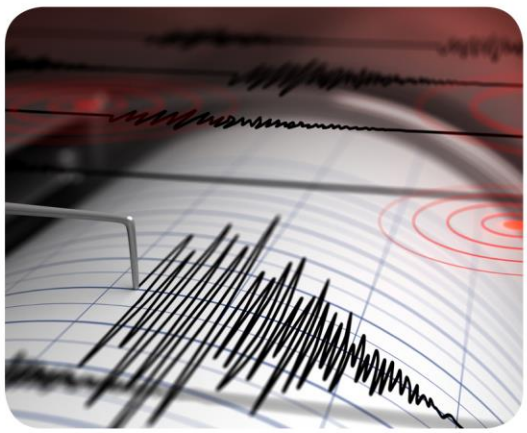
Air & Acoustic Consultants

First Property Group plc

Budgens Londis House, Widewater Place, Denham

Noise Assessment

May 2021



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Noise Assessment

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CONTENTS

1 INTRODUCTION 1

1.1 Brief 1
1.2 Application Site 1
1.3 Development Proposals 2
1.4 Assessment Scope 2

2 LEGISLATION AND POLICY CONTEXT 4

2.1 Introduction 4
2.2 Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016 4
2.3 National Planning Policy Framework (NPPF), 2019 5
2.4 Noise Policy Statement for England (NPSE), 2010 5
2.5 Planning Practice Guidance (Noise) 2019 6
2.6 Local Planning Policy 9

3 ASSESSMENT APPROACH 10

3.1 Approach to the Assessment 10
3.2 Construction Impacts 10
3.3 Operational Impacts 10
3.4 Noise Modelling 14
3.5 Assessment Receptors 14
3.6 Uncertainty and Limitations 16

4 BASELINE CONDITIONS 17

4.1 Noise Monitoring 17
4.2 Noise Survey Results 19
4.3 Background Sound Levels 20

5 CONSTRUCTION IMPACTS 21

6 OPERATIONAL IMPACTS 22

6.1 Operational Commercial Noise 22

7 MITIGATION MEASURES 25

7.1 Operational 25

8 SUMMARY & CONCLUSIONS 26

8.1 Introduction 26
8.2 Baseline 26
8.3 Operational Phase 26

APPENDICES:

APPENDIX A – DEFINITION OF TERMS

FIGURES:

Figure 1.1: Site Location 2
Figure 3.1: Assessment Receptor Locations 15
Figure 4.1: Noise Monitoring Location within the Development Site 18
Figure 4.2: Noise Monitoring Locations within Harleyford Quarry 18

TABLES:

Table 2.1: Summary of Guidance from NPSE and PPGN 7
Table 3.1: Desirable Ambient Noise Levels for Dwellings 12
Table 3.2: Maximum Steady Noise Levels for Reliable Speech Communication 13
Table 3.3: Noise Sensitive Receptors 15
Table 4.1: Noise Monitoring Equipment 17
Table 4.2: Summary of Weather Conditions 19
Table 6.1: Sound Sources Used in the Commercial Noise Assessment 22
Table 6.2: BS 4142 Acoustic Feature Corrections 23
Table 6.3: Predicted Commercial Noise Impacts at Sensitive Receptors 24

1 Introduction

1.1 Brief

1.1.1 Air & Acoustic Consultants Limited have been commissioned by First Property Group plc to undertake a noise assessment in support of a residential development, under The Town and Country Planning (General Permitted Development) (England) Order 2015, at Budgens Londis House, Widewater Place, Moorhall Road, Denham, within the London Borough of Hillingdon.

1.2 Application Site

1.2.1 The site currently consists of Budgens Londis House which is currently an occupied commercial office building located at Widewater Place. The site is located on the Eastern side of Widewater Place, which is located just north off Moorhall Road, Denham. The site is adjacent to the Grand Union Canal with the Widewater Lock to the west, a number of residential properties to the north off Peerless Drive and Moorhall Recreation Ground to the east.

1.2.2 The national grid reference for the centre of the site is, TQ 05061 88832 (British National Grid co-ordinates E: 505061 , N: 188832). The site location and surrounding area are shown in Figure 1.1.

1.2.3 There are three commercial business that are located within the proximity of the proposed development. Located to the west of the proposed development are two commercial operations, Harleyford Aggregates Ltd, and GRS (Roadstone) Ltd and to the south on the opposite side of Moorhall Road is Harefield Marina operated by M.J. Must Marine Sales (Harefield) Ltd.

1.2.4 Harley Aggregates Ltd operates the Harleyford Quarry which includes the screening and distribution of aggregate material and on southern boundary of the Quarry is GRS (roadstone) Ltd which operate an aggregate bagging plant that bags material for distribution and sale.

1.2.5 Harefield Marina provide boat sale and brokerage services but also a number of other supporting services including chandlery crane, slipway, and a number of general maintenances services.

