

Noise Impact Assessment for the Proposed Extension to the Existing Children's Hall

RCCG Victory Church, 553 Oxford Road, Reading, RG30 1HL

Report Reference 20499.NIA-RPT.01

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First Issue	20 th October 2023	Noise Impact Assessment for the Proposed Extension to the Existing Children's Hall
Rev A	30 th October 2023	Report updated with minor amendments
Rev B	4 th January 2024	Report updated further to comments received from Rebecca Moon (Environmental Health Officer) as per Internal Memorandum Ref EP /766775 dated 14 th December 2023. Key update includes revising the noise emissions criterion based on a level 10 dB below the lowest representative background sound level during daytime hours rather than during the existing church operating hours only.
Rev C	24 th May 2024	Report updated to reflect the following: - The building is to be cooled/ventilated when in use through existing air conditioning systems - Trickle vents will be installed to the fixed windows of the new extension to allow for ventilation sufficient ventilation.

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EXECUTIVE SUMMARY

ES Acoustics Ltd (ESA) have been commissioned to prepare a noise impact assessment in support of a planning application for a proposed extension to existing children's hall at RCCG Victory Church, 553 Oxford Road, Reading, RG30 1HL.

An environmental noise survey has been undertaken to establish background sound levels representative of the closest noise sensitive receptor locations. A summary of the measurement results are presented in the table below:

Date	Period / Time	Residual Sound Level $L_{Aeq, T}$ (dB)	Representative Background Sound Level L_{A90} (dB)
13/10/2023	Daytime 11:10-23:00	53	46
13-14/10/2023	Night-time 23:00-07:00	44	32
14/10/2023	Daytime 07:00-23:00	55	44
14-15/10/2023	Night-time 23:00-07:00	44	29
15/10/2023	Daytime 07:00-23:00	57	43
15-16/10/2023	Night-time 23:00-07:00	46	34
16/10/2023	Daytime 07:00-11:00	52	46

Noise breakout calculations were undertaken assuming the same occupancy within the proposed extension as the existing children's hall. Note that this would be an overestimation of the actual noise generated within the extension due to maximum occupancy of the extension being less than the existing hall. This would therefore ensure a complete worst-case assessment.

A criterion has been set based on a level 10 dB below the lowest representative background sound level during daytime hours. The resultant levels predicted at 1m from the receptor façades are compared against the criterion in the table below:

Assessment	Worst-case Affected Receptor	Criterion $L_{Aeq, T}$ (dB)	Predicted Level of Noise Breakout $L_{Aeq, T}$ (dB)
Breakout noise from proposed extension to receptor façade	551A Oxford Rd	33	32
	1 Factory Place, Wilson Rd		23

In order to achieve the levels of breakout sound predicted above, the external building fabric elements should provide the following performances:

- External walls should provide a minimum performance of R_w 50 dB.
- Windows should provide a minimum performance of R_w 36 dB.
- Trickle vents within the windows should provide a minimum performance of $D_{n,e,w}$ 40 dB.
- The roof should provide a minimum performance of R_w 45 dB.

It has been concluded that the predicted levels of noise breakout from the proposed extension would meet the set noise criterion, ensuring no adverse impact upon the closest noise sensitive receptors.

Further calculations have demonstrated that internal noise levels within the receptor properties would be well below the recognised British Standard requirements.

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1 INTRODUCTION

ES Acoustics Ltd (ESA) have been commissioned by Kayode Adekola to prepare a noise impact assessment in support of a planning application for a proposed extension to existing children's hall at RCCG Victory Church, 553 Oxford Road, Reading, RG30 1HL.

The purpose of this report is to;

- Review appropriate national and local planning policy, legislation and good practice guidance relevant to the proposal;
- Present the findings of an environmental noise survey completed on site to determine existing levels of ambient and background noise levels at nearby noise sensitive receptor locations;
- Present the findings of an internal noise survey completed within the existing children's hall to determine the expected 'source noise levels' within the proposed extension;
- Undertake an acoustic assessment of the proposed external building envelope to confirm whether sufficient sound insulation is provided with regards to noise breakout to the external environment;
- Prepare a noise impact assessment of the use of the proposed extension to assess the likelihood of adverse impact on the closest noise sensitive receptors; and
- Where appropriate provide outline mitigation advice to ensure no adverse impact upon the closest noise sensitive receptors.

This report has been prepared with consideration of the pre-application enquiry response received from Reading Borough Council for the application (reference 230650).

2 SITE CONTEXT AND BACKGROUND INFORMATION

2.1 Site Description

The site comprises the RCCG Victory Church on the south side of Oxford Road at the junction with Wilson Road. The Church is comprised of the main chapel building which fronts onto Oxford Road and a single storey hall at the rear of the site accessed through a car park via Wilson Road.

The area surrounding the site would be considered broadly residential in nature, with some ground floor commercial properties directly to the east of the site fronting Oxford Road.

An indicative site plan is shown in Figure 1 below, which shows the approximate site boundary in red and the closest noise sensitive receptor properties in green:



Figure 1 Indicative site plan (site boundary in red, closest noise sensitive receptor properties in green)

2.2 Proposal

The planning application is for a single storey extension and connection between existing Church and existing Church Hall with refurbishment of and roof light to existing basement.

The proposed extension is shown in the 3D visualisation below:

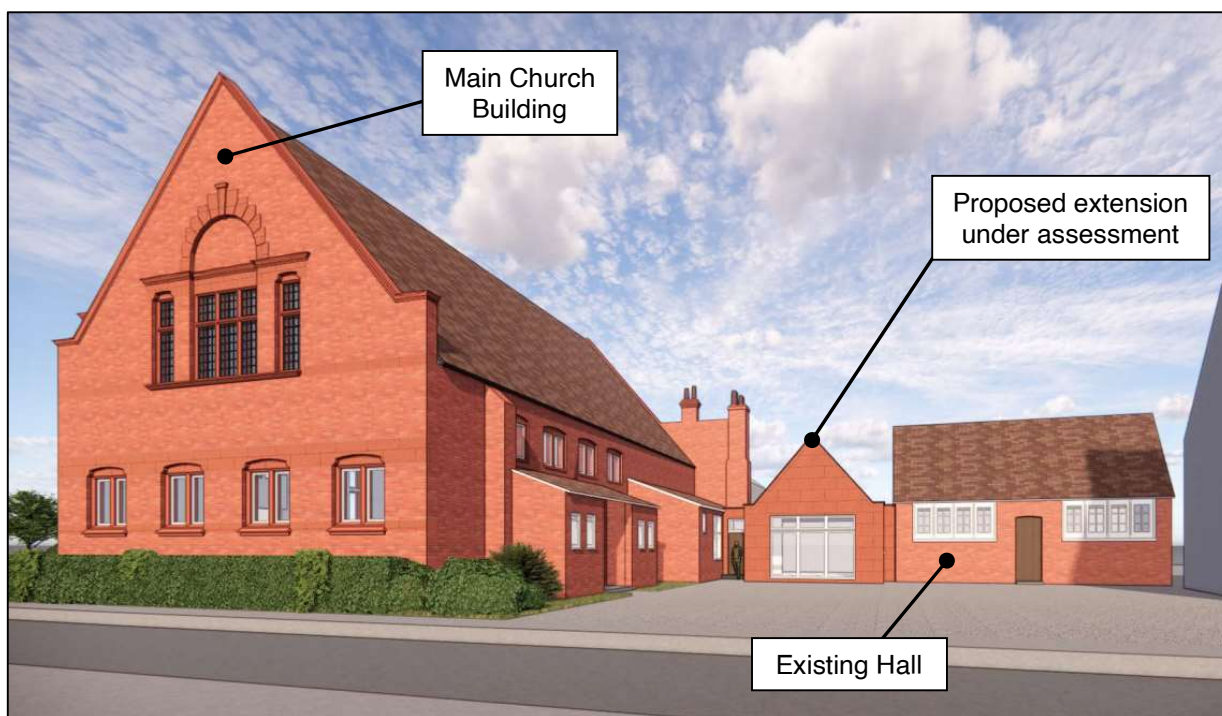


Figure 2 3D visualisation

Proposed drawings for the scheme are shown in Appendix B.

This report has been prepared to address the concerns of Reading Borough Council with regards to noise, as noted within the pre-planning application enquiry response:

"The proposed use of the extension is the same as the existing hall – classrooms to facilitate community uses. This may pose a concern in relation to noise. Any future submission should be accompanied by a noise assessment to ensure the levels of noise would not exceed that of existing."

The west-facing windows are not considered to pose a risk of harm. The distance to the residential properties on Wilson Road is in excess of 25m."

3 POLICY, LEGISLATION AND GUIDANCE

This section of the report presents the key guidance and legislation relevant to the assessment of noise associated with the proposed use.

3.1 National Policy

3.1.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) superseded and replaced Planning Policy Guidance Note 24 (PPG24), which previously covered issues relating to noise and planning in England.

