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NHDC DECARB SCHEME - NORTH HERTS LEISURE CENTRE

Environmental Noise Assessment

Willmott Dixon Construction Limited on behalf of North Hertfordshire District Council

NHDC DECARB SCHEME - NORTH HERTS LEISURE CENTRE

Environmental Noise Assessment

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1.0 INTRODUCTION

MACH has been appointed by Willmott Dixon Construction Limited on behalf of North Hertfordshire District Council to undertake an environmental noise assessment for the North Hertfordshire Leisure Centre in Letchworth Garden City such to support the decarbonisation of the leisure centre through improved building performance and the introduction of efficient mechanical services.

The development includes a variety of sports facilities including halls, swimming pools and other facilities. This report provides details of an environmental noise assessment and provides details of:

- The existing noise levels across the site.
- A façade assessment to ensure internal noise levels meet any required internal noise level criteria.
- The background noise levels such to set the noise limits for building services plant to protect the amenity of the neighbouring noise sensitive receptors.
- Assess the noise impact of the proposed mechanical plant equipment at the nearby noise sensitive receivers.

Detail of the noise survey is presented within APPENDIX A - .

1.1 Performance Standards

The table below outlines the various performance standards and guidance documents which have formed the basis of the acoustic design.

Document	Documents used for guidance
BS 4142:2014	✓
BS 7445	✓
BB93	✓
BS8233	✓

Table 1.1: Performance Standards

2.0 PERFORMANCE DOCUMENTS

2.1 Internal Ambient Noise Limit Criteria

The indoor ambient noise level limits are the sum of both building services noise and external noise ingress within the unoccupied, fully operational building. The noise level targets below have been specified with reference to guidance provided within BS8233:2014, British Council for Offices 2014 and BB93. Sports England does not provide any guidance with regard to internal noise levels.

Room Classification	Internal Ambient Noise Limit L _{Aeq, 30min} [dB]		Recommended Building Services Noise Limits NR dB
	New Build	Refurbishment	
Dance Studio	40	45	34
Sports Hall	40	45	34
Gymnasium/Activity Studio	40	45	34
Swimming Pool	50	55	44
Dining Room	45	50	39
Kitchen ¹	50	55	44
Office, Medical Room, Staff Room ¹	40	45	34
Corridor, Stairwell, Coats and Locker Area ¹	45	55	39
Changing Area ¹	50	55	44
Toilet ¹	50	55	44
¹ Considered administration or ancillary, therefore, guidance only			

Table 2.1: Internal Ambient Noise Limit Criteria

2.1.1 Design Target

This section provides a summary of the acoustic performance criteria which have been adopted for the project.

The most onerous internal ambient noise level target considered for this development is ≤45 dB L_{Aeq,30min}.

2.2 Noise Breakout

The design criteria for plant noise breakout is provided within Section **Error! Reference source not found.** .

3.0 NOISE CLIMATE

To establish the existing environmental noise levels on site, a noise survey was conducted between 13:35 on the 01/10/2024 and 13:35 on the 02/10/2024. For more information on the methodology of this survey, site information and survey data, see APPENDIX A - Environmental Noise Survey.

3.1 Site Description

The site is located at North Herts Leisure Centre: Baldock Rd, Letchworth SG6 2ER and is situated in a largely residential area. There is a main road, B656, to the north of site and the nearest train station is 1.62km to the northwest (Letchworth Garden City).

3.2 Site Map

The site in relation to its surroundings and nearest noise sensitive receivers is presented in Figure 3.1.



Figure 3.1 - Proposed Development (Red) and Nearest Noise Sensitive Receivers (Blue)

3.3 Operating Hours

The leisure centre is understood to operate between 06:00- 22:00 hours.

3.4 Summary of LAeq,30mins Noise Levels

Based on the results of the environmental noise survey as outlined within APPENDIX A - , the LAeq,30mins noise levels representative of the local noise climate is summarised below.

Location	Date	Start	End	Duration	LAeq,30min (dB)
Fixed Position 1	01/10/2024	14:00	14:30	00:30:00	59
		14:30	15:00	00:30:00	58
		15:00	15:30	00:30:00	61
		15:30	16:00	00:30:00	61
		16:00	16:30	00:30:00	62
		16:30	17:00	00:30:00	59
		17:00	17:30	00:30:00	76
		17:30	18:00	00:30:00	58
		18:00	18:30	00:30:00	57
		18:30	19:00	00:30:00	57
		19:00	19:30	00:30:00	56
		19:30	20:00	00:30:00	55
		20:00	20:30	00:30:00	53
		20:30	21:00	00:30:00	52
		21:00	21:30	00:30:00	52
		21:30	22:00	00:30:00	52
	02/10/2024	06:30	07:00	00:30:00	56
		07:00	07:30	00:30:00	56
		07:30	08:00	00:30:00	56
		08:00	08:30	00:30:00	55
		08:30	09:00	00:30:00	55
		09:00	09:30	00:30:00	55
		09:30	10:00	00:30:00	54
		10:00	10:30	00:30:00	55
		10:30	11:00	00:30:00	56
		11:00	11:30	00:30:00	56
		11:30	12:00	00:30:00	56
		12:00	12:30	00:30:00	56
		12:30	13:00	00:30:00	56
		13:00	13:30	00:30:00	59
		13:30	13:36	00:07:00	57
		12:00	12:30	00:30:00	56
		12:30	13:00	00:30:00	56
		13:00	13:30	00:30:00	59

Table 3.1: LAeq,30mins Summary

As shown in Table 3.1, 62 dB $L_{Aeq,30mins}$ is the highest measured $L_{Aeq,30mins}$ noise level at the fixed measurement position.

3.5 Summary of Spot Measurements

Spot measurements have been undertaken to quantify noise levels around the site at two locations. The attended spot measurements were used to quantify average (L_{Aeq}) values, and maximum (L_{Amax}) noise levels. The table below provides a summary of the spot measurement results.

Spot measurement	Start	End	Duration	$L_{Aeq,T}$ (dB)	L_{Amax} (dB)
S1	12:50	13:10	20 mins	63	84
S2	13:20	13:35	15 mins	57	65

Table 3.2: - Spot Measurement 1 Results Table

3.6 Summary of Background Noise Levels, L_{A90}

The table below presents measured noise levels of the L_{A90} values measured on site. These will be discussed further in the plant noise impact assessment to ensure a representative value will be used in relation to the proposed operational hours.

Measurement Position	$L_{A90,T}$ Method	Background Noise Level $L_{A90,T}$		
		Daytime (07:00 – 23:00)	Night-Time (23:00 – 05:00)	Early Morning Time (05:00 – 07:00)
F1	Modal	54	46	53

Table 3.3: Summary of Background Noise Level Measurements

4.0 NOISE MODEL

To accurately predict noise levels at each façade, a 3D noise model of the site has been created using CadnaA which is an industry standard noise propagation software. The software calculates how sound travels over distance. The models take into account reflections off hard surfaces, ground absorption, geometrical spreading. The calculations are performed in accordance with ISO 9613: Attenuation of sound during propagation outdoors.

