

Hayes Park

Noise Assessment

May 2023



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Contents

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
INTRODUCTION	5
Site Description	5
Assessment Criteria	6
National Planning Policy Framework	6
Noise Policy Statement for England	6
The London Plan	7
London Borough of Hillingdon	7
BS 8233: 2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice	9
BS 4142: 2014 Rating for industrial noise in residential and mixed use areas	10
Noise Level Measurements	11
Predicted External Noise Levels	13
Noise Level Assessment	14
External Noise Levels	14
Internal Noise Levels	14
Noise Emission Assessment	16
CONCLUSION	18
Appendix A – Weather history IHAYES8	20
Appendix B – Photographs of measurement locations	21
Appendix C – Graphs of measured 5-minute noise levels	25

EXECUTIVE SUMMARY

This report provides a noise assessment carried out at the planning stage for the proposed development at Hayes Park, Hayes. The noise assessment has been carried out to determine suitable building envelope sound insulation in order to protect the future residents from environmental noise.

Reference to the National Planning Policy Framework, national guidance and local planning policy has been made to derive reasonable design targets.

Noise levels in external amenity areas are lower than the WHO guideline limits. In our opinion, external noise levels should not constrain the granting of planning permission.

Noise intrusion with windows open is likely to result in compliance with recommendations of national guidance. In our opinion, noise intrusion should not constrain the granting of planning permission.

An assessment of noise emission typical of residential dwelling flats has been carried out. According to the BS 4142 assessment methodology, noise impact due to building services is unlikely to cause a negative impact. In our opinion, noise emission should not constrain the granting of planning permission.

INTRODUCTION

This report has been prepared in support of the detailed planning and listed building consent application being submitted by Shall Do Hayes Developments Ltd ('the Applicant') to the London Borough of Hillingdon ('the Council') for the proposed residential conversion of two listed buildings at Hayes Park, Hayes End Road, Hayes, UB4 8FE ('the site').

The description of the proposed development for the detailed planning and listed building consent application is as follows:

"Change of use of the existing buildings to provide new homes (Use Class C3), together with internal and external works to the buildings, landscaping, car and cycle parking, and other associated works."

The proposed development has evolved through an extensive pre-application and wider stakeholder consultation process, which has included collaborative discussions with the Council, Greater London Authority ('GLA'), Historic England ('HE'), and a number of other key stakeholders.

The proposed development will bring two long-term vacant office buildings, which are unique heritage assets, back into active use through their conversion to residential. The proposed development provides the opportunity of a second life for the buildings and presents a long term sustainable use that will ensure the buildings are protected and celebrated for years to come.

From the outset, the Applicant has taken a carefully informed heritage-led design approach. The objective has been to enhance the listed buildings, their setting, and the contribution they make to the wider surroundings, whilst at the same time delivering a range of planning benefits.

A noise survey has been carried out and a summary of the survey methodology and measured levels are presented in this report. The recommended target internal noise levels within BS 8233: 2014 have been used with the calculation methodology to estimate the required sound insulation of the building envelope.

An assessment of noise emission due to operation of typical building services plant has been carried out.

Site Description

The site is located within the Charville Ward of the London Borough of Hillingdon ('the Council'), who will be the relevant Local Planning Authority for the application.

The site sits within a wider former business park known as 'Hayes Park'. The red line site area which forms the basis of this application is 3.73 hectares and comprises of Hayes Park South, Hayes Park Central, the surrounding grassland area, and the associated car parking and road areas.

The wider Hayes Park business park site (which includes Hayes Park North and the adjacent multi-storey car park - but does not form part of this application) extends to 5.22 hectares. The site is accessed from the east from Park Lane and from the west from Hayes Park Road.

The Hayes Park Central and Hayes Park South buildings are both Grade II* Listed and were designed in the 1960s by American architect Gordon Bunshaft as corporate offices and research laboratories for HJ Heinz UK Limited. The buildings have been occupied by various different occupiers since they were built but are now both vacant. Hayes Park Central has been vacant since September 2020 and Hayes Park South vacant since Summer 2017. Both buildings are three storeys in height and include a basement level used for plant and servicing.

The site is bound to the east and south by the open parkland, which is private land owned by the Church Commissioners. To the west the site is bound by the agricultural land and the buildings of Home Farm. To the north, the site is bound by Hayes Park North and the adjacent multi-storey car park, with open farmland beyond that.

The entirety of the site and the much of the surrounding land is located within the Green Belt. Beyond that, there are large areas of low-density terraced housing. There is a wide selection of parks and leisure facilities in the area, including the Hayes End Recreation Ground, Park Road Green and the Belmore Playing Fields. The nearest town centres are located at Hillingdon Heath Local Centre, 1.6km to the south west, and at Uxbridge Road Hayes Minor Centre, 3.3km to the south east.

The flood risk map for planning identifies that the site is located in Flood Zone 1, and as such has a low probability of flooding.

Assessment Criteria

National Planning Policy Framework

In March 2012 the Department for Communities and Local Government published the National Planning Policy Frameworkⁱ (NPPF); an updated version was published in July 2021, with little change to the policy framework. The document sets out the Planning Policies for England and how these are to be applied.

The NPPF replaces many of the existing Planning Policy documents including Planning Policy Guidance 24: Planning and Noise (PPG24). PPG24 gave guidance on the control of noise to sensitive developments and has been used as the basis of assessment in all Local Authorities in England. The Framework allows local people and their council to produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

It is stated that Planning Policies and decisions should contribute to and enhance the natural and local environment by:

- 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.

With regards to noise the Framework states that Planning Policies and decisions should also ensure that new development is appropriate for its location, taking into account the likely effects of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or wider area:

- 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*;
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

*NPPF 2021 refers to The Noise Policy Statement for England, published by DEFRA in March 2010.

