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Ascot High Street

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22 June 2023	Update to blocks and the number of units	04	Adam Kershaw, BSc (Hons), MIOA
Limitations			
<p>This report has been prepared for the titled project and client, in accordance with our agreed scope of work, Ref: PAL-01040/SC1, dated 18 August 2022.</p> <p>This report should not be used or relied upon for any other project or purpose without the written authorisation of Pulsar Acoustics Ltd. Pulsar Acoustics Ltd accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than for the project to which it was intended. The findings and opinions included herein are based on measurements and information gathered prior to the date the report was issued. If additional information becomes available which may affect our comments, conclusions or recommendations, then Pulsar Acoustic Ltd should be informed. We then reserve the right to review the information, assess any new potential concerns, and modify our advice accordingly.</p>			



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1.0 - Introduction

A new mixed-use development is proposed on land located south of High Street, Ascot, which is situated in The Royal Borough of Windsor and Maidenhead. The Planning Reference is 22/01971.

Proposals include redevelopment of existing site to provide 2,070sqm commercial and community floorspace (mix of uses within Use Classes E, F1 and F2) and 117 dwellings with associated parking, access, open space, landscaping and other associated works. Provision of new public open space with associated hard and soft landscape works, new pedestrian and cycle paths and children's play area.

Pulsar Acoustics has been commissioned to undertake an environmental noise survey and acoustic assessment of the site.

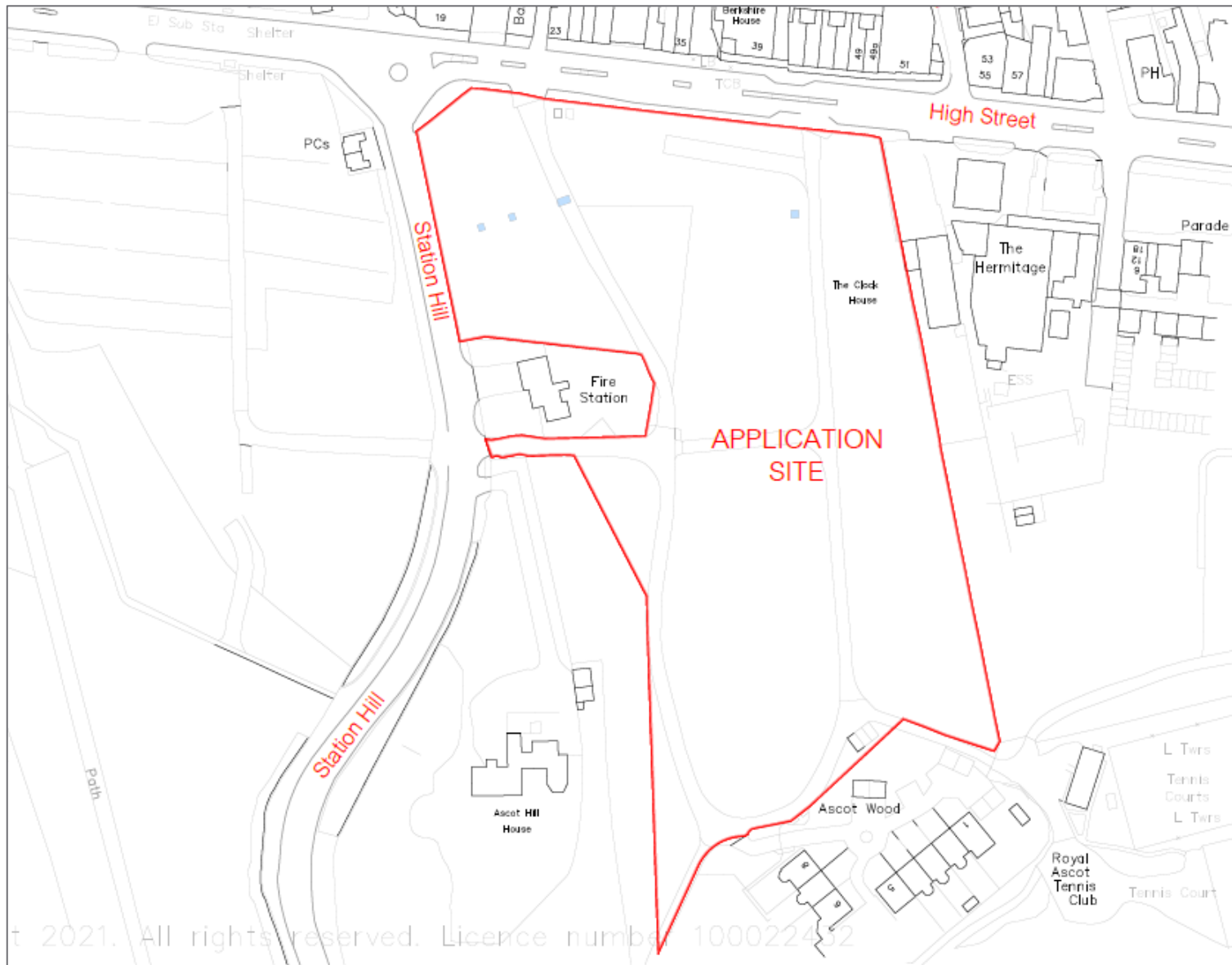
This report presents the results of our survey, recommends relevant industry standard criteria and planning policy, and provides preliminary recommendations and acoustic mitigation measures where necessary to achieve relevant guidance.

