Bloc [Consulting]

Yiewsley Housing, Former Pool and Library Sites, Yiewsley
Noise Impact Assessment

26770REP-1A

The consultancy guidance provided in this report relates only to acoustic considerations, and no account has been taken by Bloc Consulting of considerations relating to other disciplines. It is the responsibility of the design team to consider any other considerations that may arise, including, but not limited to, structural or fire engineering.

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i Document History

Version	Title	Date	Created by	Authorised by
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1 Introduction

Bloc Consulting has been appointed by the London Borough of Hillingdon to provide a noise impact assessment in respect of proposed residential properties on the sites of Yiewsley Library, Yiewsley High Street, and the former pool site to the rear of Otterfield Road, Yiewsley.

It is understood that the proposed developments consist primarily of residential properties between three and six storeys in height.

This report discusses the following acoustic aspects:

- The noise climate in the vicinity of the building, determined by on-site surveys
- Assessment of external noise intrusion using the obtained data, with derivation of sound reduction performances to meet internal noise criteria
- Commentary on the effects of the noise climate on ventilation
- External noise criteria for the installation of related building services equipment.

Note that a glossary of acoustic terms is available on our website.

2 Local Authority Requirements

2.1 London Borough of Hillingdon UDP, 2007

The Unitary Development Plan (UDP) for the London Borough of Hillingdon sets out the saved policies for development within the Borough and addresses a number of different planning considerations. The policies identified that relate to this particular development have been reproduced here.

Policy OE1:

> *"Planning permission will not normally be granted for uses and associated structures which are, or are likely to become, detrimental to the character or amenities of surrounding properties or the area generally, because of:*
>
> *[...]*
>
> *(iv) noise and vibration or the emission of dust, smell or other pollutants,*
>
> *Unless sufficient measures are taken to mitigate the environmental impact of the development and ensure that it remains acceptable."*

Policy OE5:

> *"Proposals for the siting of noise sensitive developments such as family housing, schools or certain forms of commercial activity where the occupiers may suffer from noise or vibration will not be permitted in areas which are, or are expected to become, subject to unacceptable levels of noise or vibration. Where development is acceptable in principle, it will still be necessary to establish that the proposed building or use can be sited, designed, insulated or otherwise protected from external noise or vibration sources to appropriate national and local standards."*

The UDP also states that "*London Plan Policy 4A.14 Reducing Noise and its supporting text to be used (instead of Policy OE4). Other relevant Documents: Planning Policy Guidance Note 24 Noise (2006) and Hillingdon's Supplementary Planning Document Noise (2006) to be used.*"

2.2 SPD *Noise*, London Borough of Hillingdon, 2006

The Supplementary Planning Document *Noise* sets out approaches to the assessment of various considerations of noise, depending on the type and situation of the development that is proposed.

In this case, the primary considerations are the effects of existing sources of noise on future occupants of the proposed buildings, and the amenity of the noise sensitive receptors in the vicinity of the proposed development.

Key point 1 of the SPD refers to general considerations for the siting of residential developments. Table 1 in the document reproduces the A to D noise exposure categories from the now superseded Planning and Policy Guidance document, PPG 24. This is reproduced in Table 1.

Key Point 4 of the SPD discusses residential amenity and provides objective criteria that are based on a number of statutory standards. It is noted that the criteria for 'indoor living areas' are expected to be achieved with windows open. Table 2 of the SPD is reproduced in Table 2.

Key Point 6 discusses 'industrial uses'. While this may not directly relate to the proposed development, it is relevant in setting a criterion for the assessment of external noise emissions from building services equipment. It states that:

> "[...] *the development should be controlled such that the rating level of the noise from the proposed development determined according to BS4142 is at least 5 dB below the*

background noise level $L_{A90,T}$. Ideally, the assessment of noise should give a positive indication that complaints are unlikely."

Table 1: Noise exposure categories for new dwellings near existing noise sources

Noise Exposure Categories	Times (hrs)	$L_{Aeq,T\ dB}$ Road	$L_{Aeq,T\ dB}$ Rail	$L_{Aeq,T\ dB}$ Aircraft	Mixed Sources $L_{Aeq,T\ dB}$	Advice
A	07:00 – 23:00	< 55	< 55	< 57	< 55	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
	23:00 – 07:00	< 45	< 45	< 48	< 45	
B	07:00 – 23:00	55 – 63	55 – 66	57 – 66	55 – 63	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise to meet the Council's recommended outdoor and indoor noise levels.
	23:00 – 07:00	45 – 57	45 – 59	48 – 57	45 – 57	
C	07:00 – 23:00	63 – 72	66 – 74	66 – 72	63 – 72	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise to meet the Council's recommended outdoor and indoor noise levels.
	23:00 – 07:00	57 – 66	59 – 66	57 – 66	57 – 66	
D	07:00 – 23:00	> 72	> 74	> 72	> 72	Planning permission should normally be refused.
	23:00 – 07:00	> 66	> 66	> 66	> 66	

Source: Derived from PPG24, 1994

Table 2: Residential noise criteria (from table 2, SPD Noise)

		Recommended Noise Level (dB)
Daytime Noise (07:00 - 23:00)	Outdoor living areas	As low as practicable, and < 50 $L_{Aeq,T}$ *(free field)
	Indoor living areas	< 35 $L_{Aeq,T}$ *
Night-time Noise (23:00 - 07:00)	Outside bedroom windows	< 45 $L_{Aeq,T}$ *(façade) < 60 L_{AFmax} (façade)
	Inside bedrooms	< 30 $L_{Aeq,T}$ * < 45 L_{AFmax}

Notes to table: Source: Derived from BS8233:1999 and "Guidelines for Community Noise", World Health Organisation, 1999 * Time base T should be appropriate for the circumstances, typically 1 hour day and 5 minutes night

This has been understood to imply that a criterion of 5 dB below the background sound level is acceptable, but it is preferred that 10 dB below is achieved where possible, according to the assessment method provided in BS 4142.

3 Relevant Standards and Guidance

The following primary guidance and standards have been considered in the preparation of this document:

- National Policy Statement for England (NPSE), 2010
- British Standard (BS) 8233:2014 *Guidance on sound insulation and noise reduction for buildings*
- *BS 4142:2014+A1: 2019 Methods for rating and assessing industrial and commercial sound*
- ProPG: *Planning & Noise*, 2017
- Association of Noise Consultants (ANC) *Acoustics Ventilation and Overheating Residential Design Guide*, 2020
- National Planning Policy Framework (NPPF), 2021

3.1 National Policy Statement for England (NPSE)

The Noise Policy Statement for England was published in March 2010 and provides the overarching statement of noise policy for England applying to all forms of noise other than occupational noise, and setting out the long-term vision of Government noise policy which is to:

> "*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*."

This vision 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 Explanatory Note issued alongside the NPSE has introduced three observed effect level (OEL) definitions to the assessment of noise in England, to identify and rate noise impact on the community from any proposed development:

- NOEL – No Observed Effect Level: This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.
- LOAEL – Lowest Observable Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.

The note also explains the term 'other adverse impacts' as follows:

"[…] *refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur*."

