GILLIERON SCOTT
ACOUSTIC DESIGN

Report No:
Acland Burghley Hall – Noise Impact Assessment

Date:
26th March 2021

For:
Reed Watts Architects

Report Title:

ACLAND BURGHLEY HALL
NOISE IMPACT ASSESSMENT
PLANNING

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REVISION SCHEDULE

Document Revision	Date	Document Title	Details	Prepared by	Approved by
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1.0 INTRODUCTION

Gillieron Scott Acoustic Design (GSAD) have been appointed for the acoustic design of the refurbishment of Acland Burghley Hall, in collaboration with Reed Watts Architects.

The one storey building, located in Acland Burghley School, 93 Burghley Road, London, comprises of a Hall, a control room, toilets and newly built Food Technology Classroom. The Hall is to be refurbished with new reconfiguration internally for stage and seating arrangement, the control room will be changed into a bar and box office and new ventilation will be installed in the hall consisting of mechanical supply at low level and passive extract above the stage. New toilets are proposed within the existing structure and a new extension is proposed, to accommodate a glazed corridor overlooking the external amphitheatre.

The Hall is currently naturally ventilated. The roof has recently been refurbished, with high level windows and rooflight replaced with double glazing. The buildings surrounding the School are mainly residential.

This report sets out what is understood to be the London Borough of Camden's noise policy regarding mechanical plant and activity/entertainment noise. These requirements have been used to set performance targets in terms of sound attenuation for the new air handling units as well as the extract louvres for the hall. The current mechanical designs have been set out and have been shown to meet the requirements in terms of noise at the nearest residences. These designs need further development at the next design stage.

Due to COVID-19 national lockdown taking place at the time of writing this report, a long-term background noise survey would not provide a representative outcome of the typical acoustic sound levels at the site. Existing noise surveys carried out close to the site have been utilised in order to get a sense of the acoustic climate and aid progress with the design. Additional survey work will be carried at the next design stage if deemed necessary by the Local Authority.

2.0 POLICY, GUIDANCE AND DESIGN CRITERIA

2.1 National Planning Policy Framework

The National Planning Policy Framework was introduced by the Department of Communities and Local Government in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied.

The Framework provides for the production of distinctive local and neighbourhood plans by Councils, in consultation with local people, which should be developed to reflect the needs and priorities of their communities.

It states that the planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of noise pollution.

Therefore, 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 impact on quality of life arising from noise from new development, including through the use of planning 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; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.2 National Policy Statement for England

The Noise Policy Statement for England (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.

The statement sets out the long term vision of the government's noise policy, which is to "promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development".

The guidance promotes the effective management and control of noise, within the context of Government policy on sustainable development and thereby aims to:

- 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 improvements of health and quality of life.

The statement adopts established concepts from toxicology that are currently being applied to noise impacts. The concept details noise levels, at which the effects of an exposure may be classified into a specific category. The classification categories as detailed within NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected;
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

It is recognised that SOAEL does not have a single objective noise-based level that is applicable to all sources of noise in all situations and therefore the SOAEL is likely to be different for different sources, receptors and at different times of the day.

The first aim of the Statement is to avoid significant adverse effects on health and quality of life, taking into account the guiding principles of sustainable development. The second aim considers situations where impacts are established between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur. The third aim seeks to improve health and quality of life, where possible, through the pro-active management of noise, whilst also taking account of the guiding principles of sustainable development.

2.3 BS4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound"

BS4142:2014+A1:2019 provides methods for rating and assessing industrial and commercial sound. The standard is used to rate sound from fixed installations. The standard requires a "Specific Sound Level", in terms of L_{Aeq}, is determined either by measurement or calculation at a receptor location. This Specific Sound Level may then be corrected for the character of sound and is then termed the "Rating Level".

Once the Rating Level has been determined, the background sound level is subtracted from it and the greater the difference, the greater the likelihood of an '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. The standard advocates that each site and situation should take the context of the scenario into consideration and that "not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact".

The standard provides reference periods over which the assessment should take place which have been reproduced in the table below.

Table 1 – Reference Periods

Period	Hours
Typical Daytime	07:00 – 23:00
Typical Night-time	23:00 – 07:00

2.4 Activity noise

There is a lack of consensus on an assessment method for noise levels at noise sensitive receptors with regard to entertainment noise. The design aim however, should be to design to be 'virtually inaudible'

An Institute of Acoustics working group undertook research into the subject which was collected in a Working Draft Annex to the Good Practice Guide on the Control of Noise from Pubs and Clubs (2006). Although not formally adopted by the IoA, the guidance was published in its journal, the Acoustics Bulletin.

Here, 'virtual inaudibility' is defined as:

- The L_{Aeq} of the entertainment noise should not exceed the representative background noise level L_{A90} (without entertainment noise), and
- The L_{10} of the entertainment noise should not exceed the representative background noise level L_{90} (without entertainment noise) in any 1/3 octave band between 40Hz and 160Hz.

For simplicity, and because most sound insulation and insertion loss data is presented in whole octave bands, it is proposed the second criteria above be adapted to be any octave band between 63Hz and 125Hz.

This proposed criterium is applicable for both external and internal assessments at noise-sensitive properties.

2.5 London Borough of Camden Policy

2.5.1 Plant noise

Policy A4 of the London Borough of Camden (LBC) Local Plan sets out their policy as follows:

> *"The Council will seek to ensure that noise and vibration is controlled and managed. Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:*
> *a) development likely to generate unacceptable noise and vibration impacts; or*
> *b) development sensitive to noise in locations which experience high levels of noise unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.*
>
> *We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity."*

The Camden Local plan also sets out noise thresholds in terms of various 'effect levels' described in the National Planning Policy Framework:

- NOEL – No Observed Effect Level
- LOAEL – Lowest Observed Adverse Effect Level
- SOAEL – Significant Observed Adverse Effect Level

Table 2 below summarises the noise emissions requirements for industrial and commercial noise sources, found in Appendix 3 of the Camden Local Plan:

Table 2 – Camden Local Plan Noise Emissions Limits for industrial and commercial noise

Existing Noise sensitive receiver	Assessment location	Period	NOEL	LOAEL to SOAEL	SOAEL
Dwellings	Garden used for main amenity (free field) and outside living or dining or bedroom window (façade)	Day (07:00 to 23:00)	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings	Outside bedroom window	Night (23:00 to 07:00)	'Rating level' 10dB* below Background and no events exceeding 57dB L_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dB L_{Amax}

* 10dB should be increased to 15dB if the noise contains audible tonal elements.

It is proposed that "no observed effect level" should be achieved with the new plant, and as such all plant should achieve a level of 10dB below background at 1m from the nearest noise sensitive receiver.

