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Coopervision

UK R&D FACILTY, SCHOOL LANE

Plant Noise Impact Assessment

Report No. 15-0111-0 R01

♦ PROTECT ♦ ENHANCE ♦ CONNECT

Plant Noise Impact Assessment

Coopervision

UK R&D FACILITY, SCHOOL LANE, CHANDLER'S FORD

Report number:
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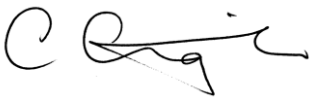
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1 INTRODUCTION

An air handling unit for laboratory fume cupboards, is to be installed at the North-East side of Coopervision's Research & Development site off School Lane, Chandler's Ford to serve the chemistry laboratory.

Sustainable Acoustics Ltd has been instructed to carry out a plant noise assessment of the proposed air handling units in the location in order to provide information for the planning application.

1.1 Context

Figure 1 gives an overhead view of the site, showing the intended position of the air handling units. The nearest receivers are those of the adjacent building to the North-East. It is understood that the rooms fronting the façade where the units are to be installed, are offices. Figure 2 shows street level views of the source and receiver positions.

2 PLANNING GUIDANCE

2.1 National Planning Policy Framework

Current planning policy is based on the National Planning Policy Framework (NPPF), published in March 2012, which supports a presumption in favour of development, unless the adverse impacts of that development would outweigh the benefits when assessed against the policies in the Framework, taken as a whole.

The noise implications of development are recognised at paragraph 123, where it is stated 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;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.*

2.2 Noise Policy Statement for England

Paragraph 123 of the NPPF also refers to advice on adverse effects of noise given in the Noise Policy Statement for England[1] (NPSE). This document sets out a policy 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".*

To achieve this vision the Statement sets the following three aims:

[1] Department for Environment, Food and Rural Affairs, *Noise Policy Statement for England,* London, 2010

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- *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.*

2.3 Local planning policy

Local policy is required to be consistent with national policy and would, therefore, reflect the concepts discussed in 3.1 above. Eastleigh Borough Council's current policy is given in the Eastleigh Borough Adopted Local Plan Review 2001-2011, Chapter 3 of which provides policies on Environmental Sustainability, including at paragraphs 3.6 to 3.18, guidance and policies relating to noise. Although a draft Local Plan 2011-2029 has been published, this document has yet to be adopted, although several policies from the Adopted Local Plan Review have been retained, included those relating to noise.

The Council expects proposals for industrial or commercial development to take account of noise impacts on any noise sensitive premises and, where appropriate, requires a noise impact assessment to be undertaken to:

- identify all significant sources of noise resulting from the development and potential conflicts between the proposed use and neighbouring uses;
- assess the likely impact both in the short and long term;
- present recommendations for noise protection measures; and
- make a statement of how the requirements of the Local Plan have been met.

Policy 29.ES states that:

Industrial or commercial development which would result in any noise-sensitive premises being subject to a loss of amenity by means of an excessive increase in noise and/or vibration exposure will not be permitted.

Whilst the term "an excessive increase" is not defined in this context, reference is made in paragraph 3.13 to the guidance given in BS 8233: 1999, BS 4142: 1997 and the WHO guidance discussed in 3.1 above, for the control and mitigation of noise affecting noise sensitive development.

3 DESIGN OBJECTIVES

The national and local palnning guidance does not provide any specific guidance on acceptable levels of noise in offices. The offices are located in an industrial estate and so some intrusive noise may be expected; but it is understood that Coopervision wishes to be a good neighbour and ensure that any noise from its plant is reasonable. The British Council for Offices provides guidance for acceptable levels on noise in offices and BS 8233 also addresses noise in offices. These guidance documents are discussed below. BS 4142, which is referred to in the local policy, is specifically for the rating of

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indusrtial noise at residential receivers and as such is not relevant to the assessment of acceptability of noise in commercial premisies.