Figure 1.1: Site Location

1.2.6 The existing noise climate around the site, in both the daytime and night-time, is generally dominated by road traffic travelling on the local highway network and intermittent noise from the Harleyford Quarry to the west.

1.3 Development Proposals

1.3.1 The development proposals are for a change of use of a building and any land within its curtilage from a use falling within Class B1(a) (offices) of the Schedule to the Use Classes Order, to a use falling within Class C3 (dwelling houses).

1.4 Assessment Scope

1.4.1 The proposed development will result in new noise sensitive receptors in the form of residential units located within the development site and noise from the existing commercial operations outside the site boundary has the potential to cause adverse noise effects from:

- Operational plant and machinery within the Harleyford Quarry site; and

- Vehicle movements within the boundaries of the Harleyford Quarry site.

1.4.2 This assessment has been undertaken to determine whether the proposed development is likely to result in any significant adverse noise impacts at the closest future noise sensitive receptors.

1.4.3 The assessment considers the suitability of the site for the proposed use with reference to the following guidance (which are further discussed in Section 2):

- National Planning Policy Framework 2019; (NPPF);
- Planning Practice Guidance (Noise), 2019;
- Noise Policy Statement for England 2010; (NPSE);
- The World Health Organisation Guidelines for Community Noise, 1999 (WHO);
- British Standard BS: 5228-1:2009 + A1:2014, Code of Practice for Noise and Vibration Control on Construction and Open Sites;
- British Standard BS: 7445-1, Description and Measurement of Environmental Noise
- ISO 1996-1:2016 Acoustics – Description, measurement, and assessment of environmental noise – Part 1: Basic quantities and assessment procedures
- British Standard BS: 4142:2014+A1:2019 Methods for rating and Assessing Industrial and Commercial Sound; and

1.4.4 To assist with the understanding of this report a glossary of acoustic terms is provided in Appendix A.

2 Legislation and Policy Context

2.1 Introduction

2.1.1 The prediction and assessment of the likely noise impacts of the proposed development has been considered against the relevant legislation policy and guidance regarding noise, which are discussed in turn below.

2.2 Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016

2.2.1 The site currently has an established B1(a) Office use and therefore under the Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016 a Class O permitted development is allowed to convert to residential (Use Class C3). A prior approval applications is required to the Local Authority to consider the:

"impacts of noise from commercial premises on the intended occupiers of the development".

2.2.2 Section W paragraph 10.b of the Town and Country Planning Act (General Permitted Development) (Amendment) Order 2016 requires the Local Authority to consider the following when determining a prior approval application for permitted development:

"(b) have regard to the National Planning Policy Framework….so far as the relevant subject matter of the prior approval, as if the application were a planning application…"

2.2.3 With regard to noise, Local Planning Authorities can only consider noise impacts from existing commercial premises on the proposed residential development and cannot consider general transportation noise impact. (However, if there is traffic noise associated to a commercial actively it is considered that this can be taken into account).

2.2.4 With regard to commercial noise impact, the following general areas should be considered:

- Noise generating plant and equipment associated with existing commercial uses i.e. air conditioning, refrigeration, kitchen extraction systems etc. which impact on amenity space areas and internal spaces;
- Any structural noise transmission associated with adjoining commercial business (not B1);

- Any permitted delivery noise associated with existing commercial uses;
- Music/Entertainment noise breakout and structure borne noise impact;
- Builders merchants/yards with significant external noise impacts; and
- Regard to use outside normal office hours.

2.3 National Planning Policy Framework (NPPF), 2019

2.3.1 The NPPF sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development. The NPPF addresses noise as a planning issue primarily through the following statement, at paragraph 180:

> *'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;'*

2.3.2 The NPPF refers to the Noise Policy Statement for England (NPSE) for advice on the achievement of these policy aims, and particularly in connection with the explanation of 'adverse impacts.'

2.4 Noise Policy Statement for England (NPSE), 2010

2.4.1 The NPSE is the overarching government policy on noise. It seeks to clarify the underlying principles and aims in past and existing policy documents, legislation, and guidance in relation to all forms of noise including environmental noise, neighbour noise, and neighbourhood noise (but not noise in the workplace).

2.4.2 It uses the established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL). The NPSE extends these by introducing Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective

value to define SOAEL for noise that is applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors and at different times.

2.4.3 The NPSE's vision 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 long-term vision is supported by the following aims:*
>
> - *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, through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.'*

2.4.4 The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL. The NPSE asserts that, while this means that all reasonable steps should be taken to mitigate and minimise adverse effects, this does not mean that such adverse effects cannot occur.

2.5 Planning Practice Guidance (Noise) 2019

2.5.1 The Government has published Planning Practice Guidance on a range of subjects including noise. The guidance forms part of the NPPF and provides advice on how to deliver its policies. The PPGN reiterates general guidance on noise policy and assessment methods provided in the NPPF, NPSE and British Standards and contains examples of acoustic environments commensurate with various effect levels.

