

Technical Memorandum

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TITLE : HVAC Plant Noise Impact Assessment

This Technical Memorandum presents the results of a noise impact assessment from the operation of new HVAC plant that will serve a new food to go offering that will be within the redeveloped sales building at the existing MFG Civic Centre Service Station, Manchester

The plant noise impact has been assessed against current British Standards/World Health Organisation guidance. No background noise data has been currently been collected for the site but based on the magnitude of the calculated noise levels showing the plant will be of very low impact this additional supporting information is not felt to be necessary.

The following plant items are proposed to be installed at the site. A copy of the proposed site layout is included in Appendix A for reference.

Plant Item	Model	Noise Data
AC Condenser	Toshiba RAV-RM1401	55 dB(A) at 1m
Kitchen Extract Fan	Systemair MUB/T 062 560EC	74 dB(A) SWL
Kitchen Supply Fan	Systemair MUB 042 500EC	86 dB(A) SWL
BoH Extract	Systemair Prio 200 EC	72 dB(A) SWL

Table 1 – Proposed plant including manufacturer's published noise data.

It is proposed that a silencer will be installed on the inlet to the supply fan to reduce the noise level to atmosphere by 10dB(A).

The sales building will be open 24 hours a day but it has not been confirmed if the food to go operator will require 24 hour use of the plant. We have assessed the noise impact from the plant based on a worst case that the plant could operate 24 hours a day, seven days a week.

MFG Civic Centre is located in a mixed commercial and residential area of Wythenshawe, Manchester, with Road and Tram routes to the south. The below aerial view of the site and surroundings has been annotated showing the proposed new sales building as well as the nearest identified residential dwellings. The proposed new plant will be sited along the rear elevation of the sales building.

The nearest and most affected existing noise sensitive receivers have been identified as the following:

- The residential dwellings of Robinswood Road at no less than 100m to the south of the site; and
- The Wythenshawe Methodist Church approximately 170m to the east.



Other noise sensitive receptors are at a greater distance from the proposed plant or are protected by greater level of screening from intervening structures and so will be subject to lower levels of noise.