2.0 - Site Description

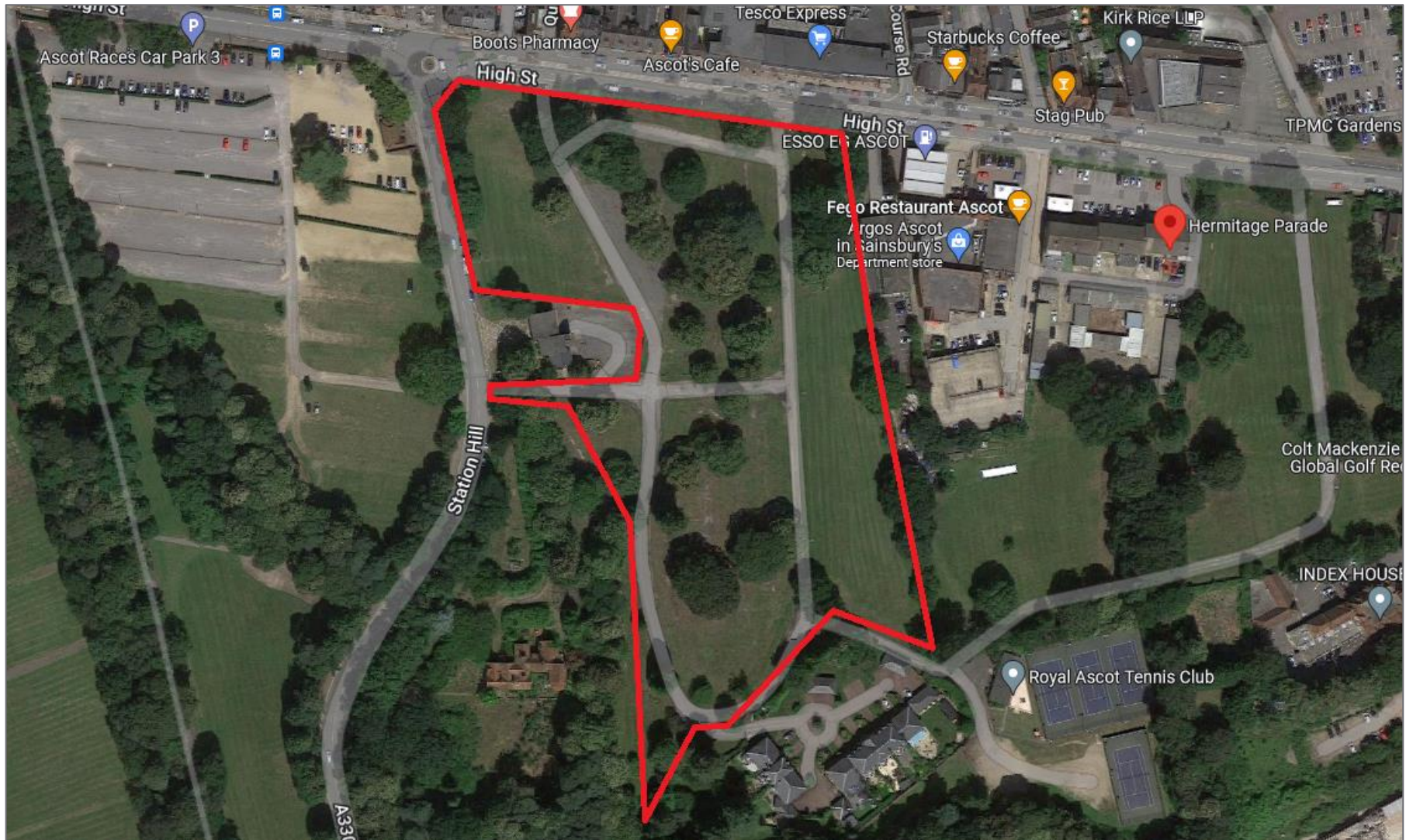
The site location is the land bounded by Ascot Fire Station, Ascot Hill House, and the road called Station Hill to the west, to the east of site is Hermitage Parade and other retail/commercial property, High Street Ascot is to the north, to the south is Ascot Wood houses, and the Royal Ascot Tennis Club is positioned to the south east.

Subjectively our engineer noted the existing noise climate was dominated by road traffic noise from Ascot High Street to the north and Station Hill to the west. Around the east, the south and towards the centre of site it was much quieter due to distance away from the roads.

The approximate site boundary is outlined red on the plans below.



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3.0 - Best Practice Guidance & Criteria

The following sections provide a list of appropriate best practice guidance, which makes reference to acoustic design and noise control for buildings.

3.1 - Planning Practice Guidance – Noise

As of March 2014, a Planning Practice Guidance (PPG) for noise was issued which provides additional guidance on the ‘National Planning Policy Framework’ (NPPF). The guidance advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

In line with the Explanatory Note of the ‘Noise Policy Statement for England’ (NPSE), the PPG goes on to reference the ‘Lowest-Observed-Adverse-Effect Level’ (LOAEL) and ‘Significant Observed Adverse Effect Level’ (SOAEL) in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE and NPPF, no objective noise levels are provided for LOAEL or SOAEL, although the PPG acknowledges 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”.

Examples of these factors include:

- The source and absolute noise level of the source along with the time of day that it occurs;
- Where the noise is non-continuous, the number of noise events and pattern of occurrence;
- The frequency content and acoustic characteristics of the noise;



- The effect of noise on wildlife;
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design;
- The impact of noise from certain commercial developments such as night clubs and pubs where activities are often at their peak during the evening and night.

The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

“Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed”.

3.2 - National Planning Policy Framework

The National Planning Policy Framework (NPPF) was updated in July 2021. One of the documents that the NPPF replaced was Planning Policy Guidance Note 24 (PPG24) *‘Planning and Noise’*.

The NPPF advises that the planning system has various objectives, and with regards to noise some important paragraphs are as follows:

Paragraph 174 advises 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

Paragraph 185 goes on to suggest:

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 impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Paragraph 187 seeks to ensure that any new development does not prejudice the legally permitted operations and activities of other, existing non-residential uses, stating:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

The NPPF document does not refer to any other documents regarding noise other than NPSE, however, as mentioned the NPSE and NPPF provide no objective noise levels. Therefore, we must also consider guidance from other best practice documents, such as BS8233, WHO, ProPG, BS4142 and ADO, which seek to recommend objective values as described in the following sections.

3.3 - BS8233

British Standard BS8233:2014 - ‘Guidance on sound insulation and noise reduction for buildings’, provides guidance for the control of noise in and around buildings.

Section 7.7.2 titled “Internal ambient noise levels for dwellings” recommends, in general for steady external noise sources it is desirable that internal ambient noise levels do not exceed the following guideline values:



Activity	Location	Desirable Internal Ambient Criteria	
		Daytime (07:00 to 23:00h)	Night-time (23:00 to 07:00h)
Resting	Living Rooms	35 dBA Leq,16h	-
Dining	Dining Room/Area	40 dBA Leq,16h	-
Sleeping (Daytime Resting)	Bedroom	35 dBA Leq,16h	30 dBA Leq,8h

The above noise levels should be considered with windows closed and the ventilation system in its open position.

Note 7 to Table 4 of BS 8233 states:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still be achieved.”

Section 7.7.3.2 titled “Design criteria for external noise” recommends:

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 dBA Leq,T, with an upper guideline value of 55 dBA Leq,T, which would be acceptable in noisier environments. However, it is also recognized 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.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens, and terraces, which might be intended to be used for relaxation. In high-noise areas consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dBA Leq,T or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.



3.4 - WHO Guidelines

World Health Organisation (WHO) guidance is in agreement with BS8233 when considering Leq,T internal noise levels for residential property.

The current WHO Environmental Noise Guidelines 2018 for the European Region (ENG), supersede the Guidelines for Community Noise from 1999 (CNG). However, the ENG recommends that all CNG indoor guideline values, and any values not covered by the current guidelines (such as industrial noise and shopping areas) remain valid.

The table below presents the recommended CNG values.