It should be noted that no specific noise limits for LOAEL and SOAEL are defined in the document; however, guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

In addition, BS 8233:2014 Note 4 states that:

> *"[…] regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F, depending on the character and number of events per night."*

However, a specific maximum L_{AFmax} value is not given by BS 8233:2014.

3.2 British Standard (BS) 8233:2014

British Standard BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* provides guidance in relation to acceptable levels of noise within buildings of different types, based on World Health Organisation (WHO) guidelines.

Guidance in BS 8233 can be used in the design of the building façade to reduce external noise to appropriate internal levels internally.

BS 8233:2014 recommends ambient noise levels in living accommodation, as outlined in Table *3* with the accompanying text:

> *"In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4 [of BS 8233]."*

Table 3: Indoor ambient noise criteria for dwellings (Table 4 of BS 8233: 2014)

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	45 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.3 British Standard (BS) 4142: 2014+A1: 2019

BS 4142:2014+A1: 2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) describes a method for assessing the likelihood of complaints from noise sources that are of an industrial nature (e.g. fans, pumps, chillers, air handling units etc.). The assessment methodology is based upon determining a 'rating level' for the equipment being assessed, which is the level of noise from the item or items of plant being assessed (expressed as a rating level $L_{Ar,Tr}$).

- The rating level is then compared with the underlying measured $L_{A90,T}$ background noise level in the absence of noise from the item or items of plant being assessed. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context of the installation site (rural or urban, etc.).
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant 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, depending on the context.

BS 4142 states that a correction should be added for any plant which gives rise to noise features that may increase disturbance such as tonal, impulsive or intermittent characteristics. With respect to the acoustic feature correction, BS 4142 states that:

> "*Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level.*"

3.4 ProPG: Planning & Noise

ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise jointly published by the Institute of Acoustics, ANC (Association of Noise Consultants) and Chartered Institute of Environmental Health (CIEH) in May 2017 provides guidance for assessment of noise affecting new residential developments. It draws on existing guidance, including BS 8233 as outlined previously.

In relation to maximum noise events ProPG: states:

> *"In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual events do not normally exceed 45 dB L_{AFmax} more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also factors such as the source, number, duration, predictability and regularity of noise events."*

3.5 National Planning Policy Framework

The NPPF set out the Government's planning policy for England. The NPPF states, with respect to noise that:

> *"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* [...]"

3.6 Association of Noise Consultants (ANC) AVO Guide

Where natural ventilation is to be employed to provide rapid ventilation for the relief of overheating (i.e. not solely for the short-term expulsion of fumes as required by Approved

Document F), noise levels external to the development are to be taken in to consideration to determine the resultant internal noise levels when windows are open. Should internal noise levels be excessive when natural ventilation is in use, occupants will then have to make the decision to either overheat or be to subjected to noise.

Table 4: Internal ambient noise level outcomes assessment matrix (from ANC Acoustics Ventilation and Overheating Residential Design Guide)

Internal ambient noise level			**Examples of outcomes**	
$L_{Aeq,T}$ during 07:00-23:00	**$L_{Aeq,8h}$ during 23:00-07:00**	**Individual noise events during 23:00-07:00**		
> 50 dB	> 42 dB	Normally exceeds 65 dB L_{AFmax}	Noise causes a material change in behaviour e.g., having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. 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.
Increasing noise level			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g., turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time.
≤ 35 dB	≤ 30 dB	Do not normally exceed L_{AFmax} 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	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 perceived change in the quality of life.

The ANC published a guidance document in January 2020 titled *Acoustics Ventilation and Overheating Residential Design Guide* that is available for download from their website. The guidance in the document seeks to provide an objective method with which to assess the impact of external noise levels on the relief of overheating strategy and is based on previous work within the industry.

The information in Table 4 has been extracted from the ANC Guide and details the derived risk levels on the basis of an open window rapid ventilation strategy.

The assessment of external noise intrusion to internal spaces through has assumed side hung type glazing arrangements that is operable by occupants, and that provides 15 dB reduction from outside to inside when open.

Assessment of the risk of noise disturbance to occupants with the use of the relief of overheating strategy as outlined above has been carried out in accordance with the 'observed effect level' system as described in the Noise Policy Statement for England (NPSE).

3.7 Proposed OEL Assessment Criteria

Consideration has been given to the various Local Authority and UK standards and guidance, and assessment criteria have been derived and provided in Table 5, relating to the 'observable effect level' system from the NPSE.

These criteria have been used in the assessment of the external noise results from the surveys, and in considering the expected internal noise levels within the development.

Table 5: Proposed LOAEL and SOAEL values for proposed dwellings, relating to road traffic as the dominant noise source or mixed sources

Assessment location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
Outdoor living space (free-field)	Day	<50 dB $L_{Aeq,16hour}$	50 dB to 55 dB $L_{Aeq,16hour}$	>55 dB $L_{Aeq,16hour}$
Outside living room (façade)	Day	<50 dB $L_{Aeq,16hour}$	50 dB to 72 dB $L_{Aeq,16hour}$	>72 dB $L_{Aeq,16hour}$
Outside dining room window (façade)	Day	<55 dB $L_{Aeq,16hour}$	55 dB to 72 dB $L_{Aeq,16hour}$	>72 dB $L_{Aeq,16hour}$
Outside bedroom window (façade /	Day	<50 dB $L_{Aeq,16hour}$	50 dB to 72 dB $L_{Aeq,16hour}$	>72 dB $L_{Aeq,16hour}$

Assessment location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAEL (Red)
free field	Night	<45 dB $L_{Aeq,8hour}$	45 dB to 66 dB $L_{Aeq,8hour}$	>66 dB $L_{Aeq,8hour}$
Inside a living room	Day	<35 dB $L_{Aeq,16hour}$	35 dB to 45 dB $L_{Aeq,16hour}$	>45 dB $L_{Aeq,16hour}$
Inside a dining room	Day	<40 dB $L_{Aeq,16hour}$	40 dB to 45 dB $L_{Aeq,16hour}$	>45 dB $L_{Aeq,16hour}$
Inside a bedroom	Day	<35 dB $L_{Aeq,16hour}$	35 dB to 45 dB $L_{Aeq,16hour}$	>45 dB $L_{Aeq,16hour}$
	Night	<30 dB $L_{Aeq,8hour}$ <42 dB L_{AFmax}	30 dB to 40 dB $L_{Aeq,16hour}$ 42 dB to 73 dB L_{AFmax}	>40 dB $L_{Aeq,8hour}$ >73 dB L_{AFmax}

4 Site Description

The proposed development is spread across two sites adjacent to Yiewsley Recreation Ground in the London Borough of Hillingdon, as individually described in sections 4.1 and 4.2 below.

The site plan in Figure 1 details the proposed development locations in their local context adjacent to Yiewsley Recreation Ground.

Figure 2 shows the site within the wider context of the southern portion of the Borough of Hillingdon, with Heathrow Airport located approximately 4.5 km to the south.

Relevant major noise sources are highlighted in red.