2.5.2 Entertainment Noise

The Camden Local Plan also sets out noise thresholds in terms of Entertainment noise

Table 3 – Camden Local Plan Noise Emissions Limits for entertainment premises

Existing Noise sensitive receiver	Assessment location	Period	NOEL	LOAEL to SOAEL	SOAEL
Dwellings	Garden used for main amenity (free field)	Day (07:00 to 19:00)	The higher of 55dB $L_{Aeq,5min}$ Or 10dB below existing $L_{Aeq,5min}$ Without entertainment noise	56dB to 60dB $L_{Aeq,5min}$ Or 9dB to 3dB below existing $L_{Aeq,5min}$ Without entertainment noise	The higher of 61dB LAeq,5min Or 2dB below existing $L_{Aeq,5min}$ Without entertainment noise
Dwellings	Garden used for main amenity (free field)	Evening (19:00:00 to 23:00)	The higher of 50dB $L_{Aeq,5min}$ Or 10dB below existing $L_{Aeq,5min}$ Without entertainment noise	51dB to 55dB $L_{Aeq,5min}$ Or 9dB to 3dB below existing $L_{Aeq,5min}$ Without entertainment noise	The higher of 56dB LAeq,5min Or 2dB below existing $L_{Aeq,5min}$ Without entertainment noise
Dwellings	Garden used for main amenity (free field)	Night (23:00 to 07:00)	'The higher of 45dB $L_{Aeq,5min}$ Or 10dB below existing $L_{Aeq,5min}$ Without entertainment noise	46dB to 50dB $L_{Aeq,5min}$ Or 9dB to 3dB below existing $L_{Aeq,5min}$ Without entertainment noise	The higher of 51dB LAeq,5min Or 2dB below existing $L_{Aeq,5min}$ Without entertainment noise

It is unclear whether these limits refer to noise levels from amplified and unamplified music. The title of the table in the Local Plan only refers to customer noise, which is assumed to mean only noise associated with customers arriving/leaving the venue as well as outside congregation.

Because of this, it is proposed that an approach towards "virtual inaudibility" be adopted, as outlined in section 2.4 as this is likely to be more stringent. This will apply to any new elements, such as new ventilation systems or façade constructions that determine the overall acoustic performance of the building. It should be stated that no change of use is proposed, so as a minimum the proposed redevelopment should be designed to ensure the noise breakout from the hall is not worse than it is currently.

2.4 Proposed Operational Hours

The operating hours of the hall are assumed to be Monday to Sunday 07:00 – 23:00.

It is assumed that the new development will have elements of services equipment that will have the facility to operate Monday to Sunday between the hours of 07:00 and 23:00.

3.0 SITE, ENVIRONMENT AND CONTEXT

Acland Burghley Hall is found in a largely residential area, surround by three suburban roads: Churchill road, Burghley road and Dartmouth Park Hill.

The A400, a source of moderate to heavy traffic is runs approximately 125m to the east of the site. This is expected to be the dominant source of noise on what is an urban residential area.

The Hall has conducted activities such as music for many years at the site and entertainment noise formed part of the local acoustic environment for many years. As there is no planned change of use for the space, it will not be adding a new type of noise source to the local acoustic environment.

The nearest noise sensitive receivers are approximately 40m away from the hall, on Burghley Road and can be seen in Appendix A

4.0 NOISE SURVEY DETAILS

Due to COVID-19 restrictions/national lockdown taking place at the time of writing this report, a long-term background noise survey would not provide a representative outcome of the typical acoustic context at the site.

An environmental noise survey was carried out previously by Aran Acoustics for the new Food Technology Classroom on 4th June 2018, on Burghley Road, in the same location as the nearest noise sensitive properties to the hall. An associated planning report Ref RP.190406.1 was issued. The 1hr spot measurement, between 11:30 and 12:30 on a weekday showed results of 55dB L_{Aeq} and 42dB L_{A90}.

A more extensive survey was carried out over 24 hours by Environmental Equipment Corporation (EEC) on the North side of the site, on Churchill Road, for the new Prep Room on 21st and 22nd October 2016, and an associated planning report Ref MO/EC15072-003 was issued. The long-term measurement results show 56dB L_{Aeq} / 41dB L_{A90} during the day, 51dB L_{Aeq} / 37dB L_{A90} during the evening, and 46dB L_{Aeq} / 33dB L_{A90} during the night.

The locations of both the Aran and EEC surveys can be seen in Appendix A.

The results obtained on Burghley Road are very similar (within 1dB) of those obtained on Churchill Road. This suggests that the noise climate is equivalent in both measurement locations, which is expected as they are both residential streets and a similar distance from a main road. Based on these results the following conclusions have been drawn.

- The day, evening and night-time measurements on Churchill road are expected to be representative of the nearest noise sensitive receivers to our site.
- The noise climate had not significantly changed between 2016 and 2018. No major developments have happened in the area since, so it is expected to still be representative.

The following background noise levels have thus been used in the assessment.

Table 4 –Ambient and background noise levels based on historical survey data.

Ambient Noise Level (time-averaged $L_{Aeq,T}$)	
Daytime (07:00-23:00hrs)	**Night-time (23:00-07:00hrs)**
51 dB(A)	46 dB(A)

Background Noise Level (minimum ($L_{A90,5min}$)	
Daytime (07:00-23:00hrs)	**Night-time (23:00-07:00hrs)**
37 dB(A)	33 dB(A)

It is proposed that the design be developed according to these noise criteria, in terms of both plant noise and activity noise mitigation. The following limitations have been noted.

- No measurements we carried out over a weekend. As this is a residential site, noise levels are not expected to vary significantly compared to during the week.
- No frequency spectrum was measured, which is useful for determining 'inaudibility' of activity noise. Assumptions have been made about the frequency content of the background noise, based on our experience of similar sites.

If required, GSAD will carry out a long-term noise survey during the next design stage, at a position equivalent to the nearest noise sensitive dwellings. This assumes restrictions are lifted and the environmental noise is deemed to be representative of typical acoustic conditions at the site.

5.0 ASSESSMENT OF PLANT NOISE

It has been proposed that a new air handling unit be installed below ground , immediately to the west of the building, feeding air directly into the hall using the existing stage as a plenum. Extract is to be provided passively via louvres which are to be installed at high level above the stage.

It is currently proposed that this supply air handling unit be housed within a new concrete plenum formed abutting the existing foundations off the western wall of the building. Fresh air will be drawn in via earth duct which leads to what is expected to be a tower incorporating louvres some 2-3m to the north of the AHU. See Appendix B and C.

A Nuaire AM61ES unit is proposed. Noise data can be found in Appendix D

Acoustic mitigation measures are yet to be determined and will be developed at the next design stage. Based on this unit running at its required duty, the following insertion losses are required to meet the Council's requirements of 10dB below background at the nearest residence.

Table 4 – Plant noise assessment of proposed Supply Fan to the Hall

	Nuaire AM61ES	Unit	Frequency Hz								dBA	Comment
			63	125	250	500	1k	2k	4k	8k		
A	Induct Inlet	L_w	83	86	79	73	67	66	61	55	76	From Manufacturers data
B	End Reflection		-4	-1	0	0	0	0	0	0		Opening assumed to be 1000 x 1000 mm at Louvre Tower
C	Surface reflections		+3	+3	+3	+3	+3	+3	+3	+3		1 surface in close proximity to louvres
D	Distance Attenuation		-33	-33	-33	-33	-33	-33	-33	-33		40m to nearest receiver
E	Safety Factor		+3	+3	+3	+3	+3	+3	+3	+3		
F	**Total**	**SPL**	**43**	**48**	**42**	**36**	**30**	**29**	**24**	**18**	**39**	A+B+C+D+E
G	Background noise level	L90	55	48	40	33	26	23	21	20	37	Day time, 0700-2300 hours
H	Difference		-12	0	+2	+3	+4	+6	+3	-2		F-G
I	**Required Insertion Loss**	**IL**	**-**	**10**	**12**	**13**	**14**	**16**	**13**	**8**		G + 10 (to get to Background -10dB) to compensate for
J	Resultant Noise Level	SPL	43	38	30	23	16	13	11	10	27	F-I

The required insertion loss shown in the table above is expected to be achieved with a 900mm long silencer. Alternatively, it could be with 2-3m of internally lined duct. This will be developed at the next stage of design.