3.1 British Council for Offices

The British Council for Offices Guide to Specification 2014 provides noise criteria for external noise intrusion, and for building services. This criteria is tabulated below:

Office Type	**Crtieria (External Noise Intrusion)**
Open Plan	NR40
Speculative	NR38
Cellular Offices	NR35

Additionally, a maximum intrusion level ($L_{A,max,F}$) is specified to not normally exceed 55 dB.

3.2 British Standard 8233: 2014

The British Standard BS 8233: 2014, *Guidance on Sound insulation and noise reduction for buildings* provides additional guidance on noise levels from sources without specific character in the built environment, based on the recommendations of the World Health Organisation.

With regard to offices, BS8233 suggests a design range of 45 – 50 dB L_{Aeq} for open plan offices and 35 - 40 dB L_{Aeq} for Executive offices; where noise levels generally apply to steady sources, and the criteria reflect that of an unoccupied space.

4 AMBIENT NOISE SURVEY

Existing noise levels were measured in 10 minute periods between 4:40pm and 5:20pm on Tuesday 21st July, and again between 2:20pm and 3:00pm on Thursday the 23rd July, at ground floor level, 4 meters from the receiver façade. This position was chosen to be representative of the noise levels at the closest window of the nearest and worst affected property.

During the measurements, the weather was warm and calm with an average temperature of 18°C

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4.1 Instrumentation

Noise levels were measured using a Rion sound level meter, type NL-32 (serial number 0024066790), with a Rion type NX-22J Sound Monitor Card installed (serial number 00630553, version 2.1) and a Rion type UC-53A ½-inch free field microphone (serial number 305924) and a Rion type NH-21 pre-amplifier (serial number 10711) fitted. The microphone was fitted with a windshield during measurements. The sound level meter, microphone and preamplifier were last calibrated in a calibration laboratory on 3 February 2015 and calibration aand conformance certificates are available. Prior to ancd on completion of the survey, the sound level meter and microphone calibration was checked sing a Rion type NC-74 Sound Level Meter Calibrator (serial number 00830811). The Calibrator was last calibrated on 27 January 2015, in accordance with the requirements of ISO 10012 and a calibration and conformance certificate is available. No significant change in the calibration level occurred during the survey.

4.2 Measured Noise Levels

It was observed during the site visit that the noise levels at the side of the property were dominated by traffic movements from the neighbouring road. No other nearby plant was evidently running at the time of the measurement. With a clear view on to the road, at the same angle as the windows of the receiver façade, the location was deemed representative of the noise levels incident on the residential property.

The measured noise levels outside Coopervision are given below in Table 1

L_{Aeq}		L_{A90}		L_{Amax}	
Range	Average	Range	Average	Range	Average
53.7 – 59.6	55.0	45.3 – 49.6	46.4	62.5 – 73.4	66.4

Table 1 – Measured noise levels outside Coopervision

5 PLANT NOISE

5.1 Plant Noise Criteria

There are no specific standards specifying noise criteria for offices; so the most suitable criterion is deemed to be the British Council for Offices Guide to Specification.

The BCO specifies external noise intrusion level limits as NR40 for open plan offices, which is approximately equal to 46 dB(A). A maximum intrusion level ($L_{A,max,F}$) is also specified, and is to not normally exceed 55 dB.

BS 8233:2014 also provides criteria on offices, and can be used to provide an additional indication of the impact of the noise; whereby the maximum internal noise criteria for an open plan office is between 45 and 50 dB(A).

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5.2 Plant Noise Assessment

It is understood that the main source of noise is attributed to two plenum fans situated within the unit, as depicted in Figure 3. The following data have been supplied with regard to the sound power levels of the inlet and outlet of the proposed air handling equipment.

	Octave centre band frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
004 Plenum Fan (Section A) Inlet	84	81	79	82	76	75	71	69
004 Plenum Fan (Section A) Outlet	81	79	81	88	84	83	79	79
007 Plenum Fan (Section B) Inlet	93	85	86	88	83	80	78	75
007 Plenum Fan (Section B) Outlet	84	83	91	96	94	88	84	78

Table 2 – Sound Power Levels of the Plenum Fans

The closest receivers are the offices, 4m away from the intended installation position of the air handling equipment, as shown in Figure 2

Break-out noise

In order to calculate the breakout noise from the casing, the sound power levels of the fan inlets and outlets are logarithmically added to estimate the internal sound power level of the unit; as 101.8 dB.

