

Bluebird Engineering

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Reading
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FAO: Jeff Assemi

02/09/2021

Dear Jeff

Re: 56 Christchurch Road, Reading

Further to our recent discussion regarding the above. Following submittal of our report 0200930_4710_ENA01, it is understood that the local planning authority has requested that a noise assessment be undertaken for the extract system that will serve the ground floor level commercial unit.

Local Authority Policy

The Reading Borough Local Plan (Adopted November 2019) includes a Section related to Noise Generating Equipment. EN 17 advises that:

EN17: NOISE GENERATING EQUIPMENT

Where noise generating equipment is proposed, the noise source specific⁶¹ level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor.

⁶¹ The noise source specific level is the measured noise level, as opposed to the rating level, which is the specific level with correction factors included.

The Local Plan goes on to say:

4.2.92 The Local Plan proposals will see a high level of development within Reading. Reading is a densely populated town with many new planning developments taking place. Residents live in close proximity to commercial activities, therefore it is important to minimise background creep in order to protect the noise environment and maintain quality of life for people living and working in the town. The negative impact of environmental noise on health is becoming better understood (for example WHO 1999, 2009 and 201162).

4.2.93 Planning Practice Guidance on noise states that no specific measures are required to manage the acoustic environment in situations where noise can be heard as a result of a development and there is a slight effect on the acoustic character of the area but there is no effect on the behaviour and attitude of people exposed to the noise. However, the guidance also states that:

- *The cumulative impacts of more than one source of noise should be considered; and*
- *In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring.*

4.2.94 *The Council considers that the above two factors apply due to the town being densely populated and there being a high likelihood of subsequent noise generating plant being installed in a particular location. It is therefore necessary for each planning application for noisy plant to protect the acoustic environment and as far as possible prevent the increase in background noise levels because the cumulative impact of installation of noisy plant which causes an increase in background noise level is likely to lead to an adverse effect.*

4.2.95 *The Planning Practice Guidance on noise also states that local planning authorities may decide to develop specific standards to apply to various forms of proposed development in their area. It cautions against the implementation of fixed thresholds because specific circumstances may justify some variation being allowed. Because this policy sets a noise target in relation to the background noise level, this allows variation of the threshold with the local circumstances because it does not set an absolute noise level that the plant must achieve, it relates it to the local noise level.*

4.2.96 *Where the plant noise rating level does not meet this standard, the background noise will increase. When subsequent new plant is added it will be assessed against this higher background level which results in an increasing benchmark against which subsequent new plant is introduced. This leads to an incremental increase in the noise in an area each time new plant is introduced ('background creep'). This policy standard has been applied by Reading Borough Council for a number of years and experience has demonstrated it to be achievable in most cases. In addition, noise control technology is improving, therefore further increasing the achievability of this standard.*

61 *The noise source specific level is the measured noise level, as opposed to the rating level, which is the specific level with correction factors included.*

62 *World Health Organisation (WHO) (1999), Guidelines for Community Noise; WHO (2009), Night Noise Guidelines for Europe; WHO (2011), Burden of Disease from Environmental Noise: Quantification of healthy life years lost in Europe*

BS 4142:2014+A1:2019. Methods for Rating and Assessing Industrial and Commercial Sound

British Standard BS 4142:2019 supersedes BS 4142:2014, which is withdrawn.

The main aim of the standard is to provide an assessment and rating method that is proportionate, sufficiently flexible and suitable for use by practitioners to inform professional judgement.

The standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from fork-lift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The Scope of the Standard is explicit in that its methods can be used to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. By definition, the methods are not therefore applicable to the assessment of the effects of sound on users of commercial, industrial or similar types of “non-residential” premises.

An **initial estimate** of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level. Typically, the greater this difference, the greater the magnitude of the impact. The standard advises that:

- a) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- b) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- c) 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.”

Note 2 to Clause 11 advises that:

“Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

When the initial estimate of the impact needs to be modified due to context, all pertinent factors should be considered which may include:

- 1. The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

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.

- 2. The character and level of the residual sound compared to the character and level of the specific sound.
- 3. The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 - i) facade insulation treatment;
 - ii) ventilation and/or cooling; and
 - iii) acoustic screening.

Target External Noise Criteria

Based on the details of the Reading Borough Local Plan Adopted November 2019 the specific plant noise levels shall be least 10 dB below the background noise level.