2.5.2 Paragraph 006 of (Reference ID: 30-006-20190722) of the PPG (Noise) explains that:

> *'The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.'*

2.5.3 Paragraph: 004 Reference ID: 30-004-20190722 of the PPG (Noise) describes the different effect levels which are defined and briefly outlined below:

- No Observable Effect Level (NOEL);

- Lowest Observable Adverse Effect Level (LOAEL); and
- Significant Observed Adverse Effect Level (SOAEL).

2.5.4 The PPG (Noise) describes noise that is not noticeable to be at levels below the NOEL. Noise exposures in this range are below the LOAEL and no mitigation is required. The NPPG (Noise) suggests that noise exposures above the LOAEL cause small changes in behaviour. Examples of noise exposures above the LOAEL provided in the NPPG (Noise) are having to turn up the volume on the television; needing to speak more loudly to be heard; or, where there is no alternative ventilation, closing windows for some of the time because of the noise. In line with the NPPF and NPSE, the PPG (Noise) states that consideration needs to be given to mitigating and minimising effects above the LOAEL, but also to taking account of the economic and social benefits being derived from the activity causing the noise. The PPG (Noise) suggests that noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL provided in the PPG (Noise) are, where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. In line with the NPPF and NPSE, the PPG (Noise) states that effects above the SOAEL should be avoided and that whilst the economic and social benefits derived from the activity causing the noise must be taken into account, such exposures are undesirable.

2.5.5 The non-numeric guidance contained within the PPG (Noise), based upon the starting point in the NPSE, is summarised in Table 2.1.

Table 2.1: Summary of Guidance from NPSE and PPGN

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Adverse Effect Level			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required

Perception	Examples of Outcomes	Increasing Effect Level	Action
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and / or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and / or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
`Noticeable and very disruptive	Extensive and regular changes in behaviour and / or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation / awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.5.6 In line with the NPPF and the NPSE, the guidance confirms that significant adverse effects should be avoided. At the next level down in the hierarchy, where there is an observed adverse effect, the PPG (Noise) confirms that effects should be mitigated and reduced to a minimum, (as far as reasonably practicable). No mitigation measures are required for effects that are considered to be below the lowest observed adverse effect level (LOAEL).

2.5.7 However, along with the NPSE it does not provide any numerical of definition of the NOEL, LOAEL and SOAEL.

2.5.8 The NPSE also refers to the World Health Organisation, (WHO) when discussing noise impacts. The WHO Guidelines for Community Noise (1999) suggest guideline values for internal noise exposure which take into consideration the identified health effects and are set, based on the lowest effect levels for general population. Guideline values for amenity which relate to external noise exposure are set at 50 or 55 dB(A), representing daytime levels below which most of the adult population will be protected from becoming moderately or seriously annoyed, respectively.

2.6 Local Planning Policy

London Borough of Hillingdon

2.6.1 The Local Plan Part 1 sets out the overall level and broad locations of growth up to 2026. It comprises a spatial vision and strategy, strategic objectives, core policies and a monitoring and implementation framework with clear objectives for achieving delivery.

2.6.2 The Hillingdon Local Plan contains the following relevant policies for noise from new developments:

> *'Policy EM8: Land, Water, Air and Noise*
>
> *The Council will implement Policy EM8 by:*
>
> *Setting high standards for reducing land, water, air and noise pollution and resisting amenity and environmental impacts that affect how we enjoy the environment in which we live and work. This includes making sure developments are designed to cope with climate conditions as they change during the development's lifetime.*
>
> *SO10: Improve and protect air and water quality, reduce adverse impacts from noise including the safeguarding of quiet areas and reduce the impacts of contaminated land.*
>
> *SO10: Improve and protect air and water quality, reduce adverse impacts from noise including the safeguarding of quiet areas and reduce the impacts of contaminated land.*

2.6.3 In 2006 London Borough of Hillingdon produced Supplementary Planning Guidance, Reference EB 46: *Noise Supplementary Planning Document* which included Key Point 6 which discusses Industrial Uses and refers to BS 4142:1997. There has been a number of key iterations of this document since the BS 4142:1997 version. The latest 2019 version of this British Standard has been utilised within this assessment and the standard and its methodology are discussed in Section 3.

3 Assessment Approach

3.1 Approach to the Assessment

3.1.1 This noise assessment has been undertaken by means of:

- A review of national and local planning policy;
- A review of the existing noise sources;
- A review of the development proposals;
- A baseline and commercial noise survey;
- A qualitative assessment of potential demolition and construction impacts;
- A quantitative assessment of the operational impacts;
- Provision of recommendations of mitigation measures, where appropriate, designed to minimise any adverse noise impacts; and
- The identification of any residual impacts resulting from the proposed development.

3.2 Construction Impacts

3.2.1 It is understood that there will be no specific external construction works associated with the proposed development. There will be some short internal alteration works but these will be short term and temporary in nature so unlikely to have any significant noise impacts.