Noise Policy Statement for England

The aim of the Noise Policy Statement for Englandⁱⁱ (NPSE) is to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion. The NPSE applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

Noise Policy Vision: Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy 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 Noise Policy Statement for England does not provide any numerical limits for residential developments. It is considered the discretion of the Local Planning Authority to decide on what is deemed acceptable.

The London Plan

The London Planⁱⁱⁱ contains Policy D14 Noise, which sets out requirements for developments London wide. The wording of D14 is reproduced below:

- A. In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:
 1. avoiding significant adverse noise impacts on health and quality of life
 2. reflecting the Agent of Change principle as set out in Policy D13 Agent of Change
 3. mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on development
 4. improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)
 5. separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening or layout, orientation, uses and materials – in preference to sole reliance on sound insulation
 6. where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles
 7. promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.
- B. Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations.

Guidance provided with D14 advocates the use of BS8233: 2014 to provide good internal acoustics.

The Policy D13 Agent of Change is said to concern the impact of noise generating activity and uses, but other nuisances should be considered under the policy.

In the London Plan glossary “noise” is said to include “vibration”.

London Borough of Hillingdon

The London Borough of Hillingdon Local Plan: Part 1^{iv} contains Policy EM8, which states that:

Noise

The Council will investigate Hillingdon's target areas identified in the Defra Noise Action Plans, promote the maximum possible reduction in noise levels and will minimise the number of people potentially affected.

The Council will seek to identify and protect Quiet Areas in accordance with Government Policy on sustainable development and other Local Plan policies.

The Council will seek to ensure that noise sensitive development and noise generating development are only permitted if noise impacts can be adequately controlled and mitigated.

The policy wording does not discuss vibration, however note 8.120 says that For the purpose of the Hillingdon Local Plan: Part 1- Strategic Policies, noise (including vibration) means:

"environmental noise" which includes noise from transportation sources;

"neighbour noise" which includes noise from inside and outside peoples homes; and "neighbourhood noise" which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.

It is therefore considered that "noise" in policy EM8 also includes "vibration".

The London Borough of Hillingdon Supplementary Planning Document contains a section which references "SPD on Noise", which is discussed below.

Development Control for Noise Generating and Noise Sensitive Development^v

The "SPD on Noise" sets out the national and regional polices relevant to noise, namely the NPPF, NPSE and London Plan as discussed previously. It also states that the LPA [London Borough of Hillingdon] will consider whether proposals would be incompatible with existing activities. In areas subject to (or expected to become) high levels of noise "development will not normally be permitted".

The SPD on Noise states that:

Where the application site is considered to be otherwise suitable then the principle requirement will be to secure and achieve acceptable acoustic standards through the application of good acoustic design.

In regards to noise generation, the SPD on Noise states that:

The planning system should not place unjustifiable obstacles in the way of such development.

It should be demonstrated, that noise has been mitigated and reduced to a minimum and that the principles of good acoustic design have been followed.

The document sets out six considerations in determining the impact of noise. These are:

1. Whether or not an unacceptable adverse effect is occurring or likely to occur;
2. Whether or not a significant adverse effect is occurring or likely to occur;
3. Whether or not an adverse effect is occurring or likely to occur;
4. Whether or not a good standard of amenity can be achieved;
5. Whether or not a good acoustic design process has been followed and whether or not appropriate acoustic standards have been achieved; and
6. Whether or not opportunities have been taken to improve or protect the existing acoustic environment where relevant.

Figure 2 of the SPD on Noise sets out Noise Risk Categories for an initial noise risk assessment.

External Transportation Noise Risk Assessment (measured/predicted, empty site, pre-mitigation)

Noise Risk Category*	Potential Effect if <u>unmitigated</u>	Pre-Planning Application Guidance
0 – Negligible $L_{Aeq,16hr} < 50\text{dB}$ $L_{Aeq,8hr} < 40\text{dB}$	No adverse effect on health and quality of life	Development proposal is likely to be acceptable from a noise perspective. Noise assessment /report required to demonstrate no adverse impacts Good acoustic design encouraged to improve existing environment
1 – Low $L_{Aeq,16hr} 50-63\text{dB}$ $L_{Aeq,8hr} 40-55\text{dB}$	Adverse effect on health and quality of life	Noise environment likely to cause adverse impacts Noise assessment /report required to demonstrate how adverse impacts will be minimised and how good acoustic design will be implemented. Planning conditions and other measures to control noise are likely to be required.
2 – Medium $L_{Aeq,16hr} 63-69\text{dB}$ $L_{Aeq,8hr} 55-60\text{dB}$ $L_{ASmax} < 82\text{dB}$	Significant adverse effect on health and quality of life	Noise environment likely to cause significant adverse impacts and development may be refused unless Noise assessment /report required to demonstrate how significant adverse impacts will be avoided and other adverse impacts minimised and how good acoustic design will be implemented Planning conditions and other measures to minimise noise will be necessary.
3 – High $L_{Aeq,16hr} > 69\text{dB}$ $L_{Aeq,8hr} > 60\text{dB}$ $L_{ASmax} < 82\text{dB}$	Unacceptable adverse effect on health and quality of life	Noise environment likely to cause unacceptable adverse impacts and development likely to be refused even if a good acoustic design process is followed, unless there is an overriding case for development in the context of Government policy on sustainable development.

Figure 1: SPD on Noise – Noise Risk Assessment Categories

The design guide of internal noise levels in the SPD on Noise reproduces the guidelines from Table 4 of BS8233: 2014. The Standard is discussed in further detail in the following section.

The SPD on Noise advocates the use of BS 4142: 2014 to assess noise generation and the level of mitigation required. Table 2 of the document provides the acceptability of different BS 4142: 2014 assessment outcomes, which is reproduced as Figure 2 below.

