Oxford Technology Park

Noise Impact Assessment

On behalf of **Hill Street Holdings Ltd**

Project Ref: 23588/3002 | Rev: 00 | Date: December 2014

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For and on behalf of Peter Brett Associates LLP				

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1 Introduction and Objectives

1.1 Context

1.1.1 An employment development, including B1 (b) business use (research and development space) at Oxford Technology Park, located off Langford Lane in Kidlington is proposed.

1.1.2 Peter Brett Associates has been commissioned by Hill Street Holdings Ltd to undertake a detailed environmental noise survey of the site in order to assess the proposals in relation to the likely noise impact at nearby noise sensitive receptors.

1.1.3 This report presents the survey methodology and findings.

1.2 Acoustics Terminology

1.2.1 For an explanation of the acoustic terminology used in this report please refer to **Appendix A** enclosed.

1.3 Objectives

1.3.1 The objectives of this report are:

- To establish the existing environmental noise levels by means of fully automated noise monitoring over a period of approximately 24 hours at a single position;
- Assess the noise impact arising from the proposed development traffic upon existing noise sensitive receptors.
- Suggest suitable plant noise emission limits based on the results of the noise survey and the typical requirements of the local authority;
- Assess qualitatively the likely noise impact arising from the demolition and construction phase of the development;
- Outline a mitigation strategy, as appropriate.

2 Local and National Guidance

2.1 National Policy

The National Planning Policy Framework (NPPF)

2.1.1 The NPPF was published in March 2012. In respect of noise, the document states that:

"The planning system should contribute to and enhance the natural and local environment by … preventing both new and existing development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of … noise pollution."

2.1.2 The NPPF goes on to advise that:

"Planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *Recognise that development will often create some noise and existing business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

2.1.3 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the *"significant adverse impacts".*

Noise Policy Statement for England (NPSE)

2.1.4 The Noise Policy Statement for England was published in March 2010. The document seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long term vision of Government noise policy:

"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."

2.1.5 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

2.1.6 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level - the 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; and

LOAEL – Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.

2.1.7 The NPSE extends these to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.

2.1.8 The NPSE notes "It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times".

Planning Practice Guidance - Noise (2014)

2.1.9 Government's Planning Practice Guidance on noise (PPG) provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the NOEL and, as exposure increases, the LOAEL and SOAEL.

2.1.10 As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.

2.1.11 The LOAEL is described in PPG as the level above which "noise starts to cause 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."

2.1.12 PPG identifies the SOAEL as the level above which "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."

2.1.13 The LOAEL and SOAEL could be potentially defined by the magnitude of noise impacts as described in the Design Manual for Road and Bridges section below.

2.2 Guidance

Design Manual for Road and Bridges (DMRB)

2.2.1 Part 7 of Volume 11 provides guidance on the noise and vibration assessment undertaken for road projects.

2.2.2 The flow chart in Figure A.1.1 of the DMRB outlines a scoping process to be undertaken to determine whether a simple assessment or a detailed assessment is required. The appropriate level of assessment depends upon threshold criteria being met.

2.2.3 The threshold criteria are as follows:

- Change in daytime traffic noise impacts in the short term of 1 dB $L_{A10,18h}$ (opening year).
- Change in daytime traffic noise impacts in the long term of 3 dB $L_{A10,18h}$ (typically 15 years after project opening).

- Change in night-time traffic noise impacts of 3 dB $L_{night,outside}$ in the long term where the $L_{night,outside}$ is predicted to be greater than 55 dB $L_{night,outside}$ in any scenario.

Simple Assessment

2.2.4 A Simple Assessment is appropriate where it is not expected or it is unclear whether the threshold values will be exceeded at any sensitive receptor.