The paragraphs relating to noise state:

174. *Planning policies and decisions should contribute to and enhance the natural and local environment by; [...]*
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans*
185. *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; [...]*
187. *Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.*

3.1.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010. The long-term vision of the Government noise policy is to *'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.'*

The NPSE vision noted above is supported by the following aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *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 improvement of health and quality of life*

The NPSE outlines observed effect levels relating to the above, as follows:

- *No observed effect level (NOEL): this is the level of noise exposure below which no effect at all on health or quality of life can be detected;*
- *Lowest observed adverse effect level (LOAEL): this is the level of noise exposure above which adverse effects on health and quality of life can be detected;*
- *Significant observed adverse effect level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;*

Noise effect levels are not set at absolute noise level targets, but instead vary depending on the context and character of the noise and site specific factors which may impact on the severity of the effect. The NPSE states:

'It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

3.1.3 National Planning Practice Guidance (NPPG)

The NPPG provides practical guidance on how the NPPF should be applied as well as and guidance on the factors influencing whether noise may be a concern at the planning stage and how adverse effects can be mitigated. The table below summarises the effect levels presented within the NPSE, as follows:

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific Measures required
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate & reduce to a minimum
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 1 Noise exposure hierarchy

3.2 Local Policy

3.2.1 Reading Borough Council

The pre-planning application enquiry response received from Reading Borough Council notes the following planning policies from the Reading Borough Council Local Plan (2019):

- *Policy CC1 – Presumption in Favour of Sustainable Development*
- *Policy CC7 – Design and the Public Realm*
- *Policy CC8 – Safeguarding Amenity*
- *Policy EN4 – Locally Important Heritage Assets*
- *Policy OU1 – New and Existing Community Facilities*

With regards to noise and disturbance, Policy CC8: Safeguarding Amenity notes the following:

Policy CC8 – Safeguarding Amenity

Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:

- *Privacy and overlooking;*
- *Access to sunlight and daylight;*
- *Visual dominance and overbearing effects of a development;*
- *Harm to outlook;*
- *Noise and disturbance;*
- *Artificial lighting;*
- *Vibration;*
- *Dust and fumes;*
- *Smell;*
- *Crime and safety; or*
- *Wind, where the proposals involve new development of more than 8 storeys.*

The position of habitable rooms, windows and outdoor living spaces will be particularly important. A back-to-back distance of 20 metres between dwellings is usually appropriate, although the circumstances on individual sites may enable dwellings to be closer without a detrimental effect on privacy.

As well as immediate impacts, other aspects to which this policy applies will include matters such as hours of operation of businesses, and effects of traffic movements, particularly of heavy goods vehicles (HGVs). Proposals which would generate regular movements of HGVs on residential roads will not be acceptable.

Where an otherwise acceptable development could change its character to a use that would have a greater impact on amenity without needing planning permission, conditions will be applied to restrict such changes.

While not directly referenced, Policy EN16: Pollution and Water Resources also considers noise impact as follows:

EN16: Pollution and Water Resources

Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution; where it would result in no deterioration in, or ideally enhance, ground and surface water quality; and where adequate water resources, sewerage and wastewater treatment infrastructure will be in place to support the proposed development prior to occupation.

Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.

Development will only be permitted on land affected by contamination where it is demonstrated that the contamination and land gas can be satisfactorily managed or remediated so that it is suitable for the proposed end use and will not impact on the groundwater environment, human health, buildings and the wider environment, during demolition and construction phases as well as during the future use of the site.

3.3 National Legislation

3.3.1 Environmental Protection Act 1990 (EPA 1990)

Section 79 of the EPA 1990 defines statutory noise nuisance as '*noise emitted from premises so as to be prejudicial to health or a nuisance*', and notes that Local Planning Authorities have a duty to inspect and detect such nuisances in their area. The specifics of noise nuisance are not defined, however, and the law only requires that the investigating officer be of the opinion that the effect of the noise in question on the average reasonable person would cause a nuisance or be prejudicial to health.

Section 80 of the EPA 1990 provides Local Planning Authorities with powers to serve an abatement notice requiring the cessation of a nuisance or requiring works to be undertaken to prevent their occurrence.

It should be noted that annoyance is not necessarily a noise nuisance, with noise nuisance being defined in Common Law as "*an unlawful interference with a person's use or enjoyment of land, or of some right over, or in connection with it*" (Read v Lyons and Co. Ltd, 1945). Noise nuisances are often assessed against the judgment of Mr Justice Luxmoore as "*interfering with the ordinary physical comfort of human existence not merely according to elegant or dainty modes of living but according to plain and sober and simple notions obtaining among English people*" (Vanderport v the Mayfair Hotel Co Ltd, 1930). Therefore, the interference in question must be unreasonable such that it can be considered a noise nuisance.

It should be noted that businesses have a defence against noise nuisance of 'best practicable means', which is defined in section 79(9) of the Act as follows:

- '*practicable*' means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications.
- '*the means*' to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery and the design, construction and maintenance of buildings and structures.
- The test is to apply only so far as is compatible with any duty imposed by law and only so far as is compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances.

3.4 Best Practice and Guidance

3.4.1 World Health Organization Guidelines for Community Noise 1999

Community noise (also called environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic; industries; construction and public work; and the neighbourhood.

The WHO Guidelines for Community Noise consider noise sources and measurement, adverse health effects of noise, and presents guideline values for specific environments (while considering specific health effects).

The guideline values with regards to residential development, which are considered by virtue of the closest noise sensitive receptor properties being residential, are presented below:

Specific Environment	Critical health effect(s)	L _{Aeq} dB	Time (hours)	L _{Amax,f} dB
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Table 2 WHO guidelines for community noise in specific environments

3.4.2 BS 8233: 2014 'Guidance on sound insulation and noise reduction for buildings'

Table 4 of BS 8233:2014 (reproduced below) provides guidance on recommended internal ambient noise levels in residential spaces based on World Health Organisation (WHO) research.

Room	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Living Room	≤ 35 dB L _{Aeq,16hr}	N/A
Dining Room	≤ 40 dB L _{Aeq,16hr}	N/A
Bedroom	≤ 35 dB L _{Aeq,16hr}	≤ 30 dB L _{Aeq,8hr}

Table 3 BS 8233:2014 indoor ambient noise levels for dwellings

Whilst it is accepted that the levels presented above are for steady external noise sources without a specific character, the guidance provides useful context as to what acceptable internal noise levels are in an ideal situation.

The standard suggests that lower noise limits might be appropriate in cases where noise sources contain a specific character, however it doesn't not specify how such limits should be applied.

3.5 Assessment Criteria for the Specific Proposal

There is no industry standard for assessing noise breakout from classrooms to facilitate community uses.

Therefore, a suitable criteria must be established based on the relevant planning policy, legislation and good practice guidance presented above. Any criteria must ensure that significant adverse impacts on health and quality of life are avoided. In cases where the criterion is exceeded, suitable mitigation measures must be proposed to ensure that the criterion is achieved.

A key component in preparing a suitably robust noise impact assessment is to compare the overall 'source noise level' (in this case the breakout noise from the classroom use) against the existing noise climate at the receptor. Basic acoustic theory states that if one sound is 10dB louder than another, then the louder sound will mask the quieter sound, such that the quieter sound would not be clearly distinguishable.

With regards to the existing noise climate that would be considered representative of the closest noise sensitive receptors, an environmental noise survey has been conducted on site (as detailed in Section 4.1).

Based on the above, we would propose that a criterion is set to ensure that the general continuous sound (L_{Aeq}) level as a result of noise breakout from the proposed hall extension is no greater than 10 dB below the representative background noise level at 1m from the closest noise sensitive façade, during the hours which the space in question would be used.

Additional consideration would be given to the internal noise level guidance presented in BS 8233:2014, to further ensure the amenity of the closest receptors.

4 NOISE SURVEYS

4.1 Environmental Noise Survey

4.1.1 Measurement Location and Procedure

A noise survey was undertaken on site as shown in the figure below, which was considered representative of the closest noise sensitive receptor locations (annotated accordingly).