4.1 Site 1: Yiewsley Library Site

Yiewsley Library is a rectangular plot located on the corner of Falling Lane (A408) and Yiewsley High Street, which respectively run along the north and west site boundaries. Yiewsley Recreation Ground borders the site to the east and south. In addition to this, the George & Dragon public house and its car park border the south-west corner of the site. The site is currently occupied by the two storey Yiewsley Library and adjoining car park. These are scheduled to be demolished to make way for the proposed development.

The nearest noise sensitive properties to this development site have been identified as the nearby properties on the north side of Falling Lane.

Road traffic at traffic light-controlled junction of Falling Lane (A408), High Road (A408), Yiewsley High Street, and Trout Road was identified as the dominant noise source at this site.

During the attended survey period, the following additional noise sources were observed:

- Frequent (approximately every 5 minutes) buses arriving at and departing from the bus stop immediately adjacent to the site on Yiewsley High Street
- Loading and unloading from small to medium goods vehicles
- Pedestrians
- Vehicle horn use by motorists.

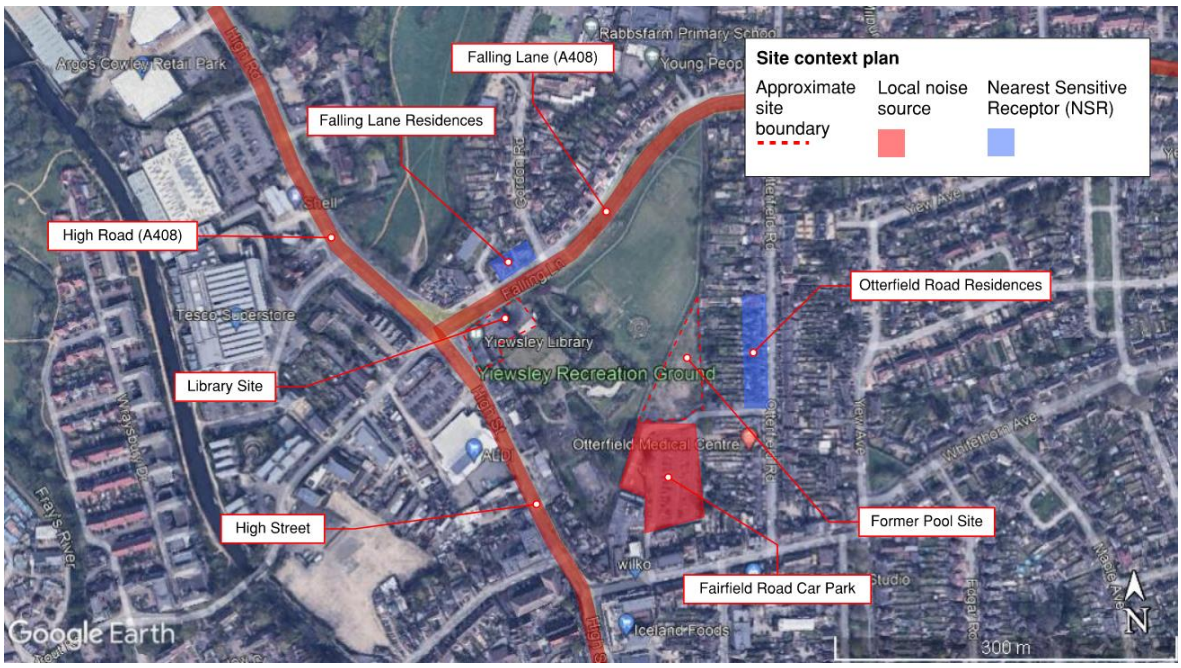

Figure 1: Site context plan (local)

4.2 Site 2: Former Pool Site

The former pool site is a roughly triangular plot located to the rear of residential properties on Otterfield Road. The rear gardens of these properties border the site to the east. To the south, the site is bounded by the Fairfield Road car park, and to the east by Yiewsley Recreation Ground. The site was empty at the time of the surveys.

The nearest noise sensitive properties to this development site have been identified as the nearby properties on Otterfield Road.

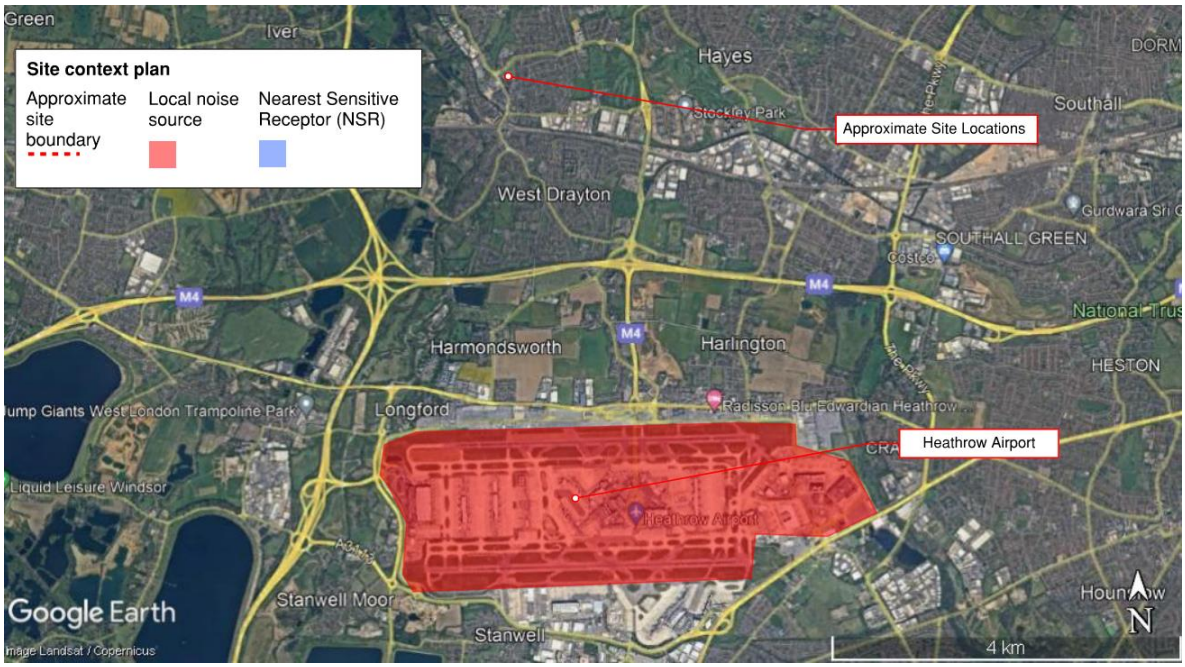

Figure 2: Site context plan (wide)

Dominant noise sources contributing to the background noise levels at this site include vehicle movements in the Fairfield Road car park adjacent to survey position C, road traffic on Falling Lane (A408) approximately 125m distant across Yiewsley Recreation Ground from survey position D, and aircraft noise from take-off, landing, and ground operations at Heathrow Airport clearly audible at both positions.

During the attended survey period, the following additional noise sources were observed:

- HGV deliveries to the rear of the Wilko store via Otterfield Road and the Fairfield Road car park (Arrival at 14:29, departure at 15:34)
- Pedestrians
- Light traffic from Fairfield Road, shielded by buildings
- Railway traffic approximately 500 m to the south
- Emergency services siren at 16:01
- Youths racing mopeds around the Fairfield Road car park between 16:54 and 17:00.