Four new extractor fans are proposed in the WCs neighbouring the hall to the east. These units are ducted with extract grilles on the WC roof. The locations can be seen in Appendix B and Appendix C. S & P TD-Ecowatt in line duct fans have been proposed by the mechanical engineer, and sound data can be seen in Appendix D.

The table below shows a calculation of the cumulative noise at the nearest noise sensitive receiver. This shows the level to be 21 dB under background and thus not contributing to the ambient noise level. No acoustic mitigation measures are required.

Table 5 – Plant noise assessment of proposed 4 extract fans serving the WCs

	S & P TD-Ecowatt	Unit	Frequency Hz								dBA	Comment
			63	125	250	500	1k	2k	4k	8k		
A	Induct outlet	SPL L_{10}	25	31	43	49	46	44	36	29	51	From manufacturer's data
B	End Reflection	L90	-12	-7	-3	-1	0	0	0	0		Assumed 300mm diameter duct
C	Distance Attenuation		-33	-33	-33	-33	-33	-33	-33	-33		40m to nearest receiver
D	Safety Factor		+3	+3	+3	+3	+3	+3	+3	+3		
E	Total for 1 unit	SPL	-27	-16	0	8	6	4	-4	-11	10	A+B+C+D+E+F+G+H+I
F	**Total for 4 units**	**SPL**	-21	-10	6	14	12	10	2	-5	16	+ 6dB for four units
G	Background noise level	L90	55	48	40	33	26	23	21	20	37	Day time, 0700-2300 hours
H	Difference		**-76**	**-58**	**-34**	**-19**	**-14**	**-13**	**-19**	**-25**	**-21**	F-G

5.0 ASSESSMENT OF ACTIVITY NOISE

There are no proposed alterations to either the external walls or roof of the hall, therefore the breakout of activity noise is expected to remain the same as before. Considering no change of use is proposed for the space, this is deemed satisfactory.

Air for the new ventilation system is to be extracted passively at high level through existing window 0penings. A new duct route and louvres are to be installed.. This removes a level of user flexibility, i.e., the ability to shut the windows if noisy activity is happening in the hall.

Because of this, attenuation is required in this ductwork to suppress activity to noise to level where it does not cause a disturbance. Required insertion losses were initially developed to reduce external noise breaking into the hall from outside, as this was deemed likely a more arduous requirement. 1500mm long silencers have been proposed by the mechanical engineer along with an attenuated louvre (see Appendix D for data of proposed units).

The table below shows noise impact assessment of assumed worst-case activity noise. The internal noise a noise level of 98dB L_{A10} measured onsite during an orchestral rehearsal in December 2020. This noise level is only expected to be exceeded very rarely, during especially loud sections of a music performance or rehearsal.

Table 5 – Activity noise assessment of proposed extract louvres serving the Hall

		Unit	Frequency Hz								dBA	Comment
			63	125	250	500	1k	2k	4k	8k		
A	Induct Inlet	SPL L_{10}	95	101	100	96	93	85	87	83	98	From measurements in hall, orchestral rehearsal.
B	Area adjustment		+6	+6	+6	+6	+6	+6	+6	+6		3.6m^2 opening
C	Sound pressure to sound power		-6	-6	-6	-6	-6	-6	-6	-6		
D	Duct attenuation	IL	-2	-1	-1	0	0	0	0	0		3m in length
E	Silencer	IL	-4	-10	-12	-16	-25	-20	-15	-10		Lindlab SLRS 1500mm. From Manufacturers data
F	Louvre	IL	-4	-6	-5	-6	-6	-9	-11	-13		Passivent. Converted from $D_{n,e,w}$ values
G	End Reflection	IL	-4	-2	-1	0	0	0	0	0		0.85m^2 area
H	Distance Attenuation		-33	-33	-33	-33	-33	-33	-33	-33		40m to nearest receiver
I	Safety Factor		+3	+3	+3	+3	+3	+3	+3	+3		
J	**Total**	**SPL**	41	43	42	33	22	16	20	20	**36**	A+B+C+D+E+F+G+H+I
K	Background noise level	L_{90}	55	48	40	33	26	23	21	20	37	Day time, 0700-2300 hours
L	Difference		**-14**	**-5**	**0**	**0**	**-4**	**-7**	**-1**	**0**	**-1**	J-K

The overall noise level of 36dB L_{Aeq} is 1dB below the measured background, and 15dB below the recorded average noise level. The low frequency octave bands of 63Hz and 125Hz are significantly below their assumed background values. Based on the criteria discussed in section 2.4, this is deemed to be “virtually inaudible” at the nearest noise sensitive receiver. It also more than achieves the criteria set out by the local authority to achieve “no observed effect level” in terms of entertainment noise.

These proposals are to be developed further at the next design stage.

7.0 CONCLUSION AND NEXT STEPS

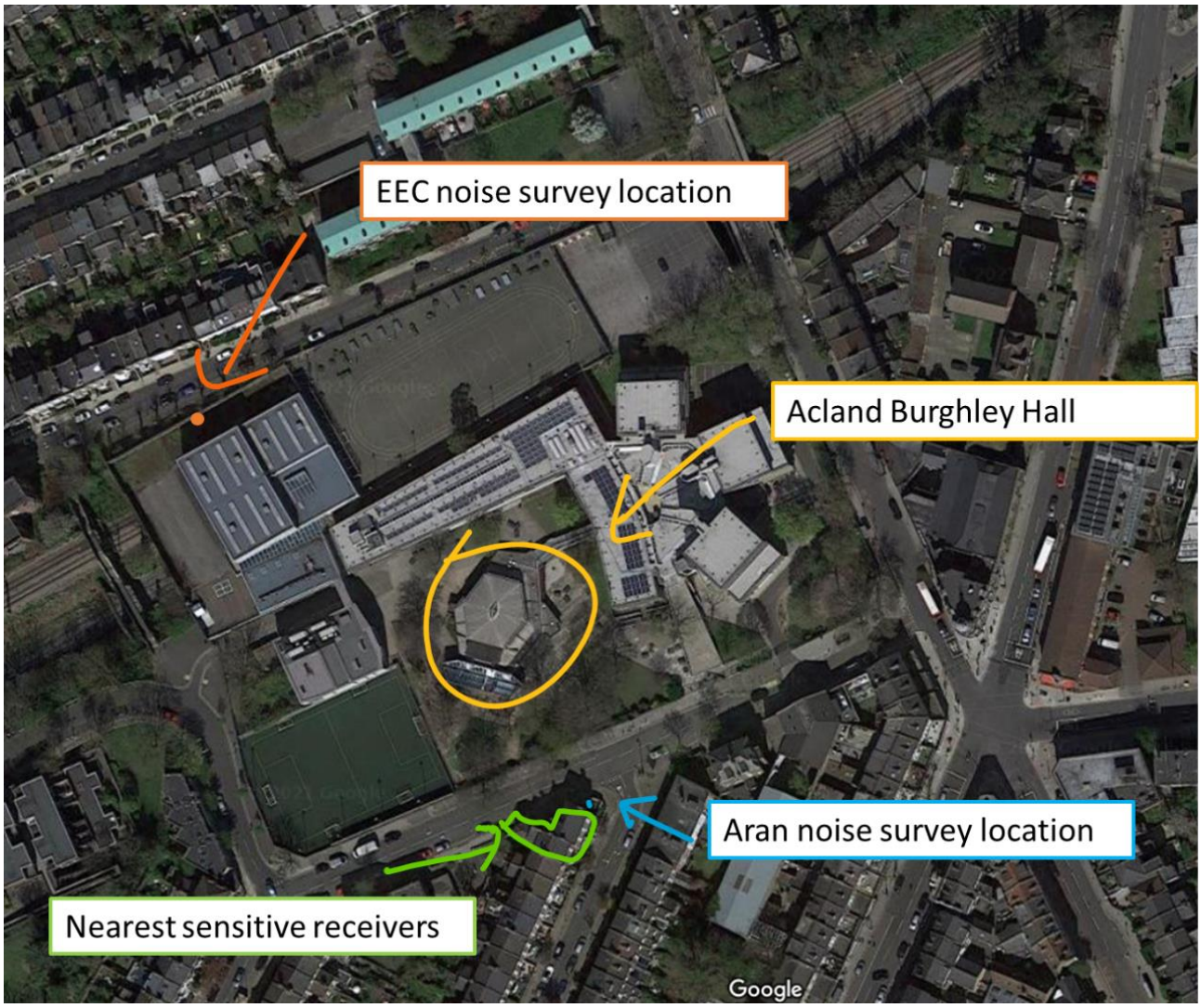
New mechanical and passive ventilation systems are proposed as part of the redevelopment of Acland Burghley Hall. The noise impact, both in terms of plant-related noise and activity noise breakout through the units, has been assessed against national and local authority guidance.