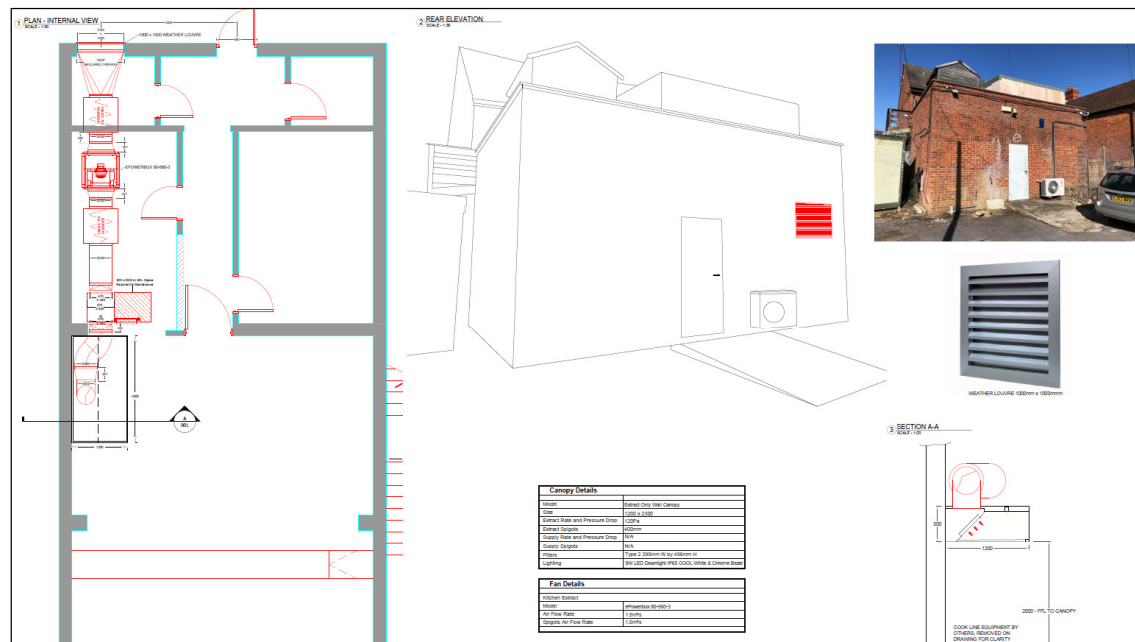
The derived external noise criteria which the new building services plant shall be required to achieve are shown below, having been derived from the measured modal background sound levels and policy requirements discussed above:

Table 1: Limiting noise criteria applicable at affected premises

Plant Location	Receptor	Day 07:00-23:00 <i>L</i> _{Aeq,60 min}	Night 23:00-07:00 <i>L</i> _{Aeq,15 min}
Any Location on the site	Third party residential dwellings	32 dB ^[1] ^[2] ^[3]	30 dB ^[1] ^[2] ^[3]
Any Location on the site	Third party commercial premises	58 dB ^[3]	
Notes:			
[1]	Penalty for tone(s) +2 dB shall be applied for a tone that is just perceptible at the noise receptor; or +4 dB shall be applied for a tone that is clearly perceptible at the noise receptor; or +6 dB shall be applied for a tone that is highly perceptible at the noise receptor		
[2]	Penalty for impulses +3 dB shall be applied for an impulse that is just perceptible at the noise receptor; or +6 dB shall be applied for an impulse that is clearly perceptible at the noise receptor; or +9 dB shall be applied for an impulse that is highly perceptible at the noise receptor		
[3]	The limiting noise levels are deemed to be considered at a position 1 metre outside the nearest affected premises		

Proposed Plant Arrangement

The proposed plant layout is illustrated below and is to comprise an internally located Epowerbox 80-560-3 extract fan and ductwork terminating at a 1000mm x 1000mm weather louvre.



The manufacturer's published noise levels for the ePowerbox 80-560-3 fan are as follows:

	Sound Spectrum (Hz)								Overall	
	63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3 m**
Inlet*	-	70	69	62	58	54	50	47	73	45
Outlet*	-	78	73	67	64	57	52	48	80	50
Breakout*	-	66	58	41	38	35	28	20	67	33

* Lw dB re 10^{-12} W
Sound data at requested duty.

** dBA re 2×10^{-5} Pa



Based on the exhaust louvre location at the rear of the building, the nearest residential window will be a minimum of 6 metres from the nearest residential window.

To meet the most stringent criterion above, the inline attenuator on the extract exhaust side of the system will need to achieve the following insertion loss values.

Atmosphere Side Attenuator

Table 2: Atmosphere side attenuator performance requirements

Item	Insertion loss (dB re: 20 μ Pa) at 1/1 octave band centre frequency (Hz)							
	63	125	250	500	1k0	2k0	4k0	8k0
Discharge attenuator	2	12	13	10	9	1	1	0

Predicted Noise Levels with Mitigation

On the basis of the above, noise levels have been calculated at nearby third party receivers, as per the following two figures. As can be seen, compliance with the target criteria identified is predicted.