5 Site Sound Survey

Attended site sound surveying has been conducted by Bloc Consulting over two days and one night. Unattended long-term monitoring would have been preferred, but there was a lack of a suitable secure location in which to install the equipment.

Sound levels were measured using the equipment shown in Table 6. Calibration certificates for all equipment can be seen in Appendix 2.

Table 6: Equipment used, attended measurements

Manufacturer	Equipment	Type Number	Serial Number
Svantek	Sound Level Meter	977A	92147
Svantek	Calibrator	SV33B	100012

Calibration checks were carried out both before and after the measurements with no significant variance observed (< 0.5 dB).

Noise measurements were recorded in:

- Broadband A-weighted indices
- Zero-weighted third-octave band levels for maximum and average levels

The microphone was fitted with an outdoor weatherproof windshield, attached to a tripod, and with a capsule height of approximately 1.2 m.

Measurements were carried out in three five-minute periods at each position, totalling 15 minutes at each position. Measurements were rotated between each position for the whole of each survey period.

5.1 Attended Measurements at Positions A and B (Library Site)

Attended measurements were carried out at positions A and B adjacent to the library site between 13:45 and 17:00 on Tuesday 21st December 2021.

- Position A was located on Falling Lane (A408) adjacent to the entrance to the existing library car park
- Position B was located on Yiewsley High Street at the south-west corner of the existing library building.

Figure 3: Library site survey plan

Photographs of the sound level meter at positions A and B are shown in Appendix 3.

The site plan in Figure 3 shows the positions used in the first survey.

Measurements were made in accordance with BS 7445.

The attended measurements were carried out over a three-hour period during the day between 10:00 and 17:00. This allowed for calculation in accordance with the CRTN (Calculation of Road Traffic Noise) 'shortened method' of long-term day and night-time metrics.

The CRTN shortened measurement method involves taking traffic noise measurements ($L_{A10,T}$) over representative time periods within any three consecutive hours between 10:00 and 17:00. By using the $L_{A10,3hour}$, as the arithmetic mean of the measured $L_{A10,T}$ values, the $L_{A10,18hour}$ value can then be calculated; CRTN states that '$L_{A10,18hour}$ = $L_{A10,3hour}$, - 1dB(A)'. The $L_{A10,18hour}$ values have then been converted into the equivalent $L_{Aeq,16hour}$ values by subtracting 2.2 dB from the $L_{A10,18hour}$ for use in the subsequent assessment.

Note that there is no shortened method for night-time assessments. However, the day and night variations can be obtained using the calculation method provided in the Transport Research Laboratory (TRL) document *Converting the UK traffic noise index $L_{A10,18hour}$ to EU noise indices for noise mapping*. For non-motorway roads, the calculations are as follows:

L_{day} = 0.95 x $L_{A10,18hour}$ + 1.44 dB

$L_{evening}$ = 0.97 x $L_{A10,18hour}$ – 2.87 dB

L_{night} = 0.90 x $L_{A10,18hour}$ – 3.77 dB

Measurement positions were rotated between positions A and B for the full duration of survey period.

Measurements were undertaken in free-field conditions.

Weather conditions during the attended survey were dry and overcast. The maximum windspeed recorded during the survey period was 2.8 ms^{-1} measured using a hand-held anemometer. The maximum and minimum ambient temperatures were 11°C and 6°C.

5.2 Attended Measurements at Positions C and D (Former Pool Site)

Attended measurements were carried out at positions C and D adjacent to the former pool site between 13:51 and 17:00 on Wednesday 22nd December 2021.

- Position C was located in the Fairfield Rd car park approximately 5 m south of the site boundary
- Position D was located in Yiewsley Recreation Ground approximately 10 m west of the site boundary.

Photographs of the sound level meter at positions C and D are shown in Appendix 3.

The site plan in Figure 4 show the positions used in the second survey.

Measurements were made in accordance with BS 7445.

The attended measurements were carried out over a three-hour period during the day between 10:00 and 17:00. This allowed calculation in accordance with the CRTN (Calculation of Road Traffic Noise) 'shortened method' of long-term day and night-time metrics, using the same procedure outlined in section 5.1.

Figure 4: Former pool site survey plan

- Attended measurements were carried out at positions C and D adjacent to the former pool site between 13:51 and 17:00 on Wednesday 22nd December 2021.

Measurements were undertaken in free-field conditions.

Weather conditions during the attended survey were dry and overcast. The maximum wind speed recorded during the survey period was 2.3 ms^{-1} measured using a hand-held anemometer. The maximum and minimum ambient temperatures were 11°C and 5°C.

5.3 Attended Night-time Measurements at Positions A and C

Additional measurements were carried out to obtain noise levels in the night period on Monday 10th/Tuesday 11th January 2022. The maximum noise levels, L_{Amax} and the background sound levels, $L_{A90,T}$ were the primary metrics of interest, given that the average sound levels have been derived using the CRTN and TRL methods.

With consideration of security for the operative carrying out the measurements, repeats of measurements at positions A and C were used only, with:

- Position A also considered representative of Position B
- Position C also considered representative of Position D.

The weather conditions at the time of the survey were dry and overcast, however it had rained prior to the survey and the road surfaces were wet. This could have had the effect of elevating noise levels from road traffic. The maximum wind speed measured during the survey was 2.1 ms^{-1}, and the ambient temperature was 7°C.

5.4 Summary Measurement Results

A summary of the measured ambient sound levels is shown in Table 7, and the summary of the maximum noise levels in Table 8.

Table 7: Survey measured ambient sound levels summary, all values in $L_{Aeq,T}$ dB

	Period		
Position	**Day, 07:00-19:00**	**Evening, 19:00-23:00**	**Night, 23:00-07:00**
A*	67	64	58
B*	68	65	59
C*	57	54	49
D*	52	49	44

*The values at these positions were calculated using the CRTN shortened method and TRL method using the $L_{A10,3hour}$ measurement results

Table 8: Survey measured 90th Percentile maximum sound levels summary, all values in L_{AFmax} dB

Position	**Night, 23:00-07:00**
A	85
C	59

Full sets of measurement data are presented in Appendix 1. Background sound $L_{A90,T}$ measurement results are summarised in section 8.

It should be noted that the calculated daytime results, i.e., between 07:00 and 19:00 have been used in the assessment of external noise intrusion to internal residential spaces. This level is

expected to be approximately 1 to 2 dB greater than the $L_{Aeq,16hour}$ value (07:00 to 23:00) for the location.

5.5 Outline Assessment of Survey Results

In consideration of Hillingdon's requirement for assessment of the external noise levels, the library site can be said to fall within noise exposure category C. The resulting advice in this instance is:

> *"Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise to meet the Council's recommended outdoor and indoor noise levels."*

The former pool site falls within noise exposure category B. The advice in this instance is:

> *"Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise to meet the Council's recommended outdoor and indoor noise levels."*

In relation to the NPSE's OEL assessment methodology and the derived criteria, the external noise levels can be assessed as follows, relating to proposed external amenity areas during the day:

- The library site represents a SOAEL or red assessment
- The former pool site represents a SOAEL or red assessment.

