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CABLE WORKS BUILDING
EASTLEIGH
PLANT NOISE IMPACT ASSESSMENT

Technical Report: R6836-1 Rev 2

Date: 7th April 2017

For: Eastleigh Borough Council
Eastleigh House
Upper Market Street
Eastleigh
Hampshire
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Project Title: Cable Works Building, Eastleigh, Plant Noise Impact Assessment

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Document Status and Approval Schedule

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been retained by Eastleigh Borough Council to undertake an assessment of the potential noise impact from proposed plant at Cable Works Building, Eastleigh. It is proposed to install four new air conditioning condenser units at the rear of the property at first floor level. It is understood that the proposed condenser units will only be operational during daytime periods (07:00 – 23:00). Therefore, this report only considers noise from the proposed condenser units during this period.

1.2 The assessment has been undertaken following ambient noise surveys at the site undertaken between 3rd and 10th March 2017.

1.3 All sound pressure levels quoted in this report are in dB relative to 20 µPa. All sound power levels are quoted in dB relative to 10^{-12} Watts. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

2.1 The property is located in a predominantly residential area in Eastleigh. The front of the property bounds Tinning Way which is a single carriageway with on street residential parking. The rear of the property provides a parking and services area to neighbouring offices.

2.2 Residential properties are located on the second and third floor of the building as well as to the east, south and north east of the property with a large office block (Aspire House) to the north west. It is understood that the nearest noise sensitive property is located on the third floor of the building (Receptor 1) approximately 6.4 metres from the proposed condenser units. The location of the nearest residential property is shown in Figure 1.

2.3 Local road traffic and motorway (M3) noise is the dominant source of background noise in the area and at the nearest residential properties.

2.4 Figure 1 shows the existing site layout.

3.0 STANDARDS AND GUIDANCE

NPPF

3.2 The National Planning Policy Framework (NPPF) [Reference 1] was published by the Department for Communities and Local Government in 2012. For noise, the NPPF policy states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions, while recognising that many developments will create some noise.

3.3 The NPPF 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.

3.4 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'. The following guidance is provided within the NPSE:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

3.4 In 2014 the Planning Practice Guidance (PPG) was finalised [Reference 3]. This 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 PPG 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 For this site it is considered that the appropriate (technical and objective) standard for use in assessing the noise impact is those of British Standard 4142: 2014 [Reference 4].

British Standard 4142:2014

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 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).

4.0 ASSESMENT METHOD

4.1 The following assessment methodology has been used:

i. A background noise survey has been undertaken to determine existing levels of background noise at the nearest residential property;
ii. Calculations of the noise level from proposed plant at the nearest residential property from manufacturers data;
iii. An assessment of the likely noise impact has been undertaken in accordance with the guidance of BS 4142. A maximum plant noise level of 5 dB below the typical background noise level has been adopted (24 Acoustics assumes the typical background noise level as the numerical average less one standard deviation).

5.0 ENVIRONMENTAL NOISE SURVEYS

5.1 Background noise measurements have been undertaken to determine the existing noise level at the nearest residential property. Noise monitoring equipment was located in the car park to the north of the property in free field conditions. This location is considered representative of the background noise levels at the nearest residential windows to the proposed condenser units. Measurements were undertaken in samples of 5 minutes in terms of the overall free-field A-weighted L_{eq}, L_{90} and $L_{max,f}$ noise levels. Noise measurements were undertaken between 3rd and 10th March 2017.

5.2 The survey location is shown in Figure 1.

5.3 The survey was undertaken with the following instrumentation:

- Rion NL32 Class 1 accuracy sound level meter;
- Bruel and Kjaer Type 4231 Class 1 accuracy acoustic calibrator.

5.4 The instrumentation calibration was verified before and after the surveys in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. All instruments were fitted with environmental weather shields during the surveys.

5.5 Weather conditions during the survey were variable with periods of heavy rain which have been excluded from the analysis. Wind speeds were generally lower than 5 m/s during the measurements.

5.6 The results of the background noise survey show typical daytime and evening background noise levels of 48 dB $L_{A90, 1hour}$ and 45 dB $L_{A90, 1hour}$ respectively and are shown graphically in Appendix B.

6.0 ASSESSMENT AND RECCOMENDATIONS

6.1 The proposed plant will comprise two Mitsubishi PUHZ-P100VHA2 and two Mitsubishi PUHZ-P125VHA3 outdoor units, installed to the rear of the property at first floor level as shown in Figure 1.