The conclusion, based on the current design, is that all noise related to the new plant meets the criteria set out by the London Borough of Camden and discussed in this report. The noise related impact is expected to be low. The design is still being developed.

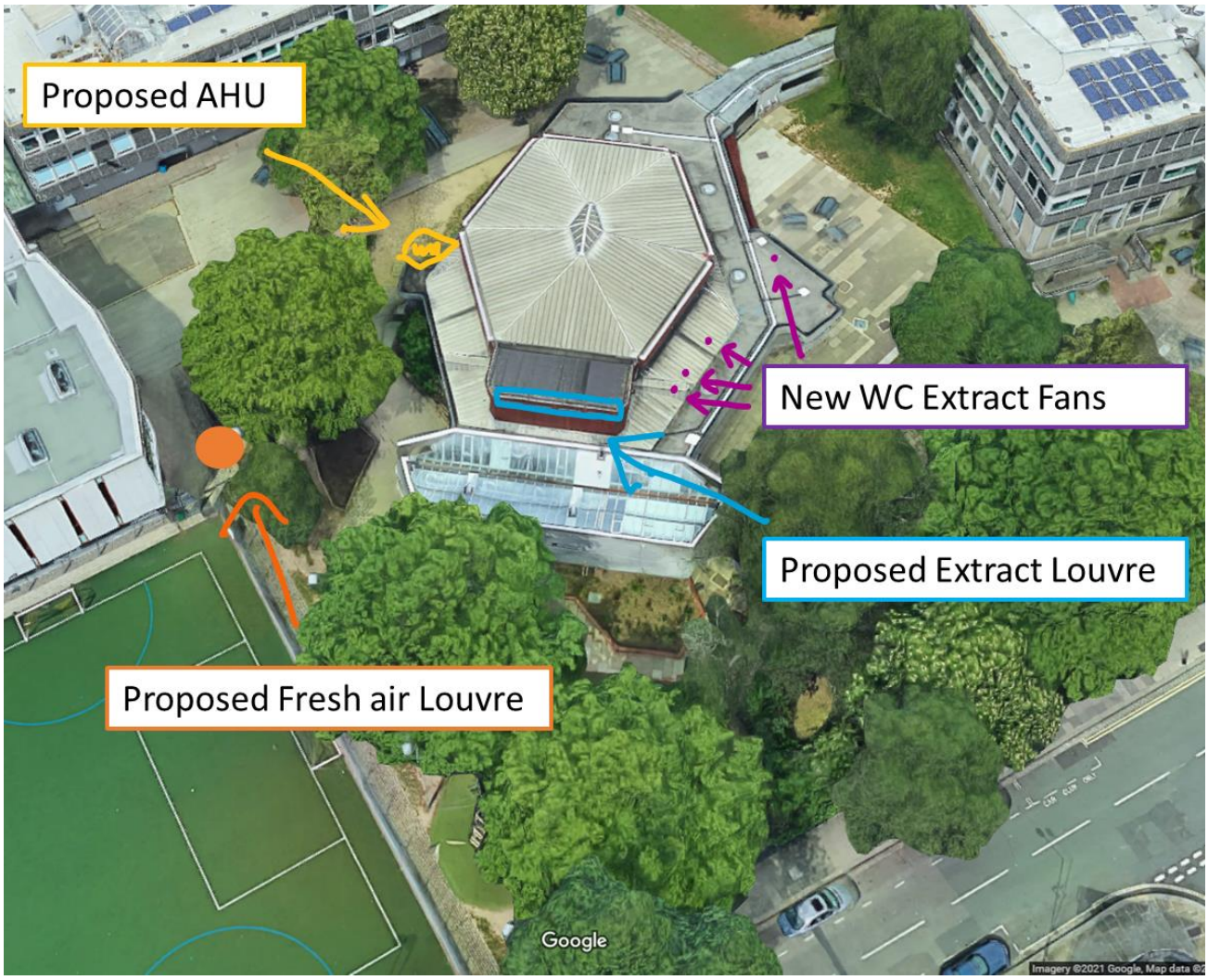
This assessment is based on historical noise survey data from the site. This is expected to still be representative of the noise levels at the nearest noise sensitive receivers. The noise data available does not include measurements for a weekend. Based on the residential nature of the site, this is not expected to fluctuate significantly from the recorded weekday levels. If required by the council, a new survey will be carried out to ensure this adopted noise levels are still relevant.

