



Reference: Baptist Chapel, School Lane, Fressingfield **Project No:** 2120097

Date: 20th August 2021

Technical note 1

Re: Addendum to Acoustic Planning Report

The following is provided as an update for the discharge of Planning Condition 12 (App No. 3872/16), since Sharps Redmore report of 23rd January 2021 was submitted.

1.0 Preamble

- 1.1 This addendum is based on:
 - Discussions between the client team with David Harrold (Mid-Suffolk EHO) as to the principles of a updated scheme for plant noise control measures.
 - The installation and operation of the air handling unit (AHU) and the larger air source heat pump (ASHP's) at their revised locations, prior to additional attenuation.
 - A site inspection and measurement with the AHU and ASHPs running, witnessed by David Harrold in the early evening on 23rd July 2021.
- 1.2 We believe that these revised proposals and measurement taken are generally acceptable, based on communications and the findings of the visit; with final confirmation requested of the Chapel from Mid-Suffolk Planning, supplemented by this document.

2.0 Background

- 2.1 Following initial discussions with the Mid-Suffolk environmental health officer (David Harrold), a design criterion was agreed of 30 dB L_{Aeq} at the nearest residences, as a level compliant with the principles of BS 4142:2014+A1:2019 to likely result in less than an adverse impact to the nearest residents.
- 2.2 The updated plant scheme:
 - Relocates the 4 largest Daikin ASHPs to the front of the building utilising 2 car parking spaces, which was a potential option noted in the original assessment.
 - Locating the smallest single ASHP around the side of the sport hall.

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- Moving the AHU marginally closer to the rear wall of the building, and predominantly enclosing the unit rather than screening.
- 2.3 The benefits of these changes are:
 - To move a significant quantum of plant to greater distances from the residences, so as to benefit from the distance decay of sound.



- To reduce the height/massing and associated noise amelioration measures with the original plant proposal.
- 2.4 Note that other more minor measures of noise control recommended to outlets from the building are not affected and remain the same as the original report.

3.0 Plant Changes

Larger ASHP's

- 3.1 The 4 No. Daikin ASHP's (RYMQ8U, REYQ12U, RYMQ16U, , REYQ18U). have an equivalent combined noise output horizontally of 67 dB L_{pA} at 1 metre at full duty.
- 3.2 However we understand the units will normally not run at full fan speed (no more than 50-70% typically) and at any one time only two are likely to be running. This would equate an equivalent single noise of closer to 57 dB L_{pA} at 1 metre. This aligns with spot measurements at 1 metre on site with two units running at partial capacity, which equates to approximately 57-58 dB $L_{pA.}$ At the shortest distance to the boundary this equates to 26-27 dB L_{pA} and therefore compliant with the original noise limit.



3.3 In addition:

- The ASHP's will include a visual hit and miss screen around them for air flow and aesthetics. This would have the ability to semi-close/screen one or two façades if needed without anticipating a significant affect on air flow, but this is not presently proposed based as strictly necessary on that measured/predicted.
- In terms of further protecting the amenity of the future neighbours to the southern boundary; this already includes a solid imperforate fence which is higher than midwindow height of the proposed application for bungalows, therefore providing further sound reduction from the ASHPs. To the western boundary there a predicted 3 dB reduction in level due to distance.
- 3.4 Accepting there is will be some variation in level from the ASHP with the use of the building annually, it is considered the ASHP's should be able to operate in their new location with a less than adverse impact to neighbours (existing and future) and generally aligning or bettering the agreed criteria. The scheme also allows for additional measures of protection with the already installed southern fence and alterations to the ASHP screen if needed in the future, but this should not affect discharge of the planning condition.