In relation to the NPSE's OEL assessment methodology and the derived criteria, the external noise levels can be assessed as follows, relating to noise levels external to habitable facades:

- The library site represents a 'between LOAEL and SOAEL' or amber assessment
- The former pool site represents a 'between LOAEL and SOAEL' or amber assessment.

6 Ventilation Strategy

6.1 Background and Intermittent Ventilation

It is understood that ventilation will be provided by localised mechanical ventilation and heat recovery (MVHR) units, located in each apartment.

The understanding is therefore that background and intermittent purge (with short term boost) ventilation as defined in Approved Document Part F will be provided by the MVHR units.

6.2 Rapid Ventilation for the Relief of Overheating

Consideration must also be given to the rapid ventilation for the relief of summer overheating. The expected internal noise levels assuming rapid natural ventilation with windows open have been assessed using the site noise data for 'worst case' examples of dwellings on each elevation. The results have then been assessed against the OEL criteria set out in section 3.7.

6.2.1 Library Site

The results of this assessment for the library site are presented in Table 9 below.

Table 9: Library site assessments for rapid ventilation through open windows

Room	Elevation	Daytime result, dB $L_{Aeq,T}$	Night-time result, dB $L_{Aeq,T}$	Night-time result, dB L_{Amax}
L01-02 Bedroom 2 13 m^2	Position B Yiewsley High Street	56	47	73
L01-04 Bedroom 2 9.2 m^2	Position A Falling Lane	64	55	82
L01-10 Kitchen/Diner/Living 36.3 m^2	Position B Yiewsley High Street	54		
L01-10 Bedroom 12.3 m^2	Position A Falling Lane	60	51	77
L01-14 Kitchen/Diner/Living 29.5 m^2	Position C Fairfield Road Car Park	47		
L01-14 Bedroom 14.4 m^2	Position C Fairfield Road Car Park	52	44	69
L01-17 Kitchen/Diner/Living 34.5 m^2	Position E Set back from Falling Lane	55		
L01-17 Master Bedroom 13.4 m^2	Position E Set back from Falling Lane	56	47	74

Assuming windows open for rapid ventilation, all assessed spaces on all elevations would be expected to be subjected to noise levels identified as significant observable adverse effect level or SOAEL.

It would therefore be suggested that an alternative to opening windows for natural ventilation is supplied for the use of future occupants. This could involve the use of a longer term boost ventilation from the MVHR units.

6.2.2 Former Pool Site

The results of this assessment for the former pool site are presented in Table 10 below.

Table 10: Former pool site assessments for rapid ventilation through open windows

Room	Elevation	Daytime result, dB $L_{Aeq,T}$	Night-time result, dB $L_{Aeq,T}$	Night-time result, dB L_{Amax}
S01-10 Kitchen/Diner/Living 33.3 m^2	Position C Fairfield Road Car Park	49		
S01-10 Bedroom 15.1 m^2	Position C Fairfield Road Car Park	47	39	47
S01-18 Kitchen/Diner/Living 29.6 m^2	Position D Yiewsley Recreation Ground	39		
S01-18 Bedroom 17.1 m^2	Position D Yiewsley Recreation Ground	41	33	46

Assuming windows open for rapid ventilation, the assessed spaces on the south and east facing elevations would be expected to be subjected to noise levels identified as significant observable adverse effect level or SOAEL.

Future occupants located on the north and west facing facades would be expected to be subjected to noise levels identified as between LOAEL and SOAEL assuming opening windows for rapid ventilation.

It would therefore be recommended that an alternative to opening windows for natural ventilation is supplied for the use of future occupants located on the south and east elevations. This could involve the use of a longer term boost ventilation from the MVHR units. A similar strategy could be employed to the north and west facing elevations, however it is suggested that the Client reviews the acceptability of the calculated internal noise levels in relation to the sustainability aspirations for the project prior to finalising the strategy.

It is expected that the new library, located on the ground floor will be mechanically ventilated and not require opening windows for rapid ventilation.

7 External Envelope Sound Insulation

An assessment has been carried out to determine the sound insulation performances required of all façade elements such that external noise intrusion can be controlled internally to ambient and maximum noise levels that meet the BS 8233 and ProPG guidance values, and that relate to assessments of 'LOAEL' according to the criteria in Table 5.

Details of calculations are available on request.

7.1 Facades

The external facades are expected to be formed from the following construction:

- Facing brickwork
- 50mm residual cavity
- 200mm mineral wool insulation
- 100mm blockwork inner leaf
- Plasterboard on dabs

The above wall construction has been modelled using the proprietary sound insulation modelling software Insul. The expected sound insulation performance is 63 dB $R_{w,}$ -6 C_{tr}.

It has been assumed that the sliding brise soleil panels will be installed over the brick façade and that an alternative lightweight system will *not* be used beneath these units.

7.2 Flat Roofs

All flat roofs are expected to be formed from minimum 200 mm structural concrete slab.

This minimum construction is expected to provide a sound insulation performance of 59 dB R_w, -5 C_{tr}, as modelled using Insul.

This level of sound insulation is expected to be suitable to control external noise ingress to the units on the top floors.

7.3 Pitched Roofs

Areas of pitched roofing are proposed to the building for the former pool site, with the exact nature of the construction yet to be confirmed. However, the expected construction is to use either reinforced concrete or precast planks as the basis.

Based on the external noise intrusion assessment, it is recommended that the whole pitched roof constructions offer a minimum of 45 dB R_w, in all locations.

7.4 Glazing

The sound reduction requirements for glazing on all facades of both buildings have been determined through calculation.

Using the 'simple calculation' method from BS 8233:2014 yields internal noise levels in exceedance of the requirements, and by more than 5 dB. Detailed calculations have therefore been conducted.

The detailed calculations have been used to determine the minimum sound reduction specifications of glazing recommended throughout.

The drawings in Appendix 4 demonstrate the resulting expected minimum performances and their locations.

7.4.1 Library Site

The proposed building to the library site will be located close to Falling Lane and Yiewsley High Street, and the junction between the two roads, and is therefore subject to high noise levels.

Glazing with sound reduction specifications will be required to this building, and these have been marked on the drawing. The specifications have been largely driven by the need to control maximum noise level intrusion at night.

7.4.2 Former Pool Site

'Standard' thermal grade glazing is expected to be suitable for use to residential space to the building on the former pool site, with the exception of the glazing to the library which has had a glazing sound reduction performance applied. This is due to the large areas of glazing to the library in relation to the sections of walling.

8 External Noise Emissions from Building Services

The noise survey data have been used to assess the underlying background noise level in the vicinity of the proposed development area. These levels can be used to determine appropriate criteria according to the methodology given in BS 4142:2014.

The nearest noise sensitive receptors (NSRs) identified by Bloc Consulting during the surveys were as follows:

- Position A: Residential properties on the north side of Falling Lane
- Position B: George and Dragon public house to the south of the site
- Positions C and D: Residential properties on Otterfield Road

Based on the development site's context, the external noise criteria in Table 11 are proposed in line with the guidance provided in BS 4142.