APPENDICES

APPENDIX A: SITE PLAN SHOWING MEASUREMENT LOCATIONS

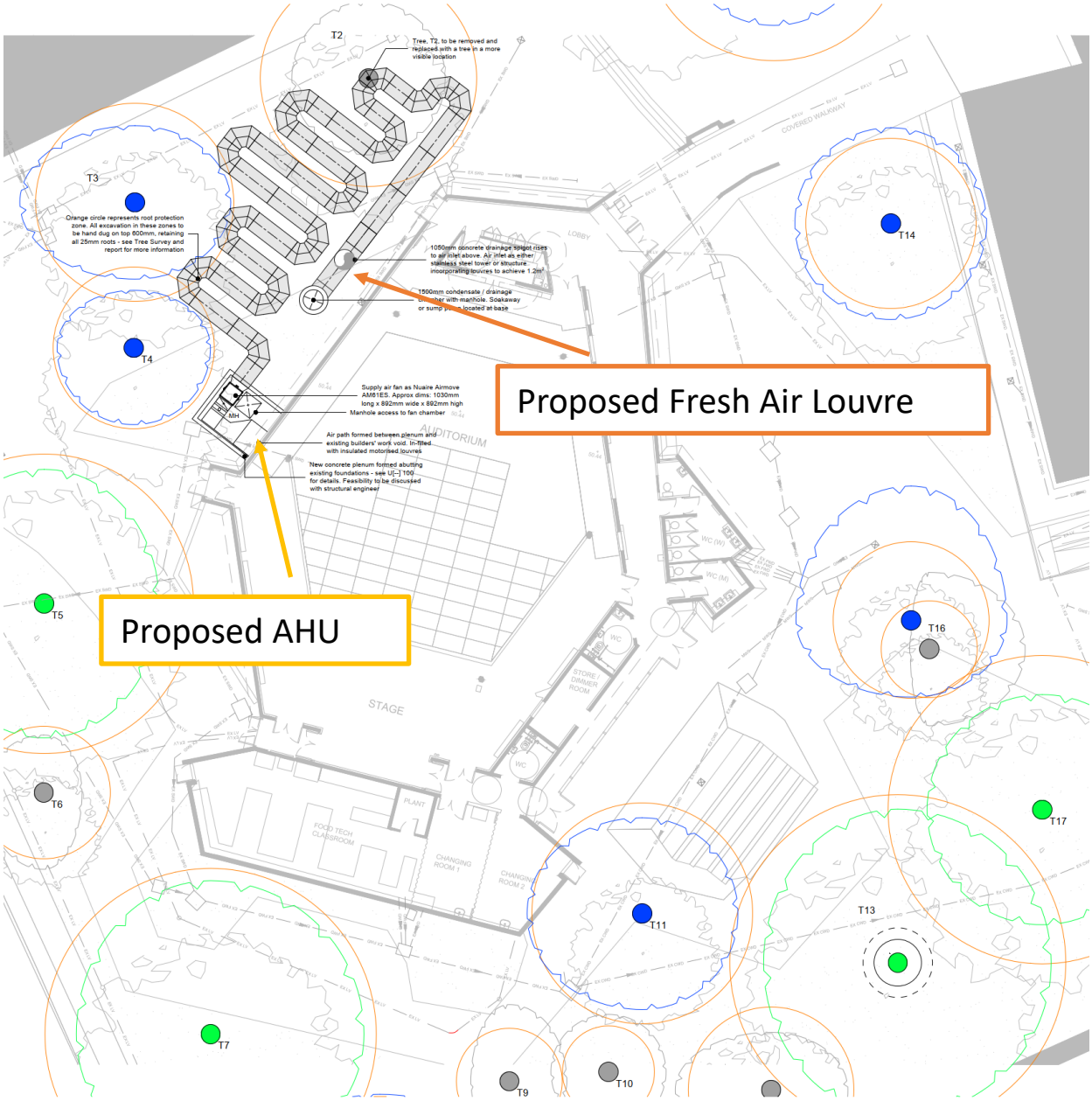


APPENDIX B: SITE PLAN SHOWING PROPOSED PLANT LOCATIONS

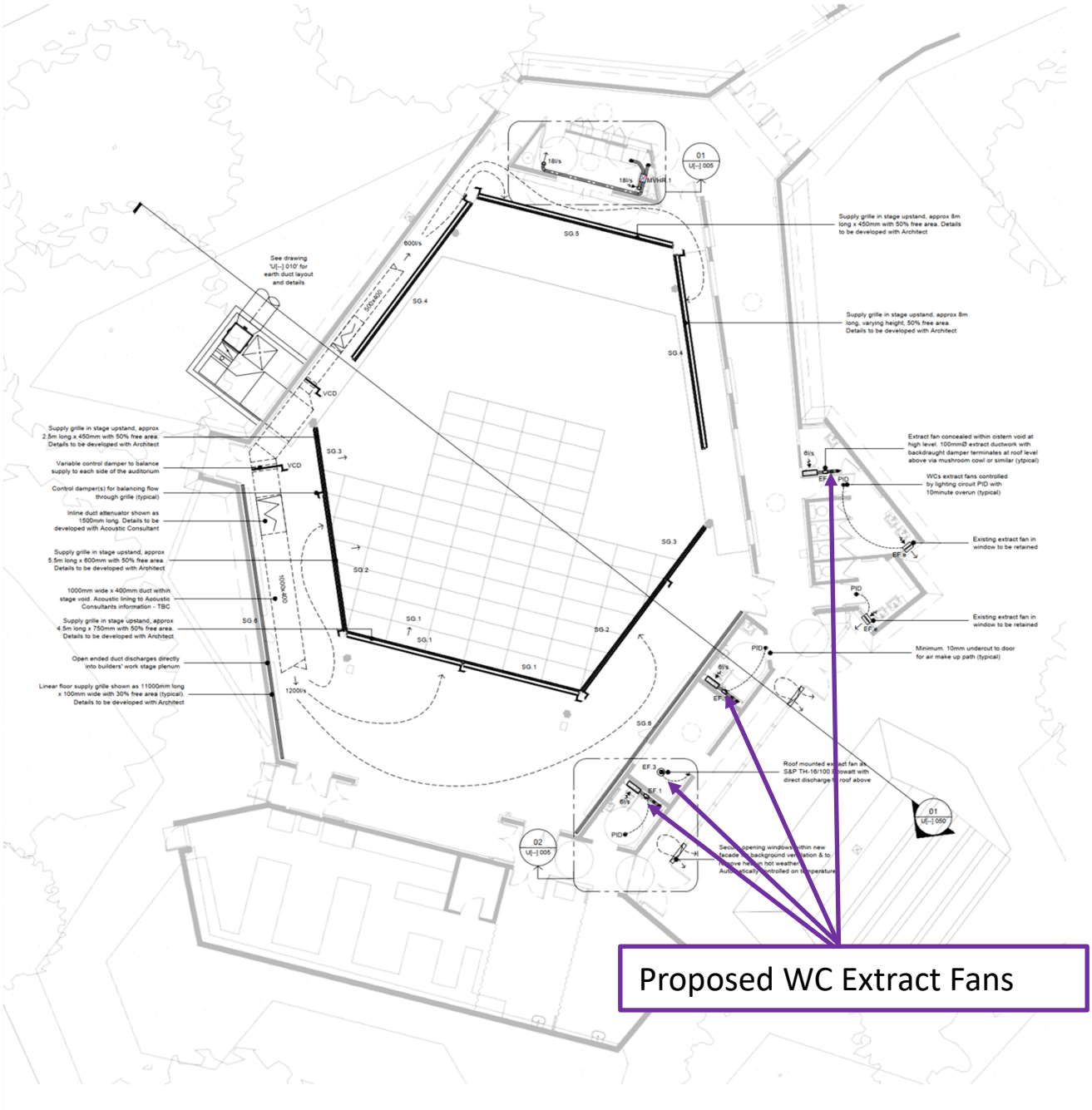


APPENDIX C: MECHANICAL SERVICES PLANS

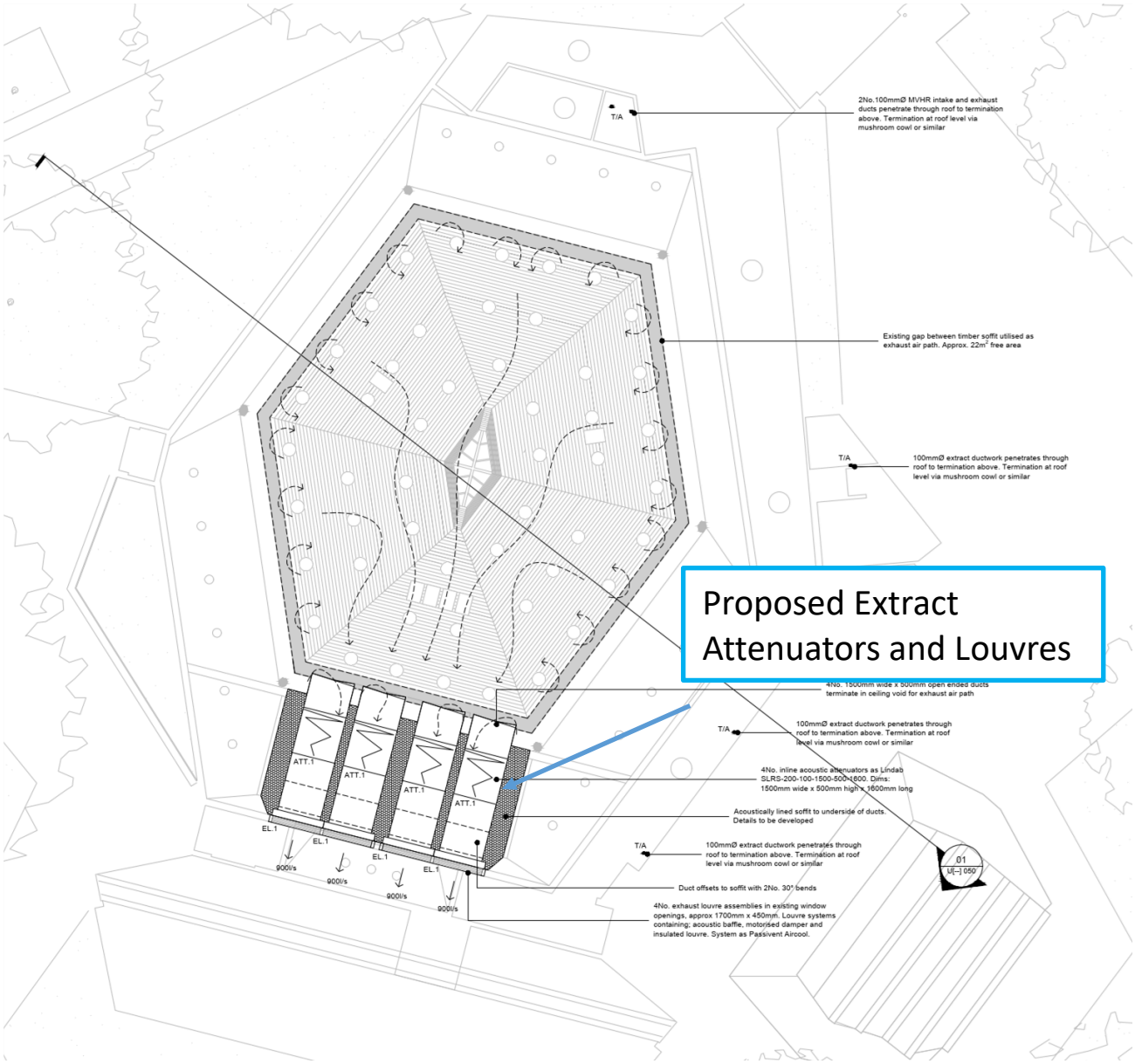
Earth Duct Layout



Ground Floor



Roof


2No.100mmØ MVHR intake and exhaust ducts penetrate through roof to termination above. Termination at roof level via mushroom cowl or similar
T/A
Existing gap between timber soffit utilised as exhaust air path. Approx. 22m² free area
T/A
100mmØ extract ductwork penetrates through roof to termination above. Termination at roof level via mushroom cowl or similar
Proposed Extract Attenuators and Louvres
4No. 1500mm wide x 500mm open ended ducts terminate in ceiling void for exhaust air path
T/A
100mmØ extract ductwork penetrates through roof to termination above. Termination at roof level via mushroom cowl or similar
4No. inline acoustic attenuators as Lindab SLRS-200-100-1500-500-1600. Dims: 1500mm wide x 500mm high x 1600mm long
Acoustically lined soffit to underside of ducts. Details to be developed
T/A
100mmØ extract ductwork penetrates through roof to termination above. Termination at roof level via mushroom cowl or similar
Duct offsets to soffit with 2No. 30° bends
4No. exhaust louvre assemblies in existing window openings, approx 1700mm x 450mm. Louvre systems containing; acoustic baffle, motorised damper and insulated louvre. System as Passivent Aircool.
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ATT.1
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APPENDIX D: PROPOSED MECHANICAL EQUIPMENT