3.3 Operational Impacts

BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

3.3.1 BS 4142:2014+A1:2019 is used to rate and assess sound of an industrial and/or commercial nature including:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and;

- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

3.3.2 The purpose of the BS 4142:2014+A1:2019 assessment procedure is to assess the significance of sound of an industrial and/or commercial nature.

3.3.3 BS 4142:2014+A1:2019 refers to noise from the industrial source as the 'specific noise' and this is the term used in this report to refer to noise which is predicted to occur due to activities associated with the nearby commercial/industrial uses.

3.3.4 BS 4142:2014+A1:2019 assesses the significance of impacts by comparing the specific noise level to the background noise level (L_{A90}).

3.3.5 Certain acoustic features can increase the significance of impacts over that expected from a simple comparison between the specific noise level and the background noise level. BS 4142:2014+A1:2019 identifies that the absolute level of sound, the character, and the residual sound and the sensitivity of receptor should all be taken into consideration. BS 4142:2014+A1:2019 includes allowances for a rating penalty to be added if it is found that the specific noise source contains a tone, impulse and/or other characteristics, or is expected to be present. The specific noise level along with any applicable correction is referred to as the 'rating level'.

3.3.6 The greater the increase between the rating level over the background noise level, the greater the magnitude of the impact. The assessment criteria given by BS 4142:2014+A1:2019 are as follows:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; 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. 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.

3.3.7 During the daytime, BS 4142:2014+A1:2019 requires that noise levels be assessed over 1-hour periods. However, during the night-time, noise levels are required to be assessed over 15-minute periods.

3.3.8 Where the initial estimate of the impact needs to be modified due to context, BS 4142:2014+A1:2019 states that all pertinent factors should be taken into consideration, including:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

3.3.9 British Standard BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' draws on the results of research and experience to provide information on the design of buildings to provide internal acoustic environments appropriate to their functions. It deals with control of noise from outside the building, noise from plant and services within it, and room acoustics in non-critical situations.

3.3.10 BS 8233:2014 defines a range of indoor ambient noise levels for spaces when they are unoccupied. A summary of the noise levels recommended in Table 4 of BS 8233:2014 guidance, for rooms used for resting and sleeping. Table 4 of the guidance has been replicated in Table 3.1 below and represent levels for sources without a specific acoustic character.

Table 3.1: Desirable Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35dB $L_{Aeq, 16hour}$	-
Dining	Dining room	40dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq, 16hour}$	30dB $L_{Aeq, 8hour}$
External Noise	Amenity Spaces	50 - 55dB $L_{Aeq, 16hour}$	-

3.3.11 BS 8233:2014 provides the following guidance regarding acceptable noise levels in external amenity areas:

'7.7.3.2 Design criteria for external noise

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T ,

with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.'

3.3.12 The lower values shown in Table 3.1 above, are generally regarded as the LOAEL for steady external sound, i.e. no adverse effect due to the impact of the sound would be expected. If the sound has certain characteristics, it could be appropriate to consider a lower value as the LOAEL.

3.3.13 BS 8233:2014 also states that:

'Where development is necessary or desirable the internal target levels can be relaxed by up to 5 dB and reasonable internal conditions achieved.'

3.3.14 Table 7 from the BS8233:2014 guidance, (replicated in Table 3.2) contains the maximum noise levels for reliable speech communication. This table can be used to gauge the effect of a noise source at the future receptors.

Table 3.2: Maximum Steady Noise Levels for Reliable Speech Communication

Distance Between Talker and Listener (m)	Noise level dB(A)	
	Normal Voice	Raised Voice
1	57	62
2	51	56
4	45	50
8	39	44

World Health Organisation Guidelines for Community Noise (1999)

3.3.15 The World Health Organisation's Guidelines for Community Noise has been considered regarding the potential impact from any maximum short-term noise levels.

3.3.16 The WHO Guidelines indicate that sound pressure levels at the outside façades of living spaces should not exceed 60dB L_{Amax} so that people may sleep with bedroom windows open. These values assume

the noise reduction with a window partially open is 15dB, resulting in an internal noise level of 45dB L_{Amax}. The guidelines state that for a good sleep, indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10 – 15 times per night. It is generally accepted that 60dB L_{Amax} at the façade is a LOAEL.

3.4 Noise Modelling

3.4.1 The potential levels of sound arising from operational activities within the Quarry have been predicted using the environmental noise modelling software CadnaA for the relevant receptor locations.

3.4.2 Several different methods of prediction have been used depending on the type of source, all of which assume downwind propagation from the source to the receptors, these are include:

- Calculation of Road Traffic Noise (CRTN) for vehicles travelling on the local highway network; and
- ISO 9613-2:1996 for all other sources, together with appropriate source data.

