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**WATERLOOVILLE HEALTH CENTRE
PLANT NOISE ASSESSMENT**

Technical Report: R9457-1 Rev 0

Date: 31st March 2022

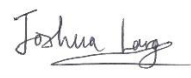
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24 Acoustics Document Control Sheet

Project Title: Waterloo Health Centre – Plant Noise Assessment

Report Ref: R9457-1 Rev 0

Date: 31st March 2022

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Document Status and Approval Schedule

Revision	Description	Prepared By	Reviewed By	Approved By
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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Oander Limited to undertake an assessment of noise from proposed new plant, to be located externally at the rear of the Vine Medical Health Centre, Waterlooville.
- 1.2 This report presents the results of the assessment, following a background noise survey undertaken between 28th February and 4th March 2022.
- 1.3 All noise levels in this report are presented in dB relative to 20µPa.

2.0 SITE DESCRIPTION

- 2.1 The Vine Medical Health Centre is located on Dryden Close, Waterlooville, in the Borough of Havant. The site is in a residential area, with the nearest noise sensitive receptor on Andrew Crescent, which is located to the west of site.
- 2.2 The health centre is open between 8:00 and 18:30 on weekdays.
- 2.3 It is proposed to install 2 air source heat pumps (ASHPs) externally at the rear of the building, at ground floor level. The plant is to be installed at a distance of approximately 5m from the health centre rear wall.
- 2.4 The new ASHPs will be required to operate during the daytime opening hours of the health centre. It is understood that the units may be required to operate during evening and night-time periods, in order to heat the building.

3.0 CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

- 3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should aim to:
- 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 quality of life.
 - Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

- 3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.
- Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life;
- 3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'.
- 3.4 The Planning Practice Guidance (PPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.
- 3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.
- 3.6 The documents described above do not refer to specific noise criteria. When considering the impact of noise from new plant 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 4142:2014 [Reference 4] are adopted.

BS 4142

- 3.7 BS 4142:2014 provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction of up to 15 dBA is applied.

- 3.8 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

- 3.9 The standard also states:

"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

Assessment Methodology

- 3.10 In accordance with guidance from BS 4142:2014, a rating level of 5 dBA below the representative background noise level will be targeted for the proposed plant.
- 3.11 Where background noise levels are low, a suitable absolute level will be chosen. If the noise emissions are tonal or contain other noticeable characteristics, a suitable correction is applicable, in accordance with BS 4142:2014.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

- 4.1 The following instrumentation was set up between 28th February and 4th March 2022 to assess the prevailing background noise levels:

Rion precision sound level meter	Type NL32
Brüel & Kjær acoustic calibrator	Type 4231

- 4.2 Background noise measurements were undertaken at a height of approximately 2m, on the western boundary, to the rear of site at the location shown in Figure 1.
- 4.3 The main source of noise at the measurement location was distant road traffic. The measurement location is representative of the noise climate outside the nearest and most affected sensitive properties on Andrew Crescent.

- 4.4 The instrumentation was configured to record 5-minute measurements of the A-weighted statistical parameters including L_{Aeq} , L_{A90} and L_{Amax} (all measured on fast response). The survey was undertaken in general accordance with BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 5].
- 4.5 The calibration of all instrumentation was verified before and after the tests and no significant signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards.
- 4.6 The weather conditions during the background noise measurements were mostly dry with wind speeds below 5 m/s. Where historic weather data shows rainfall during the noise survey period, the data has been disregarded from analysis.

Background Noise Measurements - Results

- 4.7 The results of the environmental noise survey are presented in Table 1 below and in graphical format in Appendix B.

Date	Daytime (07:00 – 19:00) L_{A90}, 1 hour, typical	Evening (19:00 – 23:00) L_{A90}, 1 hour, typical	Night-time (23:00 – 07:00) L_{A90}, 5 min, typical
Monday 28 th February	Data disregarded due to weather conditions		
Tuesday 1 st March	44	41	34
Wednesday 2 nd March	44	40	29
Thursday 3 rd March	41	33	20
Friday 4 th March	41*	-	-
Representative	42	38	28

Table 1 - Summary of free-field environmental noise measurements

* - *incomplete measurement period*

Plant Noise Limits

- 4.8 Based on guidance provided by BS 4142, Table 2 sets out the proposed maximum external plant noise levels for the daytime and night-time operational periods, to be achieved by the new plant at the nearest noise sensitive property.