Noise Impact From Relevant Proposed Industrial Or Commercial Premises Or Plant	Development Outcome
Rating Level (L _{Ar,Tr}) is at least 5 dB(A) below the Background Level L _{A90}	Normally acceptable
Rating level (L _{Ar,Tr}) is no more than 5 dB(A) above the Background Level L _{A90}	Acceptable only if there are overriding economic or social reasons for development to proceed
Rating level (L _{Ar,Tr}) is more than 5 dB(A) above the Background Level L _{A90}	Normally unacceptable

Figure 2: SPD on Noise – Noise Emission Assessment Criteria

BS 8233: 2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice

The scope of BS 8233: 2014 includes the provision of recommendations for the control of noise in and around buildings. It suggests appropriate design guide noise limits for different situations, which are primarily intended to guide the design of new or refurbished buildings.

For steady external noise source, it is desirable that the internal ambient noise levels do not exceed the guideline values in Table 2 of BS 8233: 2014. This information has been reproduced below in Table 1 for ease of reference.

Table 1: BS 8233: 2014 internal noise targets for domestic uses

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB L _{Aeq, 16hour}	-
Dining	Dining room /area	40 dB L _{Aeq, 16hour}	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq, 16hour}	30 dB L _{Aeq, 8hour}

It is stated in BS 8233: 2014 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 L_{Amax,F} dB, depending on the character and number of events per night. Sporadic noise events could require separate values.

The guideline values in Table 1 above are based on annual averages with normal diurnal fluctuations in external noise levels. A shorter averaging period may be used where external levels are atypical due to local activity. The guideline values are for internal ambient noise levels with an appropriate level of ventilation provided. An estimate of the ventilation provision will be made for the purpose of acoustic assessment. It is assumed that the appropriate level of ventilation required by Part F of the Building Regulations will be determined by a ventilation engineer.

Where a development is considered necessary or desirable, BS 8233: 2014 suggests that if the internal target levels are increased by 5 dB reasonable internal conditions will still be achieved.

The internal target level should include noise from mechanical ventilation systems but exclude other domestic building services plant.

With respect to the night time L_{Amax} dB noise criterion, the WHO Guidelines for Community Noise Exposure^v presents further clarity, stating: 'For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night'.

BS 4142: 2014 Rating for industrial noise in residential and mixed use areas

The document BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound' describes methods for rating and assessing sound of an industrial or commercial nature. It enables the effects on people nearby to be assessed and the associated risks to be minimised. It is designed to give consistent results across situations ranging from a single air-conditioning unit to a large installation such as an oil refinery.

The standard is widely used by local planning authorities in order to provide limits for industrial noise sources suited to the locality and development plans. The standard requires that the potential impact of uncertainty should be reported, and practicable steps are taken to reduce the level of uncertainty.

The sound from the industrial or commercial noise source is rated by correcting the measured sound pressure level of the source, to account for its acoustic characteristics. There are character corrections for tonality, impulsivity, intermittency, and other sound characteristics that may attract attention. The rating level may be determined, subjectively, objectively or using the reference method. Each of these methods adds a penalty to the sound source noise level to account for acoustic characteristics. This approach to adding a rating level correction to noise sources that have "distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or distinct impulses (bangs, clicks, clatters, thumps)" is accepted in the acoustics industry. It should be noted that BS4142: 2014 does not state that acoustic characteristics have to be inaudible at neighbouring noise sensitive receptors to achieve a Low impact assessment outcome.

The assessment provides a significance of potential impact of a noise source. This is achieved by comparing the background ambient noise level, and the noise source rating level. The difference between the levels indicates the magnitude of impact significance.

Typically, the greater this difference, the greater the magnitude of the impact; and 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. The relative significance of impact is given in Table 1 below.

Table 1: BS 4142 level difference significance of impact

Difference between ambient background and rating level	Significance of Impact
Around + 10 dB or more	Likely to be an indication of a significant adverse impact, depending on the context
Around + 5 dB	Likely to be an indication of an adverse impact, depending on the context
0 dB or less	An indication of the specific sound source having a low impact, depending on the context

The standard recommends that where an initial estimate of the impact needs to be modified due to the context, all pertinent factors are to be taken into consideration. These factors should include:

- The absolute level of the sound
- The character and level of the residual sound compared to the character and level of the specific sound
- The sensitivity of the receptor

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of adverse impacts.

Noise Level Measurements

Noise level measurements of the acoustic conditions at the site have been made by an unattended survey on Monday 23rd January and Tuesday 24th January 2023. The purpose of the survey was to provide sufficient acoustic information to establish the prevailing environmental noise levels across the site and the ambient background noise levels at the surrounding uses to the site. Environmental noise levels were measured at 1.5 metres above ground near the eastern façade of the Central Building and on the northern boundary of the site.

All noise level measurements were undertaken by a consultant certified as competent in environmental noise monitoring and in accordance with the principles of BS 7445: 2003^{vii}. The noise measurement instrumentation used conforms to the accuracy requirements of Type 1 as defined by BS EN 61672-1: 2013^{viii} and an inventory of all equipment used is given in Table 2 below.

Table 2: Inventory of measurement equipment

System	Location	Item	Make & Model	Serial Number	Last Calibration
2	1	Sound Level Meter	NTi XL2	A2A-08541-E0	08/11/2021
2	1	Microphone & Preamplifier	BSWA OM261	154220	08/11/2021
5	2	Sound Level Meter	Svan SV307	104975	28/04/2021
All	All	Acoustic Calibrator	Larson Davis Cal 200	9535	04/02/2022

The logging sound level meters were set to automatically average 5-minute periods measuring parameters L_{Aeq} dB, L_{Amax} dB, L_{A10} dB and L_{A90} dB. Data was also logged in 10-second periods for the L_{Amax} dB parameter. The Calibrator CAL-200 producing nominal 114 dB at 1000 Hz was used to check the sensitivity of the measurement systems at the start and end of the survey. There was no observed drift in sensitivity.