Source	CNG guideline indoors all sources
Road traffic noise	35 dBA Leq,16h
	30 dBA Leq,8h
Railway noise	35 dBA Leq,16h
	30 dBA Leq,8h
Aircraft noise	35 dBA Leq,16h
	30 dBA Leq,8h

With regards to single event noise indicators, Section 2.2.2 of the WHO Environmental Noise Guidelines 2018 states:

Single event noise indicators – such as the maximum sound pressure level (dBA Lmax) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by dBA Lmax. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators.



3.5 - ProPG:2017

The Institute of Acoustics (IOA), the Association of Noise Consultants (ANC), and the Chartered Institute of Environmental Health (CIEH), collaborated to create the Professional Practice Guidance 'ProPG: Planning & Noise – New Residential Development'.

ProPG:2017 has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The guidance encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.

ProPG is in agreement with the recommended internal and external $L_{eq,T}$ acoustic design guidance from BS8233 and WHO described above, but also provides additional advice for individual dBA L_{max} noise events as follows.

NOTE 4 - 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 dBA L_{max} , depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dBA L_{max} more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.

3.6 - Building Regulations ADO

Previously, the provision of façade sound insulation to protect against outdoor sound was considered separately from the ventilation strategy, and any strategies for mitigating overheating.

A review of planning applications in London revealed the problem. Of the applications reviewed where both noise and overheating assessments were made, it found 85% of the developments required closed windows for reasonable noise conditions, however the overheating assessment relied on open windows for reasonable thermal conditions. The result of course is residential accommodation where the occupants can either choose acoustic comfort or thermal comfort, but not achieve both simultaneously.



This led to the creation of Building Regulations Approved Document O - 'Overheating' (ADO), which came into effect on 15th June 2022.

ADO contains acoustic requirements relating to noise at night, in addition to pollution, security, protection from falling, and protection from entrapment.

The acoustic requirements of ADO are presented below.

"Noise:

3.2 - In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 - Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- *40dBA Leq,T, averaged over 8 hours (between 11pm and 7am).*
- *55dBA Lmax, more than 10 times a night (between 11pm and 7am).*

3.4 - Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use."

3.7 - Local Authority Planning Policy

Royal Borough of Windsor and Maidenhead Council issued a memorandum planning response dated 16 August 2022, which details the following two conditions with acoustic implications:

***“EP2 Site Specific Construction Environmental Management Plan (CEMP)”***

No development shall take place until a site-specific Construction Environmental Management Plan has been submitted to and been approved in writing by the Local Planning Authority. The plan must demonstrate the adoption and use of the best practicable means to reduce the effects of noise, vibration, dust and site lighting. The plan should include, but not be limited to:

- *Procedures for maintaining good public relations including complaint management, public consultation and liaison*
- *Arrangements for liaison with the Environmental Protection Team*
- *All works and ancillary operations which are audible at the site boundary, or at such other place as may be agreed with the Local Planning Authority, shall be carried out only between the following hours:*
- *08 00 Hours and 18 00 Hours on Mondays to Fridays and 08 00 and 13 00 Hours on Saturdays and; at no time on Sundays and Bank Holidays.*
- *Deliveries to and removal of plant, equipment, machinery and waste from the site must only take place within the permitted hours detailed above.*
- *Mitigation measures as defined in BS 5528: Parts 1 and 2: 2009 Noise and Vibration Control on Construction and Open Sites shall be used to minimise noise disturbance from construction works.*
- *Procedures for emergency deviation of the agreed working hours.*
- *Control measures for dust and other air-borne pollutants. This must also take into account the need to protect any local resident who may have a particular susceptibility to air-borne pollutants.*
- *Measures for controlling the use of site lighting whether required for safe working or for security purposes.*

Reason: In the interests of the amenities of surrounding occupiers during the construction of the development.

EP3 Plant Noise

The rating level of the noise emitted from all fixed plant associated with the proposed development shall not exceed the existing background level (to be measured over the period of operation of the proposed development and over a minimum reference time interval of 1 hour in the daytime and 15 minutes at night). The noise levels shall be determined 1m from the nearest noise-sensitive premises. The measurement and assessment shall be made in accordance with BS 4142: 2014+A1:2019 (or an equivalent British Standard if revised or replaced).



Reason: To protect the residential amenities of the area. Relevant Policy - Local Plan NAP3.”

It should be noted at this early stage that we cannot assist with EP2 until planning permission has been granted, the design details are further advanced, and a construction main contractor is employed.

However, at this time we can discuss and present criteria relating to EP3 based on the results of the noise survey and the guidance from BS4142 as detailed in the next section.

3.8 - BS4142

When setting plant noise emission criteria reference is commonly made to BS4142:2014 *“Methods for rating and assessing industrial and commercial sound”*.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains “a tone, impulse or other characteristic” then various corrections can be added to the specific (source) noise level to obtain the “rating level”.

BS 4142 states that: “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”. An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:

- *“Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”*



BS4142 also suggests:

“In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

Therefore, depending on the context of the noise source and receiver the determination of the “rating level” and the “background level” are both open to interpretation. However, with reference to the above it appears reasonable to infer that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window, then the plant noise is of “low impact”.

4.0 - Environmental Noise Survey

4.1 - Methodology

Sound level measurements were undertaken to determine the existing noise climate around site.

Three fixed position sound level meters were set up to log data from 09:00 hours on 05 September 2022 to 10:45 hours on 07 September 2022. The sound level meters were set to record many statistical parameters, including dBA Leq,T, L90, and Lmax, in 5-minute intervals.

The following equipment was used to undertake the survey.