4.1 Model Assumptions

The following assumptions have been made in the model, based on observation of the site and proposed development has identified the following features. These features will be included within the calculation model including any other additional parameters stated.

- Ground absorption has been set to acoustically hard
- Noise contour height is 1.6m above ground, which is considered representative of the NSR
- Topography of the site is assumed to be flat
- Order of reflections has been set to 3

4.2 Road Noise Levels

Such to correctly understand and assess the propagation of noise across the site, the model has been calibrated to the noise levels measured on-site. Table 4.1 outlines the CadnaA reference points along with the level used for calibration. Figure 4.1 shows the locations of the same reference points for further clarification.

Reference point	Location	$L_{Aeq,T}$ (dB)
R1	F1	62
R2	Baldock Road (S1)	63
R3	Site East Façade (S2)	57

Table 4.1: Reference Points for Model Calibration

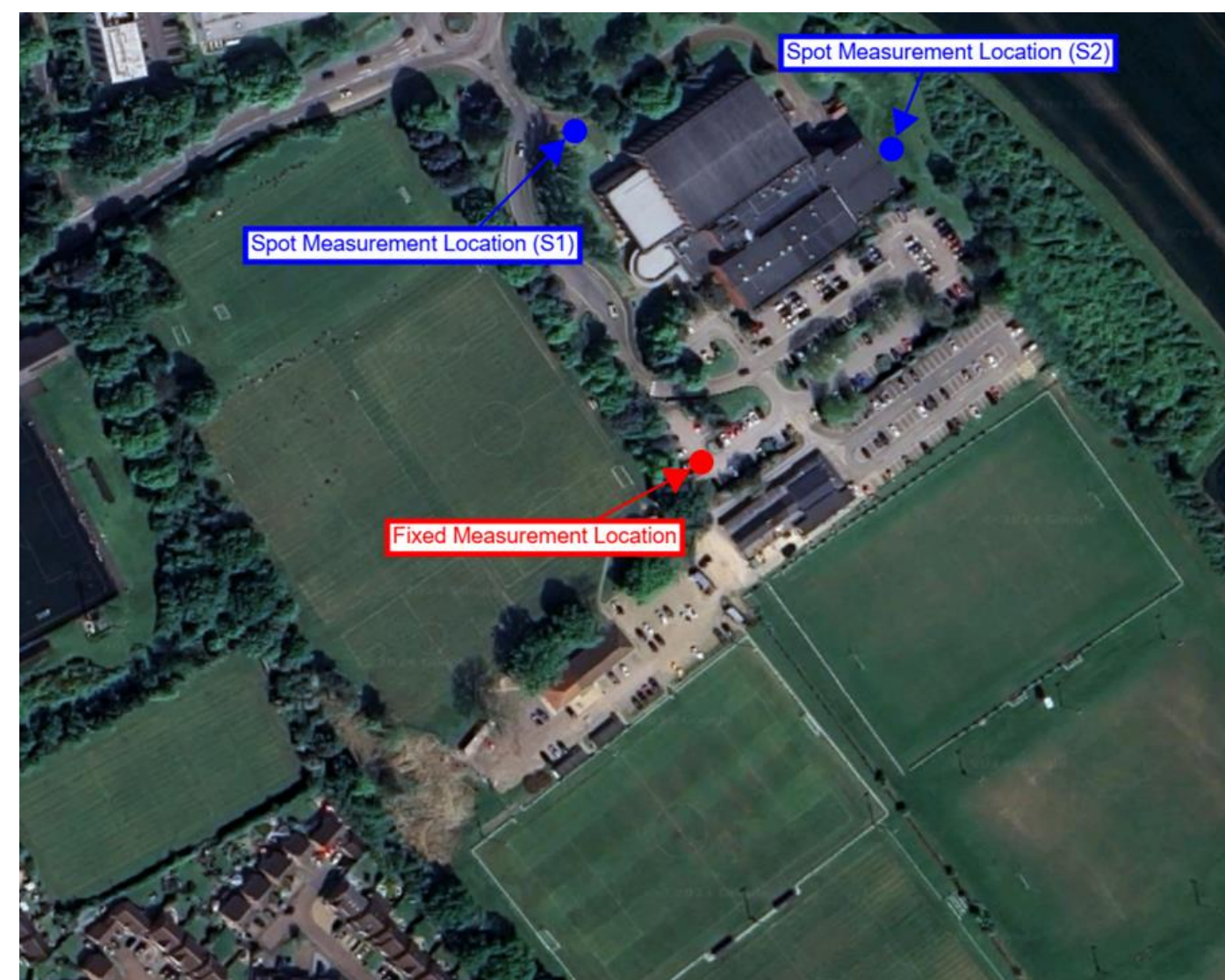


Figure 4.1: CadnaA Reference Points

4.3 Modelled Scenario

The figure below illustrates the noise map for the predicted façade levels during daytime period