Metrological conditions were calm and dry, with no precipitation during the survey period. Temperatures varied between 1 Celsius and 2 Celsius, with no periods of freezing. A log of metrological measurements from a nearby weather station is shown in Appendix A.

At location 1, distant road traffic noise from vehicles using the A40 dual carriageway and the A4020 could be heard and is considered likely to most significant contribution to the underlying level. At times bird song

appeared to be the dominant noise source. There were also contributions from occasional vehicles using Park Lane, and aircraft at RAF Northolt and Heathrow. It is understood that there would also be some contribution from adjacent businesses using the internal access road, although this was not observed during set up or collection of the equipment. Location 1 was 1.5 metres above ground, 2 metres from the eastern facade of the Central Building and 385 metres from Park Lane.

At location 2, road traffic noise from vehicles using the A40 dual carriageway was the dominant noise source. There were also contributions from aircraft at Heathrow, bird song and wind induced vegetation noise. Location 2 was 1.5 metres above the upper deck of the car park and 10 metres from the northern boundary of the site.

A Google Earth image showing the measurement locations is given below in Figure 3 and photographs of the measurement locations are shown in Appendix B.



Figure 3: Measurement Locations

A summary of the results is given in Table 3 below, with the L_{Aeq} dB noise levels for both locations logarithmically averaged over the measurement duration stated. The L_{Afmax} dB noise levels are the 10th highest of the 10-second period results and L_{A90} dB noise levels are the arithmetic average. Road traffic on the local network was considered normal with no reported incidents or events.

Table 3: Summary of noise level measurements

Location	Period	Duration [hh:mm:ss]	$L_{Aeq, T}$ dB	L_{Afmax} dB	$L_{Af10.0\%}$ dB	$L_{Af90.0\%}$ dB
1: Central Building	Day	16:59:10	47.0	70.9	47.0	43.6
1: Central Building	Night	08:00:00	42.1	51.6	42.0	39.3
2: Northern Boundary	Day	17:05:00	48.9	75.8	48.4	43.9
2: Northern Boundary	Night	08:00:00	42.2	52.0	42.1	38.9

A graph of the 5-minute noise level measurements at both locations is shown in Appendix C.

Measurements were made in octave bands at both locations, using linear Z weighting filter. The $L_{Aeq,T}$ dB noise levels logarithmically averaged over the measurement duration stated from 63 Hz to 4 kHz octave bands are shown in Table 4 below.

Table 4: Summary of octave band $L_{Aeq,T}$ dB noise level measurements

Location	Period	Duration [hh:mm:ss]	L_{Aeq} dB					
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
1: Central Building	Day	16:59:10	62.7	54.4	46.6	45.5	44.6	42.0
1: Central Building	Night	08:00:00	58.7	52.5	46.2	48.7	49.0	34.3
2: Northern Boundary	Day	17:05:00	59.3	53.6	51.3	49.4	46.6	43.2
2: Northern Boundary	Night	08:00:00	55.9	50.3	50.4	50.2	49.3	34.4
								22.0

The L_{AFmax} dB noise levels unlikely to be exceeded more than 10 times per night from 63 Hz to 4 kHz octave bands are shown in Table 5 below.

Table 5: Summary of octave band L_{AFmax} dB noise level measurements

Location	Period	Duration [hh:mm:ss]	L_{AFmax} dB					
			63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
1: Central Building	Night	08:00:00	61.0	57.2	54.4	50.8	48.2	42.1
2: Northern Boundary	Night	08:00:00	61.0	57.2	54.4	50.8	48.2	42.1
								36.3

Predicted External Noise Levels

The measured noise levels have been used to predict noise levels at the proposed facades. It is assumed that the northern façade of the Central Building would be exposed to the same noise levels as measured on the northern boundary. All other façades are assumed to be exposed to the same noise levels as measured on the east façade of the Central Building. For clarity, the predicted noise levels are shown in Table 6 below.

Table 6: Predicted façade noise levels at 2 metres

Location	Façade	Period	$L_{Aeq,T}$ dB	L_{AFmax} dB
Central Building	North	Day	48.9	75.8
Central Building	East	Day	47.0	70.9
Central Building	South	Day	47.0	70.9
Central Building	West	Day	47.0	70.9
Central Building	North	Night	42.2	52.0
Central Building	East	Night	42.1	51.6
Central Building	South	Night	42.1	51.6
Central Building	West	Night	42.1	51.6
South Building	North	Day	47.0	70.9
South Building	East	Day	47.0	70.9
South Building	South	Day	47.0	70.9
South Building	West	Day	47.0	70.9
South Building	North	Night	42.1	51.6
South Building	East	Night	42.1	51.6
South Building	South	Night	42.1	51.6
South Building	West	Night	42.1	51.6

Noise Level Assessment

External Noise Levels

The day time measured and predicted external noise levels in all outdoor amenity spaces is lower than the guideline value of 50 to 55 dB (A) given in section 7.7.3.2 of BS 8233: 2014. External noise levels are considered to comply with NPPF requirements with the proposed site layout, in our opinion.

Internal Noise Levels

Guidance in BS 8233: 2014 recommends that noise levels from steady broadband sources are not greater than 35 dB $L_{Aeq,16hr}$ in living rooms and bedrooms during the day time and not greater than 30 dB $L_{Aeq,8hr}$ in bedrooms at night time. In order to calculate a prediction of the internal noise levels, the sound insulation of each of the building envelope elements needs to be considered.

Where an open window is used for ventilation, a level difference from outside to inside of 13 dB (A) is expected. Table 7 below shows assessment with BS8233 criteria, for background noise levels when a partially open window is used for background ventilation, as required to achieve Part F^{ix} compliance.