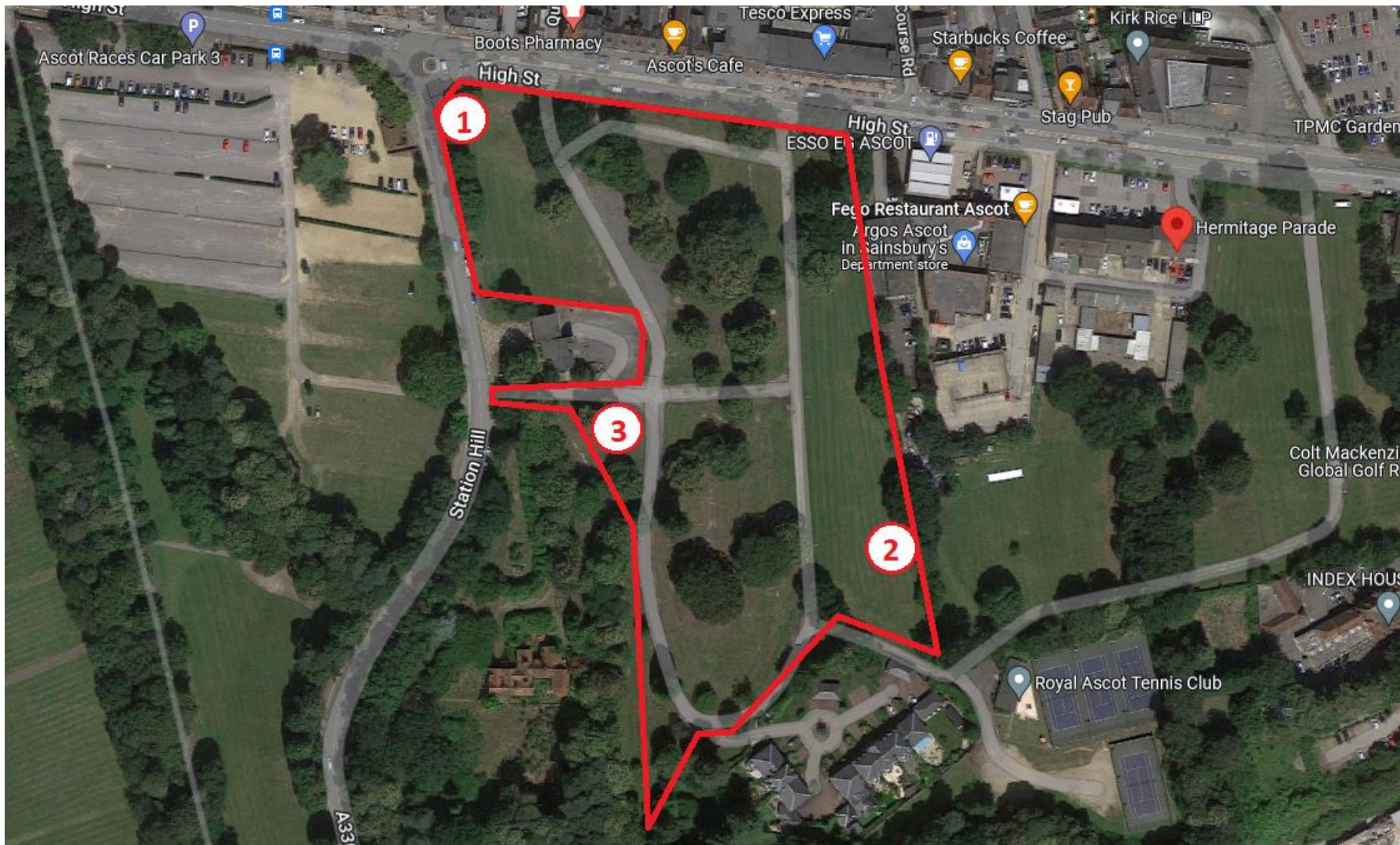


Position	Item	Make	Model	Serial Number	Annual IEC Calibration
1	Sound Level Meter - Class 1	Larson Davis	LD-824	824A2894	07 February 2022
	Preamplifier - Class 1	Larson Davis	PRM902	3024	07 February 2022
	Microphone - Class 1	Larson Davis	LD2541	7773	07 February 2022
2	Sound Level Meter - Class 1	Casella	CEL-633A	1057028	25 May 2022
	Preamplifier - Class 1	Casella	CEL-495	004728	25 May 2022
	Microphone - Class 1	Casella	CEL-251	2472	25 May 2022
3	Sound Level Meter - Class 1	Larson Davis	LD-LXT	0003615	28 February 2022
	Preamplifier - Class 1	Larson Davis	PRMLXT1L	027681	28 February 2022
	Microphone - Class 1	Larson Davis	PCB377B02	W133370	28 February 2022
ALL	Hand Held Calibrator - Class 1	G.R.A.S.	GRAS-42AG	280968	15 November 2021

The equipment calibration was spot checked before and after the survey and no significant change was found. (No more than 0.1dB).



The approximate measurement positions are indicated on the Google Maps aerial photo below.





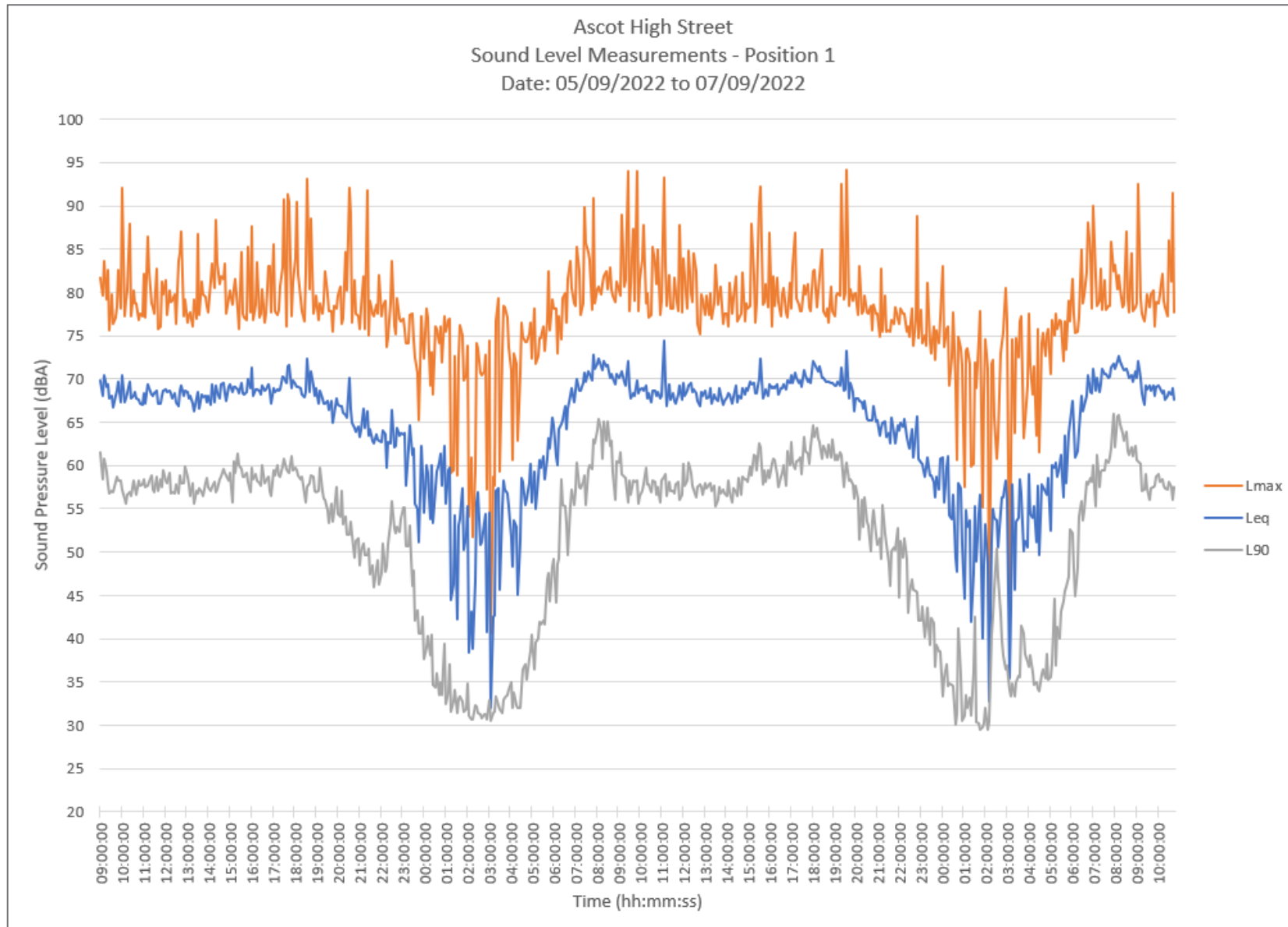
The measurement positions are described in the table below.