Table 11: External noise criteria, all values in dB

Identified noise sensitive receptor	**Daytime 07:00 – 23:00**		**Night-time 23:00 – 07:00**	
	Measured typical $L_{AF90,5min}$	**Proposed rating level $L_{Ar,Tr}$**	**Measured typical $L_{AF90,5min}$**	**Proposed rating level $L_{Ar,Tr}$**
Residential properties on Falling Lane	56	≤ 46	46	≤ 36
George and Dragon public house	57	≤ 47	46	≤ 36
Residential properties on Otterfield Road	47	≤ 37	42	≤ 32

Note to table: Where the noise exhibits tonal, impulsive or intermittent characteristics, a reduction in the above limits is imposed in line with the guidance given in BS 4142:2014.

These criteria have been set on the basis of the requirements set out in the Local Authority's SPD *Noise*, and are expected to result in a 'low impact' according to BS 4142.

All supplied noise rating levels are cumulative and are therefore to be met by the summation of individual noise levels from all relevant M&E equipment working at duty load.

It is recommended that any plant terminations facing public areas (including pedestrian pavements) do not exceed 55 dB $L_{Aeq,T}$ at 1m.

8.1 Emergency Building Services Equipment

In the case of emergency plant noise however, it is recommended that a separate criterion above the prevailing background noise level be targeted. This is on the basis that emergency plant will either operate in an emergency or be tested during a weekday (09:00-17:00) and infrequently (e.g., once a month) only.

The recommended emergency plant noise criteria are provided in Table 12.

Table 12: Emergency plant external noise criteria, all values in dB

Noise sensitive receptor	**Daytime 09:00 – 17:00**	
	Measured typical $L_{AF90,5min}$	**Proposed Rating Level $L_{Ar,Tr}$**
Residential properties on Falling Lane	56	66
George and Dragon public house	57	67
Residential properties on Otterfield Road	47	57

9 Conclusions

Bloc Consulting has been appointed by the London Borough of Hillingdon to provide a noise impact assessment in respect of proposed residential properties on the sites of Yiewsley Library, Yiewsley High Street, and the former pool site to the rear of Otterfield Road, Yiewsley.

This report has discussed the following acoustic aspects:

- The noise climate in the vicinity of the building, determined by on-site surveys
- Assessment of external noise intrusion using the obtained data, with derivation of sound reduction performances to meet internal noise criteria
- Commentary on the effects of the noise climate on ventilation
- External noise criteria for the installation of related building services equipment.

On the basis of the external noise surveys and in consideration of Hillingdon's requirement for assessment of the external noise levels, the library site can be said to fall within noise exposure category C. The resulting advice from Hillingdon in this instance is:

> *"Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise to meet the Council's recommended outdoor and indoor noise levels."*

The former pool site falls within noise exposure category B. The advice from Hillingdon in this instance is:

> *"Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise to meet the Council's recommended outdoor and indoor noise levels."*

In relation to the NPSE's OEL assessment methodology and the derived criteria, the external noise levels can be assessed as follows, relating to proposed external amenity areas during the day:

- The library site represents a significant observable adverse effect level, SOAEL or red assessment
- The former pool site represents a SOAEL or red assessment.

In relation to the NPSE's OEL assessment methodology and the derived criteria, the external noise levels can be assessed as follows, relating to noise levels external to habitable facades:

- The library site represents a 'between LOAEL (lowest observable adverse effect level) and SOAEL' or amber assessment
- The former pool site represents a 'between LOAEL and SOAEL' or amber assessment.

The proposed building's façade constructions have been assessed and glazing sound reduction values have been derived through detailed calculation to achieve the internal LOAEL criteria in all residential spaces. These have been provided in Appendix 4.

The suitability for rapid ventilation through opening windows has also been assessed. It is expected that all assessed spaces on all elevations to the proposed library site building would be expected to be subjected to noise levels identified as SOAEL or red assessment, with windows open.

Assuming windows open for rapid ventilation to the proposed building to the former pool site, the assessed spaces on the south and east facing elevations would be expected to be subjected to noise levels identified as SOAEL or red assessment.

Future occupants located on the north and west facing facades of the former pool site would be expected to be subjected to noise levels identified as between LOAEL and SOAEL or amber assessment assuming opening windows for rapid ventilation.

It would therefore be recommended that an alternative to opening windows for natural ventilation is supplied for the use of future occupants located on the south and east elevations. This could involve the use of a longer term boost ventilation from the MVHR units. It has also been recommended that the Client reviews the acceptability of the calculated internal noise levels in relation to the sustainability aspirations for the project prior to finalising the ventilation strategy to the north and west facades.

External noise criteria have been set in line with the Local Authority's requirements and BS 4142.

Appendix 1 Site Sound Survey Information

Table 13: Measurement data, daytime, attended position A

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
21/12/2021 13:45	77.6	65.7	69.3	57.5
21/12/2021 13:50	81	67.1	70.2	60.1
21/12/2021 13:55	78.4	66	68.7	59.5
21/12/2021 14:19	81.6	66.2	69.5	59.1
21/12/2021 14:24	77	66	69.4	58.9
21/12/2021 14:29	86.4	69.2	72.8	59.3
21/12/2021 14:50	88.5	70.3	71.6	61.3
21/12/2021 14:55	80.5	65.5	67.6	60.2
21/12/2021 15:00	90.1	68.2	69.8	58.5
21/12/2021 15:22	75.4	64.8	68	56.5
21/12/2021 15:27	89.2	67.8	70.6	57.4
21/12/2021 15:32	80.4	66.4	69.2	59.8
21/12/2021 15:54	82.3	68.8	71.9	59.4
21/12/2021 15:59	80.6	65.7	69.4	58.8
21/12/2021 16:04	81.6	65.9	68.7	57.2
21/12/2021 16:26	81	68.2	81	60.1
21/12/2021 16:31	77.4	67.4	77.4	60.5
21/12/2021 16:36	90.5	69.4	90.5	60.1

Table 14: Measurement data, daytime, attended position B

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
21/12/2021 14:01	84.6	68.2	71.2	59.3
21/12/2021 14:06	83.1	67.7	70.7	59.8
21/12/2021 14:11	85.5	67.8	70.8	58.1
21/12/2021 14:35	80.4	67.8	70.9	61.6
21/12/2021 14:40	82.3	68.2	71.8	59.1
21/12/2021 14:45	78.8	66.5	69.6	58
21/12/2021 15:06	85.3	69	72	58.5
21/12/2021 15:11	89.6	68.3	71.4	60
21/12/2021 15:16	83.2	67.5	70.2	60.8
21/12/2021 15:38	87.8	68.5	70	58.5
21/12/2021 15:43	76.8	66.4	70.4	59.2
21/12/2021 15:48	94.7	73.3	71.6	59.7

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
21/12/2021 16:10	88.1	67.7	69.4	60.3
21/12/2021 16:15	86.6	68.5	70.6	59
21/12/2021 16:20	81.3	67.3	70.3	60
21/12/2021 16:42	81.4	68.3	71.2	57.4
21/12/2021 16:47	84	66.3	69.6	60.4
21/12/2021 16:52	77.9	65.9	68.6	60