Table 7: Assessment of indoor ambient noise levels with windows partially open

Location	Façade	Period	$L_{Aeq,T}$ dB	L_{AFmax} dB	Compliance with BS 8233	Compliance WHO L_{Amax}	Compliance with BS 8233 +5 dB
Central Building	North	Day	35.9	62.8	No	N/A	Yes
Central Building	East	Day	34.0	57.9	Yes	N/A	Yes
Central Building	South	Day	34.0	57.9	Yes	N/A	Yes
Central Building	West	Day	34.0	57.9	Yes	N/A	Yes
Central Building	North	Night	29.2	39.0	Yes	Yes	Yes
Central Building	East	Night	29.1	38.6	Yes	Yes	Yes
Central Building	South	Night	29.1	38.6	Yes	Yes	Yes
Central Building	West	Night	29.1	38.6	Yes	Yes	Yes
South Building	North	Day	34.0	57.9	Yes	N/A	Yes
South Building	East	Day	34.0	57.9	Yes	N/A	Yes
South Building	South	Day	34.0	57.9	Yes	N/A	Yes
South Building	West	Day	34.0	57.9	Yes	N/A	Yes
South Building	North	Night	29.1	38.6	Yes	Yes	Yes
South Building	East	Night	29.1	38.6	Yes	Yes	Yes
South Building	South	Night	29.1	38.6	Yes	Yes	Yes
South Building	West	Night	29.1	38.6	Yes	Yes	Yes

The predicted internal noise levels in Table 7 demonstrate that there is likely to be compliance with BS 8233: 2014 guidelines with windows open for background ventilation. The northern facades of the Central Building should comply with the 'BS 8233: 2014 + 5dB' guidelines. All other locations should comply with the BS 8233: 2014 guidelines. Both of these design targets are considered to result in acceptable internal noise levels. The SPD on Noise provides guidance from BS 8233: 2014 that:

In certain circumstances where external noise levels above WHO guidelines, but development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved

The SPD on Noise also suggests that if windows are opened for ventilation purposes, there would be a reduction of 10 to 15 dB(A) from outside to inside. As the guidelines allow for 2 dB (A) further reduction than assumed in

the Table 7 values, it is considered that there would be no material excess of the guidelines during the partially open window condition.

To calculate internal noise levels with windows closed, the guidance in BS 8233: 2014 allows for a simplistic calculation using A-weighted values, where the resultant internal noise is at least 5 dB (A) lower than the target noise level. As further recommended by the guidance document, the longer procedure has been used for a more rigorous calculation. Noise levels in octave bands have been used to calculate the minimum required acoustic performance for each building envelope element.

The use of mechanical extract ventilation (MEV) or mechanical supply and extract ventilation system (MSEV) would be acceptable, although not necessary for environmental noise intrusion purposes.



Figure 4: Glazing and ventilation requirements

The glazing and ventilation configuration has been grouped into two categories. The requirements have been derived from achieving the internal noise level requirements of BS 8233: 2014. Examples of double glazing are listed below.

- Glazing - R_w 30 dB - 4mm float glass, 20mm cavity, 4mm float glass

All living rooms on the ground floors are likely to meet internal noise level criteria of BS 8233: 2014 with windows open for background ventilation purposes. With open windows for background ventilation, all bedrooms on the first floors are likely to meet the internal noise level criteria of BS 8233: 2014. An acoustically unrated, standard slot trickle ventilator could be used instead of an open window if desired.

External walls could be constructed from curtain wall glazing, with or without non-vision areas or spandrel panels with insulative backing. Alternatively, a masonry or a lightweight construction could be used and are likely to provide greater than the minimum required R_w 40 dB for noise environmental noise intrusion purposes, at all locations. For Building Regulation^x compliance, the design stage should include consideration of noise transmission flanking around party walls, where there are any continuous elements, such as curtain walling.

The roof system is likely to be a flat roof system, with concrete slab insulation and plasterboard ceilings. The system is likely to exceed the minimum required least R_w 40 dB for noise intrusion purposes, at all locations.

It is assumed that the bedrooms and living rooms would be furnished and the standardised acoustic absorption correction has been applied, based on reverberation times of 0.5 seconds, as required by the calculation methodology.

Any balcony doors or external doors that give direct access to bedrooms or living rooms should have the same sound reduction rating as the glazing at that elevation.

With the above provisions it is expected that internal L_{Aeq} dB noise levels in living rooms and bedrooms will not be greater than 35 dB (A) during the day and 30 dB (A) during the night. It is expected that L_{Afmax} dB noise levels in bedrooms will not regularly exceed 45 dB (A) at night based on assessment of the 10th highest measured values.

In our opinion, if the building envelope elements and external wall build up are chosen to meet or exceed the acoustic performance values shown, then the internal noise levels in all rooms should meet the guidelines of BS 8233: 2014.

The mechanical extract ventilation systems are to be selected so that the combined environmental and services noise levels do not exceed the target internal noise levels. The building services noise emission limits to atmosphere combined should be controlled to not cause disturbance to neighbouring uses. Typically, the use of low noise domestic extract and supply fans with termination either through wall or at roof levels should be sufficient and is assessed in the following section.

Noise Emission Assessment

It is usually considered appropriate that the average measured $L_{A90\ 15min}$ dB noise level during the day and night periods is representative of the typical ambient background noise level. At this stage of the development the proposals for building services plant have not been determined. An example plant schedule for the purpose of feasibility assessment is shown in Table 8 below, based on ventilation and heating plant distributed across the flats.