3.4.3 The predictions have been based on the operation of the adjacent commercial business at full capacity and the following information has been incorporated into the prediction model:

- Ordinance Survey Map Tiles;
- Ordinance Survey Topographical data;
- The layout of the existing site has been included as 3D structures and a receptor height of 1.5m to represent ground floor and 4m to represent the first floor has been used; and
- Input of a manned noise monitoring survey of adjacent specific commercial noise sources

3.5 Assessment Receptors

3.5.1 The receptors have been selected based upon the future residential units most exposed to the potential noise sources, as a result of the Proposed Development. The selected noise sensitive receptor locations are detailed in Table 3.3.

Table 3.3: Noise Sensitive Receptors

Receptor	Height (m)	Description	Receptor Location Description
R1	1.5 / 4	Budgens Londis House, Widewater Place, Moorhall Road	Ground Floor External Area to the East of Budgens Londis House – Representative of the external area for the proposed future receptor
R2	1.5 / 4	Budgens Londis House, Widewater Place, Moorhall Road	Ground Floor External Area to the North West of Budgens Londis House – Representative of the external area for the proposed future receptor
R3	1.5 / 4	Budgens Londis House, Widewater Place, Moorhall Road	Ground Floor External Area to the South West of Budgens Londis House – Representative of the external area for the proposed future receptor

3.5.2 The proposed receptor locations are illustrated in Figure 3.1.

Figure 3.1: Assessment Receptor Locations

3.6 Uncertainty and Limitations

3.6.1 Regarding the noise survey measurements, the baseline survey was conducted as a manned survey on Wednesday 12th May 2021 to obtain a representative sample of the baseline noise environment and also the specific noise associated with the commercial and industrial operations at Harleyford Quarry including the GRS Bagging plant.

3.6.2 The calibration drift on the meters was very small; less than 0.1 dB for all measurements. All equipment was within laboratory calibration in accordance with the relevant standards (calibrators every year and sound level meters every 2 years).

3.6.3 The assessment of the operational sound has been made to be as robust as possible by undertaking a consultation with the owners and operators of the Harleyford Quarry and a specific noise survey of the operational noise from the Quarry has been undertaken.

3.6.4 it is considered that whilst there will always be a level of inherent uncertainty in any assessment, where possible, potential sources of uncertainty have been minimised and it is considered to be a representative and robust assessment of the likely impacts.

4 Baseline Conditions

4.1 Noise Monitoring

4.1.1 A number of short-term attended baseline and specific noise surveys were undertaken on Wednesday 12th May 2021. The survey consisted of a number of short-term background noise monitoring measurements in several external areas around the proposed development site that were selected to be representative of the future residential exposure.

4.1.2 Specific noise measurements were also undertaken of the operational plant within the Quarry site including the GSP Bagging plant.

4.1.3 All measurements were taken using class 1 sound level meter. The microphone measurement position was in the acoustic free field and was mounted on a pole at 1.5m above the ground. calibration checks were performed at the start and end of the survey; no significant drift in calibration was observed.

4.1.4 The details of the monitoring equipment used is set out in Table 4.1, the monitoring position within the proposed development site is illustrated in Figure 4.1. and Figure 4.1. shows the monitoring locations that were used within Harleyford Quarry.

Table 4.1: Noise Monitoring Equipment

Equipment Type	Manufacturer	Model	Serial Number	Calibration Due
Sound Level Meter	Larson Davis	Model Lxt1	6042	02/2023
Pre-Amplifier		PRMLxT1		
Microphone		377BO2		
Calibrator	Larson Davis	Cal 200	17574	01/2022

Figure 4.1: Noise Monitoring Location within the Development Site

Figure 4.2: Noise Monitoring Locations within Harleyford Quarry

4.1.5 The weather conditions during the survey were influenced by a north-westerly wind and there was some precipitation during the monitoring period, however, monitoring was stopped during the periods of precipitation.

4.1.6 Some additional noise is likely to result from monitoring following the periods of precipitation due to vehicle movements over wet surfaces. Average wind speeds were monitored at several periods during the survey and the monitoring period were below 5 m/s.

4.1.7 The information provided in Table 4.2, uses data from Weather Underground. The weather station is located Harefield Village (Station ID: IUXBRI9).

Table 4.2: Summary of Weather Conditions

Date	Temp (°C)	Wind Speed (m/s)		Wind Direction	Total Precipitation (mm)
		Average	Peak		
12/05/21	12.2	0.53	3.25	NW	0.25

4.2 Noise Survey Results

4.2.1 During the monitoring survey a subjective assessment was undertaken of the ambient noise and in the area close to the local highway network. The noise from the local highway network was a significant and dominant noise source. As the distance from the road increased the contribution of road traffic to the ambient noise level decreased and the noise from the operations at the Quarry became more audible.

4.2.2 The commercial noise that was audible within the development site included the operation of the aggregate screen process that splits aggregate material based upon size and uses conveyors to form piles of equally sized material. The noise that is audible was from the engine running the plant and the impact noise of the larger aggregate material, (stones) dropping from the conveyor onto storage piles.