6.2 The manufacturer's stated plant noise levels are detailed in Table 1:

Model	Sound Pressure Level (dB) per Octave Band Frequency, Hz								dBA
	63	125	250	500	1k	2k	4k	8k	
Mitsubishi PUHZ-P100VHA2 (Heating)	57	56	55	50	50	45	52	33	54
Mitsubishi PUHZ-P125VHA3 (Heating)	68	57	51	52	50	48	42	37	55

Table 1: Plant Sound Pressure Level at 1 metre.

6.3 Calculations have been undertaken to determine the noise level at the nearest residential property assuming all condenser units are operational. The proposed condenser units operate in two modes, heating and cooling, the heating mode presents the highest level and has therefore been used in the calculations to provide a worst-case scenario prediction. Calculations have been completed using single octave data as shown in full in Appendix C.

6.4 Calculations indicate that, with the proposed plant installed, the noise level at the closest residential property (Receptor 1) would be 33 dB L_{Aeq}. Predicted noise levels at other receptors would be below 35 dB L_{Aeq}.

6.5 Noise from the proposed condenser units is expected to contain no distinctive tones when assessed at the nearest residential property. For this reason, it is not considered necessary to apply a rating correction for tonality or impulsivity.

6.6 The assessment indicates that noise from the proposed condenser units would meet the established plant noise limits and therefore be acceptable.

7.0 CONCLUSIONS

7.1 24 Acoustics Ltd has been instructed by Eastleigh Borough Council to undertake an assessment of the noise impact from proposed plant associated with Cable Works Building, Eastleigh.

7.2 An assessment has been undertaken following background noise measurements at the site undertaken between 3rd and 10th March 2017.

7.3 The assessment has indicated that noise from the plant at the nearest residential property would achieve the established plant noise limits of 5dB below the typical background noise level.