The insertion loss data of the casing panels has been provided by the manufacturer. Propagating the sound power level through the casing, and to the receiver windows (assuming quarter spherical radiation), the resulting level incident on the windows is calculated to be : 59.8 dB(A)

In addition, some noise will escape via the air intake louvre. This is calculated based on the sound power level of the inlet of the bottom plenum fan, and the area of the louvre relative to the area of the inlet. Accounting for directivity, and applying the same distance propagation, a contribution of 57.3 dB(A) from noise from the louvre is calculated to be incident on the windows. This is a conservative calculation as it has assumed no losses through the louvre filters.

Exhaust stack outlet noise

Noise from the outlet of 1 metre above the roof will propagate to the windows of the adjacent offices. For the calculation, the relative height, and horizontal distance of the outlet to the receiver windows is taken into account to establish a duct directivity correction based on the angle of propagation. The distance is calculated to be approximately 7.5 metres. The exhaust stack outlet position relative to the air handling unit is shown in Figure 4

The contribution to the level outside the receiver windows is calculated to be 57.6 dB(A).

Assessment

The overall level outside the office windows is calculated to be 61.7 dB(A) when taking into account break out noise from the casing and the louvre, as well as the contribution from the outlet.

Allowing for 15 dB attenuation through a partially open window, the levels inside the office due to the plant are estimated to be 47 dB(A).

The British Council for Offices criteria specify a rating of NR40 inside open plan offices, which is approximately 46 dB(A). By this assessment, the desired level is exceeded by 1 dB; however, if it is argued that the character of the noise is distinctive against the background, it would be appropriate to set a lower target of 43 dB(A) internally.

BS8233:2014 give criteria which aim to achieve 45 to 50 dB(A) inside open plan offices; and so the level inside from the installed unit may satisfy this guidance.

6 MITIGATION

It is recommended that in order to meet BCOs criterion of NR40 inside the office, mitigation measures are taken to meet levels of 43 dB(A) internally, which is equivalent to approximately 58 dB(A) externally.

The level of breakout noise from the unit casing can be minimised by installing an acoustic barrier in front of the air handling unit. This may be made of a solid material such as marine plywood with a sound absorptive material, such as mineral wool, on the side facing the air handling unit. Alternatively, metal cassette barrier systems are available. The barrier should have no less than 2m height in order to break line of sight from the majority of the unit to the receiver windows. The barrier should extend at least 1 meter past the line of sight from any office window and the ends of the air handling unit.

With such a barrier in place, a 5 dB attenuation minimum is expected from the casing breakout, and a 10 dB minimum attenuation from the louvre noise; meaning breakout noise outside the window would be expected to be 52dB(A).

An in-duct attenuator is recommended for use in the outlet from plenum fan 007. Such an attenuator should aim to mitigate the level by no less than 5 dB, in order to ensure that overall external levels do not exceed 58 dB(A)

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7 SUMMARY AND CONCLUSION

A noise assessment has been carried out at Coopervision's R & D facility, School Lane, Chandler's Ford to establish if the proposed air handling unit system will be acceptable in terms of noise impact on the adjacent offices. The primary assessment method used was the British Council for Offices Guide to Specification. Plant noise levels have been calculated based on manufacturer's data and appropriate standards, and are in line with local authority policy 29.ES. The noise levels due to the plant have been assessed and mitigation has been specified. With mitigation installed as recommended, it is considered that there will not be an unreasonable impact on the neighbouring properties.