Table 8: Example building services plant schedule

Manufacturer	Plant	Location	Quantity #	Power kW	SWL dB (A)
Vevor	Electric water heater tank	Each flat	127	2	-
Domus	MEV	Each flat	127	0.05	55

The nearest noise sensitive receptors to the site are considered to be the dwelling at Home Farm (165 m), Mellow Lane East (140 m), Josan Farm House (160 m), properties on Blackpool Gardens, Balmoral Drive and Frogmore Gardens (220 m) Noise emission levels from the example building service plant have been predicted to the nearest off site receptor locations, shown in Figure 5 overleaf.

For the purpose of noise emission calculation, it is assumed that the boundary fences will remain open post and rail fences.

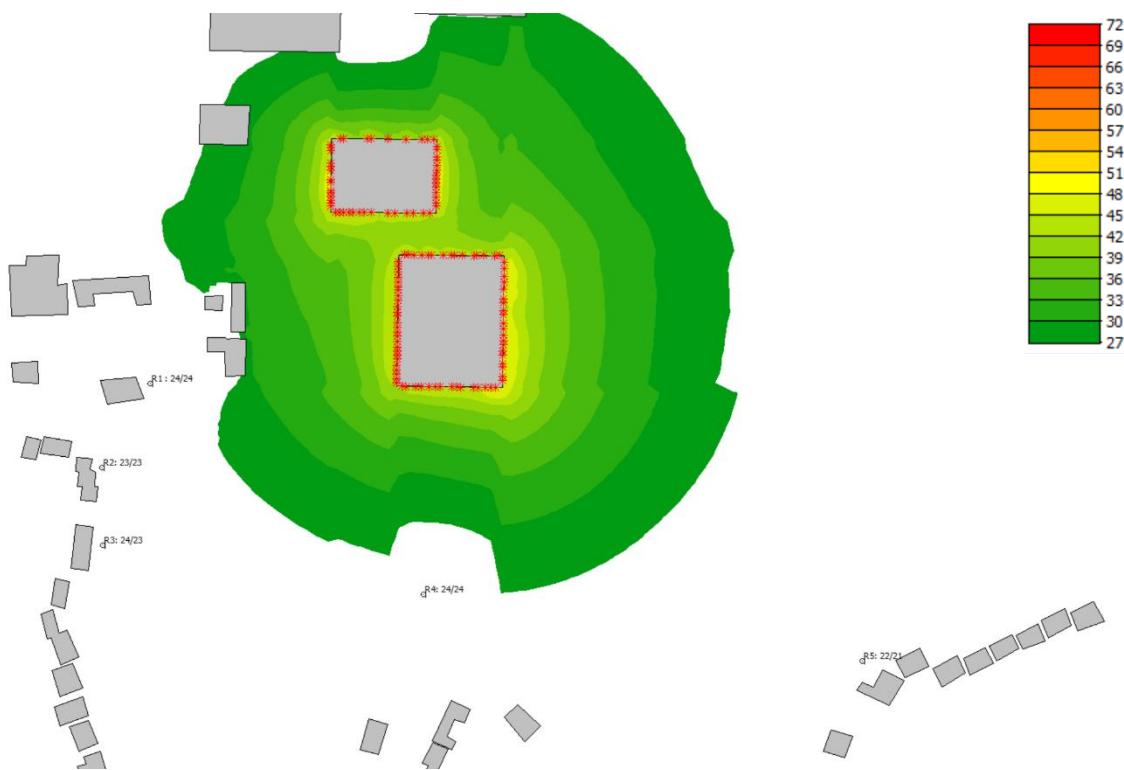


Figure 5: Sample noise emission receptor locations

Table 9 below shows an assessment of the noise emission likely from the example building services plant, for the nearest noise sensitive receptors during the day time periods. The assessment using the methodology of BS 4142: 2014^{xi} to rate the noise level and assess the likely impact adversity. A 2 dB tonality correction has been applied to allow for increased noise at blade pass frequency, although tonality is not expected to be perceptible at any of the receptor locations.

Table 9: Assessment of day time noise emission from building services plant

Name	Height above ground, metres	Predicted noise emission level $L_{Aeq\ 1\ hour}$ dB	Rating noise level $L_{Ar\ 1\ hour}$ dB	Background noise level L_{A90} dB	Excess of rating level over background noise level
R1 Home Farm	1.5	23.6	25.6	43.6	-18.0
R1 Home Farm	4	23.8	25.8	43.6	-17.8
R2 Mellow Lane East	1.5	23.0	25.0	43.6	-18.6
R2 Mellow Lane East	4	22.8	24.8	43.6	-18.8
R3 Hayes End Rd	1.5	23.6	25.6	43.6	-18.0
R3 Hayes End Rd	4	23.4	25.4	43.6	-18.2
R4 Josan Farm House	1.5	23.9	25.9	43.6	-17.7
R4 Josan Farm House	4	23.8	25.8	43.6	-17.8
R5 Frogmore Gardens	1.5	21.6	23.6	43.6	-20.0
R5 Frogmore Gardens	4	21.1	23.1	43.6	-20.5

The assessment in Table 9 shows that typical building services for residential dwelling houses could be operated at the proposed development with no excess of rating level over the background noise level in the day time. According to the BS 4142: 2014 assessment methodology, this indicates that an adverse impact is unlikely, due to building services noise in the day time.

Table 10 below shows assessment of building services noise emission during the night time.