2.2.5 The Simple Assessment calculates the short term and long term impacts of the development at noise sensitive receptors through the comparison of design scenarios based on projected baseline (opening) year and future (typically 15 years after opening) year traffic data. Comparisons should be made between:

- The Do-Minimum (without scheme) scenario in the opening year and the Do-Something (with scheme) scenario in the opening year (short term);
- The Do-Minimum scenario in the opening year and the Do-Something scenario in the future assessment year (long term);
- For night-time noise impacts, comparisons in the long term should only be considered.

2.2.6 If any of the threshold criteria are exceeded, a detailed assessment will be undertaken.

Detailed Assessment

2.2.7 A Detailed Assessment is appropriate where any of the threshold values are expected to be exceeded or where a Simple Assessment demonstrates that any of the threshold values are expected to be exceeded.

2.2.8 For a Detailed Assessment, the Simple Assessment comparisons should be made with an additional comparison made between the Do-Minimum scenario in the opening year and the Do-Minimum scenario in the future assessment year (long term).

Magnitude of Noise Impacts

2.2.9 The magnitude of impact due to the change in noise level at each noise sensitive receptor is categorised according to the criteria presented in **Table 2.1** for the short term impacts and **Table 2.2** for the long term impacts.

Table 2.1: DMRB Classification of Magnitude of Noise Impacts in the Opening Year (Short Term)

Change in Noise Level (dB)	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1.0 – 2.9	Minor
3.0 – 4.9	Moderate
5+	Major

Table 2.2: DMRB Classification of Magnitude of Noise Impacts in the Future Year (Long Term)

Change in Noise Level (dB)	Magnitude of Impact
0	No change
0.1 – 2.9	Negligible
3.0 – 4.9	Minor
5.0 – 9.9	Moderate
10+	Major

2.2.10 The Design Manual for Roads and Bridges (DMRB) Volume 11 provides broad advice on the assessment of road traffic vibration, noting that ground-borne vibration resulting from road traffic is difficult to accurately predict and that it is extremely unlikely to cause damage to buildings. Notwithstanding this, the DMRB does recognise that ground-borne vibration can cause disturbance to residents where the sub-grade is soft, the road surface is uneven and/or when dwellings are within a few metres of the carriageway.

2.2.11 The DMRB provides guidance on ambient levels of vibration as Peak Particle Velocities (PPV), stating that for traffic vibration generally a PPV of 0.3 mm/s measured on a floor in the vertical direction is on the threshold of perceptibility. As such, the threshold criterion for traffic induced vibration is a PPV rise to above a level of 0.3 mm/s or where an existing PPV above 0.3 mm/s is predicted to increase. PPVs in the structure of buildings close to heavily trafficked roads rarely exceed 2 mm/s and are typically well below 1 mm/s. The DMRB also states that there is no firm evidence that structural damage to buildings can occur below 10 mm/s.

2.2.12 DMRB recommends that the effects of vibration should be considered where appropriate. In the case of ground-borne vibration, the likelihood of perceptible vibration being caused is particularly dependent upon the smoothness of the road surface. Research has shown that vibration levels caused by heavy vehicles travelling at 110 km/h over a 25 mm hump (i.e. a large discontinuity consistent with poorly backfilled trench) could cause perceptible vibration at up to 40m from the road[1].This would infer that it is unlikely that significant levels of vibration would be generated at distances greater than this. Also, with a newly laid road surface it is a requirement of new highway construction specification that the surface would be smooth and free from any discontinuities of this magnitude. DMRB Vol. 11, Section 3, Part 7 HA 213/11 Annex 5, paragraph A5.26 of DMRB states such vibrations are unlikely to be important when considering disturbance from new roads and an assessment would only be necessary in exceptional circumstances.

2.2.13 The DMRB covers the potential for airborne noise, from heavy goods vehicles, to cause vibration nuisance close to main roads. As an indication of the scale of impact relative to noise effects, the guidance in DMRB paragraph HA 213/11 Annex 6, paragraph A6.21 states that for a given level of noise exposure the percentage of people bothered very much or quite a lot by vibration is 10% lower than the corresponding figure for noise nuisance. On average traffic induced vibration is expected to affect a very small percentage of people at exposure levels below 58 dB $L_{A10,\ 18\ hr}$. Also, the significance of any change in airborne traffic vibration can be considered proportional to the significance of changes in traffic noise. As such the assessment of airborne vibration can be considered to be included within the assessment of airborne noise.

