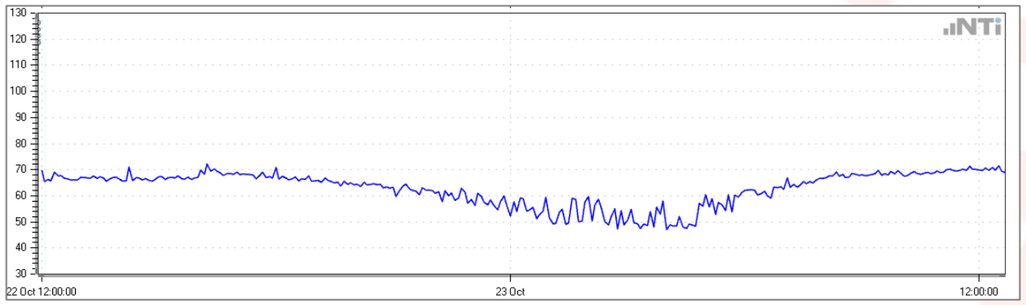


Figure 5: Residual sound level time history, $L_{Aeq,\ 1\ sec}$ (dB) shown as blue – position P2

B.2 The measured daytime $L_{A90,\ 1\ hr}$ levels are shown in Table 7.

Position P1		Position P2	
Time (hh:mm)	$L_{A90,\ 1\ hr}$ (dB)	Time (hh:mm)	$L_{A90,\ 1\ hr}$ (dB)
22/10/2020 11:00	48	22/10/2020 12:00	61
22/10/2020 12:00	48	22/10/2020 13:00	61
22/10/2020 13:00	48	22/10/2020 14:00	60
22/10/2020 14:00	47	22/10/2020 15:00	60
22/10/2020 15:00	47	22/10/2020 16:00	63
22/10/2020 16:00	48	22/10/2020 17:00	62
22/10/2020 17:00	47	22/10/2020 18:00	59
22/10/2020 18:00	46	22/10/2020 19:00	56
22/10/2020 19:00	46	22/10/2020 20:00	53
22/10/2020 20:00	46	22/10/2020 21:00	49
22/10/2020 21:00	44	22/10/2020 22:00	48
22/10/2020 22:00	45	23/10/2020 07:00	55
23/10/2020 07:00	49	23/10/2020 08:00	60
23/10/2020 08:00	51	23/10/2020 09:00	62
23/10/2020 09:00	52	23/10/2020 10:00	62
23/10/2020 10:00	51	23/10/2020 11:00	64

Table 7: Measured background sound levels, $L_{A90,\ XX}$

B.3 Analysis to determine the typical background sound levels representative of the daytime period for position P1 and P2 is undertaken following the guidance of BS 4142, with results shown in Figure 6 and Figure 7 respectively.

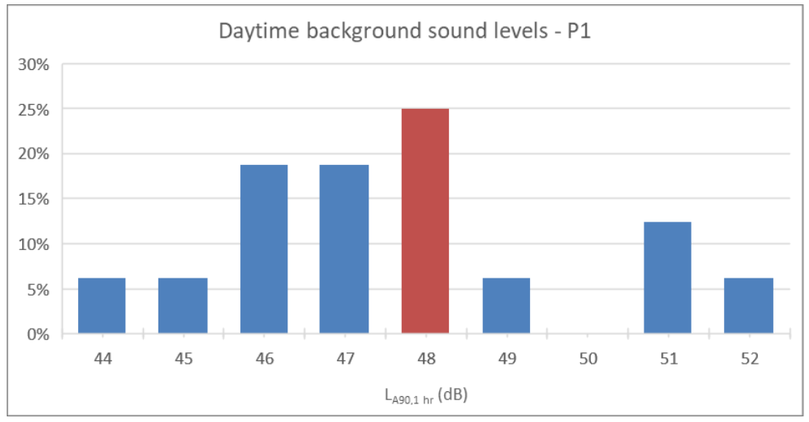


Figure 6: Analysis of daytime background levels at position P1, $L_{A90,\ 1\ hr}$