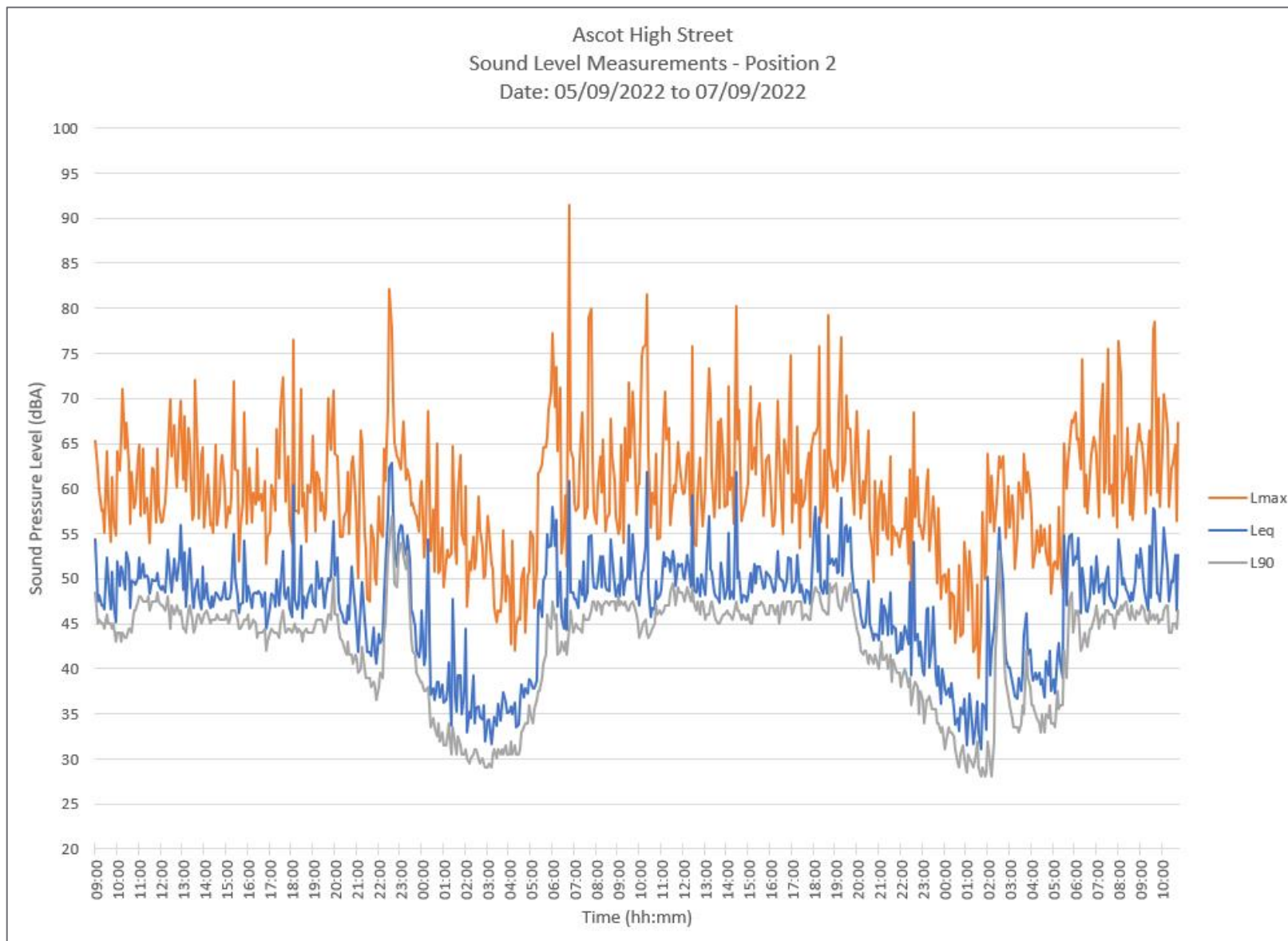
Position	Description
1	The sound level meter was located in the northwest corner of site towards the roundabout. The microphone was positioned at a height of approximately 2.5m above ground level, attached to an extension pole protruding from a tree. This position was approximately 3m away from the road edge.
2	The sound level meter was located in the southeast corner of site towards Ascot Tennis Club. The microphone was positioned at a height of approximately 2.5m above ground level, attached to an extension pole protruding from a tree. This position was approximately 2m away from the site boundary.
3	The sound level meter was located around the west centre area of site towards the fire station. The microphone was positioned at a height of approximately 2.5m above ground level, attached to an extension pole protruding from a tree. This position was approximately 40m away from the road edge of Station Hill.