4.3.1 Daytime (07:00 to 23:00)

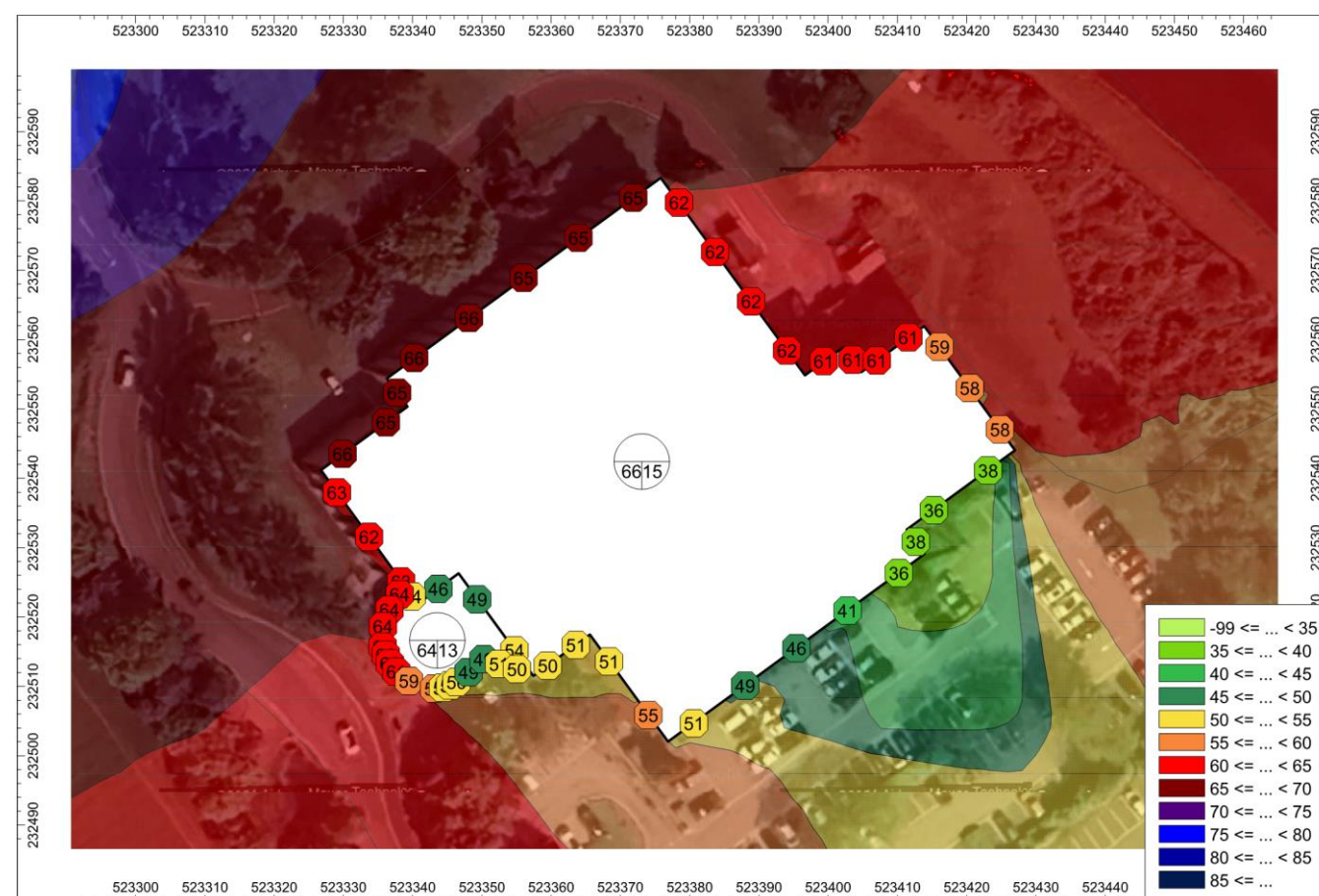


Figure 4.2 – Noise Map Showing the Predicted Façade Level. Daytime.

5.0 FAÇADE ASSESSMENT

5.1 Façade Exposure Categories

Due to the varied predicted noise levels on different facades of the proposed development, noise exposure categories have been set to allow different ventilation and façade specification assessment to be carried out.

Based on the noise survey and 3D noise modelling, spectral data has been derived which has formed the basis for the break-in calculations. The noise levels used in the assessment are shown below.

Façade Exposure Category	Time Period	Sound Pressure Level, dB (Octave Band Centre Frequency, Hz)						
		125	250	500	1000	2000	4000	dB(A)
1	L _{Aeq} , 30mins	60	55	51	54	53	44	58
2	L _{Aeq} , 30mins	63	59	56	58	57	50	63
3	L _{Aeq} , 30mins	67	62	59	62	61	54	67

Table 5.1: Façade Noise Levels



Figure 5.1: Façade Exposure Categories

5.2 Suitable Ventilation Strategies & Façade Specification

5.2.1 Natural Ventilation Feasibility

An open window typically, provides 10 – 15 dB attenuation. MACH typically takes 13dB as the attenuation provided by an open window ventilation strategy. Subtracting this figure from the predicted façade noise level gives a predicted internal noise level.

Façade Exposure Category	Internal Ambient Noise Limit (dB L _{Aeq,30min})	Predicted Façade Noise Levels (dB L _{Aeq,30min})	Open Window Attenuation (dB)	Predicted Internal Ambient Noise Level (dB L _{Aeq,30min})
1	45	58	- 13	45
2	45	63	- 13	50
3	55	67	- 13	54

Table 5.2: Natural Ventilation Feasibility

As the table shows, site noise levels have been found to be sufficiently low that natural ventilation through openable windows is feasible for all spaces in façade categories 1 and 3. The predicted internal noise level is seen to exceed the design limit for spaces in façade category 2; therefore, simple openable windows should not be relied upon as part of the normal ventilation strategy for these spaces. Further design development will be required.

5.2.2 Façade Specification

The minimum façade specification required to meet the internal noise level requirements are shown below:

- External Wall - 43dB R_w
- Window - 32dB R_w
- Roof - 43dB R_w

5.2.3 Proposed Façade Enhancements

It is understood that enhancements to the façade are to include new windows/kalwall, insulated rendered walls, injected insulation and increased insulation to the roof.

The existing walls are understood to be concrete and cavity masonry. It is considered that the sound reduction requirements for the façade will be met with proposed addition of insulated render and injected insulation. The sound reduction of the Kalwall system will need to be reviewed.

The existing roofs are understood to be a flat roof with insulation on profiled deck. It is considered that the sound reduction requirements for the roof will be met with proposed addition of insulation.

6.0 NOISE BREAK-OUT ASSESSMENT

6.1 Criteria

BS 4142:2014 “Methods for rating and assessing industrial and commercial sound” describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions.

The likelihood of complaints in response to a noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level.

6.2 Design Target

No specific plant noise limits have been provided by the Council as part of the pre-application advice process undertaken by the Applicant;

When considering the existing background levels of a site, BS 4142:2014, “Methods for Rating and Assessing Industrial and Commercial Sound” states that the background sound level used for the assessment should be representative of the period being assessed.

BS4142:2014 goes on to state:

“To obtain a representative background sound level a series of either sequential or disaggregated measurements ought to be carried out for the period(s) of interest, possibly on more than one occasion. 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 modal value.”

The table below presents measured noise levels of the $L_{A90,T}$ values measured on site. For the purposes of assessment, MACH Acoustics has used the typical daytime and night-time background noise level.

Position	Time Period	Assessed Background Noise Level (dB L_{A90})
Fixed	Daytime (07:00 - 23:00)	54
	Night-Time (23:00 - 05:00)	46
	Early Morning Time (05:00 - 07:00)	53

Table 6.1: L_{A90} Background Noise Levels for Plant Noise Break-out Assessment

6.3 Assessment Criteria

6.3.1 BS4142 and LOAEL & SOAEL

A summary of the BS4142:2014 assessment method is included in APPENDIX D - Within it, it describes the likely level of adverse impact in relation to the comparative difference between the background noise level and the noise rating level predicted at the receiver. These relate to the descriptions within assessment method described in PPG – Noise, presented in APPENDIX C - above and therefore the following values can be applied to LOEAL & SOAEL;

Difference	BS4141 Description	PPG – Noise
+10 dB	Significant Adverse Impact	SOAEL
0 dB	Does not exceed background is an indication of low impact	LOAEL

Table 6.2: BS4142:2014 and LOAEL & SOAEL

6.3.2 Summary of Criteria

In summary of the criteria above, it is considered that where the Rating Level L_{ArTr} does not exceed the background sound level L_{A90} , this is an indication of the specific sound source having a low impact, depending on the context and suggests a LOAEL.

The assessments considered within this report are therefore based upon a design target of less or equal to background. This is however subject to agreement from the local planning authority.

6.4 Noise Sensitive Receivers

The noise impact generated by the new plant installation has been assessed at the worst-affected NSR's which are described in Section 3.2 of this report.