Table 15: Measurement data, daytime, attended position C

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
22/12/2021 13:51	83.1	56.3	57.8	51.1
22/12/2021 13:56	77.7	55.4	57.1	48.2
22/12/2021 14:01	65.9	55.7	57.7	52.3
22/12/2021 14:26	80.5	61	59.8	51.3
22/12/2021 14:31	71.7	59.1	61.7	53.6
22/12/2021 14:36	73.1	59	61.2	53.3
22/12/2021 14:59	70.7	56.2	58	52.3
22/12/2021 15:04	66.3	55.8	58	51.4
22/12/2021 15:09	66.1	55.8	58.1	50.9
22/12/2021 15:33	80.8	63.5	61.4	51.2
22/12/2021 15:38	77	57.1	58.7	50.7
22/12/2021 15:43	70.9	57.5	59.9	51.5
22/12/2021 16:07	64	53.3	55.6	48.9
22/12/2021 16:12	75.2	55.7	58.5	49
22/12/2021 16:17	69.8	53.7	56.3	49.4
22/12/2021 16:40	73.8	55.6	56.5	49.7
22/12/2021 16:45	70.3	55.1	57.5	50.4
22/12/2021 16:50	79.1	59.9	63.1	50.9

Table 16: Measurement data, daytime, attended position D

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
22/12/2021 14:09	65.7	51	52.4	48.8
22/12/2021 14:14	65.1	53.8	57	48.5
22/12/2021 14:19	68.7	53.3	55.6	49.9
22/12/2021 14:42	60.7	51.8	53.7	49.3
22/12/2021 14:47	68.3	52.5	53.9	49.1
22/12/2021 14:52	62.6	52.4	54.5	49.6
22/12/2021 15:16	70.3	54.4	56.8	49.6

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
22/12/2021 15:21	67.8	52.2	53.7	48.5
22/12/2021 15:26	68.2	54	55.8	49.1
22/12/2021 15:50	61.5	50.6	52.2	48
22/12/2021 15:55	60.1	49.9	51.5	47.5
22/12/2021 16:00	61.1	50.6	51.7	48.4
22/12/2021 16:23	64.7	50.9	52.3	48.1
22/12/2021 16:28	65.5	52.3	54	48.9
22/12/2021 16:33	72.2	53.5	55.1	48.4
22/12/2021 16:58	66.5	53.3	55.8	49.1
22/12/2021 17:03	82.1	56.7	54.2	49.5
22/12/2021 17:08	65.2	52.2	53.8	49.3

Table 17: Measurement data, night-time, attended position A

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
10/01/2022 23:15	64.6	77	69.3	48.3
10/01/2022 23:20	62.1	72.4	66.8	48.1
10/01/2022 23:25	63.8	80.7	67	48.8
10/01/2022 23:54	64.3	78.3	67.4	47.5
10/01/2022 23:59	62.9	74.4	67.6	47.8
11/01/2022 00:04	65.7	90.7	66.7	46.7

Table 18: Measurement data, night-time, attended position C

Start Time	$L_{Aeq,5min}$	L_{AFmax}	$L_{A10,5min}$	$L_{A90,5min}$
10/01/2022 23:35	44.9	54.3	46.4	43.1
10/01/2022 23:40	44.2	50.9	45.2	42.9
10/01/2022 23:45	44.3	48.1	45.4	42.9
11/01/2022 00:13	44.3	54.1	45.1	42.6
11/01/2022 00:18	46.1	56.3	47.8	44
11/01/2022 00:23	45.3	60.6	46.6	43

Appendix 2 Equipment Calibration Certificates

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 17 June 2020

Certificate Number: UCRT20/1504

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

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Approved Signatory

K. Mistry

CUSTOMER	Bloc Consulting Parker House 44 Stafford Road Wallington SM6 9AA Mr David Gnanaseharam
ORDER No	14015277 Job No UKAS20/06308
DATE OF RECEIPT	16 June 2020
PROCEDURE	Calibration Engineer's Handbook, section 25: periodic testing of sound level meters to IEC 61672-3:2006 (BS EN 61672-3:2006) as modified by UKAS TPS 49 Edition 2:June 2009
IDENTIFICATION	Sound level meter Svantek type SVAN 977A serial No 92147 connected via a preamplifier type SV 12L serial No 95185 to a half-inch microphone type ACO 7052E serial No 77721 fitted with a foam windshield type SA 22. Associated calibrator Svantek type SV 33B serial No 100012 with a half-inch housing.
CALIBRATED ON	17 June 2020
PREVIOUS CALIBRATION	None known

Laboratory Location

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
Phone 01371 871030

ilac-MRA UKAS CALIBRATION 0789 CALIBRATION

Certificate of Calibration

Certificate number: **U38321**

Test Object: **Sound Calibrator**

Producer: **Svantek**
Type: **SV33B**
Serial number: **100012**
Customer: **Bloc Consulting**
Address: **Parker House, 44 Stafford Road, Wallington, Surrey. SM6 9AA.**
Contact Person: **David Waidson**
Order No:

Measurement Results	Level dB	Level Stability dB	Frequency Hz	Distortion %
Measurement 1	114.03	0.02	1000.00	0.41
Measurement 2	114.04	0.02	1000.00	0.41
Measurement 3	114.04	0.02	1000.00	0.41
Result (Average):	**114.04**	**0.02**	**1000.00**	**0.41**
Expanded Uncertainty:	0.1	0.02	1	0.1
Degree of Freedom:	>100	>100	>100	>100
Coverage Factor:	2	2	2	2

The stated level is relative to 20µPa. The level is traceable to National Standards. The stated level is valid at reference conditions.The following correction factors have been applied during the measurement
Pressure:0 dB/kPa Temperature:0 dB/°C Humidity:0 dB/%RH Load volume: 0.00027 dB/mm3

Conditions	*Pressure kPa*	*Temperature °C*	*Humidty %RH*
Reference conditions	101.325	23	50
Measurement conditions	100.996 ±0.042	22.8 ±0.1	42.3 ±1.2

The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by the coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.

Records: K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2021\SVANSV33B_100012_M1.nmf

Preconditioning
The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Method
Calibration has been performed as set out in the current version of CA Technical procedure TP01

Calibration Dates:

Received date:	22/06/2021	Reviewed date:	02/07/2021
Calibration date:	02/07/2021	Issued date:	02/07/2021

Technicians: (Electronic certificate)
Calibrated by: *Palanivel Marappan BEng(Hons), MSc*
Reviewed by: *Darren Batten*

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Appendix 3 Survey Photographs

