

Technical Note

Project name	University of Manchester, Samuel Alexander Pump House		
Design note title	Noise Impact Assessment		
Document reference	19939-HYD-XX-XX-Y-TN-1001		
Author	Jake Schofield, BSc (Hons), Pg.Dip, MIOA		
Revision	P01		
Date	25 July 2023	Approved	✓

1. Introduction

Hydrock have been instructed to carry out a desk based Noise Impact Assessment in relation to a proposed pump house at the Samuel Alexander Building, University of Manchester.

This assessment has been carried out to appraise the potential for noise impacts in accordance with current policy and guidance with reference the latest development plans.

This note is technical in nature and therefore a glossary of acoustic terminology has been appended for reference.

2. Methodology

This assessment considers the potential for noise impacts from the pump station at Existing Sensitive Receptors (ESRs). The approximate location of the pump station and receptors in the immediate vicinity is shown in **Figure 1** below.

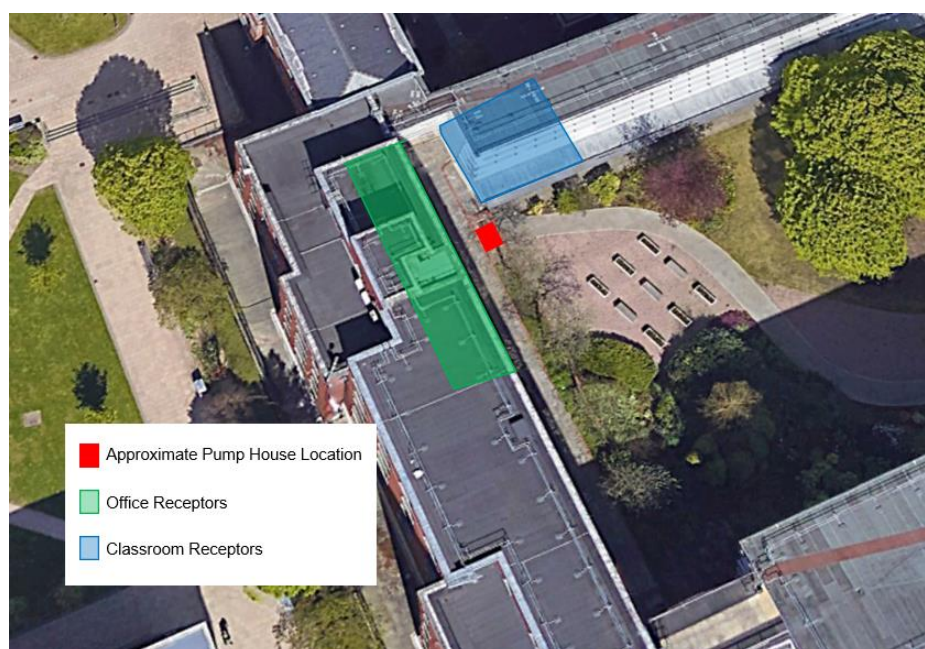


Figure 1: Proposed Pump Station

The assessment carried out considers the following current policy, standards, and guidance documents:

- » National Planning Policy Framework, 2021 (NPPF);
- » Noise Policy Statement for England, 2010 (NPSE);
- » Planning Practice Guidance – Noise, 2021 (PPG);
- » Building Bulletin 93 – Acoustic Design of Schools; Performance Standards, 2015 (BB93); and,
- » World Health Organisation (WHO) Guidelines for Community Noise, 1999.

University buildings are exempt from complying with the requirements of BB93 in accordance with Building Regulations. However, the criteria provided by BB93 are considered appropriate in determining the potential for noise impact in University buildings, given the educational context.

2.1 Consultation with Local Planning Authority

With regards to noise from the proposed pump house, Manchester City Council (MCC) provided the following comments:

An acoustic assessment under the requirements of paragraph 180 of the National Planning Policy Framework, (Core Strategy DM1 and Saved Unitary Development Plan Policy DC26) which provides details of the existing noise levels in the area including levels during daytime, night time and weekends along with an indication of noise levels that you propose to achieve within the accommodation and details of the acoustic glazing and acoustically treated ventilation you propose to use and what measures will need to be implemented on site to meet internal noise requirements. In terms of the proposed uses, the study should identify the acoustic treatment and measures that will limit the breakout of noise in accordance with a noise study of the premises. The scheme proposed shall include acoustic treatment of the building structure and specified maximum internal noise levels (Core Strategy DM1 and Saved Unitary Development Plan Policy DC26).

This assessment evaluates the potential for impacts based on available information, without baseline noise survey data, in order to determine whether a full assessment and noise survey is required. Where predicted noise levels are significantly below health-based guidance criteria, it is considered that the aims of national policy NPPF and NPSE, can be demonstrated to be achieved

2.2 Existing Sensitive Receptors

This assessment considers the potential for impact at the nearest offices and education rooms at the Samuel Alexander building. Office use is believed to be located to the west of the proposed pump station location, and education use to the north.