6.5 Items of Noise Generating Plant

Information on the proposed plant installations have been provided by QODA M&E engineers. The items of plant within each group, along with their locations and operational hours are as follows:

Reference	Type of Source	Manufacturer/ model	Location	Number of Units	Operational Hours
ASHP-01	Air Source Heat Pump / Breakout noise	EUROKLIMAT/ 510-3-3 PV	External ASHP compound	1	05:00–23:00
ASHP-02&03	Air Source Heat Pump / Breakout noise	EUROKLIMAT/ 680-4-4 PV	External ASHP compound	2	05:00–23:00

Table 6.3: Proposed items of noise generating plant

The following site plan shows the proposed plant installation.

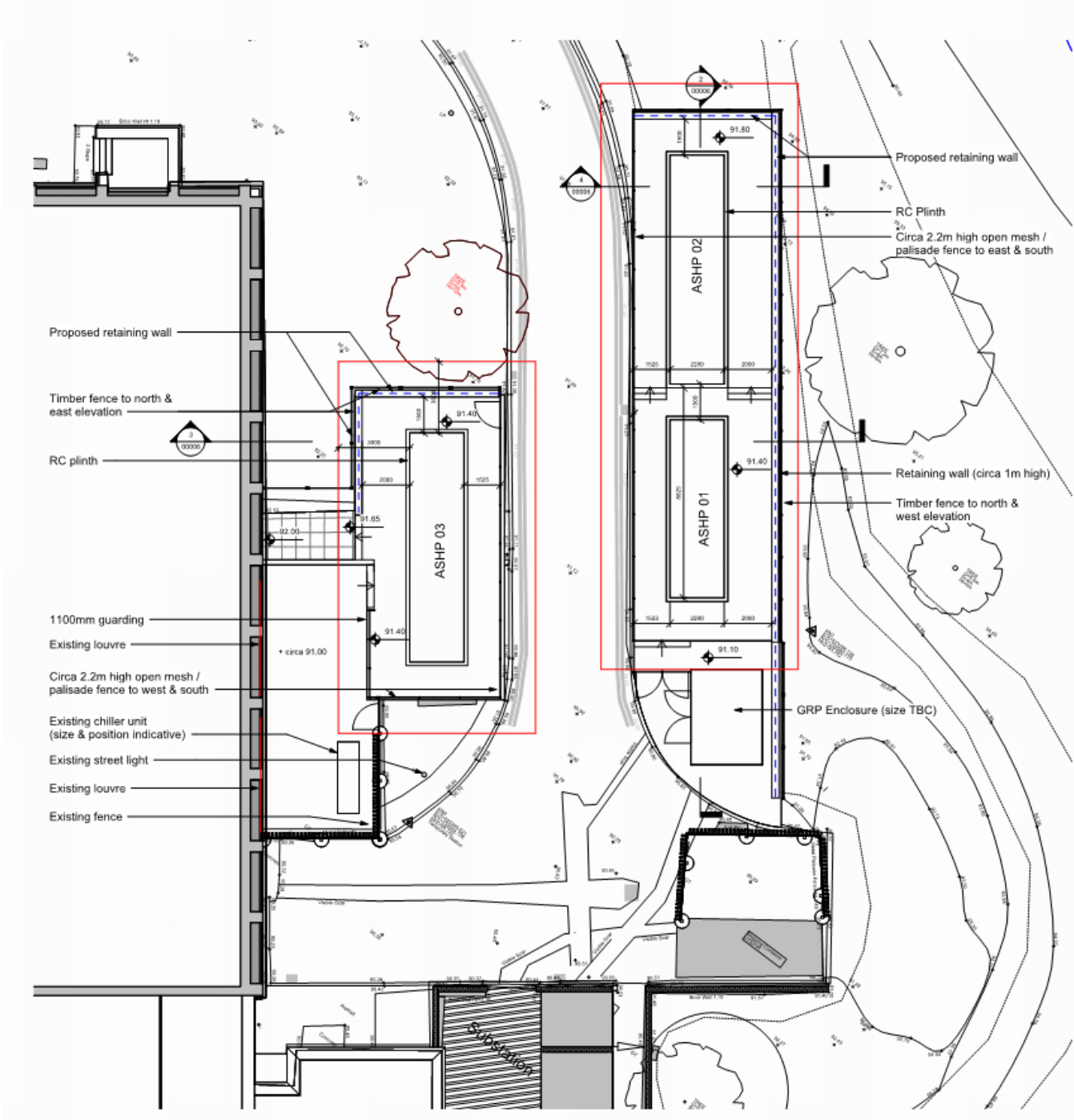


Figure 6.1: Site plan showing proposed plant layout

6.6 Plant Noise Data

The following noise levels for the individual items of plant are presented below. All data is based on manufacturers data. All plant noise data sheets are included within APPENDIX B -

Unit Reference	Noise Data Type	Sound Levels, dB, at Octave Band Centre Frequencies, Hz								dBA
		63	125	250	500	1000	2000	4000	8000	
ASHP-01	Breakout L _w	—	—	—	—	—	—	—	—	95
ASHP-02&03	Breakout L _w	—	—	—	—	—	—	—	—	96

Table 6.4: Plant Noise Data

6.7 3D Acoustic Model

A 3D acoustic model of the development has been constructed in CadnaA such to accurately predict noise break out from individual items of plant from the development at nearby noise sensitive receptors. CadnaA is an industry standard noise modelling software which calculates how sound travels over distance. The model considers reflections off hard surfaces, ground absorption, acoustic screening, and geometrical spreading. The calculations are performed in accordance with ISO 9613: Attenuation of sound during propagation outdoors.

The following assumptions have been made in the model, based on observation of the site and proposed development has identified the following features. These features will be included within the calculation model including any other additional parameters stated.

- Ground absorption has been set to acoustically hard
- Topography of the site is assumed to be flat.
- Order of reflections has been set to 3

A screenshot of the 3D noise model is illustrated below.