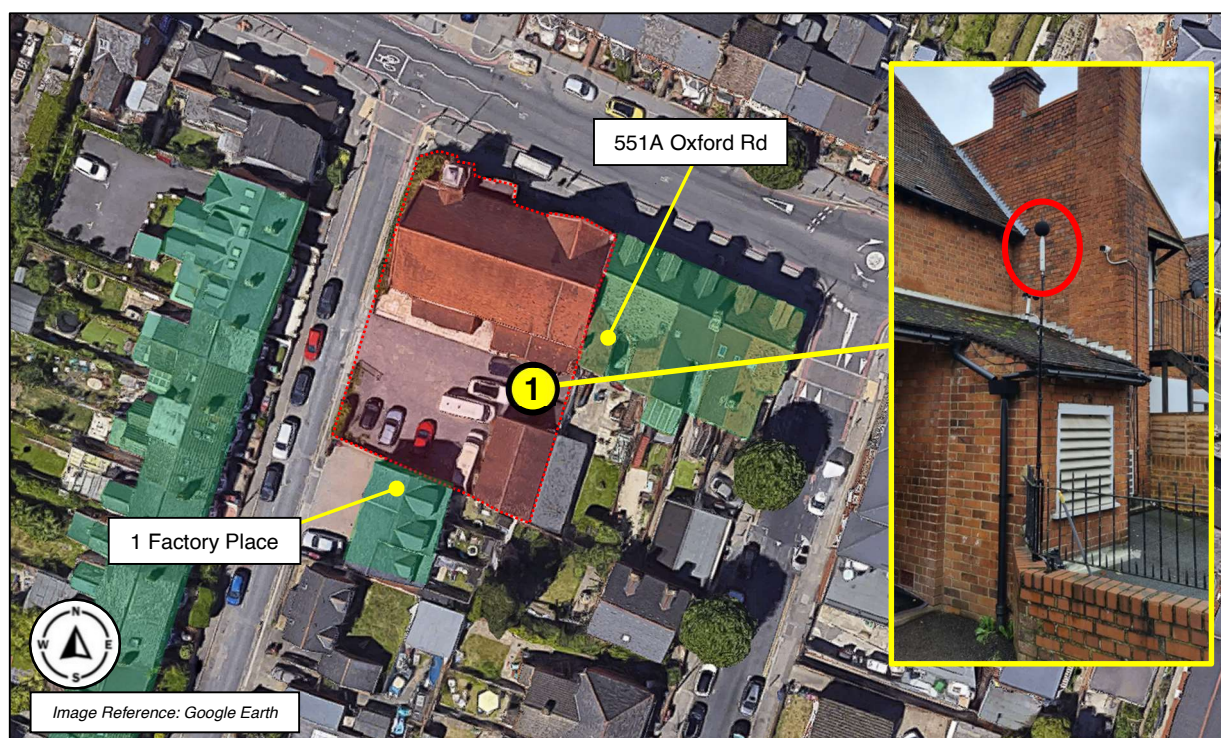


Figure 3 Noise survey measurement location

An initial appraisal of the site during the site visit determined traffic noise from the surrounding roads to be the dominant noise source affecting the site. In addition, there was some noise associated with externally mounted building services plant (air source heat pumps and/or air conditioning units). Note that the white louvred panel shown in the inset picture above was to serve an old boiler which has been condemned, and therefore has no noise emissions associated with it.

The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*', with automated monitoring undertaken between 11:10 on 13/10/2023 and 11:00 on 16/10/2023.

The key acoustic descriptors measured for this assessment are as follows:

- $L_{Aeq,T}$ (the continuous equivalent A-weighted noise level over a given time period, T);
- $L_{A90,T}$ (the noise level exceeded for 90% of the measurement period T , referred to as the 'background' noise level);

4.1.2 Measurement Equipment

The table below presents the equipment used for the baseline noise survey. The equipment calibration was verified before and after use and no abnormalities were observed.

Equipment	Make and Model	Serial Number
Sound Level Meter	Svantek 977 Class 1 Sound Level Meter	34191
Microphone Capsule	Svantek MK 255	77747
Microphone Preamplifier	Svantek SV 12L	32446
Calibrator	Svantek SV33 Class 1 Sound Calibrator	125829

Table 4 Noise survey equipment used for the environmental noise survey

4.1.3 Weather Conditions

Weather conditions during the automated monitoring were generally dry with light winds and therefore suitable for the measurement of environmental noise.

Measurements of temperature and wind speed were undertaken over a 15-minute period on both the installation and collection visits as reported in the table below. Additional data on precipitation has been sourced from local weather stations. A summary of the weather data is reported in the table below:

Description	Installation Date 13/10/2023	Collection Date 16/10/2023
Temperature (° Celsius)	9*	8*
Wind speed (m/s)	2.2**	1.7**
Wind direction	North	North
Precipitation	See below	See below
Presence of damp roads/wet ground	Yes	No
Cloud cover (Oktas***)	7 ☁	2 ☁
Presence of fog/snow/ice	None	None

Table 5 Weather conditions

*measured during the site visit using a handheld anemometer

**maximum speed measured over 15-minute period during the site visit using a handheld anemometer

***An okta is a unit of measurement used to describe the amount of cloud cover at any given location. Sky conditions are estimated in terms of how many eighths of the sky are covered in cloud, ranging from 0 oktas (completely clear sky) through to 8 oktas (completely overcast)

While it was not raining during the installation of the monitoring equipment, it had rained that morning resulting in the presence of wet roads. Precipitation data has been sourced from local weather stations as follows:

- 13:00-14:00 on 13th October – 0.4mm
- 18:00-19:00 on 13th October – 0.8mm
- 19:00-20:00 on 13th October – 3.5mm
- 22:00-23:00 on 13th October – 1.1mm
- 01:00-02:00 on 14th October – 0.2mm
- 18:00-19:00 on 14th October – 0.4mm

Analysis of the environmental noise time history graph (see Appendix C1) shows no significant deviations that would be attributed to adverse weather over the typically observed noise trace. It should also be noted that no rain occurred on Sunday 15th October, which would be the key period of interest.

4.1.4 Survey Results

A summary of the measurement results are presented in the table below, with a noise time history of the full environmental noise survey is shown in Appendix C1.

Date	Period / Time	Residual Sound Level	Representative Background Sound Level
		$L_{Aeq, T}$ (dB)	L_{A90} (dB)
13/10/2023	Daytime 11:10-23:00	53	46
13-14/10/2023	Night-time 23:00-07:00	44	32
14/10/2023	Daytime 07:00-23:00	55	44
14-15/10/2023	Night-time 23:00-07:00	44	29
15/10/2023	Daytime 07:00-23:00	57	43
15-16/10/2023	Night-time 23:00-07:00	46	34
16/10/2023	Daytime 07:00-11:00	52	46

Table 6 Environmental noise survey measurement results

Note that the representative background sound level has been derived from the modal L_{A90} values.

A noise time history of the environmental noise survey data between 07:00-23:00 on the 15th October is shown in Appendix C2.

4.2 Internal 'Source' Noise Survey

4.2.1 Measurement Location and Procedure

An internal noise survey was undertaken within the existing hall to measure source noise levels that would be expected within the proposed extension. Due to the space being operational, a microphone was mounted on the wall to ensure it was out of reach of the children and did not interfere with the general use of the space.

Part B4 of ISO 1996-2:2017 '*Acoustics: Description, measurement and assessment of environmental noise Part 2: Determination of sound pressure levels*' suggests that when a microphone is mounted directly to a reflective surface, a 6 dB correction should be applied. However, in order to ensure worst-case source levels are used for the assessment, no correction would be applied to the measured data.

While the survey was between 11:10 on 13/10/2023 and 11:00 on 16/10/2023, the key period of interest would be Sunday 15th October while the space was in use.

4.2.2 Measurement Equipment

The table below presents the equipment used for the internal noise survey. The equipment calibration was verified before and after use and no abnormalities were observed.

Equipment	Make and Model	Serial Number
Sound Level Meter	Convergence Instruments NSRT MK3 Type 1 Meter	CIL2Ld260f+Vgri56D5ND
Calibrator	Svantek SV33 Class 1 Sound Calibrator	125829

Table 7 Noise survey equipment used for the internal noise survey

4.2.3 Survey Results

An hourly breakdown of the measurement data between 10:00-13:00 on Sunday 15th October while the church was operational is shown in the table below.

Period / Time	Residual Sound Level $L_{Aeq, T}$ (dB)
10:00-11:00	62
11:00-12:00	80
12:00-13:00	83

Table 8 Environmental noise survey measurement results during church operating hours on Sunday 15th October

A noise time history of the internal noise survey data between 07:00-23:00 on the 15th October is shown in Appendix C3.

5 NOISE IMPACT ASSESSMENT

In the following section of the report, the noise breakout associated with the proposal are analysed in support of the planning application.

5.1 Noise Criteria at the Closest Receptors

Based on the planning policy and guidance presented in Section 3 and the environmental noise levels measured on site presented in Section 4.1.4, a suitable criterion to ensure the amenity of the closest noise sensitive receptor properties is shown in the table below. Note that this is based on the lowest representative background sound level measured during daytime hours.

Assessment	Criterion $L_{Aeq, T}$ (dB)
Breakout noise from proposed extension to a position 1m from the receptor façade	33

Table 9 Noise impact assessment criteria

For the avoidance of doubt, the criterion has been set at a level 10 dB below the representative background sound level established during the church operating hours on Sunday between 10:00-13:00.

5.2 Specific Sound Levels

As noted within Section 4.2.3, the worst-case $L_{Aeq, 1 \text{ hour}}$ noise level measured within the existing hall is 83 dB(A). The single octave band frequency spectrum that would be used for the noise breakout assessment is shown in Table 10:

Octave band centre frequency sound power levels, dB								dB(A)
63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
48	60	67	78	81	76	56	48	83

Table 10 Worst-case $L_{Aeq, 1 \text{ hr}}$ within existing hall

5.3 Noise Breakout Assessment

Noise breakout calculations (presented in Appendix D) have been undertaken based on the following assumptions:

- The reverberant sound level within the proposed extension would be the same as the reverberant sound level measured within the existing hall. Note that this would be an overestimation of the actual noise generated within the extension due to maximum occupancy of the extension being less than the existing hall. This would therefore ensure a complete worst-case assessment.
- The non-glazed external building fabric construction should provide a minimum sound reduction performance of R_w 50 dB.
- The glazed elements of the external building fabric construction should provide a minimum sound reduction performance of R_w 36 dB.
- The roof construction should provide a minimum sound reduction performance of R_w 45 dB.

The resultant levels of noise breakout predicted at 1m from the receptor façade and within the receptor properties are compared against the criteria in Table 11:

Assessment	Worst-case Affected Receptor	Criterion $L_{Aeq, T}$ (dB)	Predicted Level of Noise Breakout $L_{Aeq, T}$ (dB)
Breakout noise from proposed extension to a position 1m from the receptor façade	551A Oxford Rd	33	32
	1 Factory Place, Wilson Rd		23

Table 11 Noise breakout assessment

As shown above, the predicted levels of noise breakout from the proposed extension would meet the set noise criteria in all instances, ensuring no adverse impact upon the closest noise sensitive receptors.