<u>AHU</u>

Atmospheric exhaust/FAI attenuation

- 3.5 With the AHU marginally closer to the church, the fresh air intake remains facing south a top the unit about 10-12 metres from the nearest residence. The exhaust is proposed to be directed east facing alongside the sports hall side of the building, so it is of the order of 21-25 metres from the nearest residential property (No's 12 and 13 Sancroft Way).
- 3.6 With the AHU unit operating and unattenuated, it has measured noise level of 57-59 dB L_{Aeq} at the boundary line at the front drive of nearest end property on Sancroft Way and 52 dB L_{Aeq} at the garden boundary.
- 3.7 This aligns with the calculation's pre-attenuation included within the initial report and the induct attenuation remains required for the FAI and exhaust.
 - FAI: We recommend the FAI attenuator is selected such that the noise output is no more than 42 dBA at 1 metre insitu.
 - Exhaust: We recommend the exhaust attenuator is selected such that the noise output is no more than 48 dBA at 1 metre insitu.
- 3.8 From our calculation we estimate the revised minimum dynamic insertion losses (D.I.L) for the attenuators (superseding those of the original report) are given in the table below:

	1/1 Octave Band Centre Frequecies (Hz)							
D.I.L. (dB)	63	125	250	500	1k	2k	4k	8k
Supply FAI	7	22	37	44	40	45	35	25
Exhaust	8	15	29	39	43	43	25	17

3.9 The final selection must to be made by the attenuator supplier to meet the noise limits at 1 metre, with appropriate consideration of airflow/regenerative and breakout noise control. An estimate based on a 38% free area attenuator, would be 2400 mm long for the FAI and 1500-1800 mm for the exhaust.

AHU Casing & Ductwork Breakout

- 3.10 Calculations indicated that even with in-induct attenuation controlled as above, the casing noise from the AHU itself would potentially exceed the noise limit at the neighbour's boundary by 10-15 dB without any protection. The previous scheme included for an acoustic screen around the AHU including other measures to control noise breakout from the unit.
- 3.11 This has been simplified to a full enclosure around the unit consisting of a roof and walls, as illustrated on the plan.
- 3.12 The path for the FAI is at high level above the AHU and exhaust air is at low level from AHU; are indicated by the arrows.
- 3.13 The enclosure is proposed to be constructed of the same materials as the main building



to remain in keeping. A roof of 34-74 mm insulated composite panel and walls of 16 mm cement particle boarding and 9 mm OSB cladding. The door being of a similar mass or greater.

- 3.14 Calculations indicate that the breakout noise from such an enclosure will be no more than 25 dB L_{Aeq} at the boundary and therefore within criteria, and with scope for the additional noise from the attenuated FAI and exhaust.
- 3.15 There is a single small ASHP along the sports hall wall, already installed. This has unit has a predicted noise level 27-28 dB L_{Aeq} at the nearest residence / boundary, and therefore compliant alone. If needed, due to the cumulative addition of noise sources, the enclosure for the AHU as it returns marginally along the side of the building can extend its wall or

similar solid imperforate screen at low level in front of the ASHP to provide at least 5 dB of additional acoustic screening (i.e. at least 0.3 m higher than the ASHP) ensuring sufficient distance to allow suitable air flow.

4.0 Concluding Remarks

- 4.1 The revised plant arrangement and noise control reduces the overall visual impact of the proposed plant to the premises at the end of Sancroft Way. It replaces the screen to the rear with an enclosure in the same design as the main building.
- 4.2 By moving the larger ASHP's to the front of the building, the distances are greater which noticeably reduces the noise level at the boundary. Accepting some variation in levels will occur by the nature of the systems, the anticipated running conditions alongside supplementary spot measurements indicate the unit are likely to comply with the agreed noise limit during normal use. Additional aspects of the scheme provide further protection and opportunities.
- 4.3 The AHU is shown to be operating as expected in terms of noise output. The revised scheme includes an enclosure around the unit, only open for FAI and exhaust which are heavily attenuated as previously.
- 4.4 From the site inspection visit by the Mid-Suffolk EHO and the testing undertaken, these measures are anticipated to be acceptable to the Council for the discharge of Planning Condition 12.