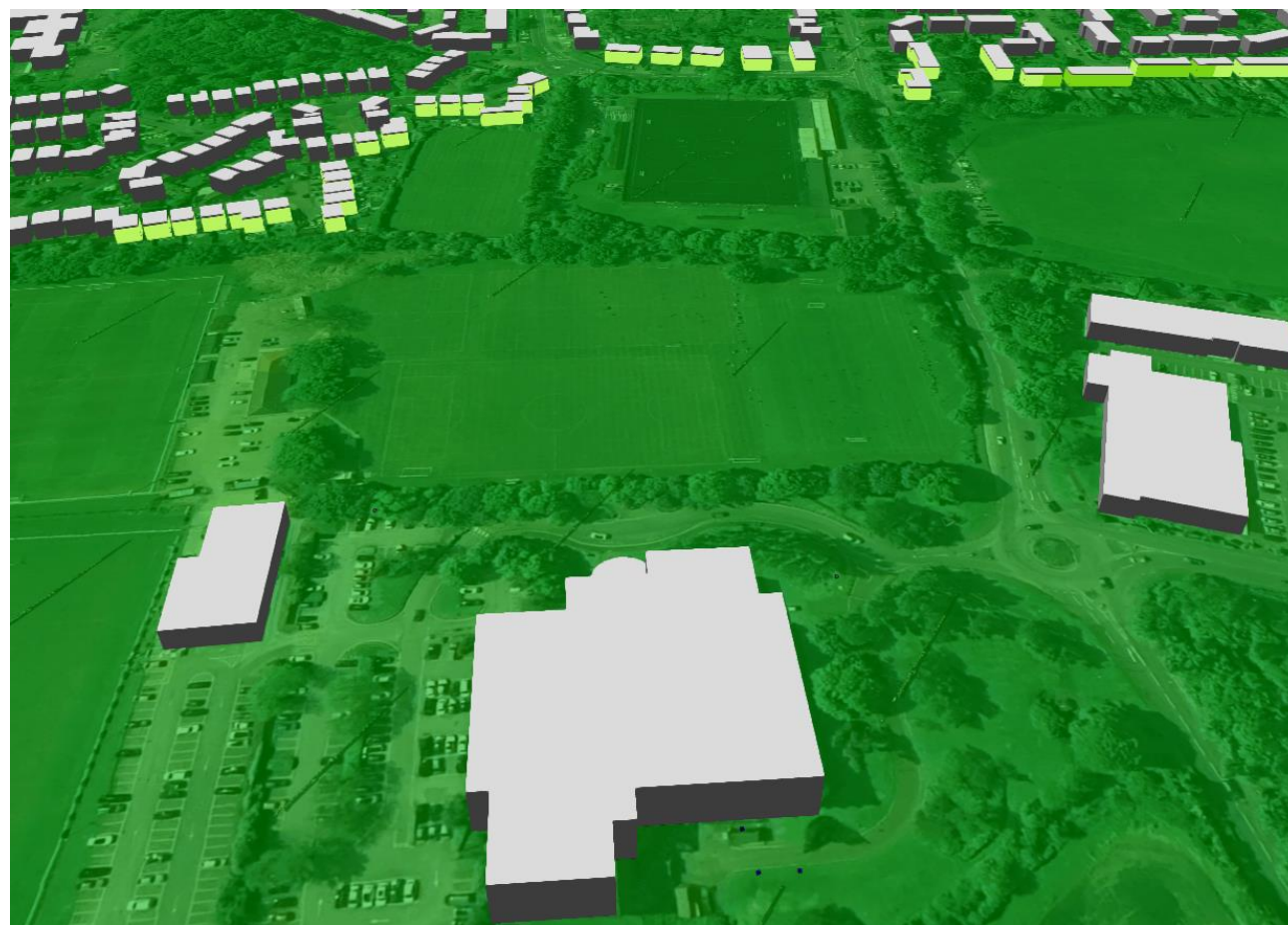


Figure 6.2: 3D Acoustic model with noise sources

6.8 Noise Impact Assessment

The table below provides the calculated rating levels at the worst-affected noise sensitive receptors. The resultant noise map which calculated the combined specific noise level at each receiver is also presented below. Each image below represents the relevant operational time of the plant equipment as described in Table 6.3.

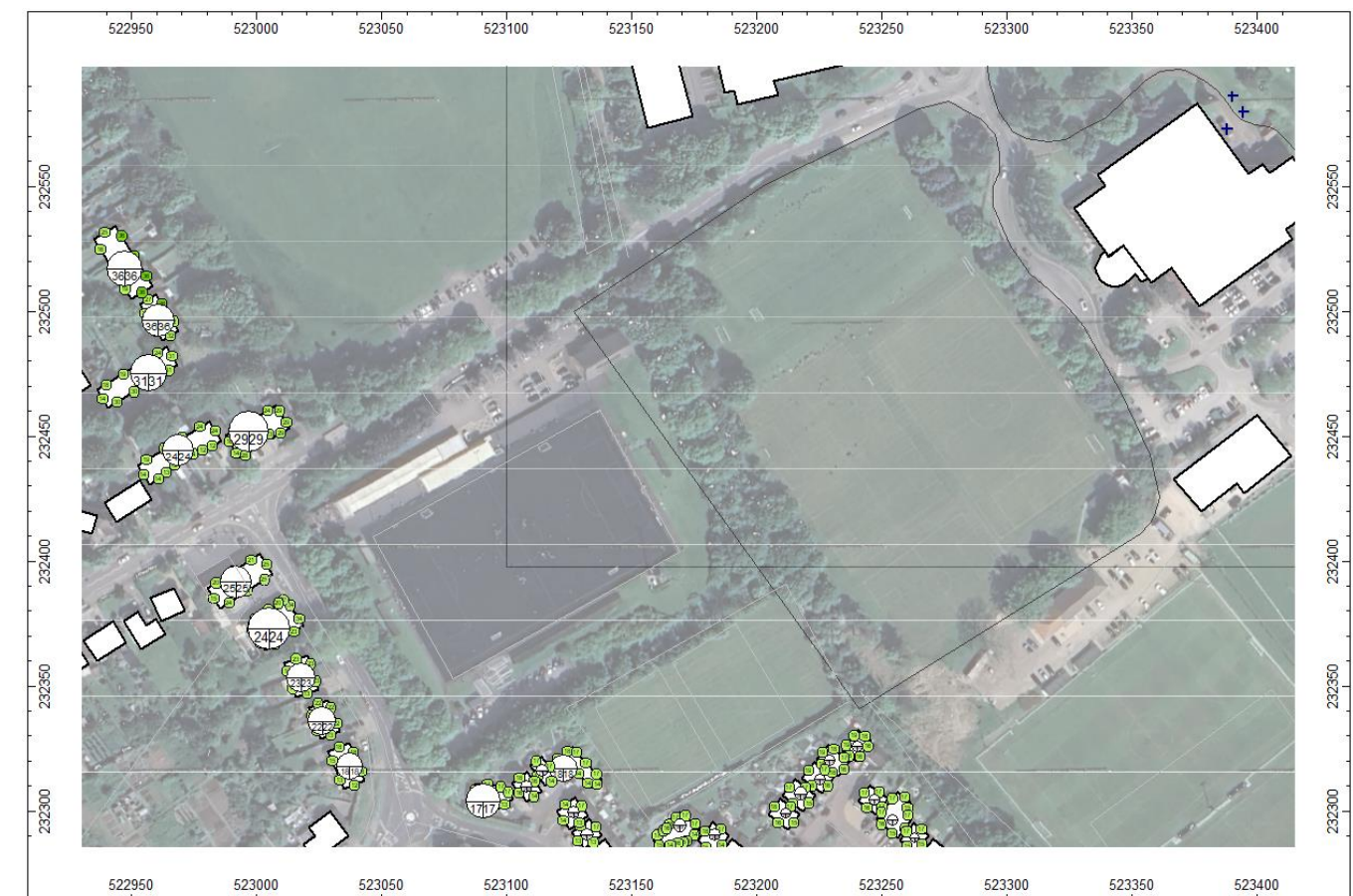


Figure 6.3: Resultant noise map in Mian Operation Hour (05:00-23:00)

NSR Reference	Time Period	Background Noise Level (dB L _{A90,T})	Criteria (dB)	Specific Noise Level (dB L _{Aeq,T})	Feature Correction	Rating Level (dB L _{A,T})	Assessment Outcome
Residential dwellings on Baldock Rd	Daytime (07:00 – 23:00)	54	Below Background	36	+0	36	-16
	Early Morning Time (05:00 – 07:00)	53	Below Background	36	+0	36	-17

Table 6.5: Plant Noise Assessment Outcome

As can be seen in Table 6.5, the cumulative noise levels generated by the plant equipment is predicted to be at least 16dB below the existing background sound level at the nearest sensitive receptors. As described within Table 6.2 this is an indication of a low impact and is considered to be a LOAEL.