Section 6 includes details of possible external building fabric constructions that would meet the required level of sound insulation to ensure that the predicted levels are achieved. Additional advice is also provided with regards to internal acoustics within the space.

5.4 Further Calculations

Additional calculations are presented with regards to the expected internal noise level within the closest noise sensitive receptor properties, with comparison to the recommended internal noise levels presented in BS 8233:2014 (see Section 3.4.2).

With regards to the sound reduction performance offered by a partially open window, BS 8233:2014 states a reduction of 10-15dB attenuation from outside to inside.

Based on the assessment levels calculated above, expected internal noise levels would be as shown in the table below:

Receiver	BS 8233 Daytime Internal Noise Level dB(A)	Calculated Rating Level at 1m from Receptor Façade dB $L_{Aeq, T}$	Min. Attenuation Provided by Partially Open Window dB	Expected Internal Noise Level Within Receptor Property dB(A)
551A Oxford Rd	35	32	-10	22
1 Factory Place, Wilson Rd	35	23	-10	13

Table 12 Summary of expected internal sound level within receptor properties

The expected internal noise levels would be well below the recommended internal ambient noise level guidance of the recognised British Standard, further ensuring the amenity of the closest noise sensitive receptors.

6 NOISE MITIGATION MEASURES

6.1 External Building Fabric

Note that the only specific requirements with regards to the external building fabric are as follows:

- External walls should provide a minimum performance of R_w 50 dB.
- Windows should provide a minimum performance of R_w 36 dB.
- Trickle vents within the windows should provide a minimum performance of $D_{n,e,w}$ 40 dB.
- The roof should provide a minimum performance of R_w 45 dB.

Methods of achieving the above requirements are presented below for indicative purposes only.

6.1.1 External Walls

Example constructions that would be capable of achieving the performance noted above are presented in Table 13:

Construction Type	Description
Masonry	Solid Constructions: • 160mm min. solid brickwork. • 140mm min. solid concrete blockwork (density 1850-2250 kg/m³).
	Cavity Wall Constructions: • 100mm min. aerated concrete blockwork inner leaf (density 550-750 kg/m³), 100mm cavity with 50-75mm mineral wool insulation (density 40-48kg/m³), 100mm min. high density concrete blockwork outer leaf (density 1850-2250 kg/m³). • 100mm min. brickwork, 100mm cavity with 50-75mm mineral wool insulation (density 40-48kg/m³), 100mm min. brickwork.
Metsec Style System	• Internal wall lining formed from 2x15mm SoundBloc plasterboard, 100mm metal stud with 100mm mineral wool insulation (density 40-48kg/m³), 1x18mm sheathing board, cladding system fixed back to the sheathing board

Table 13 External wall examples capable of achieving a minimum performance of R_w 50 dB

6.1.2 Glazing

Noise breakout calculations have assumed a 4/12/6mm double glazing system that would achieve an overall performance of R_w 36 dB. The single octave band performance spectrum for the window system used for the calculations is shown in Table 14.

Glazing Type	Octave band centre frequency SRI, dB						R_w ($C;C_{tr}$)
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
4/12/6mm	24	21	33	41	44	41	36 (-2;-6)

Table 14 Glazing types and required glazing performances

6.1.3 Ventilation

Trickle vents will be installed within the windows providing a minimum acoustic performance of $D_{n,e,w}$ 40 dB to allow sufficient passive ventilation in accordance with Approved Document F.

In the case of overheating mitigation, it is understood that the building is to be cooled via the existing air conditioning systems.

6.1.4 Roof

A typical pitched roof system comprised of roofing tiles or slates, 50mm mineral wool insulation (density 45-48kg/m³) with a ceiling lining of 1x15mm Wallboard would comfortably achieve the minimum performance requirement of R_w 45 dB.

6.2 Internal Building Fabric

Note that the guidance presented within this section is provided as best practice and for indicative purposes only.

None of the measures below are required to achieve the resultant levels of noise breakout at the receptor properties and are presented to provide a good quality internal acoustic environment for the space.

6.2.1 Internal Partition / Moveable Partition

With regards to the separating partition proposed to divide the proposed extension into two spaces, the level of sound reduction required from the partition would depend on the level of privacy and sound insulation required from the partition.

Assuming a low level of separation and privacy is required, we would recommend a system that would offer a performance in the region of R_w 40 dB. In the case of a fixed partition, this could be achieved with the following construction:

- 70mm Gypframe 'C' Studs at 600mm centres with 1x12.5mm SoundBloc either side

In cases where a high level of separation and privacy is required, we would recommend a system that would offer a performance in the region of R_w 55 dB. In the case of a fixed partition, this could be achieved with the following construction:

- 70mm Gypframe 'C' Studs at 600mm centres with 2x15mm SoundBloc either side and 50mm mineral wool insulation (density 40-48kg/m³) between the studs

In the case of a moveable partition, we would recommend Style Partitions, who provide systems ranging from R_w 38-59 dB.

6.2.2 Reverberation Control

In order to ensure that reverberation is suitably controlled within the extension for the purposes of good speech intelligibility, we would recommend a reverberation time target of 0.8s.

Proposed solutions are presented below depending on the floor finish within the space:

Floor Type	Additional Absorption Recommended
Carpet	10-15m ² of Class A absorptive panels should be installed on the walls and/or suspended from the ceiling soffit
Vinyl	27m ² of Class A absorptive panels should be installed on the walls and/or suspended from the ceiling soffit
Hard Wood	25m ² of Class A absorptive panels should be installed on the walls and/or suspended from the ceiling soffit

Table 15 Absorption recommendations to achieve a 0.8s reverberation time within the proposed extension

7 CONCLUSION

ES Acoustics Ltd (ESA) have been commissioned to prepare a noise impact assessment in support of a planning application for a proposed extension to existing children's hall at RCCG Victory Church, 553 Oxford Road, Reading, RG30 1HL.

An environmental noise survey has been undertaken to establish background sound levels representative of the closest noise sensitive receptor locations relative to the proposed extension.

Based on the findings of the environmental noise survey and a review of relevant national planning policy, local planning policy and good practice documents, a suitable noise emissions criterion has been set to ensure that adverse impacts on health and quality of life are avoided.

Noise breakout calculations have been undertaken considering the worst-case source noise levels within the proposed extension to the closest noise sensitive receptor.

It has been concluded that the predicted levels of noise breakout from the proposed extension would meet the set noise criterion, ensuring no adverse impact upon the closest noise sensitive receptors. This assumes that the external building fabric constructions provide the level of sound insulation presented within this report.

Further calculations have demonstrated that internal noise levels within the receptor properties would be well below the recognised British Standard requirements.

ACOUSTIC TERMINOLOGY

Decibel scale - dB

The decibel (dB) is a relative unit of measurement used in acoustics. The dB is a logarithmic ratio between a measured level and a reference level of 0 dB (i.e the threshold of human hearing). Simply put, the decibel compresses the wide range of sounds we hear into more manageable numbers.

Addition of noise from several sources

Sound produced by multiple sound sources are added logarithmically e.g. power ratio of 2 = 3dB, power ratio of 10 = 10dB. Therefore, two equally intense sound sources operating simultaneously produce a sound level which is 3dB higher than a single source e.g. 60dB + 60dB = 63dB.

Subjective impression of noise

Human response to sound is highly individualized and often based on psychological factors such as emotion and expectation. Sensitivity to sound typically depends on the loudness, pitch, duration of the occurrence, and time of occurrence (e.g. a sound source could cause annoyance during the night where it would not during the day). The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level	Change in perceived loudness
1 dB	Imperceptible
3 dB	Just barely perceptible
6 dB	Clearly noticeable
10 dB	About twice as loud

'A' Weighted Frequency Filter - dB(A)

The human ear is not equally sensitive in all frequencies. The A-weighting filter was devised to take this into account when undertaking noise measurements and allows a sound level meter to replicate the human ears response to sound.

$L_{Aeq, T}$

Sound can fluctuate widely over a given period. L_{Aeq} is the A-weighted equivalent continuous sound level, with T denoting the time period over which the fluctuating sound levels were averaged e.g. $L_{Aeq, 16h}$ is the equivalent continuous noise level over an 16 hour period.

L_{A90}

A-weighted sound level exceeded for 90% of the measurement period, calculated via statistical analysis. The L_{A90} descriptor is typically used to establish background sound levels for noise impact assessments

L_{A10}

A-weighted sound level exceeded for 10% of the measurement period, calculated via statistical analysis.

L_{AFmax}

A-weighted sound level maximum sound pressure level that has been measured over a given time period

ACOUSTIC TERMINOLOGY

Octave Bands

The audio or frequency spectrum of the human ear is in the range of 20Hz to 20 kHz. The spectrum tells how the energy of the sound signal is distributed in frequency. Octave bands divides the audio spectrum into 10 equal parts. The International Standards Organisation defines the centre frequency of these bands as 31.5Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1kHz, 2kHz, 4kHz, 8kHz and 16kHz.

Noise Rating (NR) Curves

A method of rating noise using a set of curves relating octave band sound pressure levels. Typically used for building services systems within offices

Airborne sound

Sound radiated from a source into the surrounding air e.g. musical instruments, tv/radio, machinery/equipment. Airborne sound insulation refers to the reduction or attenuation of airborne sound, usually via a solid partition between a source and receiver.