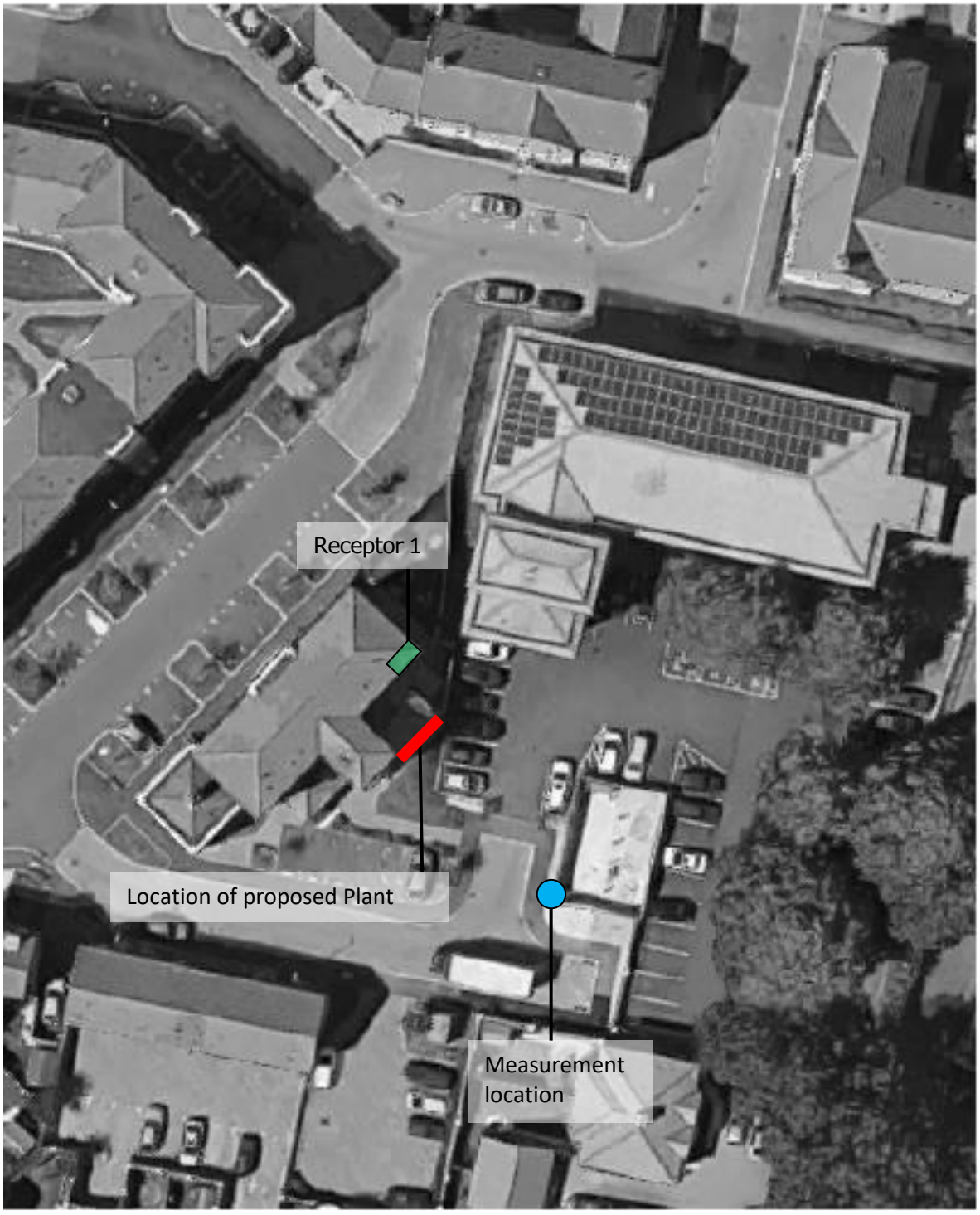
REFERENCES

1. National Planning Policy Framework, Department for Communities and Local Government, 2012.

2. Noise Policy Statement for England, Defra, 2010.

3. Planning Practice Guidance, Department of Communities and Local Government, March 2014.

4. British Standards Institution. British Standard 4142: 'Method for Rating and Assessing Industrial and Commercial Sound', 2014.



Project: Cable Works Building, Eastleigh.	**Description:** Site Layout Plan	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A
Date: March 2017	**Drawn By:** KE	**Job No:** 6836-1

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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 internal, 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.