Table 10: Assessment of night time noise emission from building services plant

Name	Height above ground, metres	Predicted noise emission level $L_{Aeq\ 15\ min}\ dB$	Rating noise level $L_{AR\ 15\ min}\ dB$	Background noise level $L_{A90}\ dB$	Excess of rating level over background noise level
R1 Home Farm	1.5	23.6	25.6	38.9	-13.3
R1 Home Farm	4.0	23.8	25.8	38.9	-13.1
R2 Mellow Lane East	1.5	23.0	25.0	38.9	-13.9
R2 Mellow Lane East	4.0	22.8	24.8	38.9	-14.1
R3 Hayes End Rd	1.5	23.6	25.6	38.9	-13.3
R3 Hayes End Rd	4.0	23.4	25.4	38.9	-13.5
R4 Josan Farm House	1.5	23.9	25.9	38.9	-13.0
R4 Josan Farm House	4.0	23.8	25.8	38.9	-13.1
R5 Frogmore Gardens	1.5	21.6	23.6	38.9	-15.3
R5 Frogmore Gardens	4.0	21.1	23.1	38.9	-15.8
R1 Home Farm	1.5	23.6	25.6	38.9	-13.3
R1 Home Farm	4.0	23.8	25.8	38.9	-13.1
R2 Mellow Lane East	1.5	23.0	25.0	38.9	-13.9
R2 Mellow Lane East	4.0	22.8	24.8	38.9	-14.1

The assessment in Table 10 shows that typical building services for residential dwelling houses could be operated at the proposed development with no excess of rating level over the background noise level in the night time. According to the BS 4142: 2014 assessment methodology, this indicates that an adverse impact is unlikely, due to building services noise in the night time.

It maybe feasible to use alternative building service plant technology. The developer should carry out a noise assessment to ensure the rating level does not exceed the ambient background noise during the design stage.

The negative excess of $L_{AR,T}\ dB$ rating level above $L_{A90}\ dB$ background noise level during day time and night time is an indication of the specific sound source having a low impact, depending on the context, according to the BS 4142 methodology.

Hillingdon Council's SPD on Noise suggests a noise emission limit of 5 dB (A) below background, as normally acceptable for planning purposes. The predicted noise levels from the combined operation of all building service plant associated with the development is significantly lower than the limit set out in the SPD on Noise.

In our opinion, noise emission of building services should not constrain the granting of planning permission.

CONCLUSION

This report has presented the findings of an assessment of likely intrusive environmental noise levels, for the proposed development at Hayes Park, Hayes. The assessment has been carried out for Iceni Projects.

The results of a noise survey carried out by NRG Consulting on Monday 23rd and Tuesday 24th January 2023 have been used to establish the prevailing noise levels at the proposed façades. The measured noise levels have been used with the design targets of BS 8233: 2014 to estimate the required external wall, glazing and ventilator acoustic performance. With the minimum acoustic requirements shown, all of the bedrooms and living rooms would achieve the internal noise level recommendations of BS 8233: 2014 during the day time and night time. The $L_{Afmax}\ dB$ noise levels in bedrooms at night time are predicted to be lower than WHO guidance.

Compliance with BS 8233: 2014 recommendations should be sufficient to satisfy the requirements of NPPF 2021, London Borough of Hillingdon Policy EM8 and London Plan Policies D13 and D14 for environmental noise intrusion.

In our opinion, environmental noise intrusion should not be a constraint to the granting of planning permission.

Noise in external amenity areas is likely to be lower than the WHO guidelines. Compliance with WHO Guidelines should be sufficient to satisfy the requirements of London Borough of Hillingdon Policy EM8 and London Plan Policies D13 and D14. Noise external amenities areas should not be a constraint to the granting of planning permission.

A BS 4142: 2014 methodology assessment has been carried out for typical building services plant associated with residential dwellings. The likely noise emission from the example building services, would result in a 'Low impact' on the amenity of the nearest noise sensitive receptors. It is feasible that plant likely to be associated with the development will comply with the noise limits set out in Hillingdon Council's SPD on Noise.

Compliance with BS 4142: 2014 recommendations should be sufficient to satisfy the requirements of London Borough of Hillingdon Policy EM8 and London Plan Policies D13 and D14 for noise emission.

In our opinion, building services noise emission should not be a constraint to granting planning permission.

ⁱ National Planning Policy Framework, Department for Communities and Local Government, July 2021

ⁱⁱ Noise Policy Statement for England, Department for Environment Food and Rural Affairs, March 2010

ⁱⁱⁱ The London Plan, Mayor of London, March 2021

^{iv} London Brough Hillingdon Local Plan: Part 1: Strategic Policies, November 2012

^v Development Control for Noise Generating and Noise Sensitive Development, Supplementary Planning Document, London Boroughs of Hillingdon, Hounslow, and Richmond Upon Thames, July 2014

^{vi} Guidelines for Community Noise, World Health Organization, April 1999

^{vii} BS 7445-1: 2003 'Description and measurement of environmental noise – Part 1: Guide to quantities and procedures'

^{viii} BS EN 61672-1: 2013: 'Electroacoustics. Sound level meters. Specifications.', BSI, December 2013

^{ix} Approved Document F, F1 Means of Ventilation, The Building Regulations 2010, HM Government, October 2010

^x ENGLAND AND WALES. Building Regulations 2010 (England and Wales), as amended. London: The Stationery Office.

^{xi} BS 4142: 2014 , Methods for rating and assessing industrial and commercial sound, BSI, October 2014