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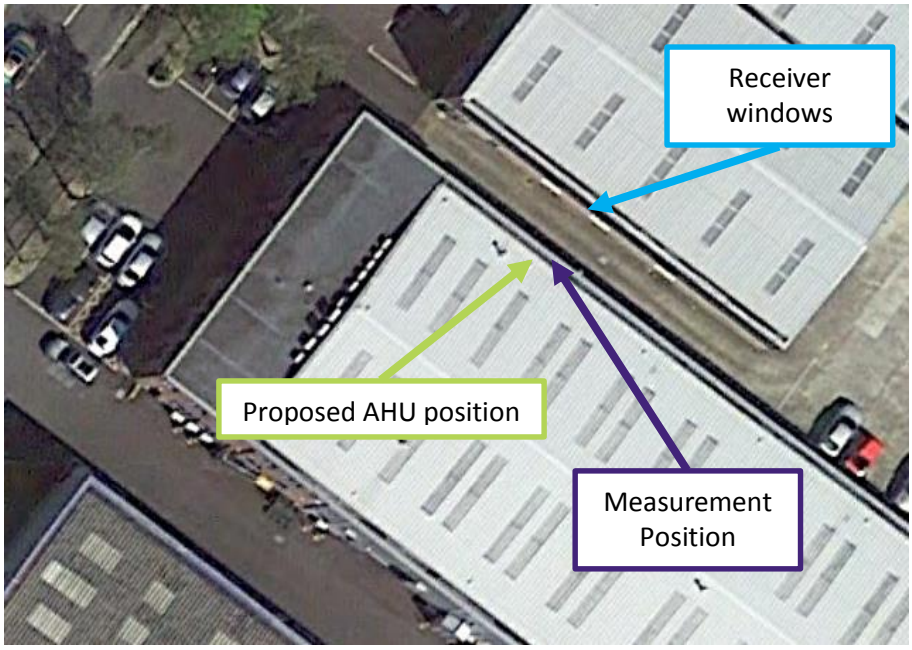