Impact sound

Sound resulting from the impact between colliding objects, e.g. footfall impact upon a floor. Impact sound insulation refers to the resistance of a floor to the transmission of impact sound, typically via the installation of a 'resilient layer'

Flanking sound

The transmission of airborne sound between two adjacent rooms by paths other than via the separating partition between the rooms, e.g. the abutment point of a wall and floor.

Structure-borne noise

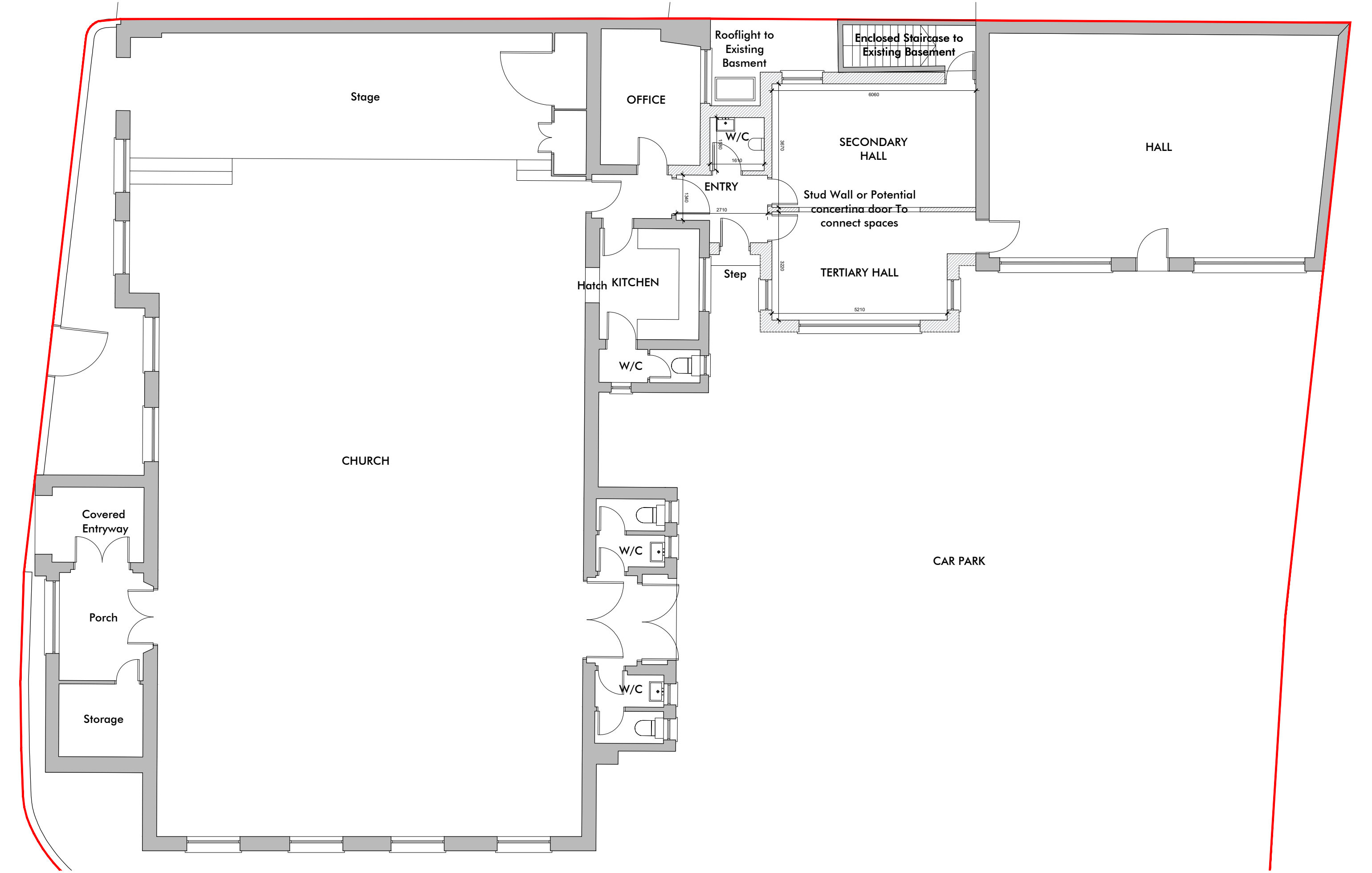
Noise caused by the vibration of elements of a structure. This can result in reradiated noise, whereby the vibrating element transmits airborne sound into a space e.g. vibration caused by mechanical plant installed within a plant room which is not adequately isolated from the structure, or construction/demolition work in an adjacent building.

Reverberant sound

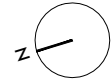
Sound in an enclosed space (usually a room), which results from repeated reflections at the boundaries. Reverberation time is the time taken for a steady sound level in an enclosed space to decay by 60dB, measured from the moment the sound source is switched off. A example of a typically reverberant space would be a classic church. Absorptive materials can be used to reduce reflections and reverberation times.

APPENDIX B

PROPOSED PLANS



Project Address: RCCG Victory at Reading, 553 Oxford Rd, Reading RG30 1HJ
Drawing Number: 2.VCR.P.01.A
Drawing Name: Proposed Ground Floor Plan - OPTION A
Scale: 1:100 @ A3

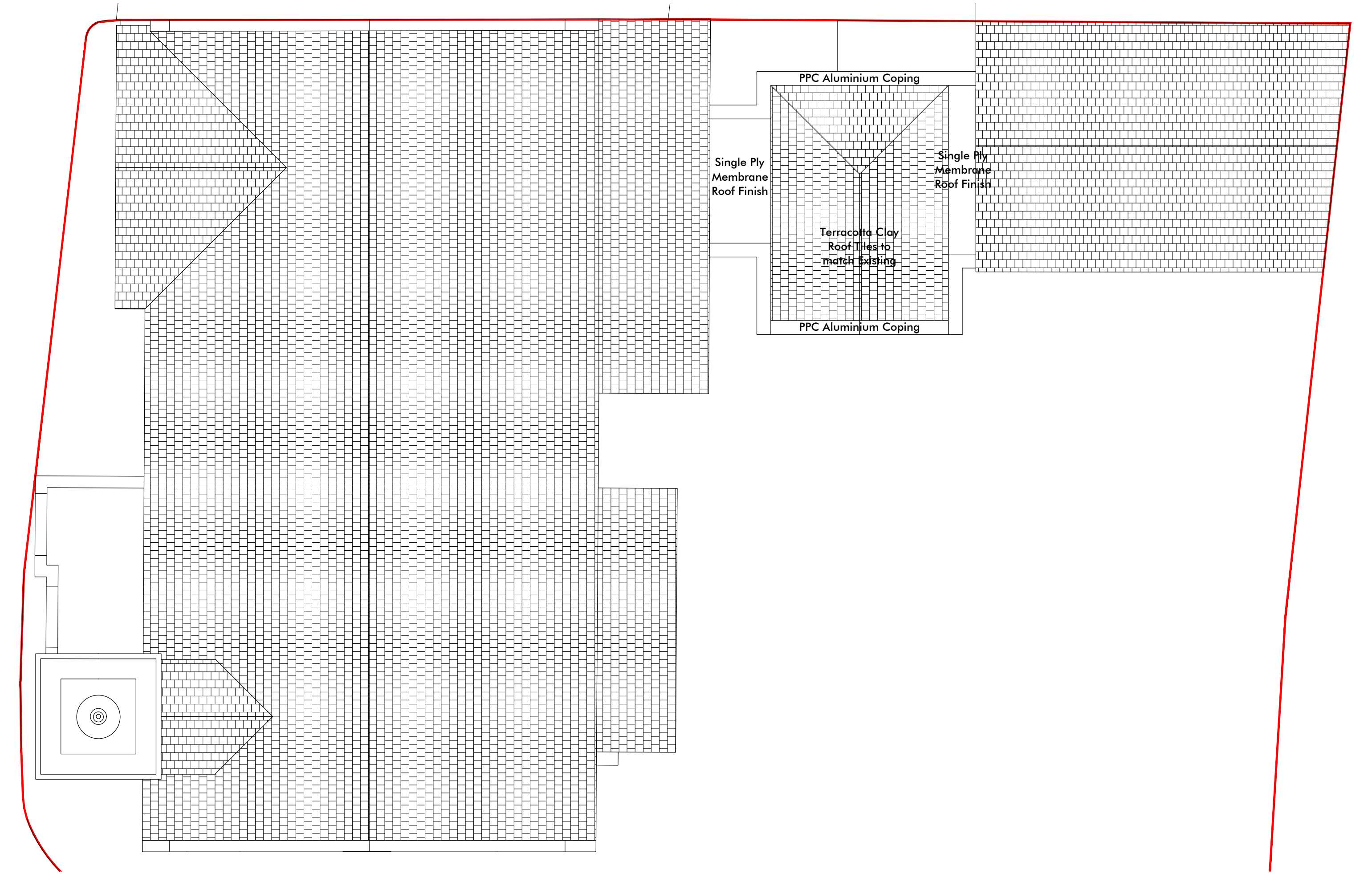


Rev.	Date	Description
-	23.09.23	Planning Pack

General Note -
The general contractor is responsible for the verification of all dimensions and levels on site prior to any construction or pricing works. The drawing author is to be informed immediately of any discrepancy. Figured dimensions take priority over scaled dimensions. Reliance on scaled dimensions is only appropriate for drawing and scaling purposes.