Figure 5: Position A

Figure 6: Position A

Figure 7: Position B

Figure 8: Position B

Figure 9: Position C

Figure 10: Position C

Figure 11: Position D

Figure 12: Position D

Appendix 4 Glazing Performances Drawings

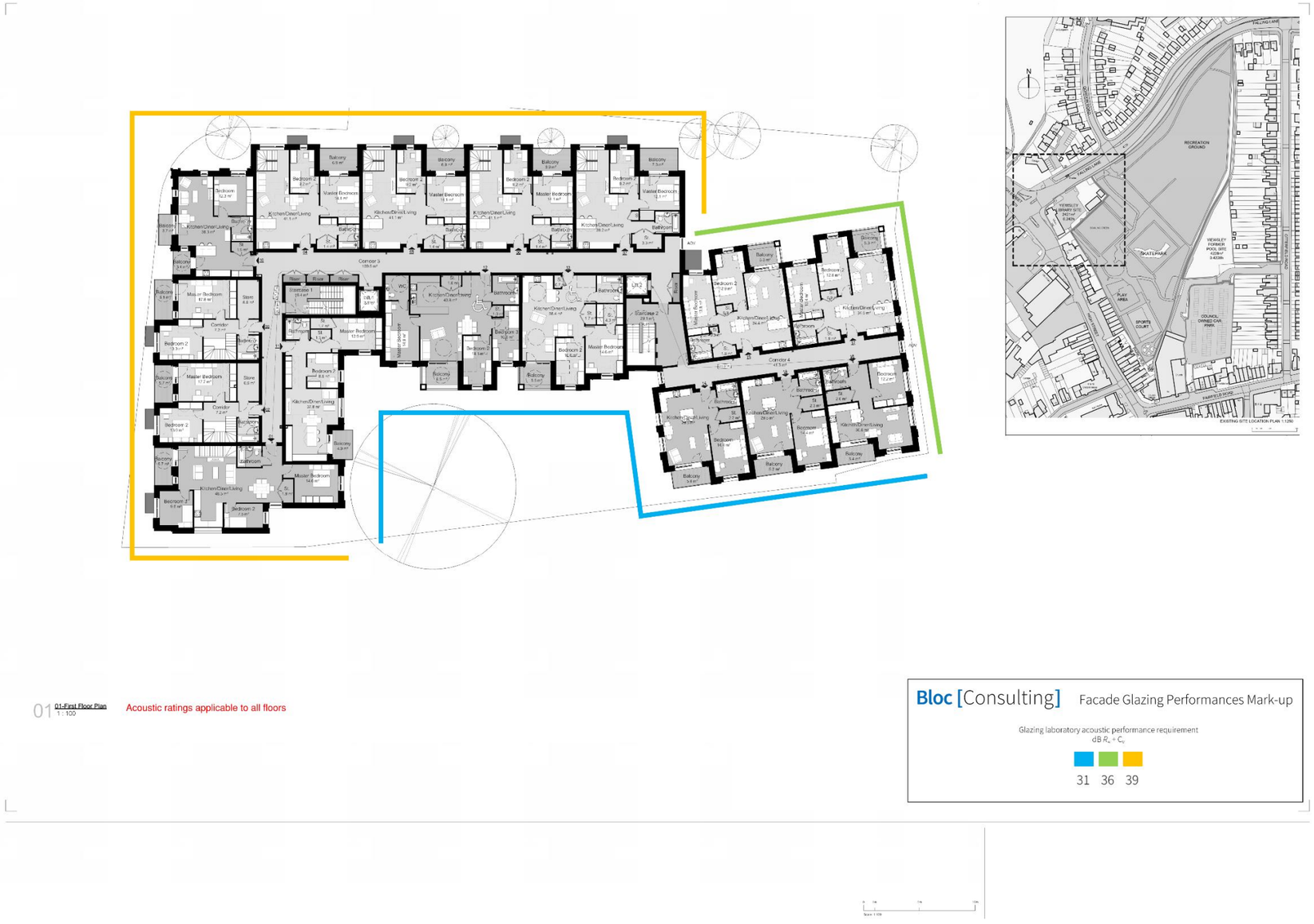
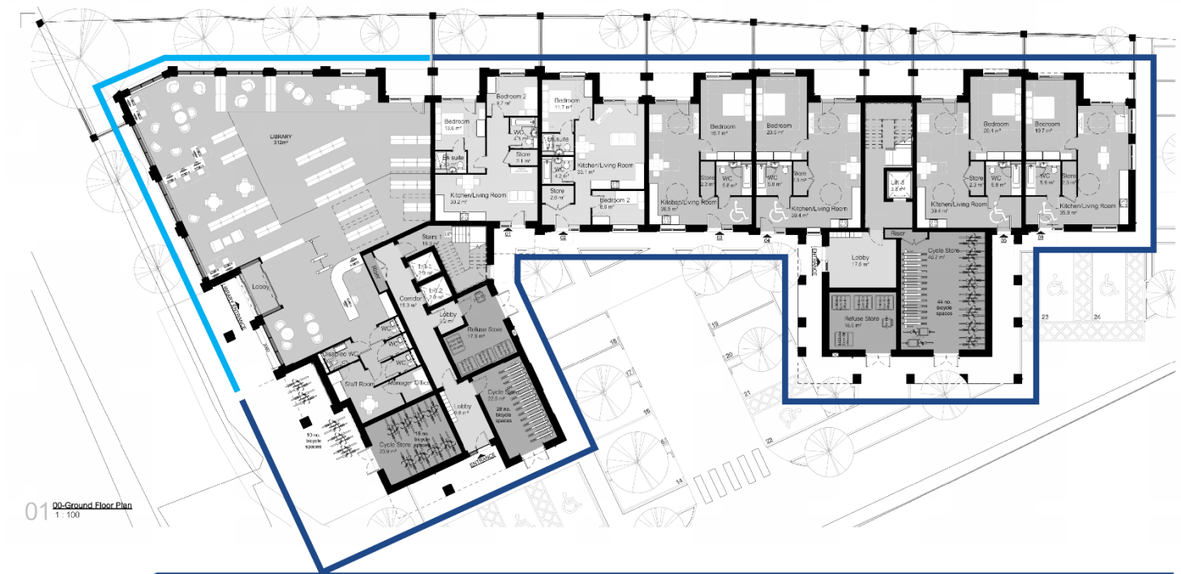
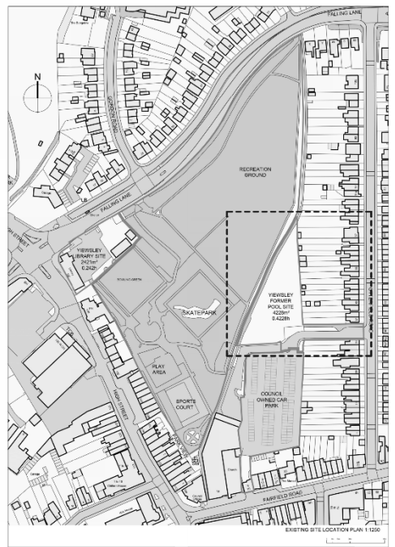


Figure 13: Sound reduction performances, library site, all floors





Bloc [Consulting] Facade Glazing Performances Mark-up

Glazing laboratory acoustic performance requirement
dB $R_w + C_{tr}$

Standard thermal grade 29

Acoustic ratings applicable to all floors from first to fifth

Appendix 5 Credentials

Bloc Consulting, a division of All Bloc Limited, has specialised in providing the UK Construction Industry with a range of acoustics services since 2019. Specialising in Environmental and Building Acoustics, all Bloc Consulting acousticians are members of the Institute of Acoustics.

Bloc Consulting has been accredited for on-site acoustic testing by Sound Insulation Testing and Measurement Association (SITMA) since 2019.

Bloc Consulting meets the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010 with amendments to 2015.