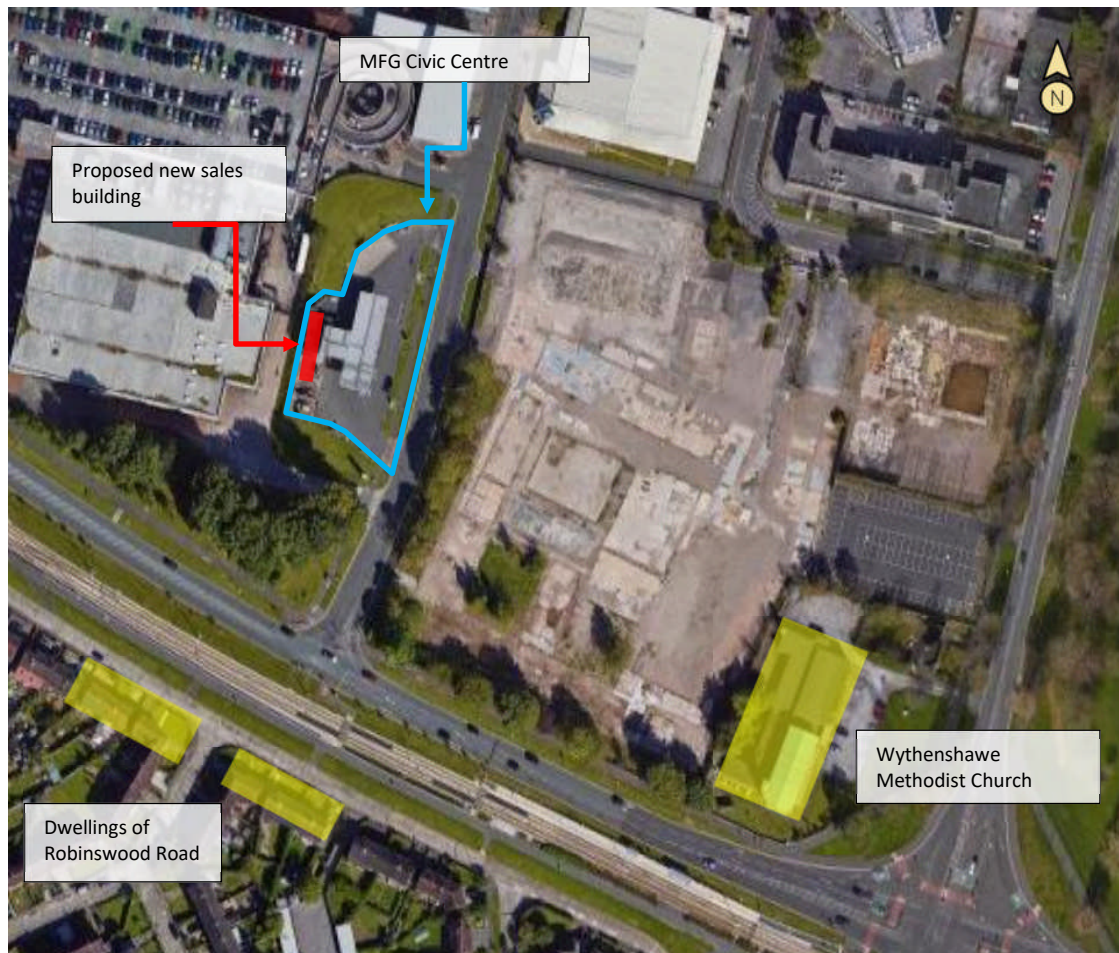


Figure 1 – Aerial view of the site and surroundings.

Figures 2 and 3 below present the results of acoustic modelling of noise emissions from the site and resultant noise immission levels. Calculations have been completed using industry standard acoustic modelling software Datakustik CadnaA, in accordance with the general calculation procedure outlined in ISO 9613.

Results are based on the worst-case simultaneous operation of all new HVAC plant, operating at their maximum duty and assumes a line of sight between the new services and the nearest noise sensitive receiver locations.



Receiver Location	Immission level, dB $L_{Aeq,T}$
Dwellings of Robinswood Road	29
Methodist Church	23

Table 2 – Resultant immission level at nearest noise sensitive receivers.

World Health Organisation's (WHO) 'Night Noise Guidelines for Europe – 2009' includes guidance on the effects of external night-time noise on the population's health. Table 5.4 of that document outlines the health effects associated with different external average, yearly night time (23:00 – 07:00) noise levels based on levels outside of bedroom windows ($L_{night,outside}$). For external noise levels up to 30dB(A), although individual sensitivities and circumstances may vary, no substantial biological effects are observed. Thus, 30dB(A) is equivalent to the No Observed Effect level (NOEL) for night noise.

Based on the calculated worst-case resultant noise levels from the plant operation outside of the nearest windows being below 30dB(A) even during daytime hours, the operation of this new services plant could therefore be classified as achieving the NOEL.

We have also undertaken a review of the resultant noise levels expected within the most-affected residential dwellings.

BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings', section 7, gives guidance on acoustic criteria and noise levels appropriate for various internal spaces that have different functions. Section 7.7 relates specifically to buildings having a residential purpose and offers guidance on appropriate internal ambient noise levels for dwellings (when unoccupied) with specific consideration:

- i. for bedrooms, the acoustic effect on sleep; and
- ii. for other rooms, the acoustic effect on resting, listening and communicating.

The guidance applies to external noise as it affects the internal acoustic environment from sources without a specific character.

Table 4 of section 7.7.2 recommends the following internal noise limits for private dwellings based on the presence of steady, external noise sources:

Table 4 Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,1\text{hour}}$	—
Dining	Dining room/area	40 dB $L_{Aeq,1\text{hour}}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,1\text{hour}}$	30 dB $L_{Aeq,8\text{hour}}$

The guidance criteria are based upon research and existing guidelines provided by the World Health Organisation and is based upon steady noise of an anonymous nature.

It is generally considered that the sound insulation provided by a partially open window will be 10-15dB, dependent on window type, extent of opening and source frequency content. Adopting a minimum reduction of 10dB in this context will ensure that most assessments are as robust as possible.

It can be seen that in the worst case, with a partially open window reduction of 10dB, an internal ambient noise level of no more than 19 dB $L_{Aeq,T}$ will be achieved within the Robinswood Road dwellings due to the operation of the proposed HVAC plant. This is significantly below the 30 dB(A) figure outlined for bedrooms and can be described as achieving the NOEL.

Between the MFG Civic Centre service station and the Robinswood Road dwellings is Simonsway, a major dual carriageway and also the Manchester Tramline. Based on a review of the Extrium Noise Map for the the expected noise levels based on the L_{den} is in the range of 55-59.9dB(A) which is significantly above the calculated plant noise level such that there should be no perceptible impact.



Figure 4 – Screenshot of Exrium Noise Map for the immediate vicinity based on calculated road traffic noise

On the basis of this assessment, it is considered that noise does not pose a material constraint to the operation of the new proposed HVAC plant at MFG Civic Centre, Manchester.

Appendix A

Proposed Site Layout

quietly moving forward