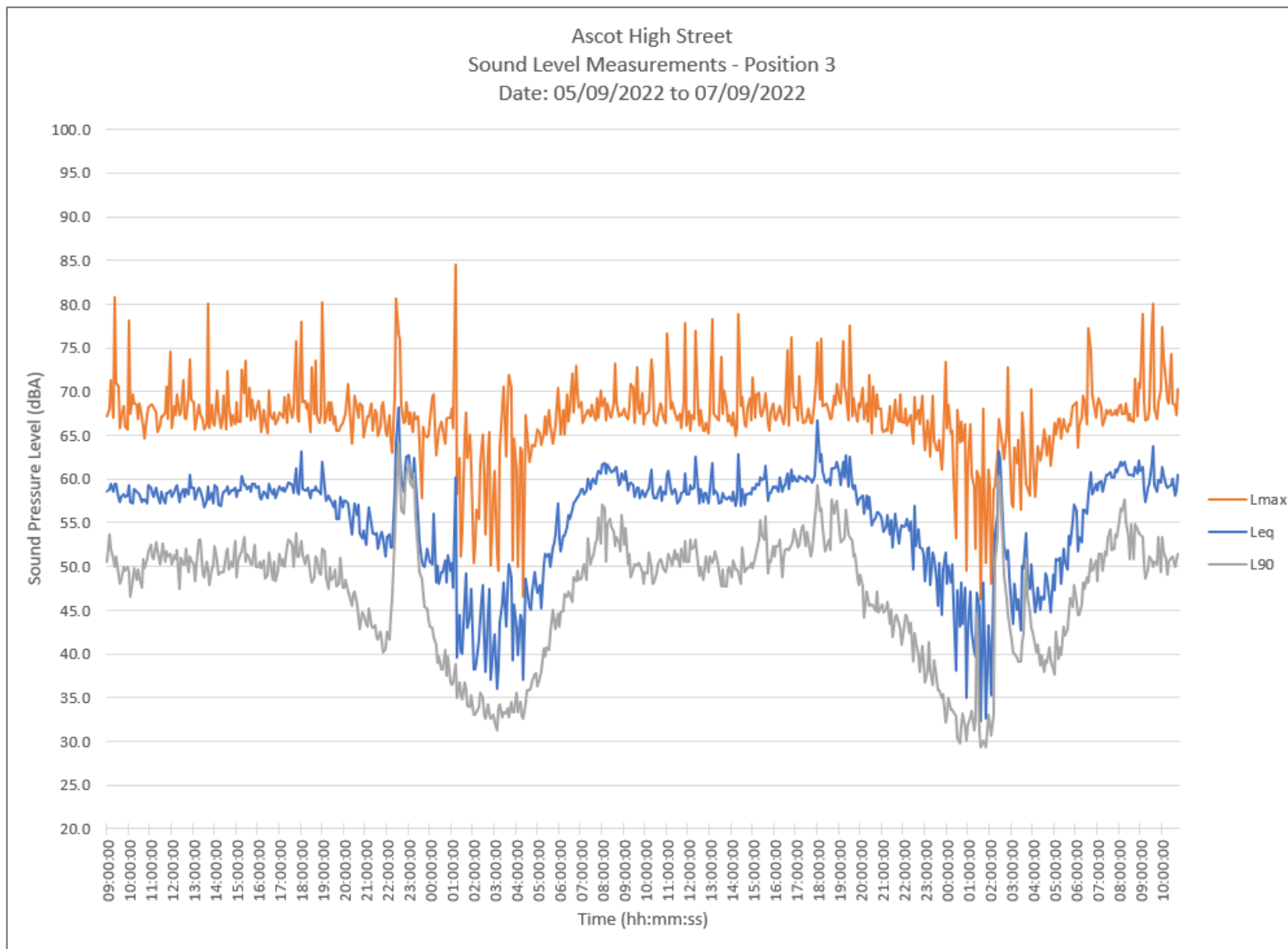
4.2 –Measurement Data

The sound level data measured at each position has been plotted on the time history graphs below.

The data has been converted to present the dBA, Leq,T (T = 07:00h to 23:00h daytime, and 23:00h to 07:00h night-time), statistical L90, and the 10th highest Lmax values, in the tables below for each position to be compared to, BS8233, WHO, ProPG, BS4142 and ADO guidance.









Position 1 - dBA Sound Pressure Levels							
Date	Day/Night - Time	Leq, τ	L90 Mean	L90 Modal	L90 Median	L90 Minimum	10 th Highest Lmax Night-time
05/09/2022	09:00 to 23:00h	68	56	58	58	46	n/a
	23:00 to 07:00h	60	39	32	36	30	78
06/09/2022	07:00 to 23:00h	69	58	58	58	42	n/a
	23:00 to 07:00h	60	39	35	37	29	79
07/09/2022	07:00 to 10:45h	70	60	57	60	55	n/a

Position 2 - dBA Sound Pressure Levels							
Date	Day/Night - Time	Leq, τ	L90 Mean	L90 Modal	L90 Median	L90 Minimum	10 th Highest Lmax Night-time
05/09/2022	09:00 to 23:00h	51	45	45	45	37	n/a
	23:00 to 07:00h	48	36	31	34	29	66
06/09/2022	07:00 to 23:00h	51	46	46	46	35	n/a
	23:00 to 07:00h	46	36	34	35	28	58
07/09/2022	07:00 to 10:45h	51	46	47	46	44	n/a

Position 3 - dBA Sound Pressure Levels							
Date	Day/Night - Time	Leq, τ	L90 Mean	L90 Modal	L90 Median	L90 Minimum	10 th Highest Lmax Night-time
05/09/2022	09:00 to 23:00h	59	50	51	50	40	n/a
	23:00 to 07:00h	53	40	33	38	31	70
06/09/2022	07:00 to 23:00h	59	50	50	51	38	n/a
	23:00 to 07:00h	53	40	39	40	29	69
07/09/2022	07:00 to 10:45h	60	52	51	52	48	n/a



4.3 - Computer Noise Mapping

The survey data has been combined with Google Mapping software and preliminary architectural drawings, to create computer noise models within our DGMR iNoise mapping software. The noise level receptor points are positioned in the iNoise model at the survey measurement locations, to calibrate the model using the measured dBA Leq,T and Lmax noise levels. The modelled results and receptor points appear to correlate to within about $\pm 2\text{dBA Leq,T}$, and around $\pm 3\text{dBA Lmax}$.

The software calculation methodology is based on '*ISO:9613 - Attenuation of sound during propagation outdoors*', and uses the recommendations of the quality standard '*ISO:17534 - Software for the calculation of sound outdoors*'. This is an established method of assessment, whereby Table 5 of ISO 9613-2:1996 estimates a worst-case accuracy of $\pm 3\text{dB}$ over distances up to 1000 metres.

The following images present the current predicted daytime and night-time noise climate around site, with and without the proposed development. During later design stages additional measurements can be made around site if necessary, to update the noise model which can subsequently be used to assist with the acoustic design of the proposed buildings and amenity space.



Noise map showing predicted daytime Leq,T noise levels in the absence of development.





Noise map showing predicted night-time Leq,T noise levels in the absence of development.





Noise map showing predicted night-time Lmax noise levels in the absence of development.





Noise map showing predicted daytime Leq,T noise levels with approximate layout of proposed development.





Noise map showing predicted night-time Leq,T noise levels with approximate layout of proposed development.





Noise map showing predicted night-time Lmax noise levels with approximate layout of proposed development.





5.0 - Assessment

5.1 - Consideration for BS8233 & WHO Guidance

As described in BS8233 and WHO guidance, the desired internal daytime value is 35dBA Leq,T, and the night-time value is 30dBA Leq,T, expected with windows closed and ventilation method open.

We understand MVHR systems are proposed for ventilation purposes. An MVHR ventilation method is considered 'System Type 4' in Building Regulations Approved Document F - 'Ventilation' (ADF).