Air Handling Unit

nuaire **SUMMARY FAN DATA SHEET**

Nuaire, Western Industrial Estate, Caerphilly, CF83 1NA, United Kingdom. email:info@nuaire.co.uk
UK Commercial enquiries T:029 2085 8200 UK Residential enquiries T:029 2085 8500 International enquiries T:+44.29 2085 8497
Whilst the information given on this data sheet is fan specific, it is in summary and reference to the product selection catalogue and installation & maintenance documents is recommended.
This data sheet produced on 03 Mar 2021 12:31 using software version 4.5.3680.0

Technical Data

AM - Airmover

Fan Code:	**AM61ES**
Installation Manual Links:	671174
Required duty:	1.8 m³/s at 200 Pa
Actual duty:	2.54 m³/s at 397 Pa
Actual at required flow:	1.8 m³/s at 513 Pa
When speed controlled to required duty (70.94%):	
Fan Input Power:	**0.716 kW**
Motor Input Power:	**0.956 kW**
Specific Fan Power:	**0.5 W/(l/s)**
Velocity at required duty:	2.778 m/s
Fan Total Efficiency:	51%
At full speed:	
Fan Input Power:	2.007 kW
Maximum Fan Input Power:	2.055 kW
Motor Input Power:	2.604 kW
Specific Fan Power:	1.0 W/(l/s)
Fan Total Efficiency:	26%
Maximum Fan Speed:	6 pole, 915 RPM
Electrical Supply:	400V 3 Phase 50 Hz
Nominal Motor Rating:	2.2 kW
Motor current (flc):	6.4 A
Motor starting current (sc):	6.4 A
Motor Efficiency:	IE2 / High Efficiency
Max. operating temp:	50°C
Weight:	164 kg

All Ecosmart fans feature soft-starting and stepless variable speed control. A switch disconnector is required to isolate the fan from the electrical supply.

Sound Data

Acoustic perfomance to ISO 13347 and AMCA 300.