4.2.3 The other noise that was audible was from a reversing beeper that was operating intermittently within the Quarry site.

4.2.4 During the survey period there was also significant noise as a result of a large development project which forms part of the HS2 development. The HS2 development were undertaking piling work as

part of the construction of a new viaduct located approximately 500m to the west of the proposed development.

4.2.5 During the morning of the monitoring survey the Harleyford Quarry was in full operation, so the initial noise survey included undertaking measurement of the operational Quarry noise at each of the identified receptor locations. Due to the HS2 piling work the measurement duration of the operational Quarry noise was limited to short periods of up to 5 minutes.

4.2.6 A visit was undertaken to the Harleyford Quarry and the GRS Bagging plant to better understand the operations and the specific noise sources. This visit included a number of monitoring surveys of the specific operational noise sources.

4.2.7 During this Quarry site visit it was noted that the screening process was supported by two loading bull dozers that operate with broadband reversing alarms and ridged lorries also visit the site to deliver and collect aggregate materials.

4.2.8 The GRS Bagging operation utilises a bagging machine to fill the bags with aggregate material from a hopper and two forklifts (with broadband reversing alarms) transport the filled bags to storage areas for directly loaded onto waiting lorries.

4.2.9 When the Quarry and HS2 construction works ceased operations the background noise surveys were undertaken within the proposed development site at each of the identified receptor locations.

4.3 Background Sound Levels

4.3.1 As part of an assessment of industrial or commercial sound, following the guidance of BS 4142:2014+A1:2019 a representative background sound level must be determined.

4.3.2 Due to the operation of Harleyford Quarry and the HS2 construction works the background noise measurements were undertaken during the afternoon of the 12th May when the Quarry had ceased operation.

4.3.3 The background noise levels were considered to be the typical background sound levels for the daytime periods at each of the monitoring location.

5 Construction Impacts

5.1.1 It is understood that there will be no major construction works associated with the proposed scheme. There will be internal alterations and there may be new boundary fences installed but these are likely to be short in duration. Therefore, it has been concluded that a construction noise assessment is not necessary.

6 Operational Impacts

6.1 Operational Commercial Noise

6.1.1 As set out earlier in this report , the potential adverse effects of commercial and/or industrial sound experienced at the future sensitive receptors have been assessed using the methodology described in BS 4142:2014+A1:2019.

6.1.2 The adjacent commercial activities consist of the continuous operation of the aggregate screening process and noise associated with the loading and distribution vehicles. As the commercial operations are limited to the daytime, no night-time impact assessment / activity has been considered.

6.1.3 The level of activity was discussed with the manager of the Quarry and the bagging plant and these processes run continuously throughout the day and the work undertaken on the 12th May was representative of a reasonable normal / worst case level of operational activity.

6.1.4 The specific source levels used for the predictions of operational noise, were collected during the site visit to Harleyford Quarry and details of the sources used in the assessment are provided in Table 6.1.

Table 6.1: Sound Sources Used in the Commercial Noise Assessment

Activity	Sound Power Level at Octave Band Centre Frequencies (dB)								Overall dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
HGV Arriving Movement	-	-	-	-	-	-	-	-	73.0
Aggregate Screening Plant	-	-	-	-	--		-	-	62.0
Volvo L120F wheel loader	-	-	-	-	-	-	-	-	65.0
Volvo L120F Broadband Reversing	-	-	-	-	-	-	-	-	67.2
Forklift	-	-	-	-	-	-	-	-	67.5
Forklift Reversing Alarm	-	-	-	-	-	-	-	-	73.0

6.1.5 Each noise source has been considered for corrections to account for the assessment period and activity duration as well as any distinctive acoustic feature or characteristics.

6.1.6 The various operational manoeuvres, including loading and unloading of HGV's each take varying amounts of time which are accounted for with an on-time correction for the BS 4142:2014+A1:2019 assessment period of 1 hour during the daytime.

6.1.7 The HGV movement that occurs within the Quarry and GRS bagging areas have been assessed as a worst-case assuming operation for 30mins in an hour.

6.1.8 Any distinctive characteristics of any of the specific sound source are accounted for with penalty corrections for tonality, impulsivity, and intermittency and a full list of penalties applied to the proposed sources and resulting noise rating levels are provided in Table 6.2 along with justifications.