Pont + Wils Architects Ltd.
Email: oscar@pontwils.co.uk
Phone: 07833287819
Website: www.pontwils.co.uk
Address: 9 Scobell Close, Shinfield,
Reading, Berkshire, RG2 9HH





Project Address: RCCG Victory at Reading, 553 Oxford Rd, Reading RG30 1HJ
Drawing Number: 2.VCR.P.02
Drawing Name: Proposed Roof Plan
Scale: 1:100 @ A3



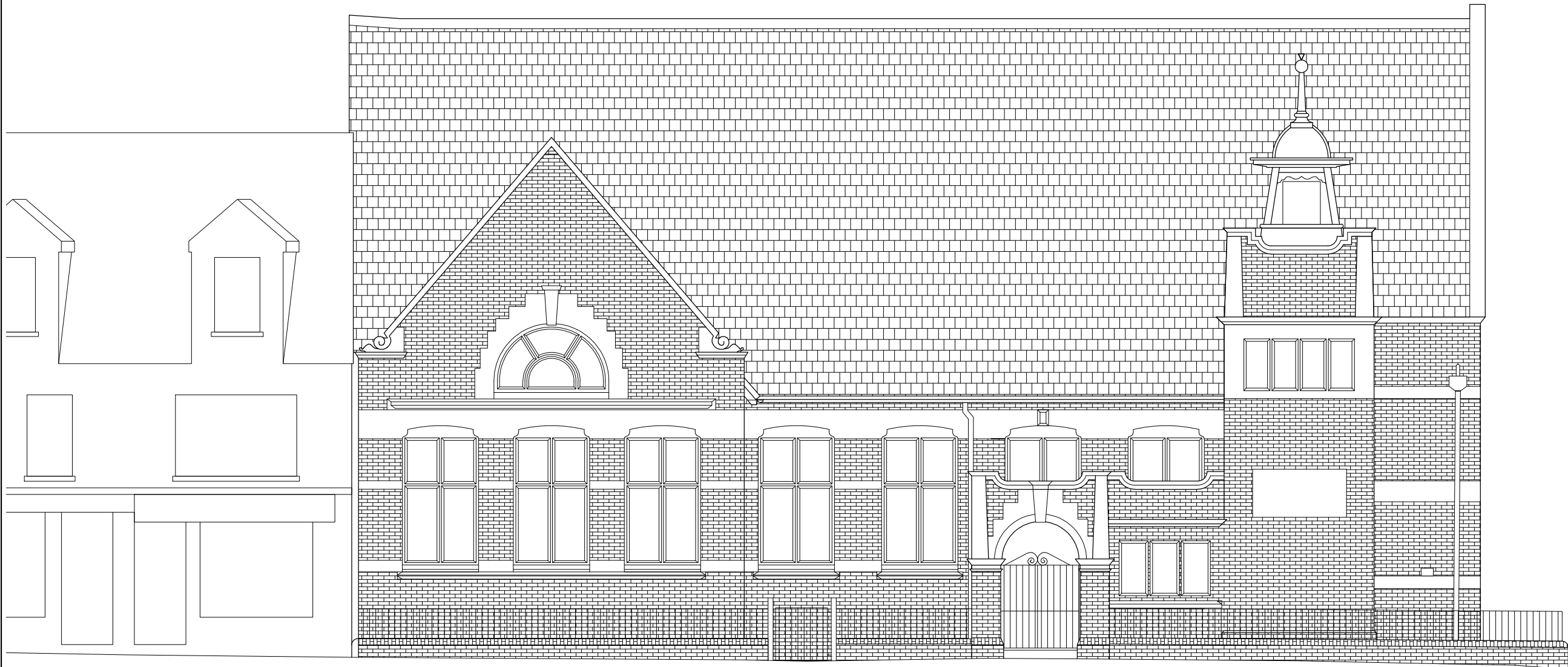
Rev.	Date	Description
-	23.09.23	Planning Pack

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PROPOSED NORTH ELEVATION

Project Address: RCCG Victory at Reading, 553 Oxford Rd, Reading RG30 1HJ
Drawing Number: 2.VCR.P.10
Drawing Name: Proposed North Elevation
Scale: 1:100 @ A3



Rev.	Date	Description
-	23.09.23	Planning Pack

General Note -
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PROPOSED WEST ELEVATION

Project Address: RCCG Victory at Reading, 553 Oxford Rd, Reading RG30 1HJ
Drawing Number: 2.VCR.P.11
Drawing Name: Proposed West Elevation
Scale: 1:100 @ A3



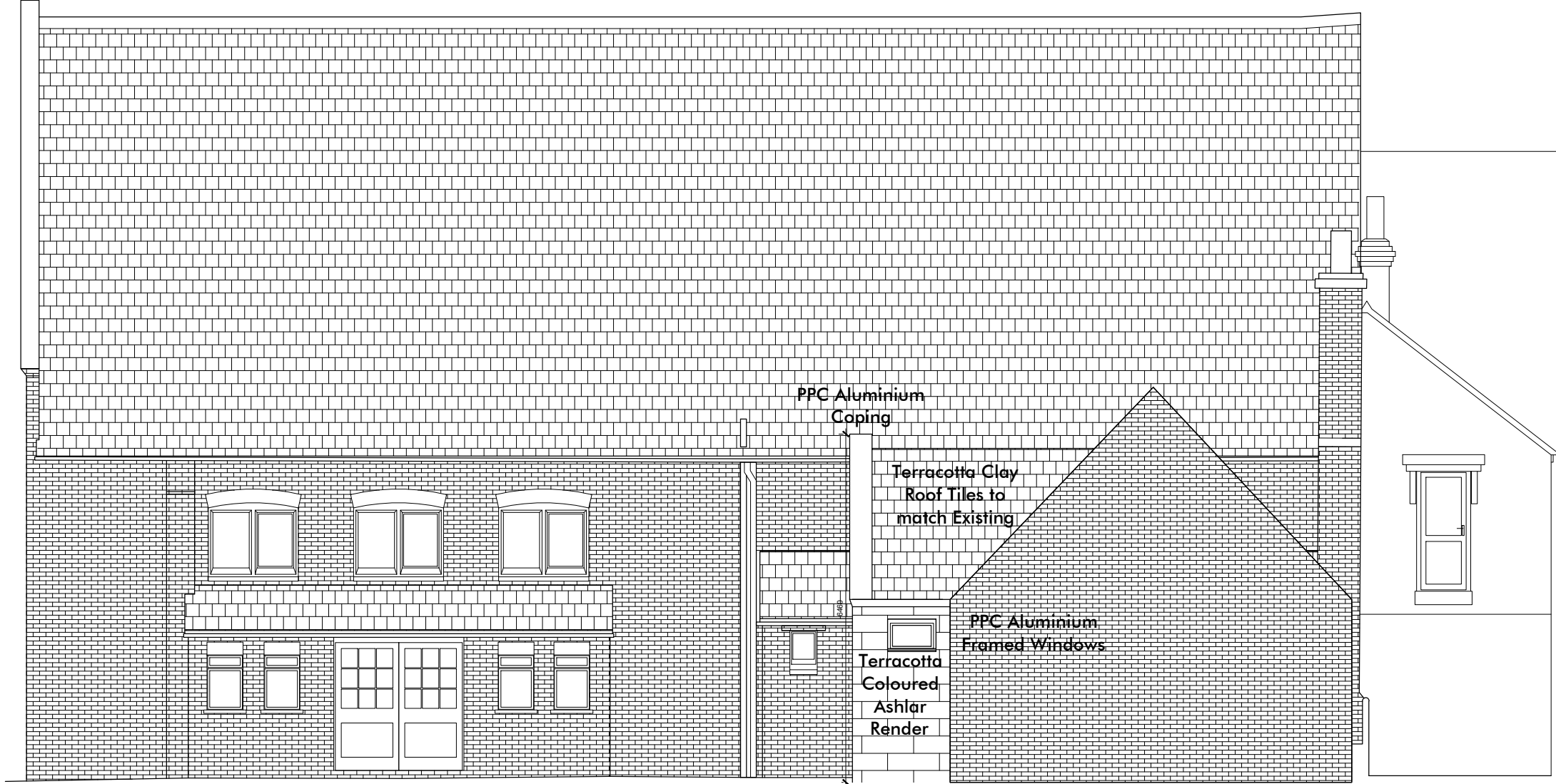
Rev.	Date	Description
-	23.09.23	Planning Pack

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PROPOSED SOUTH ELEVATION

Project Address: RCCG Victory at Reading, 553 Oxford Rd, Reading RG30 1HJ
Drawing Number: 2.VCR.P.12
Drawing Name: Proposed South Elevation
Scale: 1:100 @ A3