Desk based review indicates there are no residential receptors within 50m of the proposed pump house. In addition, as the pump house is situated within a courtyard, and fully enclosed by the Samuel Alexander building, any residential receptor would not be in direct line of sight to the source of noise.

The potential for impact at any residential receptors is therefore considered negligible, and does not require further consideration in this assessment.

3. Noise Assessment

In accordance with BB93, the recommended Internal Ambient Noise Level (IANL) criteria for educational spaces is 35dB $L_{Aeq,30mins}$ for generic classrooms and 40dB $L_{Aeq,30mins}$ for office use.

A manufacturers specification sheet for a representative pump has been provided by the appointed Hydrock's M&E team i.e. a Grundfoss 3kW 2-pole three phase motor pump. The data sheet provides sound levels in accordance with ISO3743:2010 *Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering methods for small, movable sources in reverberant fields*.

The data sheet references the source levels as sound pressure levels, with no reference distances. However, ISO3743 provides a methodology for determining sound power levels, therefore, the quoted levels from the data sheet are assumed to be sound power levels.

The pump will be located in an enclosure, 1650 x 1650 x 900mm with side door access and access from above. The enclosure will be formed by 25mm slab foam insulation which is laminated between 2 layers of GRP / Gelcoat which is 5-10mm thick. A 200x200mm aluminium louvre will be position in one of the facades of the enclosure with an approximate 50% open area for ventilation.

The sound insulation provided by the enclosure has been predicted based on readily available data for composite panel systems comprising rigid insulation, acoustic modelling software Insul 8.0, and our experience with similar proposals.

In order to provide a robust assessment, the insulation performance of the pump house façade with the louvre, which provides the lowest level of sound attenuation due to the open area, has been adopted.

Noise levels have been predicted at sensitive areas at each receptor i.e. internally, assuming open windows for ventilation purposes. A summary of the predictions at ESRs is provided in **Table 1**,

Table 1: Predicted Noise Level at Internal Noise Sensitive Locations

Element	Noise Level at Receptor	
	Office	Education
L_{in} (Diffuse Sound Field Inside Enclosure)	75dB(A)	75dB(A)
R (Composite Sound Reduction of Vented Façade)	-17dB	-17dB
+ 10xlog(S) – 20xLog(R) – 8 ^[1]	-20	-26
Open Window Attenuation	-15	-15
Predicted Internal Noise Level	23dB(A)	17dB(A)

$$L_{ff} = L_{in} - SRI + 10xlog(s) - 20xlog(r) - 14$$

Where: ' L_{in} ' is the diffuse sound field inside the enclosure, ' r ' is the distance to the receptor, and ' s ' is the surface area of the façade emanating noise.

[1] Assuming 5m to the window of the nearest office building and 10m to the nearest façade of the education building. In addition, as this equation is for free-field levels, and not façade levels, a +6dB correction has been applied to assume a diffuse sound field at the façade, providing a robust assessment.

The noise level predicted in office rooms with an open window is 23dB(A), and in education rooms is 21dB(A). These noise levels are significantly below the recommended criteria in BB93 and health-based values provided in WHO guidance.

This indicates noise from the proposed pump house is likely to be negligible at ESRs. With reference to PPG, noise is considered to be present and not intrusive and below the LOAEL defined by NPSE.

Therefore, no additional noise mitigation is required.

4. Conclusion

Hydrock have been instructed to carry out a desk based noise assessment to determine the potential for noise impact associated with a proposed pump house at the Samuel Alexander building, University of Manchester.

Noise impacts have been considered at the nearest sensitive areas at the existing University building with reference to internal ambient noise level criteria in BB93.

The assessment shows that noise levels are predicted to be significantly below the recommended criteria in BB93 within nearby classrooms and offices. Furthermore, predicted noise levels are below health-based values provided by WHO as indicators for the onset of adverse health impacts.

Therefore, noise from the proposed pump house is considered to have a negligible impact, and no additional mitigation is required. It is considered that there are no reasonable noise grounds for the refusal of planning permission, based on this assessment.

Appendix A Glossary of Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
R_w	R_w is the single-number quantity which characterizes the sound insulating properties of a given material over a range of frequencies. This is typically measured in a laboratory in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	$D_{n,e,w}$ is the single number quantity which characterizes the airborne sound insulation performance across a given 'element' and is typically used to describe the acoustic performance of trickle ventilators etc.
C_{tr}	C_{tr} is a correction term applied to single-number sound insulation values (R_w , $D_{n,e,w}$ etc.) to afford additional weighting against low frequency performance.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, it is measured outside and at least 3m from buildings.