Figure 1 – Overhead view of site

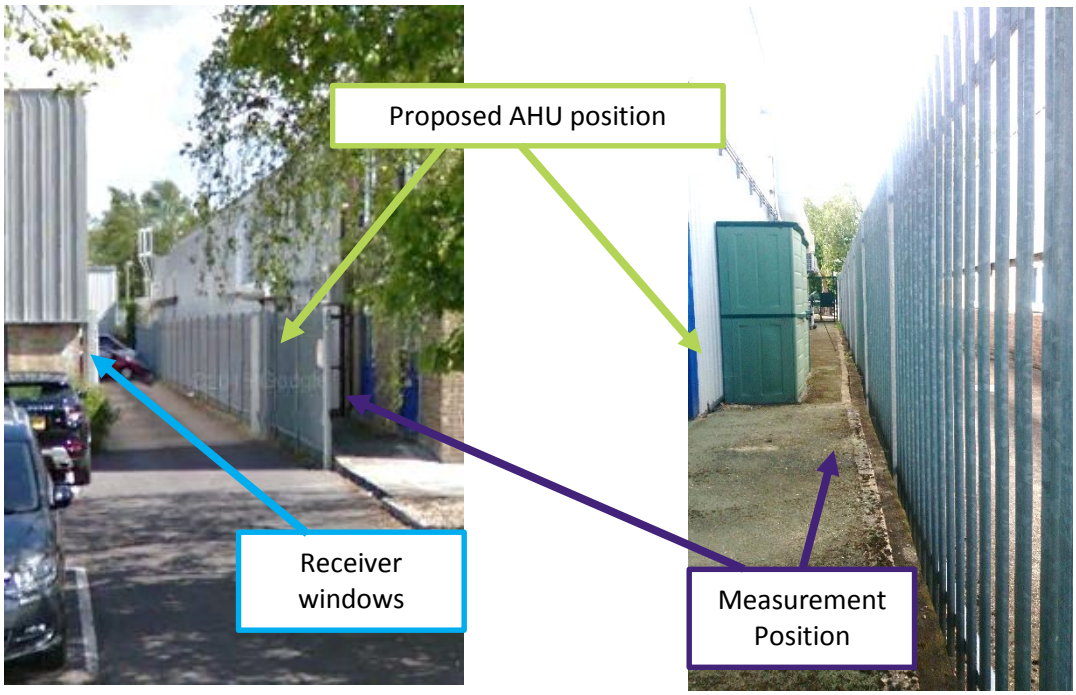


Figure 2 – Street level view of site

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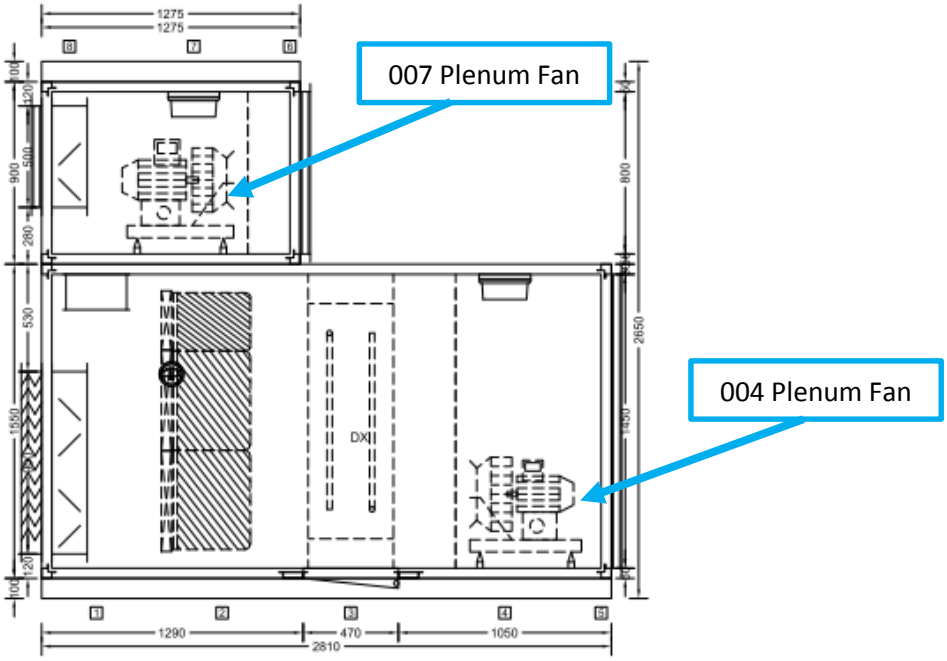


Figure 3 – Air Handling Unit

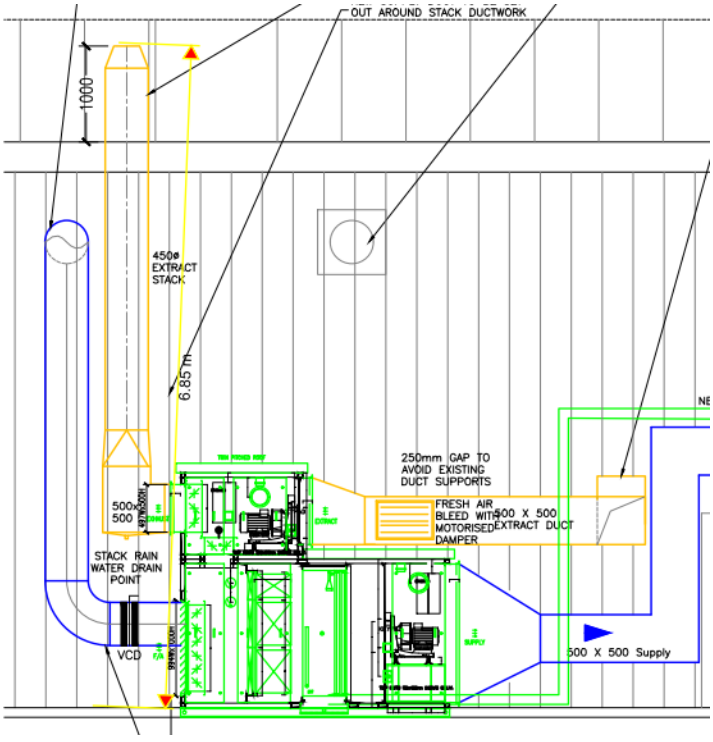


Figure 4 – Side elevation of ductwork from the air handling unit.

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