Ventilation System Analysis - Atmosphere Calculation															
Project Name		56 Christchurch Road													
Paragon reference		4887													
Calc sheet date		02/09/2021													
Calc sheet reference		Atmosphere side assessment													
Revision		1													
Receiver Reference:		64 Christchurch Road													
Plant reference / description		ePowerbox 80-560-3													
Fan Data Entry						63	125	250	500	1k	2k	4k	8k	dB(A)	
Fan Sound Power Level Data		ACTUAL	In-duct Lw			78.0	78.0	73.0	67.0	64.0	54.0	52.0	48.0		
Fan Air Volume			litres/sec												
Total Static Pressure			Pa												
AHU Loss		None													
AHU Loss		None													
AHU Loss		None													
Number of sources correction		1													
Lw introduced into ventilation system						78.0	78.0	73.0	67.0	64.0	54.0	52.0	48.0		
Atmosphere noise radiating condition					Dim (mm)	Dim (mm)	63	125	250	500	1k	2k	4k	8k	dB(A)
Situation			Louvre opening												
Radiating aperture			Rectangular		1000	1000									
Radiating angle from normal			90°				-2.0	-3.0	-5.0	-8.0	-10.0	-11.0	-11.0	-11.0	
Location Q-factor			2				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Distance to receiver				6.00 m			-26.6	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6	
Number of sources				1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Atmosphere side effect							-25.5	-26.5	-28.5	-31.5	-33.5	-34.5	-34.5	-34.5	
Barrier between source and receiver?		N													
Predicted Atmosphere side Lp						52.5	51.5	44.5	35.5	30.5	19.5	17.5	13.5	40	
Design Criteria		Value	Type				63	125	250	500	1k	2k	4k	8k	dB(A)
Design criteria		30	dB(A)												
				Typical spectral values			50	39	31	25	21	18	16	14	30
Limiting values for design criteria						50.0	39.0	31.0	25.0	21.0	18.0	16.0	14.0		
Excess and Mitigation						63	125	250	500	1k	2k	4k	8k	dB(A)	
Calculated Ductborne Insertion loss requirement							2.5	12.5	13.5	10.5	9.5	1.5	1.5	0.0	
Calculated Breakout Insertion loss requirement															
Overall Insertion loss requirement							2.5	12.5	13.5	10.5	9.5	1.5	1.5	0.0	
33% FA ,1800 long							2	12	13	10	9	1	1	0	
Excess							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Mitigated Ductborne Noise Level						50.0	39.0	31.0	25.0	21.0	18.0	16.0	13.5	30	

Ventilation System Analysis - Atmosphere Calculation																
Project Name		56 Christchurch Road														
Paragon reference		4887														
Calc sheet date		02/09/2021														
Calc sheet reference		Atmosphere side assessment														
Revision		1														
Receiver Reference:		Whitley Park Lane														
Plant reference / description		ePowerbox 80-560-3														
Fan Data Entry						63	125	250	500	1k	2k	4k	8k	dB(A)		
Fan Sound Power Level Data		ACTUAL	In-duct Lw			78.0	78.0	73.0	67.0	64.0	54.0	52.0	48.0			
Fan Air Volume			litres/sec													
Total Static Pressure			Pa													
AHU Loss		None														
AHU Loss		None														
AHU Loss		None														
Number of sources correction		1														
Lw introduced into ventilation system						78.0	78.0	73.0	67.0	64.0	54.0	52.0	48.0			
Atmosphere noise radiating condition						Dim (mm)	Dim (mm)	63	125	250	500	1k	2k	4k	8k	dB(A)
Situation			Louvre opening													
Radiating aperture			Rectangular		1000	1000										
Radiating angle from normal			0-45°				2.0	3.0	4.0	5.0	5.0	5.0	5.0	5.0		
Location Q-factor			2				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Distance to receiver				23.00 m			-38.2	-38.2	-38.2	-38.2	-38.2	-38.2	-38.2	-38.2		
Number of sources				1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Atmosphere side effect							-33.2	-32.2	-31.2	-30.2	-30.2	-30.2	-30.2	-30.2		
Barrier between source and receiver?		N														
Predicted Atmosphere side Lp						44.8	45.8	41.8	36.8	33.8	23.8	21.8	17.8	39		
Design Criteria		Value	Type				63	125	250	500	1k	2k	4k	8k	dB(A)	
Design criteria		30	dB(A)													
				Typical spectral values			50	39	31	25	21	18	16	14	30	
Limiting values for design criteria						50.0	39.0	31.0	25.0	21.0	18.0	16.0	14.0			
Excess and Mitigation						63	125	250	500	1k	2k	4k	8k	dB(A)		
Calculated Ductborne Insertion loss requirement							0.0	6.8	10.8	11.8	12.8	5.8	5.8	3.8		
Calculated Breakout Insertion loss requirement																
Overall Insertion loss requirement							0.0	6.8	10.8	11.8	12.8	5.8	5.8	3.8		
33% FA ,1800 long							2	12	13	10	9	1	1	0		
Excess							0.0	0.0	0.0	1.3	3.3	4.3	4.3	3.8	0	
Mitigated Ductborne Noise Level						42.3	33.3	28.3	26.3	24.3	22.3	20.3	17.8	30		

I trust this assists, however please do not hesitate to contact us should you have any queries or require further amendments

Yours sincerely



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