Please note a 2.5m height enclosure is proposed around the ASHP compound. This assessment shows that the plant noise level at the nearest residential dwellings is sufficiently low without this enclosure, and therefore the actual onsite plant noise will be further reduced if the enclosure is installed.

6.8.1 Acoustic Feature Correction

The following acoustic feature corrections have been considered in regards to the rating level, $L_{A,r,T,r}$ at the affected NSR's.

6.8.1.1 Intermittency

The proposed plant units are not seen to be intermittently operating in nature. Therefore, intermittency correction is not applied.

6.8.1.2 Tonality

The tonality of the proposed M&E items could not be assessed as third octave noise data is required for the assessment and only octave/single-figure noise data was available at the time of writing. However, the proposed M&E items are typically broadband in character.

6.9 Vibration Control

Although not necessarily related to planning matters, it is also important to consider the potential transfer of structure borne noise to the development itself, in the form of vibration.

It is typically recommended that condenser units and fans or anything generating vibration are isolated from the supporting structure by either steel spring isolators or rubber footings. Where there are particularly sensitive locations nearby, or when equipment is mounted on lightweight structures, consideration to use caged restrained type anti-vibration mounts should be made.

In addition, it is critical that the isolation is not "short-circuited" by associated ductwork or pipework. As such, flexible connectors should be introduced between the plant and any associated pipework or ductwork. Associated pipework and ductwork should be resiliently mounted, as appropriate.

6.10 Uncertainty

Consideration of the potential uncertainties involved in the sound level measurements and the assessment methodology have been made to ensure a high level of confidence in the outcome of the assessment. Annex B

of BS4142:2014 presents a range of factors and good practice methods which should be made, and these have been considered in this assessment.

7.0 CONCLUSION

In summary the following points set out the conclusions of this report;

Noise Survey

- A noise survey has been conducted at the proposed site to establish the existing noise climate. These noise levels are presented in Section 3.0 of this report and the details of the noise survey itself are included in APPENDIX A - .

Design Criteria

- MACH has proposed a set of design criteria, which is considered appropriate for the planning stage, which has been provided in Section 2.1.1.

Façade Assessment

- The feasibility assessment of different ventilation strategies, indicates that natural ventilation through openable windows is feasible for spaces within façade category 1 and 3. However, for the façade category 2, the ventilation strategy will require further design development.
- Section 5.2.2 outlines the minimum sound reduction indices required for the façade elements such to comply with the established internal noise criteria.

Assessment – Noise Breakout

- An assessment of the proposed new plant which forms part of the decarbonisation strategy of the leisure centre has been undertaken.
- The assessment criteria to be used for the purpose of planning submission has been established and is provided Section 6.3.2.
- Details of the plant equipment have been provided to MACH, including location, hours of operation, noise data and any proposed mitigation has been presented in Sections 6.5 and 6.6 of this report.
- Calculations have shown that the Rating Level from the proposed plant is predicted to be at most 16dB below the background sound level without the inclusion of an enclosure around the ASHP plant compound.
- The assessment therefore suggests that the proposed plant and associated attenuation will have a low impact upon the nearest sensitive receptors and is therefore considered to be a LOAEL.

APPENDIX A - ENVIRONMENTAL NOISE SURVEY

To establish the existing environmental noise levels on site, a noise survey was conducted between 13:35 on the 01/10/2024 and 13:35 on the 02/10/2024.

This site assessment was undertaken by Darryl Chen of MACH Group.

A.1 Site Description

The site is located at North Herts Leisure Centre: Baldock Rd, Letchworth SG6 2ER and is situated in a largely residential area. There is a main road, B656, to the north of site and the nearest train station is 1.62km to the northwest (Letchworth Garden City).

A.1.1 Subjective Noise Climate (On-site)

Noise Type	Noise Characteristics	Sources
Dominant	A primary contributor of noise levels on the site.	Main road, B656
Other Noise Contributions	Contributors to the remainder of the noise climate on site.	Bird song

Table A.1.1 Subjective Summary of the Noise Sources

S

A.1.2 Non-Representative Noise Sources

During the survey, there was an increase in L_{Aeq} between 17:10 and 17:40 on 01/10/2024. This period of data has been highlighted in Figure A.3.3 and removed from any calculations for future assessments.

A.2 All Measurement Locations

To help with the understanding of the site and measurement locations all the measurement positions are presented on the map below. Photos of the locations in situ are in the following sections.



Figure A.2.1 All Measurement Locations on a Map

A.3 Fixed Measurement

A fixed microphone position was used to record noise levels between 13:35 on the 01/10/2024 and 13:35 on the 02/10/2024, where the fixed long-term meter was set to measure consecutive 'A' weighted 5-minute time samples.

To help with the understanding of the site and the measurement locations, the figures below present the location of the microphone position(s) in situ. The measurement data between 17:10 and 17:40 on the 01/10/2024 has been deemed as atypical of the site and has not been included in any calculations for the assessment.

A.3.1 Fixed Measurement Location – F1



Figure A.3.2 Fixed measurement F1 location in situ

A.3.2 Fixed Measurement Results – F1

The following graph presents the noise levels recorded over the measurement period at the fixed location (F1).