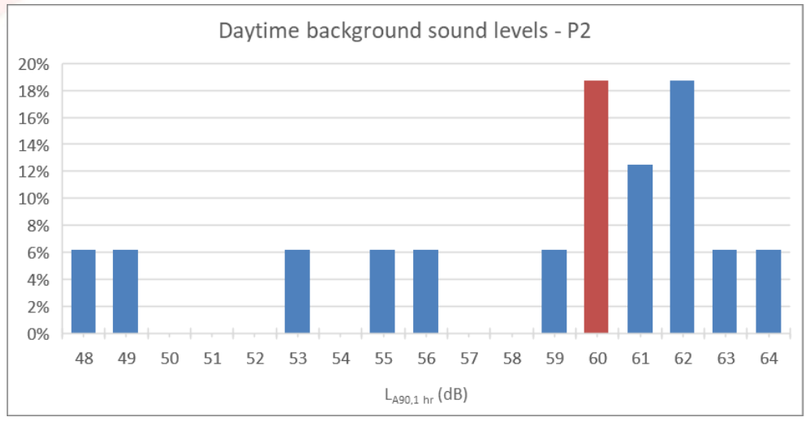


Figure 7: Analysis of daytime background levels at position P2, $L_{A90,\ 1\ hr}$

Appendix C Noise transmission and propagation

C.1 Noise transmission and propagation is modelled using proprietary software, CadnaA. This models noise propagation outdoors according to ISO 9613, Reference 7.

C.2 The parameters used, source of data and details are described in Table 8.

Parameter	Source	Details
Model dimensions	Google Earth	British Transverse Mercator coordinates
Site location and layout	Architects drawings	Architects drawings, Reference 8
Topography	DEFRA Lidar composite data	Modelled with no changes in topography
Building heights	Drawings for the proposed building and Google Street view	Architects drawings for the proposed building. For residential buildings: 3 m per storey + 2 m roof
Receptor positions	Site observations and Google Street view	On the NSR1 and NSR2 façade 2nd floor window (the most exposed window to the potential plant noise impact)
Building and barrier absorption coefficient	ISO 9613-2	0.21 to represent a reflection loss of 1 dB
G, Ground factor	ISO 9613-2	Hard ground, G = 0; Porous ground, G = 1 (locally on model)
Max. order of reflections	Apex Acoustics	Three

Table 8: Modelling parameters and assumptions

C.3 A plan view and a 3D perspective of the CadnaA model are shown in Figure 8 and Figure 9 respectively.

C.4 The NSR receivers are positioned as shown by the black and white circles in Figure 8.