Table 6.2: BS 4142 Acoustic Feature Corrections

Equipment /Activity	Characteristic and Justification	Penalty (dB)
HGV Arriving Movement	The dominant source of noise is traffic movements on roads and HGV's will not stand out against this, so no penalty has been added.	0
Aggregate Screening Plant	The screening plant is audible but does not contain tonality, impulsivity, and intermittency and so no penalty has been applied	0
Volvo L120F wheel loader	tonality, impulsivity, and intermittency	0
Volvo L120F Broadband Reversing	Reversing alarms can be impulsive however but as this is a broadband alarm, it is operating at least 80m from the receptor and there is a canal with raised banks in-between blocking direct line of sight no tonality, impulsivity, and intermittency penalty has been added.	0
Forklift	The dominant source of noise is traffic movements on roads and the forklift is operating at least 80m from the receptor and there is a canal with raised banks in-between blocking direct line of sight no tonality, impulsivity, and intermittency penalty has been added.	0
Forklift Reversing Alarm	Reversing alarms can be impulsive however this is operating at least 80m from the receptor and there is a canal with raised banks in-between blocking direct line of sight so an impulsivity penalty of +3 has been added. The source will not be simultaneously tonal, so no tonality penalty has been added. The penalty is not applied to receptors that are shielded from the source by the proposed development	+3dB

6.1.9 The noise rating levels, and representative background noise levels have been based upon the modelled specific noise levels at the facades of the previously identified noise sensitive receptors, these are provided in Table 6.3.

Table 6.3: Predicted Commercial Noise Impacts at Sensitive Receptors

Receptor	Height (m)	Daytime (07.00 – 23.00) Specific Level (dBA)	Acoustic feature Penalty (dBA)	Rating Level $L_{Ar,Tr}$ (dBA)	Background Level (dBA)	Difference (dBA)
R1	1.5	29.3	0	29.3	42.5	-13.2
	4	35.3		35.3		-7.2
R2	1.5	32.5	0	32.5	43.5	-11
	4	32.7		32.7		-10.8
R3	1.5	28.4	0	28.4	47.7	-19.3
	4	28.6		28.6		-19.1

6.1.10 It can be seen in Table 6.3, that the rating noise levels are below the background noise level at each of the receptor locations, indicating no adverse effects are likely at these receptors.

6.1.11 In terms of the BS 4142 Guidance the impacts would be categorised as NOEL by the NPSE and there are no likely adverse effects, no further action is required.

6.1.12 With regard to internal noise levels BS 8233:2014 provides the criteria for internal amenity noise level and the standard allows for a 15dB reduction in noise level from external to internal noise, due to the attenuation provided by the façade make-up of the building with an open window.

6.1.13 To achieve the BS 8233:2014 internal daytime criteria of 35dB (for resting areas such as bedrooms) the external noise should not exceed 50dB. The results of the modelling show that the highest external façade level as a result of the Quarry operations is 35.3dB and so there are not likely to be any adverse effects and the impacts upon the internal noise levels would be categorised as NOEL by the NPSE, with no further action is required.

6.1.14 The external noise levels as a result of the operations at Harleyford Quarry are also well below the required BS 8233:2014 criteria and the WHO guidelines for external amenity noise levels.

6.1.15 To note, AAC have not been advised if the Proposed Development includes any external air handling plant and therefore not considerations have been made in this assessment.

7 Mitigation Measures

7.1 Operational

7.1.1 As described in Section 6, no adverse impacts are considered likely as a result of the proposed development and no additional mitigation measures are proposed.

8 Summary & Conclusions

8.1 Introduction

8.1.1 Air and Acoustic Consultants Ltd has been instructed by First Property Group plc to undertake a noise assessment in support of the residential development of Budgens Londis House, Widewater Place, Moorhall Road, Denham under The Town and Country Planning (General Permitted Development) (England) Order 2016 Class O to allow conversion to residential (Use Class C3).

8.2 Baseline

8.2.1 The existing noise climate at the site is dominated by background road traffic noise with additions from the operations at Harleyford Quarry.

8.2.2 The baseline background ambient noise environment at the future noise sensitive receptor locations has been established with a manned noise survey.

8.3 Operational Phase

8.3.1 The impacts at each of the receptor locations has been predicted using the CadnaA noise propagation model, incorporating ISO 9613-2 calculations, and monitored noise sources; to allow for an assessment in line with the relevant British Standards, Guidance documents and Planning Policy.

8.3.2 The operational noise from Harleyford Aggregates and the GRS Bagging has been considered including the undertaking of specific noise measurements for all the main noise sources.

8.3.3 The assessment shows that no adverse effects are likely at any of the noise sensitive receptor locations as a result of the operations of Harleyford Aggregates or GRS bagging and the potential impacts are considered to represent NOEL.