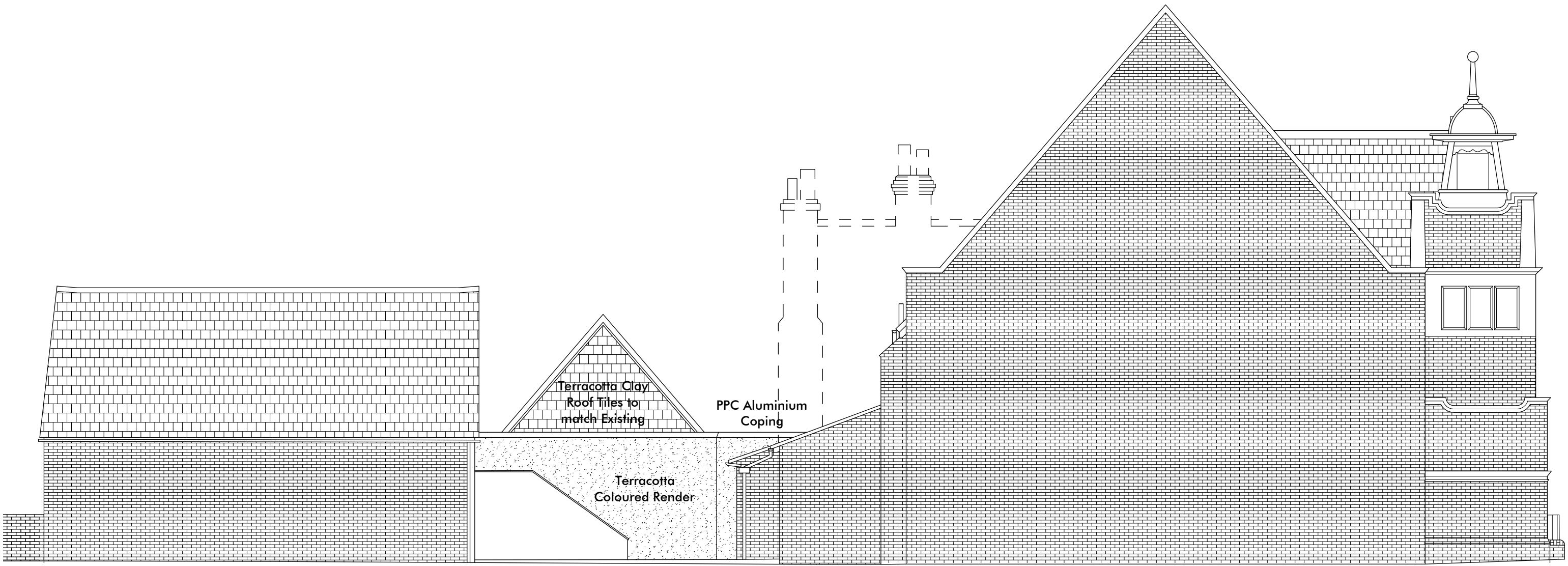
Rev.	Date	Description
-	23.09.23	Planning Pack

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PROPOSED EAST ELEVATION

Project Address: RCCG Victory at Reading, 553 Oxford Rd, Reading RG30 1HJ
Drawing Number: 2.VCR.P.13
Drawing Name: Proposed East Elevation
Scale: 1:100 @ A3



Rev.	Date	Description
-	23.09.23	Planning Pack

General Note -
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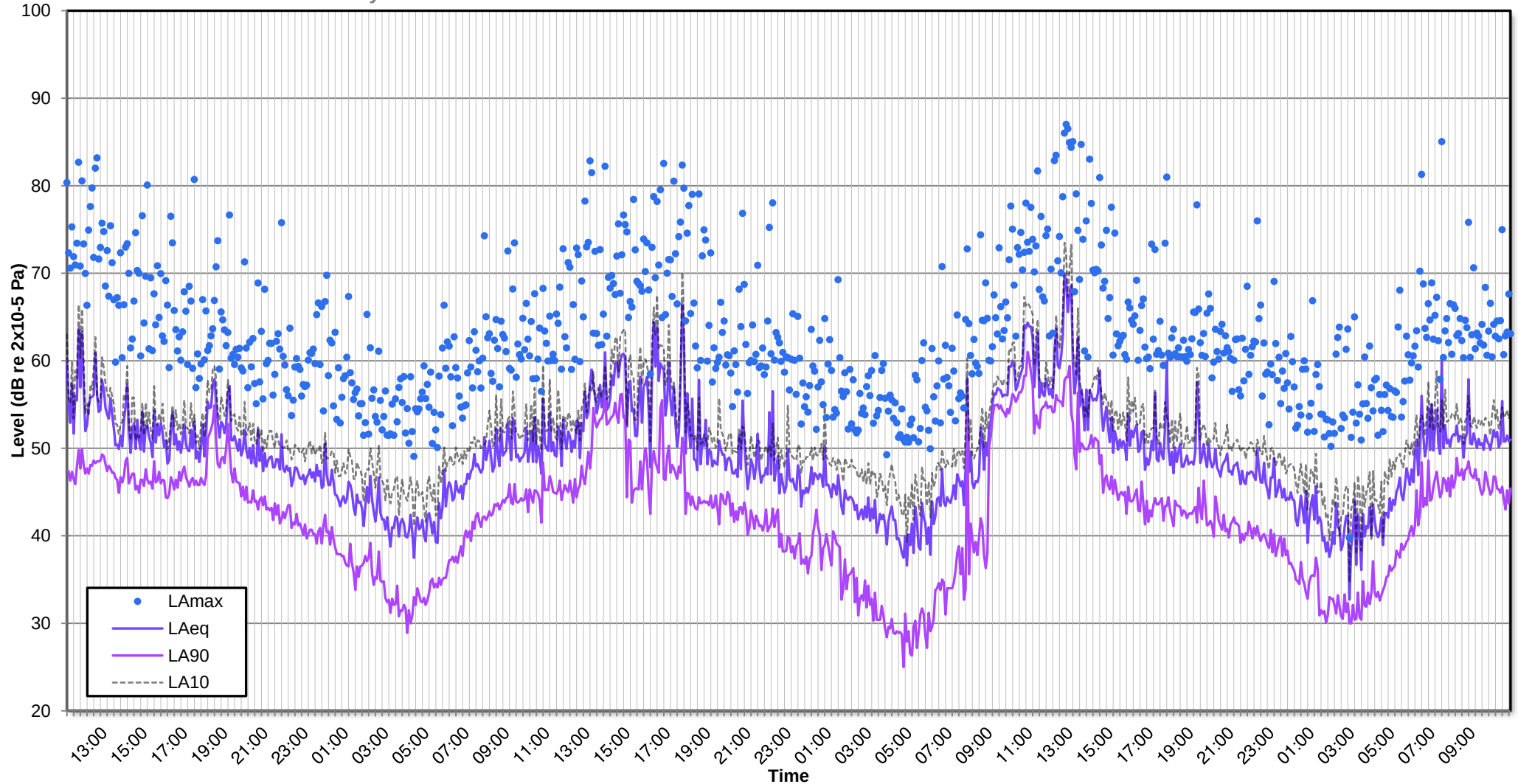
APPENDIX C1