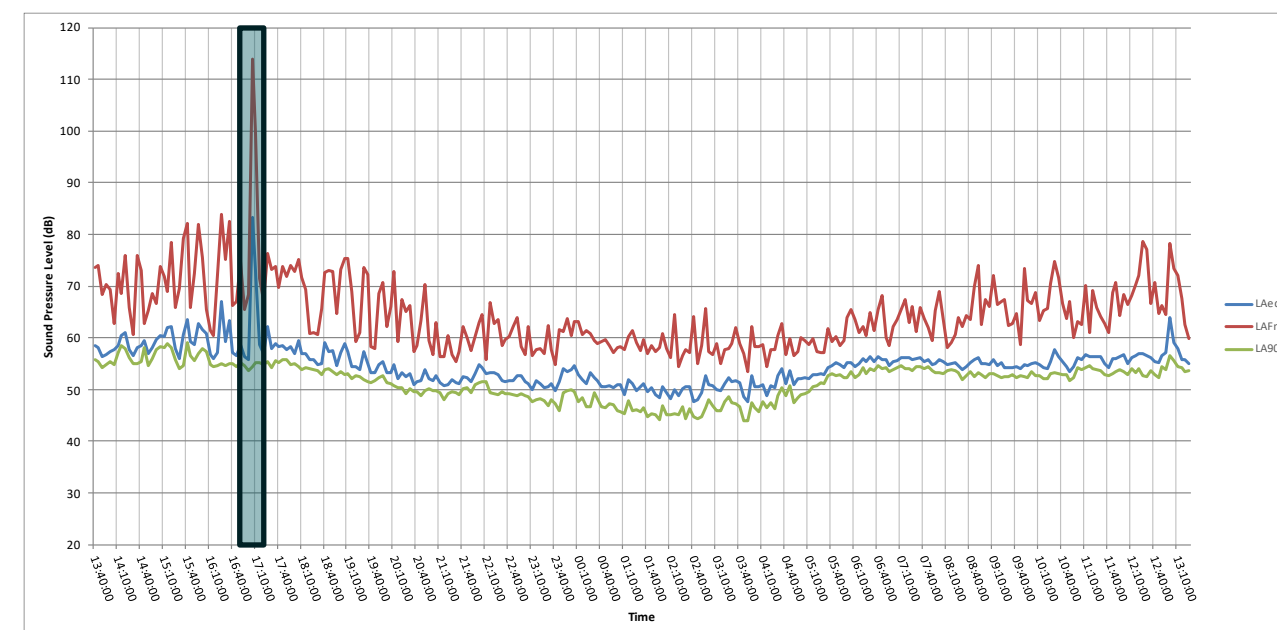


Figure A.3.3 Sound Pressure Level at fixed location, F1

A.4 Spot Measurement

Spot measurements help quantify existing noise levels at different points around the site.

The figures below present the location of the microphone position(s) in situ.

The results of the measured levels at these location(s) are also presented in Section A.5, Table A.5.2.

A.4.1 Spot Measurement - S1

This spot measurement was taken between 12:50 and 13:10 on 02/10/2024.



Figure A.4.4 - Spot Measurement S1 in situ

A.4.2 Spot Measurement – S2

This spot measurement was taken 13:20 and 13:35 on 02/10/2024.



Figure A.4.5 - Spot Measurement S2 in situ

A.5 All Spot Measurement Results

The L_{Aeq} , L_{AFmax} , and L_{A90} levels measured from all spot measurements are shown in Table 4.2 below.

Spot Measurement Position	Date	Start	End	Duration	$L_{Aeq,T}(dB)$	L_{AFmax}	L_{A90}
S1	02/10/2024	12:50	13:10	20 mins	63	84	58
S2	02/10/2024	13:20	13:35	15 mins	57	65	56

Table A.5.2 - Spot Measurement 1 Results Table

A.6 Measurement Equipment

Item	Serial No.	Certificate No.	Last Calibration	Calibration Due
NTI Precision Sound Analyser XL2 TA	A2A-13314-E0	207923	02/02/2024	02/02/2026
NTI Pre-amplifier MA220	7677	207923	02/02/2024	02/02/2026
NTI Microphone Capsule MC230A	A14417	207907	26/01/2024	26/01/2026
Svantek Acoustic Calibrator SV33A	64140	204757	13/12/2023	13/12/2024

Table A.6.3 Measurement Equipment

A.7 Meteorological Conditions

Data Taken from: <https://www.timeanddate.com/weather/>

Date	Time (hh:mm)	Temperature (High / Low) (°C)	Humidity (%)	Pressure (hPa)	Wind Speed (m/s)	Wind Direction	Conditions
01/10/2024	06:00	12/11	94	1007	6.9	WNW	Light rain. Partly sunny.
	12:00	13/11	96	1005	7.8	WNW	Light rain. Low clouds.
	18:00	13/12	96	1007	7.5	NNW	Mostly cloudy.
02/10/2024	00:00	12/12	99	1009	7.8	N	Light rain. Passing clouds.
	06:00	14/12	96	1013	6.	NNE	Partly sunny.
	12:00	14/12	87	1016	5.8	NE	Broken clouds.

Table A.7.4 Meteorological Conditions

APPENDIX B - PLANT NOSIE DATA

HERA HT R290 510-3-3 PV

HERA HT R290		365-3-3 PV	425-3-3 PV	465-3-3 PV	510-3-3 PV	
Heating Capacity ⁽¹⁾ (LN/SL versions)		[kW]	360	419	461	507
Total power input ⁽¹⁾		[kW]	113	131	146	159
COP		[-]	3,20	3,19	3,17	3,19
Heating Capacity ⁽¹⁾ (XL versions)		[kW]	358	416	458	502
Total power input ⁽¹⁾		[kW]	112	130	144	158
COP		[-]	3,21	3,19	3,17	3,19
Water flow ⁽¹⁾		[m³/h]	62,4	72,6	79,9	87,9
User circuit pressure drop ⁽¹⁾ - Base version		[kPa]	53,7	62,1	58,3	64,0
Min / Max water flow (heat exchanger, user side)		[m³/h]	59,3 / 74,9	69 / 87,1	75,9 / 95,9	83,5 / 106
Applications for seasonal efficiency for heating according to Commission Regulation (EU) No 813/2013 - Low Temperature - Average Climate						
SCOP (LN/SL - XL)		[W/W]	3,983 - 4,048	4,009 - 4,066	3,992 - 4,045	3,704 - 3,769
η _{s,h} (LN/SL - XL)		[%]	156,3 - 158,9	157,4 - 159,6	156,7 - 158,8	145,1 - 147,8
Applications for seasonal efficiency for heating according to Commission Regulation (EU) No 813/2013 - Medium Temperature - Average Climate						
SCOP (LN/SL - XL)		[W/W]	3,304 - 3,351	3,330 - 3,374	3,326 - 3,364	3,364 - 3,398
η _{s,h} (LN/SL - XL)		[%]	129,1 - 131,0	130,2 - 131,9	130,0 - 131,6	131,5 - 132,9
Cooling Capacity ⁽²⁾ (LN/SL versions)		[kW]	323	373	411	453
Total power input ⁽²⁾		[kW]	127	146	161	175
EER		[-]	2,54	2,56	2,55	2,58
Cooling Capacity ⁽²⁾ (XL versions)		[kW]	321	372	409	450
Total power input ⁽²⁾		[kW]	122	141	157	171
EER		[-]	2,63	2,64	2,61	2,63
Water flow ⁽²⁾		[m³/h]	55,6	64,2	70,6	77,8
User circuit pressure drop ⁽²⁾ - Base version		[kPa]	45,1	51,5	48,3	53,2
Min / Max water flow (heat exchanger, user side)		[m³/h]	44,5 / 66,7	51,4 / 77,1	56,5 / 84,8	62,3 / 93,4
Technical data						
Refrigerant / GWP		-	R290 / 3			
Charge of refrigerant		[Kg]	> 12			
Number of refrigerant circuits		N°	3			
Compressor type / quantity		-/N°	Semihermetic reciprocating with VFD (Variable Frequency Drive) / 3			
Expansion valve type		-	Electronic			
Fans quantity / type		-	12 / Axial EC			
Fans power input ⁽¹⁾ (total)		[kW]	2,93	3,30	3,48	3,63
Total air flow ⁽¹⁾		[m³/h]	125.600	130.900	133.350	135.400
Electrical data						
Power supply (main - gas detector)		-	400/3+N/50 - 230/1/50			
Maximum absorbed power		[kW]	211	243	269	290
Locked rotor current - LRA		[A]	337	388	430	463
Maximum absorbed current (full load)		[A]	337	388	430	463
Solution BASE-P - with Hydronic Kit						
Pump type		-	Centrifugal			
Standard pump (1,5 bar)						
Motor efficiency		-	IE3			
Pump motor nominal power input		[kW]	5,5	5,5	5,5	5,5
Pump motor nominal absorbed current		[A]	10,6	10,6	10,6	10,6
Increased pump (3,0 bar)						
Motor efficiency		-	IE3			
Pump motor nominal power input		[kW]	9,2	9,2	9,2	11,0
Pump motor nominal absorbed current		[A]	17,2	17,2	17,2	21,3
Water connections						
Size (nominal external diameter)		[inch]	4" (DN 100)	4" (DN 100)	5" (DN 125)	5" (DN 125)
Noise levels ⁽³⁾						
Total sound power (LN version)		[db(A)]	93	93	93	95