Noise calculated speed controlled to required duty (70.94%)

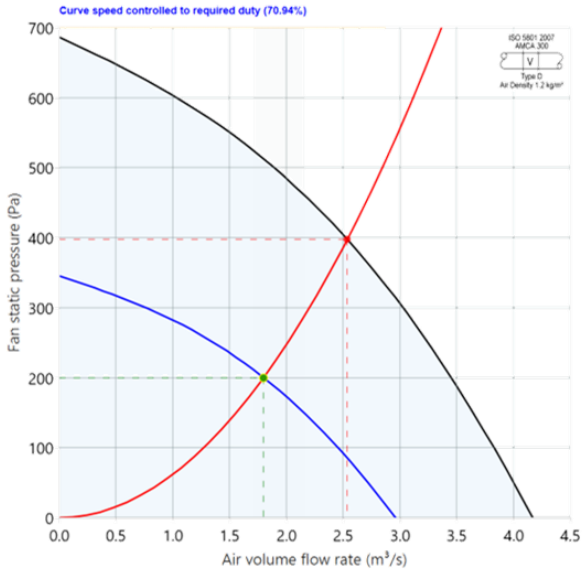
Sound Power Levels re 1 pWatts (Hz):

Hz	63	125	250	500	1k	2k	4k	8k	dBA
Induct Inlet	83	86	79	73	67	66	61	55	
Induct Outlet	85	75	78	78	70	68	61	54	
Open Inlet	78	83	78	73	67	66	61	55	
Open Outlet	80	72	76	78	70	68	61	54	
Breakout	77	70	66	55	39	37	39	29	40
For 100% speed:	+2	+3	+4	+5	+8	+8	+8	+8	

dBA is spherical at 3 metres. For hemi-spherical add 3 dBA.
Values shown are for inlet Lw, outlet Lw sound power & breakout levels for: Installation Type D: ducted inlet, ducted outlet. Ratings include the effects of duct end correction.

Please note that the noise data stated on this data sheet for the unit and/or silencer is tested in accordance with UK, European and International industry laboratory standards. However onsite conditions may vary and we would recommend that this information is verified by an acoustic specialist in order to ensure its suitability for the intended application.

Performance Chart



Selected Ancillaries

2 x AMDF5	Quickfit double flanged flexible connector
1 x NAV3	Anti-vibration mounting kit
1 x ES-PIR2	Ecosmart PIR Sensor
1 x ES-LCD	Ecosmart LCD Touch Screen User Control (White)

Specification

The unit casing shall consist of high rigidity Pentapost framework with double skinned infill panels. Panels shall contain inert high density infill. Panel material shall be heavy gauge Aluzinc corrosion resistant steel. Fans shall be of high efficiency backward curved centrifugal design, manufactured in galvanised steel. Fans shall be direct drive with high efficiency IE2 motors to IEC60034-30:2008 where applicable (e.g. single speed motors, rated at 0.75kW and above). The efficiency rating of other motors will vary by size and type.
If an inverter is supplied with the fan, it needs to be mounted internally within the building unless a weatherproof enclosure is ordered.
Unit fitted with full Ecosmart controls, BMS interfaces and commissioning controls. Ecosmart fans incorporate (in a convenient separate enclosure) a control package providing full Ecosmart functionality. The fan shall have the following energy saving functions integrally mounted within the fan unit on a purpose made PCB, all components pre-wired by the manufacturer: integral maximum and minimum speed adjustment/setting; integral adjustable run on timer; integral BMS interfaces, 0-10v and volt free failure indication.

AMDF5
Square double flanged flexible connectors with a pair of quickfit flanges. The flexible duct material is a sound barrier mat with wear resistant skin, designed to improve sound installation. The material is self extinguishing and suitable for operating temperatures between -30°C to +65°C.

NAV3
Resilient rubber anti-vibration mountings, supplied as a set of 4.

ES-PIR2
Circular PIR sensor - supplied with pre-plugged 10m length of communication cable. The sensor will activate the system when movement is detected

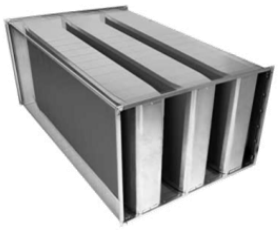
ES-LCD
LCD touch screen ventilation user control panel in white compatible with Ecosmart system. Control has built in time clock. Supplied with pre-plugged 10m length of communication cable.

Extract Attenuators

lindab | we simplify construction

SLRS - Rectangular straight

Project: ABS No Louvre (Final) 17-03-2021



Requirements:		
Air volume	qv	450 l/s
Width		1500 mm
Height		500 mm
Length		1500 mm
Results:		
Face velocity	v	0.6 m/s
Total pressure loss	Δpt	3 Pa

SLRS - Rectangular straight

Rectangular straight silencer from the Aerodim™ series.

SLRS is built with the Aerodim™ silencer baffle SLRA. The SLRA is manufactured with a frame of galvanized sheet
and absorption material type Lindtec™. The Lindtec™ surface is easy to clean and prevents removal of fibres.

Due to the aerodynamic design, the SLRS has a low pressure loss and a low generation of flow noise. To calculate the silencer, you can use our IT-program DimSilencer™

The SLRA baffle is available in a width of 200 mm. The SLRS is also available in other lenghts and with other baffle distances than shown in the tables.

Hz	63	125	250	500	1K	2K	4K	8K	Sum	Sum
Lwi	4	10	12	16	25	20	15	-	**27**	**27**
ΔL	5	12	26	40	50	44	27	18		
Lw	1	0	0	0	0	0	0	0	**0**	**0**
Lwo	3	0	0	0	0	0	0	-	**0**	**0**
	dB	**dB**	**dB**	**dB**	**dB**	**dB**	**dB**	**dB**	**dB(A)**	**NR**

Order code

SLRS-200-100-1500-500-1500

System Supply

Extract Louvres

passivent

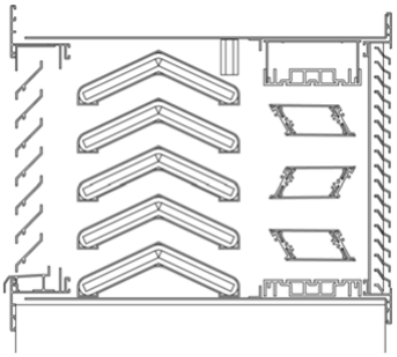
North Frith Oasts, Ashes Lane
Hadlow, Kent TN11 9QU
www.passivent.com

Acoustic Wall Aircool Range

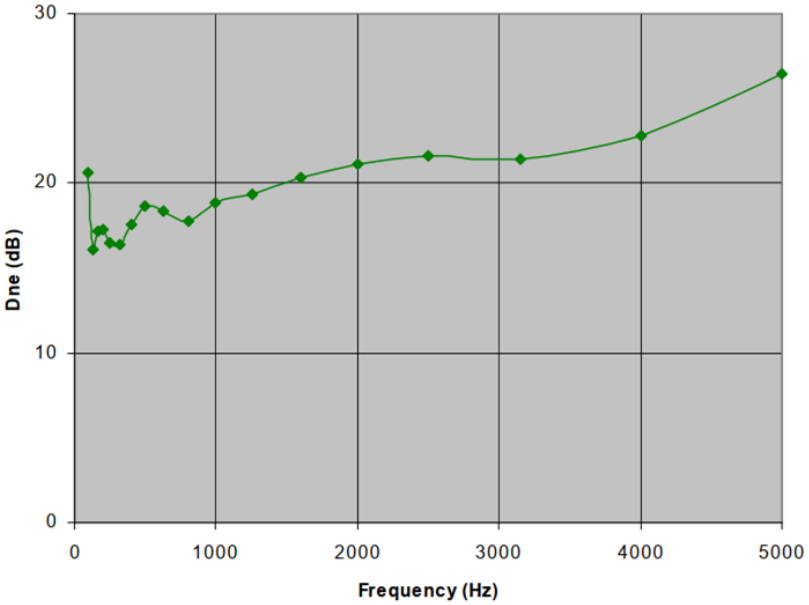
These louvres are façade mounted devices allowing an air inlet or outlet for the building.