The Institute of Acoustics (IOA), and Association of Noise Consultants (ANC), collaborated to create the 'Acoustics, Ventilation and Overheating: Residential Design Guide' dated January 2020.

This guide suggests that the typical external free field to internal noise level differences are, Leq,T = 27dBA, and Lmax = 31dBA. This assumption is based on using MVHR with standard domestic double glazing, that has a minimum acoustic performance of Rw (Ctr) 29 (-4) dB, as taken from BS EN 12758 - 'Glazing and airborne sound insulation - Product descriptions and determination of properties'.

Working backwards from the above we can predict external daytime and night-time free field noise levels, that should be compatible with conventional double glazing and MVHR system, as shown in the table below.

Description	Daytime dBA	Night-time dBA
Leq,T value	62	57

Where the Leq,T noise levels around site do not exceed the levels described above, we believe the internal noise level recommended by BS8233 and WHO should be achievable using standard 'off-the-shelf' thermal double glazing and MVHR.

Based on the layout proposals, our measurement data and the noise mapping analysis, we note dwellings would need to be located around 25m away from the roads Ascot High Street and Station Hill, to experience external noise levels lower than described above.



Where residential property is proposed to be closer than around 25m from the road edge, then external noise levels are anticipated to exceed the dBA Leq,T daytime and night-time described above, and as such higher specification acoustic glazing and ventilation methods will likely be required.

The IOA/ANC guide indicates for MVHR and high acoustic performance glazing, the external free field to internal noise level difference could be around $Leq,T = 38$ dBA, and $L_{max} = 45$ dBA. These assumptions are based on high acoustic performance windows with R_w (Ctr) 43 (-6) dB, from proprietary manufacturer data.

Working backwards from the above we can predict external daytime and night-time free field noise levels, that should be compatible with high performance double glazing and MVHR systems, as shown in the table below.

Description	Daytime dBA	Night-time dBA
Leq,T value	73	68

The highest Leq,T daytime value measured on site was 70dBA, and a night-time value of 60dBA, both at Position 1.

The highest noise levels measured on site are between those compatible with using either typical standard double glazing, or using high-performance acoustic glazing.

During the later design stages, acoustic specifications with octave band frequency (Hz) data will need to be determined for all areas of site, and not just rely on the simplified single figure values mentioned for planning purposes. The specifications will need to be based on the finalised layouts and distances, a ventilation and cooling strategy that complies with ADO, and the proposed building construction methods. The acoustic data from glazing and ventilation manufacturers would need to be reviewed pre-construction for compliance with the acoustic specifications.

5.2 - Consideration for ProPG

The Leq,T guidance found in ProPG is agreeable with the BS8233 and WHO values described above. In addition, the ProPG suggests internal L_{max} levels should ideally not exceed 45dBA more than 10 times per night. This guidance is expected with windows closed and ventilation method in its open position.



With consideration for the IOA/ANC guidance for glazing and MVHR ventilation described in the section above, the approximate guideline free field external noise limits would be:

- Standard double glazing, L_{max} values should not normally exceed ~76 dBA more than 10x per night.
- High performing acoustic glazing, L_{max} values should not normally exceed ~90 dBA more than 10x per night.

At Position 1 the 10th highest L_{max} sound level measured was 79dBA, this position was relatively close to the site boundary and as such noise levels will reduce due to distance away from the roads. The residential property built within around 20m of the roads will need the most careful design consideration for the acoustic performance of glazing and ventilation to achieve the L_{max} values, alongside the design considerations relating to BS8233, WHO and ADO.

As suggested above, during the later design stages acoustic specifications with octave band frequency (Hz) data will need to be determined for all areas of site, and not just rely on the single figure values mentioned in this report for planning purposes.

5.3 - Consideration for Building Regulations ADO

The acoustic requirements of ADO are reiterated below.

“Noise:

3.2 - In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 - Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- *40dBA Leq,T, averaged over 8 hours (between 11pm and 7am).*
- *55dBA Lmax, more than 10 times a night (between 11pm and 7am).*



3.4 - Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use."

The example of when noise should be considered - "*where the local planning authority considered external noise to be an issue...*" is useful, but does not define all the situations in which it is necessary to consider the noise requirements in ADO. Many residential developments that do not have planning conditions for noise, could fail to comply with the noise requirements in ADO unless the design team recognise the need for this assessment.

Paragraph 3.3 defines the acoustic internal levels, whereby relying on opening windows to remove excess heat would not comply with the ADO requirements of noise at night. The sound insulation performance of any window opening is a function of the hole created in the façade. For ease of reference this hole should be termed the "acoustic open area".

ADO states buildings should be constructed to meet requirement O1 using passive means as far as reasonably practicable. A passive means in ADO is defined as any means of cooling a building which is not mechanical cooling (e.g. air conditioning), and includes openable windows and/or mechanical ventilation fans.

If an open window for the removal of excess heat results in these noise levels being exceeded, the overheating mitigation strategy must adopt one of the alternative means listed in ADO, i.e. Ventilation louvres in external walls, or a mechanical ventilation system, or a mechanical cooling system.

We understand that SRE, London Square and Cass Allen have undertaken a preliminary review relating to ADO overheating. This has determined that in the worst-case situation mechanical cooling will be required in some rooms, due to their location relative to the road traffic noise, and their predicted exposure to higher thermal conditions. At distances further away or screened from the road noise, and in locations with cooler thermal conditions, the proposed passive and MVHR methods should be acoustically suitable.

Determining acoustic solutions for Building Regulations purposes is rarely undertaken during planning stage due to the lack of detailed design. Therefore, the exact room conditions, locations, and acoustic mitigation measures will need to be determined during the later detailed design stages.



5.4 - Consideration for BS4142

The Council condition relating to plant noise is EP3 reiterated below which references assessment in accordance with BS4142.

“EP3 Plant Noise

The rating level of the noise emitted from all fixed plant associated with the proposed development shall not exceed the existing background level (to be measured over the period of operation of the proposed development and over a minimum reference time interval of 1 hour in the daytime and 15 minutes at night). The noise levels shall be determined 1m from the nearest noise-sensitive premises. The measurement and assessment shall be made in accordance with BS 4142: 2014+A1:2019 (or an equivalent British Standard if revised or replaced).”

Figure 4 of BS4142 provides a statistical analysis example for measurement periods to determine a background sound level. It suggests for that distribution of data the ‘modal’ value was considered to be representative, as it was the most commonly occurring value during the time period of interest.

The lowest daytime and night-time Modal L90 values are presented in the table below.

Position	Time	Lowest Modal dBA L90
1	Day	57
	Night	32
2	Day	45
	Night	31
3	Day	50
	Night	33

During later design stages when the proposed building services items and locations are known, the manufacturers data will need to be reviewed, and acoustic solutions will need to be developed to control plant noise in accordance with BS4142.