ENVIRONMENTAL NOISE TIME HISTORY

20499.NIA-RPT.01

11:00 on 13th October to 11:00 on 16th October 2023

External Environmental Noise Survey



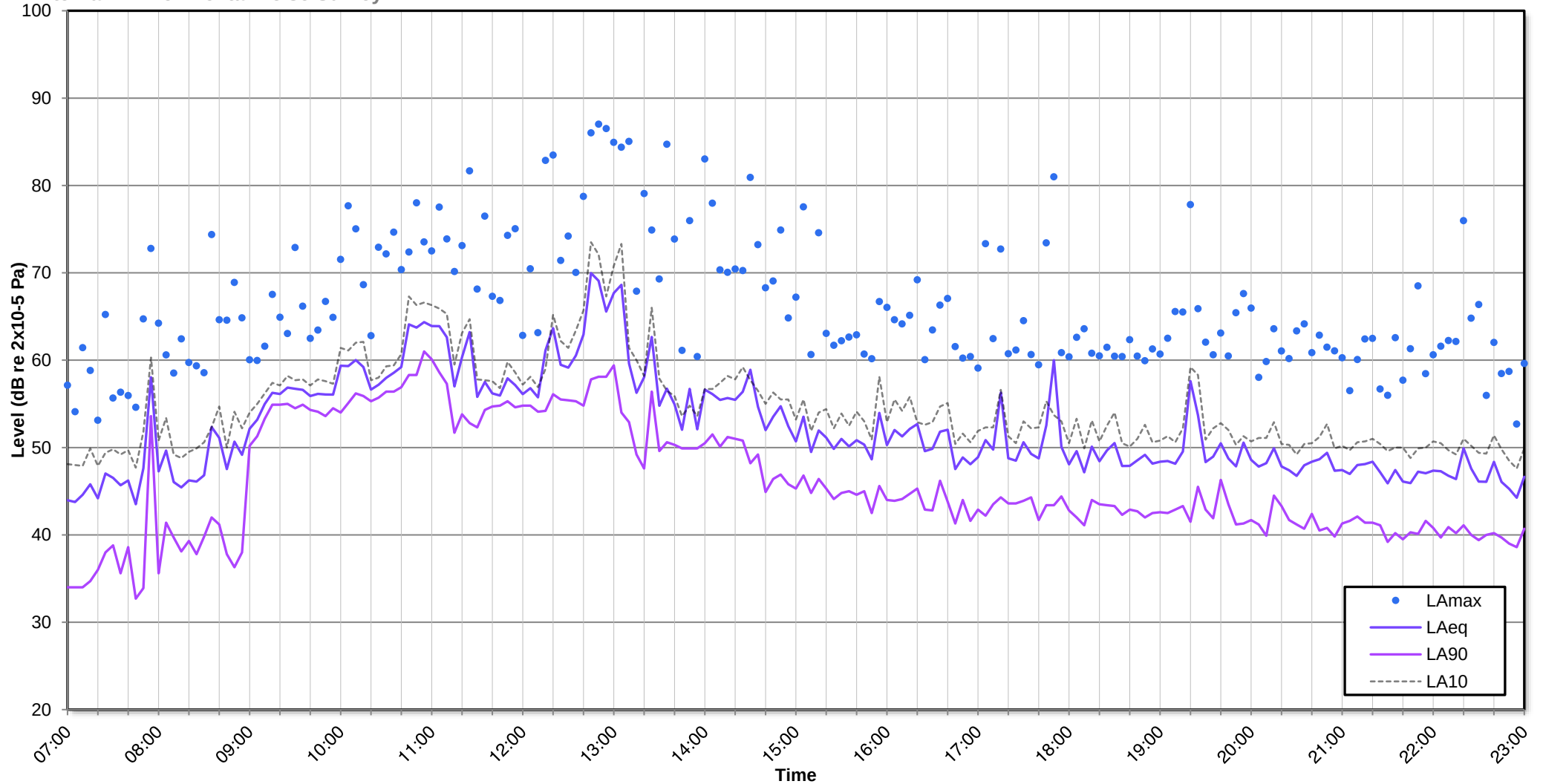
APPENDIX C2

ENVIRONMENTAL NOISE TIME HISTORY

20499.NIA-RPT.01

07:00 to 23:00 on 15th October 2023

External Environmental Noise Survey



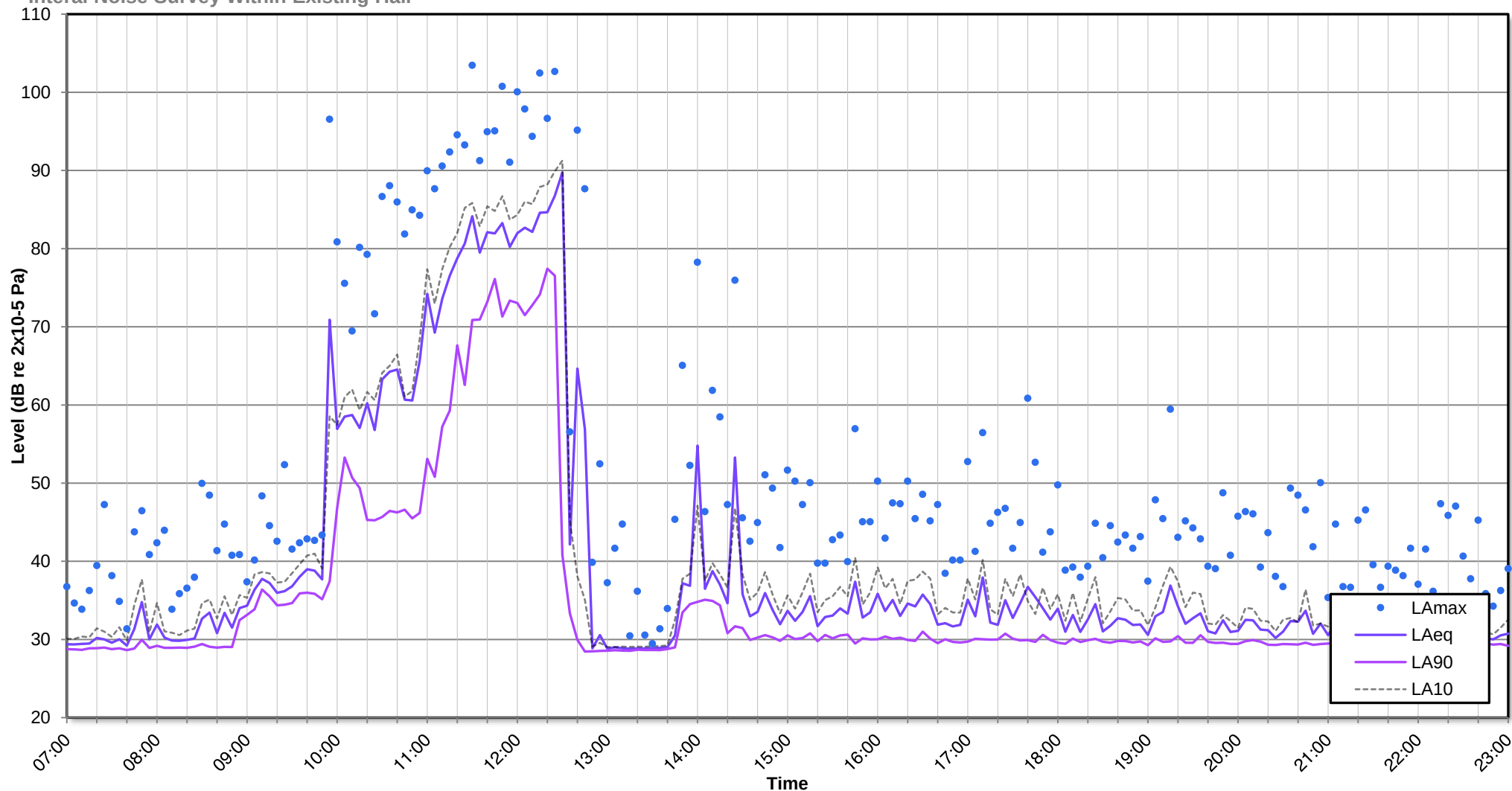
APPENDIX C3

INTERNAL NOISE TIME HISTORY

20499.NIA-RPT.01

07:00 to 23:00 on 15th October 2023

Internal Noise Survey Within Existing Hall



APPENDIX D

NOISE BREAKOUT CALCULATIONS

The sound pressure level in the at the closest receptor ($L_{p,out}$) is calculated using:

$$L_{p,out} = L_{p,in} + TL + 10 \log_{10}(S) - 20 \log_{10}(R) - 14$$

where

$L_{p,in}$ is the reverberant sound pressure level within the source room, dB

TL is the sound reduction of the external façade element

S is the surface area of the external façade element

R is the distance from the external façade element to the closest receptor façade

This calculation assumes hemispherical radiation and point source, and so is only valid for distances greater than 3 times the major source dimension. As the closest receptor properties would be less than 3 times the major source dimension, a correction of $10 \log(R)$ would be applied instead.

Note that any additional acoustic propagation factors, such as screening provided by a boundary wall, should be added to the above calculation as required.

Reference: Acoustics, Noise and Buildings (Fourth Edition), Parkin, Humphries and Cowell, p238

Calculation of noise breakout via east façade of the proposed extension to closest receptor property at 1 Factory Place, Wilson Road (rear façade)			
External Building Fabric Details:			
Element:	West Façade	Façade Description:	Approx. 340mm external wall with a window facing onto the boundary wall separating 553 and 551 Oxford Road.
Area of Element, m ² :	27.9		
Distance from Façade to Receptor, m:	12		

	Octave Band Centre Frequency, dB							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
$L_{p,in}$ Reverberant sound pressure level in proposed extension	48	60	67	79	82	77	56	48
TL Composite sound level reduction provided by west façade	-21	-24	-21	-33	-41	-44	-41	-45
$10 \log(S)$ Correction for area of west façade	14	14	14	14	14	14	14	14
$20 \log(R)$ Attenuation provided by distance	-22	-22	-22	-22	-22	-22	-22	-22
-14	-14	-14	-14	-14	-14	-14	-14	-14
Attenuation provided by the building envelope	-5	-5	-5	-5	-5	-5	-5	-5
Reflection at the receptor façade	3	3	3	3	3	3	3	3

Calculated sound pressure level at receptor façade									
Assessment Location	Overall dB(A)	Linear dB at Octave Band Centre Frequency							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
1m from the façade of the receptor	23	4	13	23	23	18	10	-8	-20
Within the receptor property	13	-6	3	13	13	8	0	-18	-30

Calculation of noise breakout via east façade of the proposed extension to closest receptor property at 551A Oxford Road			
External Building Fabric Details:			
Element:	East Façade	Façade Description:	Approx. 340mm external wall with a large window facing west.
Area of Element, m ² :	27.9		
Distance from Façade to Receptor, m:	4		

	Octave Band Centre Frequency, dB							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
$L_{p,in}$ Reverberant sound pressure level in proposed extension	48	60	67	78	81	76	56	48
TL Composite sound level reduction provided by west façade	-21	-24	-21	-33	-41	-44	-41	-45
$10 \log(S)$ Correction for area of west façade, dB	14	14	14	14	14	14	14	14
$20 \log(R)$ Attenuation provided by distance	-12	-12	-12	-12	-12	-12	-12	-12
-14	-14	-14	-14	-14	-14	-14	-14	-14
Attenuation provided by boundary wall and building envelope, dB	-5	-5	-5	-5	-5	-5	-5	-5
Reflection at the receptor façade	3	3	3	3	3	3	3	3

Calculated sound pressure level at receptor façade									
Assessment Location	Overall dB(A)	Linear dB at Octave Band Centre Frequency							
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
1m from the façade of the receptor	32	13	22	32	31	26	18	1	-11
Within the receptor property	22	3	12	22	21	16	8	-9	-21