Description: [Reference 4]
390mm deep unit featuring external weather louvre and single acoustic chevron.
Internal louvre is open, with no liner or internal cowl.

Area of test specimen: 0.60m²
Size of test specimen: 1500(w) x 400(h) mm
(Nominal opening size)



Freq (Hz)	Dn,e (dB)
100	20.6
125	16.1
160	17.2
200	17.3
250	16.5
315	16.4
400	17.6
500	18.7
630	18.4
800	17.8
1000	18.8
1250	19.3
1600	20.3
2000	21.1
2500	21.6
3150	21.4
4000	22.8
5000	26.4



$D_{n,e,w}$ (dB) = 20

$D_{n,e,w}$ = Weighted elemented-normalised level difference (dB) rating according to ISO 717-1
(Unit closed $D_{n,e,w}$ value = 38dB)

Laboratory testing of airborne sound insulation of small building elements following BS EN 20140 and ISO 140-140
Independent testing completed by the University of Salford Acoustic Division.

T: 01732 850770 F: 01732 850949 E: projects@passivent.com

WC Extract fans

TD-ECOWATT

5211021000 - TD-250/100 ECOWATT (90-260V 50/60HZ) RE - IN LINE DUCT FANS

Range of low profile mixed flow fans with ball bearings and brushless DC motors, of high efficiency and low consumption. Manufactured in plastic, removable fan body, and rated as standard 90/260V- 50/60Hz, IP44. Fan speed 100% adjustable with an external control type REB-ECOWATT. Suitable for any kind of ventilation application where the noise level of the ventilation system is of particular importance and, due to continuous operation, a significant energy saving is desirable. It is also suitable for applications that require a Demand Controlled Ventilation System involving the use of other sensors or controls. Brand S&P model TD-250/100 ECOWATT (90-260V 50/60Hz) RE.for an airflow 20,1 l/s and static pressure 76 Pa.

Theoretical Working Point

Airflow	20,0 l/s
Static Pressure	75 Pa
Temperature	20 °C
Altitude	0 m
Density	1,2 kg/m³
Frequency	50 Hz

Working Point

Airflow	20,1 l/s
Static Pressure	76 Pa
Dynamic pressure	3,94 Pa
Total Pressure	79 Pa
Input power	0,011 kW
Outlet speed	2,6 m/s
Fan speed	2224 rpm
Specific Fan Power	0,54 W/l/s
Voltage speed control	8,7 V

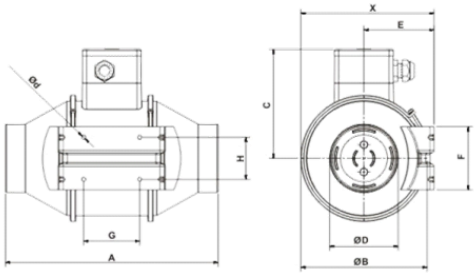
Construction

Discharge diameter	100 mm
Fan size	100
Weight	2,00 kg

Motor Characteristics

Number of poles	2
Voltage	1-230V-50Hz
Maximum absorbed current	0,1 A
IP Rating	IP44
Motor insulation class	F

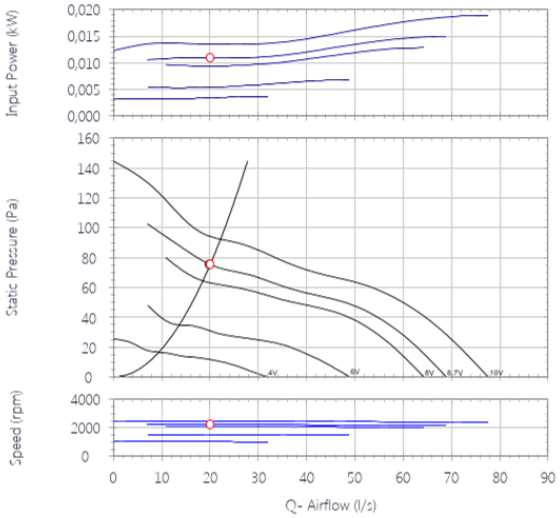
Drawing



X	A	B	C	D	E	F	G	H
188	303	176	156	97	100	90	80	60

Ød
5.5

Performance Chart



Sound Performance

	63	125	250	500	1k	2k	4k	8k	Overall
Inlet (LwA)	24	32	42	50	49	44	37	29	54
Inlet LpA @ 1,5m	10	17	28	36	35	30	22	15	39
Outlet (LwA)	25	31	43	49	46	44	36	29	53
Outlet LpA @ 1,5m	11	16	29	35	31	30	22	14	38
Breakout (LwA)	23	34	47	40	37	36	27	20	49
Breakout LpA @ 1,5m	9	19	33	25	22	21	13	6	34

APPENDIX E: GLOSSARY OF ACOUSTIC TERMS

DECIBEL (dB) - A unit of sound pressure measurement
Sound Pressure Level in dB (*L*p) = 20 log (Measured sound pressure/Reference sound pressure = 20 µPa)

dB(A) - The A -weighted sound pressure level, the weighting network reduces low frequency sound in a similar way to the human ear.

REVERBERATION TIME (RT or *T*) – decay of sound in rooms
The time taken for a sound, once terminated, to fall through 60dB i.e. to one millionth of its original sound intensity. *T*30 – RT for first 30dB of decay. RT_{500} - Mid frequency RT.
HERTZ (Hz) - a unit of frequency measurement. The normal range of hearing is from 20Hz to about 15kHz.

ABSORPTION COEFFICIENT – degree to which a material absorbs sound.
The ratio of absorbed to incident sound energy (perfect absorber = 1)

SOUND REDUCTION INDEX *R* – quantity which describes a material's ability to reduce the sound pressure level across it (e.g. a wall or floor)

$R = L1 - L2 + 10\log (S/A)$

*L*1 - Average sound pressure level in source room (averaged from 100 Hz – 3150 Hz)
*L*2 - Average sound pressure level in receiving room (averaged from 100 Hz – 3150 Hz)
S – Wall Area (m^2)
A – Total absorption in receiving room (m^2 units)

*R*w – weighted sound reduction index

AVERAGE ROOM TO ROOM LEVEL DIFFERENCE – *D*, dB = *L*1 – *L*2, averaged 1/3 octave bands from 100Hz – 3150kHz.

*D*w – weighted value of D (usually 2 - 3dB higher)

*D*nT, w – *D*w corrected for reverberation time of receiving room

NOISE RATING CURVES (NR CURVES) – set of curves used to describe optimum background noise levels for different tasks.

*L*10/90 LEVEL (dB) - The level in dB of a time varying sound pressured level (e.g. traffic) exceeded for 10%/90% of the time of measurement.
*L*90 is usually called the BACKGROUND NOISE LEVEL.

*L*eq AVERAGE SOUND PRESSURE LEVEL – level dB of a time varying sound pressure level with equal amounts of energy above and below it, for the time of measurement.

TONAL NOISE – noise of a single frequency (or a narrow band of frequencies that can be perceived as a tone), audible above the broad band noise background. Noise which is at least 5dB above the average of the 1/3 octave band sound pressure levels immediately on either side of it.