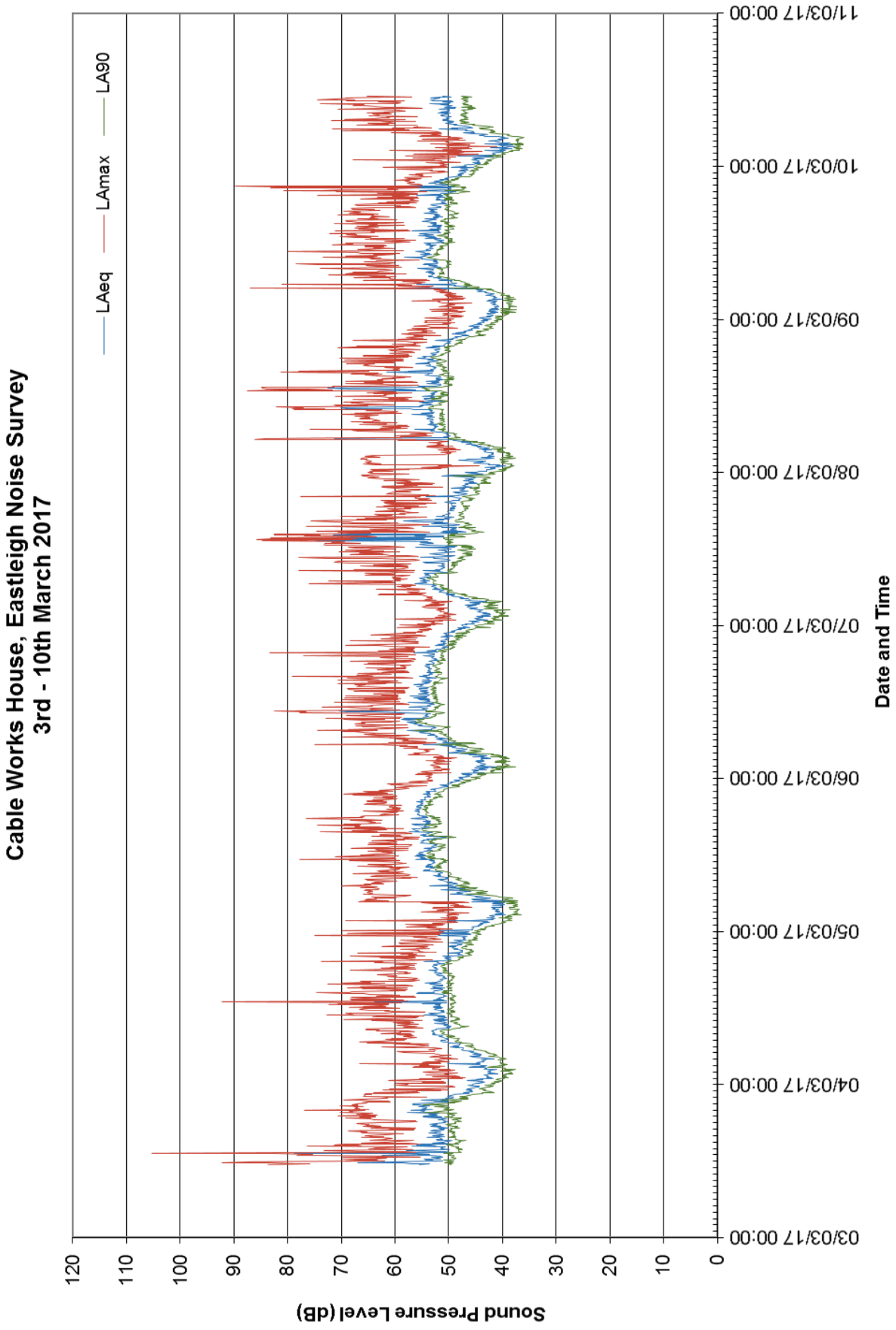
iii) The L_{A10} noise level

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 – BACKGROUND NOISE SURVEY RESULTS



APPENDIX C – CALCULATED NOISE LEVELS

Unit	63	125	250	500	1k	2k	4k	8k	dB(A)	Comments
Unit Lp										
1) PUHZ-P100VHA2	57	56	55	50	50	45	42	33	**54**	Max heating condition at 1m
2) PUHZ-P100VHA2	57	56	55	50	50	45	42	33	**54**	Max heating condition at 1m
3) PUHZ-P125VHA3	68	57	51	52	50	48	42	37	**55**	Max heating condition at 1m
4) PUHZ-P125VHA3	68	57	51	52	50	48	42	37	**55**	Max heating condition at 1m
Distance Loss										
1) PUHZ-P100VHA2	-16	-16	-16	-16	-16	-16	-16	-16		Distance to nearest window = 6.37m
2) PUHZ-P100VHA2	-16	-16	-16	-16	-16	-16	-16	-16		Distance to nearest window = 6.37m
3) PUHZ-P125VHA3	-16	-16	-16	-16	-16	-16	-16	-16		Distance to nearest window = 6.37m
4) PUHZ-P125VHA3	-16	-16	-16	-16	-16	-16	-16	-16		Distance to nearest window = 6.37m
Screening										
1) PUHZ-P100VHA2	-7	-7	-8	-9	-10	-12	-22	-22		Staircore line of sight Screening
2) PUHZ-P100VHA2	-7	-7	-8	-9	-10	-12	-22	-22		Staircore line of sight Screening
3) PUHZ-P125VHA3	-7	-7	-8	-9	-10	-12	-22	-22		Staircore line of sight Screening
4) PUHZ-P125VHA3	-7	-7	-8	-9	-10	-12	-22	-22		Staircore line of sight Screening
Other										
1) PUHZ-P100VHA2	3	3	3	3	3	3	3	3		Refelection from mounting surfaces
2) PUHZ-P100VHA2	3	3	3	3	3	3	3	3		Refelection from mounting surfaces
3) PUHZ-P125VHA3	3	3	3	3	3	3	3	3		Refelection from mounting surfaces
4) PUHZ-P125VHA3	3	3	3	3	3	3	3	3		Refelection from mounting surfaces
Directivity										
1) PUHZ-P100VHA2	-2	-2	-4	-6	-6	-8	-8	-8		Fans face in horizontal axis away from rear façade
2) PUHZ-P100VHA2	-2	-2	-4	-6	-6	-8	-8	-8		Fans face in horizontal axis away from rear façade
3) PUHZ-P125VHA3	-2	-2	-4	-6	-6	-8	-8	-8		Fans face in horizontal axis away from rear façade
4) PUHZ-P125VHA3	-2	-2	-4	-6	-6	-8	-8	-8		Fans face in horizontal axis away from rear façade
Levels at nearest sensitive window										
1) PUHZ-P100VHA2	35	34	30	22	21	12	-1	-10	**26**	Noise level from condenser unit
2) PUHZ-P100VHA2	35	34	30	22	21	12	-1	-10	**26**	Noise level from condenser unit
3) PUHZ-P125VHA3	46	35	26	24	21	15	-1	-6	**27**	Noise level from condenser unit
4) PUHZ-P125VHA3	46	35	26	24	21	15	-1	-6	**27**	Noise level from condenser unit
Total									**33**	Cumulative noise level from plant at nearest residential window

Table C1: Calculated Noise Levels, Receptor 1.