6.0 - Retail & Commercial Property

Non-residential floor space is proposed within Blocks 1, 2 and 3, which are the three blocks closest to Ascot High Street and Station Hill. The non-residential spaces are proposed in the lower floors of these buildings with residential dwellings located in the floors above.

The non-residential uses are intended to be flexible across Use Class E, F1 and F2 to allow for a variety of land uses, including small scale retail, offices, cafes, restaurants, creative uses, art galleries, community spaces and other community focussed uses.

The separating walls and floors between dwellings, and those separating the dwellings from non-residential space, will need to be designed to achieve the minimum acoustic requirements of Building Regulations Approved Document Part E - 'Resistance to the Passage of Sound' (ADE).

Achieving ADE will protect the residential dwellings from a reasonable level of sound, however limiting noise levels will need to be established for the retail/commercial tenants, and be imposed within their lease handbook. Where higher levels of noise are desired the acoustic design of the fitout will need to provide the necessary upgrade to allow for the higher noise levels.

As a minimum the external and internal commercial noise levels will need to be controlled in accordance with the following:

- Building Regulations
- British Standard BS 8233 "Guidance on sound insulation and noise reduction for buildings".
- British Standard BS 4142 "Methods for rating and assessing industrial and commercial sound".
- CIBSE Guides issued by the Chartered Institution of Building Services Engineers.
- Planning Conditions and other requirements of the Local Authority.
- Statutory noise nuisance legislation.
- Manufacturer's installation instructions, particularly those relating to acoustic matters.
- Other relevant British Standards and Codes of Practice.

Acoustic restrictions imposed on the commercial/retail tenants will need to be considered on an individual basis during detailed design stages relative to their location and intended use.



7.0 - Construction Phase

When a main contractor is appointed, they will need to create a site-specific Construction Environmental Management Plan (CEMP).

As described by Condition EP2, the CEMP must demonstrate the adoption and use of best practicable means to reduce the effects of noise, vibration, dust and site lighting. The plan should include, but not be limited to:

- Procedures for maintaining good public relations including complaint management, public consultation and liaison
- Arrangements for liaison with the Environmental Protection Team
- All works and ancillary operations which are audible at the site boundary, or at such other place as may be agreed with the Local Planning Authority, shall be carried out only between the following hours:
- 08 00 Hours and 18 00 Hours on Mondays to Fridays and 08 00 and 13 00 Hours on Saturdays and; at no time on Sundays and Bank Holidays.
- Deliveries to and removal of plant, equipment, machinery and waste from the site must only take place within the permitted hours detailed above.
- Mitigation measures as defined in BS 5528: Parts 1 and 2: 2009 Noise and Vibration Control on Construction and Open Sites shall be used to minimise noise disturbance from construction works.
- Procedures for emergency deviation of the agreed working hours.
- Control measures for dust and other air-borne pollutants. This must also take into account the need to protect any local resident who may have a particular susceptibility to air-borne pollutants.
- Measures for controlling the use of site lighting whether required for safe working or for security purposes.

When a main contractor is appointed, further construction proposals and methodology information will become available. Then it will be possible to consider the acoustics, noise and vibration sections of the CEMP if necessary.

Suitable noise and vibration guidance, criteria and mitigation measures should be considered in accordance with BS5228 - Part 1 'Noise' and Part 2 'Vibration' as described by Condition EP2.



8.0 - Conclusion

A new mixed-use development is proposed on land situated adjacent to Ascot High Street, in The Royal Borough of Windsor and Maidenhead. The Planning Reference is 22/01971.

Proposals include redevelopment of existing site to provide 2,070sqm commercial and community floorspace (mix of uses within Use Classes E, F1 and F2) and 117 dwellings with associated parking, access, open space, landscaping and other associated works. Provision of new public open space with associated hard and soft landscape works, new pedestrian and cycle paths and children's play area.

Pulsar Acoustics was commissioned to undertake an environmental noise survey and acoustic assessment of the site.

Three fixed position sound level meters were set up to log data from 09:00 hours on 05 September 2022 to 10:45 hours on 07 September 2022, to establish the existing noise climate around site. The data obtained has been used to create models in our DGMR iNoise mapping software.

Industry standard guidance and criteria has been presented based on appropriate acoustic design documents, Planning Practice Guidance (PPG), National Planning Policy Framework (NPPF), BS8233, WHO Guidelines, ProPG, Building Regulations ADO, Local Authority Conditions, and BS4142.

Our acoustic assessment has recommended and discussed acoustic mitigation which are appropriate at this early planning stage, to demonstrate how residential dwellings and commercial use space would be able to coexist.

During the later design stages, the proposed construction methods and materials will need to be reviewed. Acoustic design specifications will be required to ensure appropriate sound insulation is provided, and to suitably control external and internal noise intrusion to comply with industry guidance and Building Regulations.

The project proposals do not present new acoustic challenges when compared to other similar existing mixed-use developments located around the UK, and as such we see no acoustic reasons why planning permission would be refused.



APPENDIX A - Acoustic Terminology

The following is an explanation for some of the acoustic parameters used in this report to describe the measurements and mitigation.

- **dB** The decibel is used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level. This approach is advantageous for handling sound levels, where the ratio of the highest to lowest sound which humans could encounter, can be as high as 1,000,000 : 1. The ratio is considered with respect to the quietest and loudest sound we can hear. This is the threshold of hearing at the frequency of 1000Hz, which is taken as 20 μ Pa (2x10⁻⁵ Pa) of pressure for the average person. (A decibel is simply a ratio and is used in many other industries too, but most commonly in acoustic or electrical signal analysis.)
- **dBA** The human ear is more susceptible to mid-frequency noise than to higher and lower frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds to the overall level of perception by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted frequency spectrum (Hz). The measured or calculated 'A' weighted noise level is known as the dBA level.
- **L_{eq,T}** The equivalent continuous sound level in decibels, equivalent to the total sound energy measured over a stated period of time and is also known as the time-averaged sound level.
- **dBA L_{eq,T}** The A-weighted equivalent continuous sound level in decibels measured over a stated period of time 'T', and is sometimes written dB LA_{eq,T}.
- **L90** This parameter is the noise level exceeded for 90% of the period T (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.
- **dBA L_{max}** The maximum dBA noise level recorded during the measurement interval period.

When discussing sound levels as decibels we use a logarithmic scale, therefore the dBA values do not follow a linear relationship. When discussing similar noises, a change of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible by a human, but is a doubling/halving of sound energy. (i.e. 50dBA + 50dBA = 53dBA).

If you require a more detailed explanation for any of the acoustic principles or parameters discussed in this report please do not hesitate to ask.