Air & Acoustic Consultants

APPENDICES

Appendix A – Definition of Terms

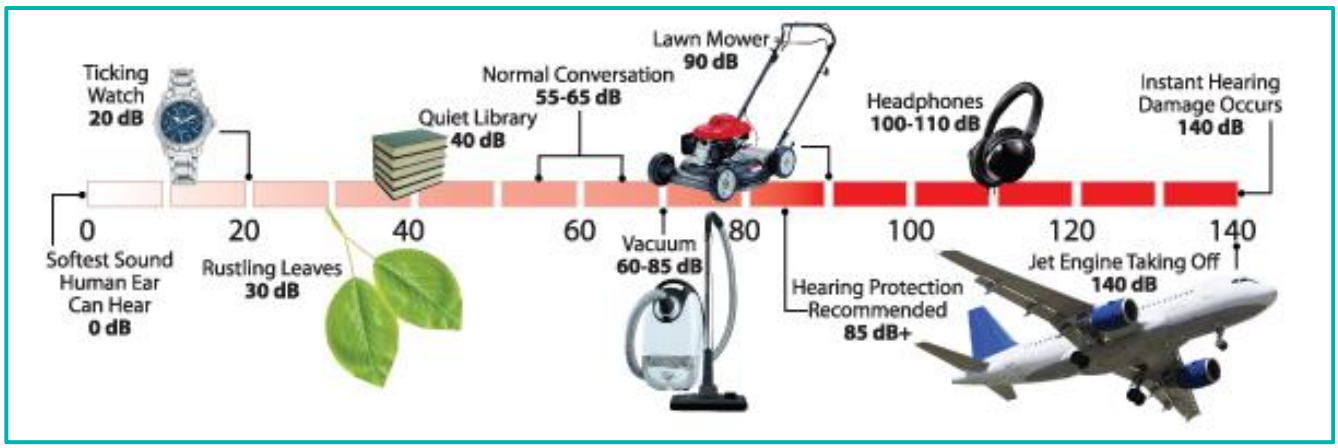
Sound Pressure - Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.

Sound Pressure Level - The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10-6 Pascals) on a decibel scale.

Decibels dB - Noise is commonly defined as unwanted sound. The range of audible sound is from 0dB to 140dB, which is taken to be the threshold of pain. The sound pressure detected by the human ear covers an extremely wide range. The decibel (dB) is used to condense this range into a manageable scale by taking the logarithm of the ratio of the sound pressure and a reference sound pressure.

The decibel scale is logarithmic and therefore when two noise sources are present together, they must be combined logarithmically, therefore, when two sound sources of the same sound pressure level are combined the resultant level is 3dB(A) higher than the single source. However, in subjective terms the ear can distinguish a difference in 'loudness' between two simple noises sources when there is a 3dB(A) difference between them. I emphasis, loudness, not a measure of annoyance. Again, for simple sources, when two sounds differ by 10dB(A) one is said to be twice as loud as the other.

Figure A.1: Examples of Typical Noise Levels



Noise Level Indices - Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.

'A' Weighted Decibels dB(A) - The frequency response of the ear is usually taken to be about 18Hz (number of oscillations per second) to 18,000Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than at the lower and higher frequencies, and because of this, the low and high frequency component of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most used, and which correlates best with the subjective response to noise, including that of music, is the dB(A) weighting. This electronic filter matches the variation in the frequency sensitivity of the meter to that of the human ear. This is an internationally accepted standard for noise measurements.

Table A.1: Other Standard Noise Units:

Symbol	Name	Definition
$L_{Aeq,T}$	Equivalent Continuous Sound Level	The A-weighted sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound under investigation. The LAeq provides a single value to express the average sound energy over the measurement period and is the most widely used indicator for environmental noise.
$L_{Amax,T}$	maximum 'A' weighted noise level	This is the maximum 'A' weighted noise level recorded during the measurement period, (T).
$L_{A90,T}$	the 'A' weighted noise level	This is the 'A' weighted noise level exceeded for 90% of the measurement period (T). This is normally used to describe the background noise.
$L_{A10,T}$	the 'A' weighted noise level exceeded for just 10 % of time	This is the 'A' weighted noise level exceeded for just 10 % of the measurement period, (T). This is normally used to describe traffic noise.
$L_{A90,T}$	the 'A' weighted noise level exceeded for just 90 % of time	A noise level index. The noise level exceeded for 90% of the time over the period T. L90, can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L_S	Specific noise level.	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
$L_{Ar,Tr}$	Rating noise level	The specific noise level plus any adjustments for characteristic features of the noise.
$D_{n,c,w}$	Laboratory Insulation Rating	A single-number rating of the laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it.
$D_{nf,w}$	Weighted normalised flanking level difference	A single-number that quantifies the in-situ airborne sound insulation between rooms, when the transmission only occurs through a specified flanking path.
$D_{nT,w}$	Weighted standardized level difference	Single-number quantity that characterizes the in-situ airborne sound insulation between rooms.
R_w	Weighted sound reduction index.	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies in a laboratory.
C_{tr}	Traffic noise weighting correction	Correction term applied against the sound insulation single-number values (R_w, D_w and $D_{nT,w}$) to provide a weighting against low frequency performance.
NOEL	No Observed Effect Level	Noise Policy Statement for England (2010) - The noise level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
LOAEL	Lowest Observed Adverse Effect Level	Noise Policy Statement for England (2010) - The noise level above which adverse effects on health and quality of life can be detected.
SOAEL	Significant Observed Adverse Effect	Noise Policy Statement for England (2010) - The noise level above which significant adverse effects on health and quality of life occur.

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