HERA HT R290 680-4-4 PV

HERA HT R290		560-4-4 PV	620-4-4 PV	680-4-4 PV
Heating Capacity ⁽¹⁾ (LN/SL versions)	[kW]	559	614	676
Total power input ⁽¹⁾	[kW]	175	194	211
COP	[-]	3,20	3,16	3,20
Heating Capacity ⁽¹⁾ (XL versions)	[kW]	556	610	671
Total power input ⁽¹⁾	[kW]	173	193	209
COP	[-]	3,21	3,17	3,20
Water flow ⁽¹⁾	[m³/h]	97	107	117
User circuit pressure drop ⁽¹⁾ - Base version	[kPa]	39,4	40,6	40,9
Min / Max water flow (heat exchanger, user side)	[m³/h]	92 / 116	101 / 128	111 / 141
Applications for seasonal efficiency for heating according to Commission Regulation (EU) No 813/2013 - Low Temperature - Average Climate				
SCOP (LN/SL - XL)	[W/W]	4,040 - 4,101	4,015 - 4,069	3,763 - 3,829
η _{s,h} (LN/SL - XL)	[%]	158,6 - 161,0	157,6 - 159,7	147,5 - 150,2
Applications for seasonal efficiency for heating according to Commission Regulation (EU) No 813/2013 - Medium Temperature - Average Climate				
SCOP (LN/SL - XL)	[W/W]	3,375 - 3,416	3,359 - 3,397	3,410 - 3,447
η _{s,h} (LN/SL - XL)	[%]	132,0 - 133,6	131,4 - 132,9	133,4 - 134,9
Cooling Capacity ⁽²⁾ (LN/SL versions)	[kW]	503	550	609
Total power input ⁽²⁾	[kW]	195	215	235
EER	[-]	2,58	2,55	2,60
Cooling Capacity ⁽²⁾ (XL versions)	[kW]	500	547	606
Total power input ⁽²⁾	[kW]	189	209	228
EER	[-]	2,65	2,61	2,65
Water flow ⁽²⁾	[m³/h]	86,5	94,5	105
User circuit pressure drop ⁽²⁾ - Base version	[kPa]	36,1	34,8	35,4
Min / Max water flow (heat exchanger, user side)	[m³/h]	69,2 / 104	75,6 / 113	83,8 / 126
Technical data				
Refrigerant / GWP	-	R290 / 3		
Charge of refrigerant	[Kg]	> 12		
Number of refrigerant circuits	N°	4		
Compressor type / quantity	-/N°	Semihermetic reciprocating with VFD (Variable Frequency Drive) / 4		
Expansion valve type	-	Electronic		
Fans quantity / type	-	16 / Axial EC		
Fans power input ⁽¹⁾ (total)	[kW]	4,41	4,63	4,85
Total air flow ⁽¹⁾	[m³/h]	174.750	177.700	180.750
Electrical data				
Power supply (main - gas detector)	-	400/3+N/50 - 230/1/50		
Maximum absorbed power	[kW]	324	359	366
Locked rotor current - LRA	[A]	517	573	586
Maximum absorbed current (full load)	[A]	517	573	586
Solution BASE-P - with Hydronic Kit				
Pump type	-	Centrifugal		
Standard pump (1,5 bar)				
Motor efficiency	-	IE3		
Pump motor nominal power input	[kW]	7,5	7,5	11
Pump motor nominal absorbed current	[A]	13,6	13,6	21,3
Increased pump (3,0 bar)				
Motor efficiency	-	IE3		
Pump motor nominal power input	[kW]	11,0	15,0	15,0
Pump motor nominal absorbed current	[A]	21,3	27,7	27,7
Water connections				
Size (nominal external diameter)	[inch]	5" (DN 125)	5" (DN 125)	6" (DN 150)
Noise levels ⁽³⁾				
Total sound power (LN version)	[db(A)]	95	95	96

APPENDIX C - POLICY FOR NOISE

C.1 National Planning Policy Framework (NPPF)

The current National Planning Policy Framework (NPPF), December 2024, sets out the Government's planning policies for England.

With regards to noise impact, Paragraph 191 of the NPPF states the following:

"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 life⁶⁹;

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; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation. "

Paragraph 193 goes on to state:

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.

*The draft NPPF published on 30 July 2024 propose no change to the above statements.

C.2 Noise Policy Statement for England (NPSE)

The aim of the Noise Policy Statement for England (NPSE) is to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion. The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims: 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

Observed Effect Level: In order to fit an objective assessment of "significant adverse" and "adverse" impacts, the NPSE introduced the concept of categorising the impact from noise pollution into different observed effect level categories. This has been expanded further within the more recent document "National Planning Policy Guidance – Noise".

C.3 National Planning Policy Guidance - Noise

Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The current guidance contained in the NPPG is summarised in the table below. This advice has not changed since the introduction of the 2018 version of the NPPF.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 7.5: Noise exposure hierarchy

C.4 Summary of National Guidance

The first two aims of the NPSE and the table from NPPG-Noise (Table 7.5) 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”

Therefore, taking an overview of national policy it is clear that when considering the impact of noise, one must consider the significance of any impact. The presence of an adverse impact in itself is not sufficient to refuse permission.

APPENDIX D - BS 4142

BS 4142:2014 “Methods for rating and assessing industrial and commercial sound” describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions. The likelihood of complaints in response to a noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level.

BS 4142 states that one should ‘obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level and consider the following:

- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

The aforementioned rating level is based upon the specific noise level of the noise source in question. A correction should be applied to the specific noise level to obtain an increased rating level if ‘a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources. To summarise, BS4142 section 9.2 advises the following with regards to corrections for acoustic characteristics:

- **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 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.
- **Other sound characteristics** – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied
- **Intermittency** – When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.