Noise Source	Period and Rating Noise Level, dB	
	Daytime Operation (07:00 – 19:00) [$L_{Aeq,1 \text{ hour}}$]	Evening & Night-time (19:00 - 07:00) [$L_{Aeq,15 \text{ min}}$]
All Plant	37	25

Table 2 - Proposed maximum external plant noise levels

- 4.9 As night-time background noise levels are low, an absolute plant noise limit of 25 dB $L_{Aeq, 15 \text{ min}}$ has been proposed. This would still provide a high level of protection to the neighbouring properties.
- 4.10 If noise from the plant contains tones or temporal characteristics that are sufficiently perceptible at the receive location, a correction shall be applied to the values in Table 2, in accordance with BS 4142.

5.0 PLANT NOISE ASSESSMENT AND RECOMMENDATIONS

- 5.1 The new plant is to be located at ground floor level, approximately 5m to the rear of the health centre. The site layout and proposed plant location are shown in Figure 1.
- 5.2 The nearest noise sensitive receptor is on Andrew Crescent, approximately 35m away. The window at first floor height of 4m above ground level is deemed to be a worst-case scenario, as screening from the garden fences is negligible.
- 5.3 The new ASHPs will primarily be in operation at daytime while the health centre is open, and may also be required to operate during evening and night-time periods, in order to heat the building. The noise assessment has been undertaken with plant operational during daytime and night-time periods.
- 5.4 Noise from the equipment is not expected to contain tones or temporal characteristics that are sufficiently perceptible at the nearest residential properties. Table 3 shows the manufacturers' published noise level data.

Sound Pressure Level (dB)									dBA
Unit	Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
2 No. Mitsubishi CAHV-P500YB-HPB	70	65	60	57	51	47	49	45	59

Table 3 - Manufacturer's ASHP Source Data – Sound Pressure Level at 1m

- 5.5 Calculations have been undertaken using the manufacturer's octave band noise data to determine the plant noise rating level at the nearest noise sensitive windows on Andrew Crescent. Corrections were made for the distance between the receiver and plant.
- 5.6 Initial calculations showed that the plant exceeded the established plant noise limits, and therefore mitigation measures are necessary. Two options for mitigation are described below.

Mitigation Method 1: Barrier Surrounding Plant

- 5.7 A solid barrier surrounding the proposed plant should be constructed, in accordance with the following specification:
- Barrier to be imperforate, with no holes or gaps;
 - Barrier material of minimum mass per unit area 15 kg/m² (e.g. two layers of minimum 25mm thick timber board);
 - Minimum height 500mm above the top of the ASHPs;
 - Barrier to fully enclose all sides of the plant compound.

Mitigation Method 2: AHSP Attenuation

- 5.8 Alternatively, attenuation should be applied directly to the AHSP units, to attenuate the intake and discharge. The minimum required acoustic performance of the ASHP attenuation is specified in Table 4:

Minimum Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
3	6	8	12	12	10	10	8

Table 4 - ASHP Attenuation – Acoustic Performance Specification

Plant Noise Levels with Mitigation

- 5.9 Using either of the mitigation methods described above, the calculated total plant noise levels at the nearest windows are as described in Table 5:

	Sound Pressure Level, dBA	
	Daytime Operation (07:00 – 23:00) [L _{Aeq,1 hour}]	Evening & Night-time (19:00 – 07:00) [L _{Aeq,15 min}]
Plant Noise Level	22	22
Plant Noise Limit	37	25

Table 5 - Predicted maximum plant noise levels at Andrew Crescent – with mitigation

- 5.10 The calculations demonstrate that, with either a solid barrier or attenuation as recommended, noise levels associated with the proposed plant would achieve the established maximum noise levels at the nearest receptors.

6.0 CONCLUSIONS

- 6.1 24 Acoustics Ltd has been instructed by Oander Limited to undertake an assessment of noise from proposed new plant, to be located externally at the rear of the Vine Medical Health Centre, Waterloooville.
- 6.2 An environmental noise survey has been undertaken to determine the prevailing background noise levels during daytime and night-time periods.
- 6.3 Based upon the survey results, planning guidance and British Standard 4142, maximum noise levels have been established for new plant, to be achieved outside the nearest noise sensitive properties on Andrew Crescent.
- 6.4 Two options for plant noise mitigation have been recommended, in order to meet the established criteria for nearby properties.
- 6.5 Calculations have been undertaken which demonstrate that, with either of the recommended mitigation measures, noise emission levels from the proposed plant would achieve the established criteria at the nearest noise sensitive properties.



REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2012.
2. DEFRA, Noise Policy Statement for England, March 2010.
3. Planning Practice Guidance, Department of Communities and Local Government (revised December 2014).
4. British Standards Institution. British Standard 4142. Methods for Rating Industrial and Commercial Sound, 2014.
5. British Standards Institution. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: ENVIRONMENTAL NOISE LEVELS