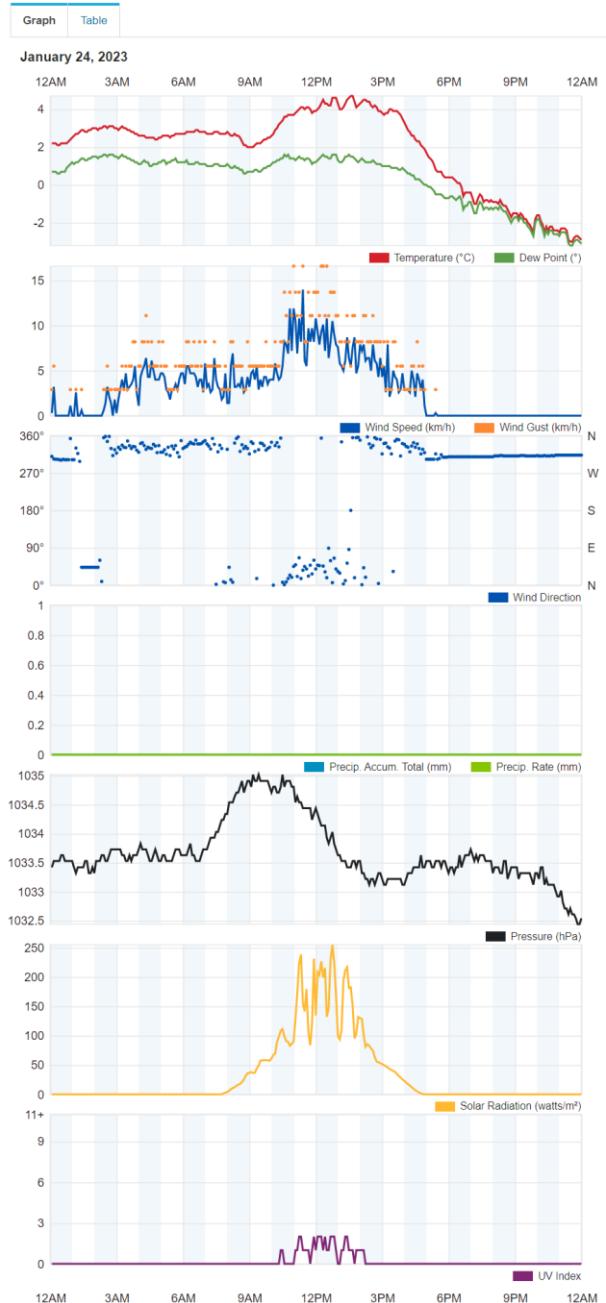
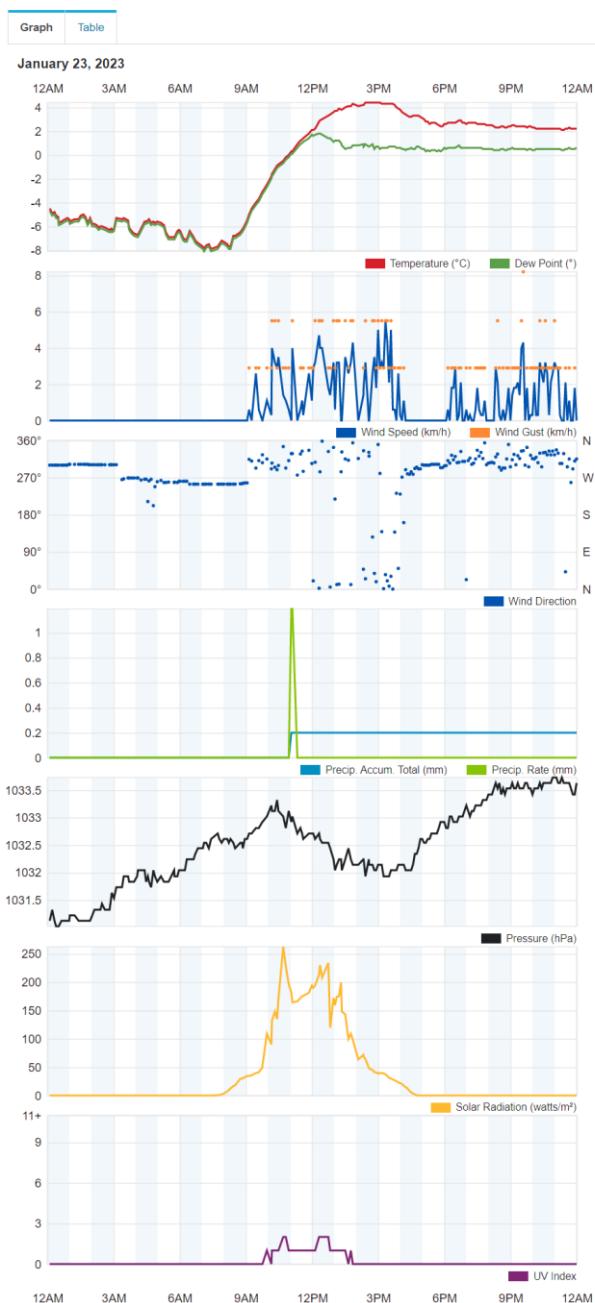
Appendix A – Weather history IHAYES8

Weather History for IHAYES8

Summary			
January 23, 2023			
	High	Low	Average
Temperature	4.4 °C	-7.9 °C	2.2 °C
Dew Point	1.8 °C	-8.1 °C	0.1 °C
Humidity	99 %	76 %	86 %
Precipitation	0.20 mm	–	–
Wind Speed	5.5 km/h	0.0 km/h	0.2 km/h
Wind Gust	8.2 km/h	–	0.5 km/h
Wind Direction	–	–	NNW
Pressure	1,033.73 hPa	1,030.82 hPa	–

Weather History for IHAYES8

Summary			
January 24, 2023			
	High	Low	Average
Temperature	4.7 °C	-3.2 °C	1.8 °C
Dew Point	1.6 °C	-3.4 °C	0.2 °C
Humidity	99 %	79 %	90 %
Precipitation	0.00 mm	–	–
Wind Speed	14.0 km/h	0.0 km/h	1.3 km/h
Wind Gust	16.6 km/h	–	2.1 km/h
Wind Direction	–	–	–
Pressure	1,035.02 hPa	1,032.24 hPa	–



Appendix B – Photographs of measurement locations



Location 1 looking west



From Location 1 looking north



Location 1 looking east



Looking south from Location 1



Location 2 looking north



Location 2 looking west



Location 2 looking east

Appendix C – Graphs of measured 5-minute noise levels