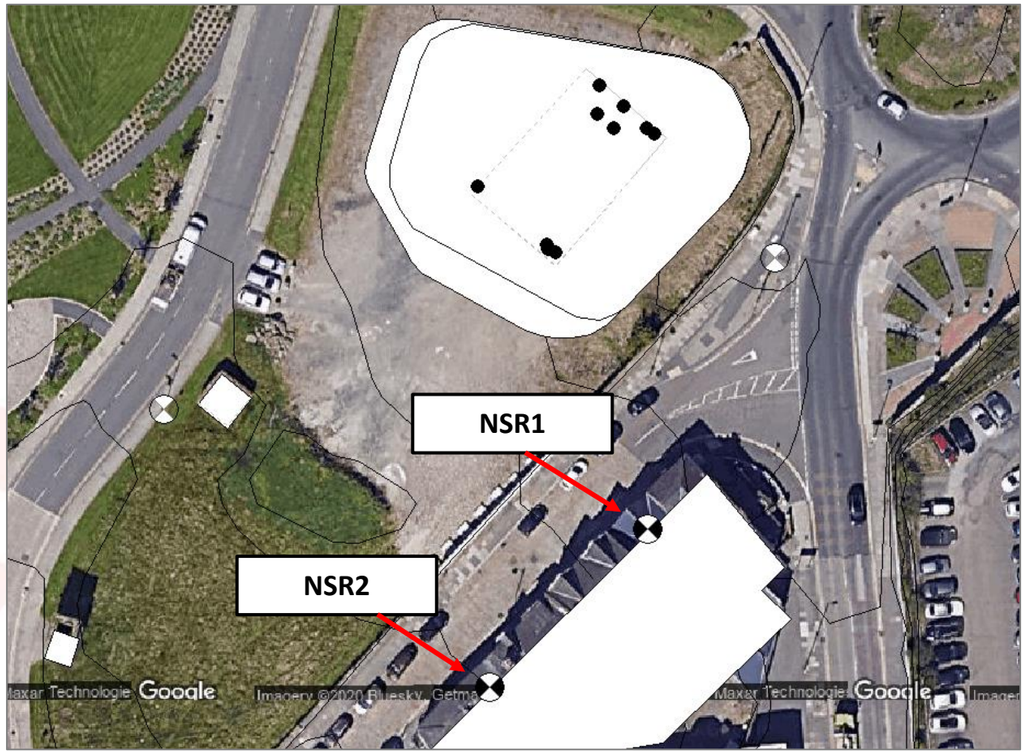


Figure 8: Plan view of the CadnaA model

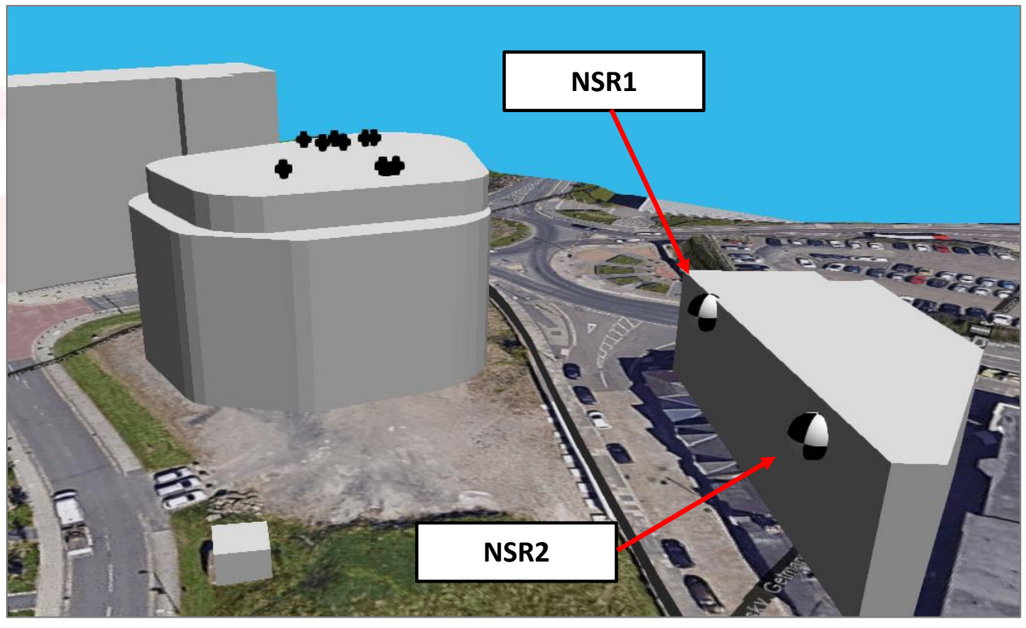


Figure 9: 3D view of the CadnaA model

Appendix D Professional qualifications and competence

D.1 All Apex Acoustics consultants work under the close supervision of a member who holds qualification in acoustics and is a member of the IOA.

D.2 This can be verified by searching the Institute of Acoustics' list of Members, available here, with the surname of the consultant.

http://www.ioa.org.uk/membership-check

D.3 Apex Acoustics is a member of the Association of Noise Consultants (ANC). The ANC is a trade organisation which seeks to raise the standards of acoustic consultancy and as such there are barriers to entry to ensure member's competency.

D.4 This report has been completed and checked by appropriately qualified and experienced acoustic consultants.