[1] Watts, G.R. (1990). Traffic induced vibration in buildings. TRRL RR246, Transport and Road Research Laboratory, Crowthorne.

Calculation of Road Traffic Noise (CRTN), 1988;

2.2.14 The Department of Transport/Welsh Office Memorandum CRTN describes procedures for traffic noise calculation, and is suitable for environmental assessments of schemes where road traffic noise may have an impact.

2.2.15 The CRTN shortened measurement procedure recognises the trends in traffic profiles and corrects the arithmetic mean of three 1-hour readings taken in consecutive hours between 10:00 -17:00 hours to provide a reliable estimate of the $L_{A10,18h}$ over the period 06:00 - 24:00 hrs.

British Standard 4142: 2014 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'

2.2.16 British Standard 4142: 2014 "M*ethods for rating and assessing industrial and commercial sound"* (BS4142) describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

2.2.17 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However the determination of noise amounting to a nuisance is beyond the scope of the standard.

2.2.18 The standard should not be used to assess sound from the passage of vehicles on public roads and railway systems; recreational activities; music and other entertainment; shooting grounds; construction and demolition; domestic animals; people; public address systems for speech and other sources falling within the scopes of other standards or guidance. The standard can not be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.

2.2.19 The procedure contained in BS4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur.

2.2.20 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:

a) Typically, the greater this difference, the greater the magnitude of the impact.

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

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

2.2.21 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.

2.2.22 Where the initial estimate of the impact needs to be modified due to the context, the following factors should be considered:

a) The absolute level of sound.

b) The character and level of the residual sound compared to the character and level of the specific sound.

c) 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 such as:

    a) Façade insulation treatment.

    b) Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation and.

    c) Acoustic screening.

3 Site Description

3.1 Location

3.1.1 The proposed site is located at land off Langford Lane in Kidlington, Oxfordshire, (OX5 1RA). The site falls within the jurisdiction of Cherwell District Council. The location of the site is shown in **Figure 1** below.

Figure 1: Location Map (courtesy of maps.google.co.uk)

3.2 Description

3.2.1 The site is located off Langford Lane in Kidlington. Residential areas are located west of the site at an approximate distance of 120 m. The A44 lies to the west. The site is currently undeveloped greenbelt land with an approximate area of 6.5 hectares.

4 Methodology

4.1 Procedure

4.1.1 Fully automated environmental noise monitoring was undertaken from approximately 16:00 hours on Tuesday 11 November 2014 to 09:00 hours on Friday 16 November 2014.

4.1.2 Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were calm. The sky was generally cloudy. Using information from local weather forecasts and observations, it is understood that generally throughout the survey period the weather conditions were similar to this. These conditions are considered suitable for obtaining representative environmental noise levels.

4.1.3 Measurements were taken continuously of the A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} sound pressure levels over full 15 minute periods.

4.2 Measurement Position

4.2.1 The noise level measurements were undertaken at a single position (LT1). The sound level meter was located approximately 150 m from Langford Lane and approximately 150 m from the closest noise sensitive receptors to the west. The microphone was attached to a pole and was located approximately 1.5 m from ground level.

4.2.2 The dominant noise source around the site during the daytime was noise from Langford Lane. Intermittent aircraft movements arriving and departing from Oxford Airport located approximately 220 m from the measurement location were audible at the location of the site.

4.2.3 The measurement position was selected in order to establish the typically lowest environmental noise levels at the nearby residential premises for subsequent use in setting plant noise emissions criteria. The approximate location of the measurement position is shown on the plan in **Figure 2** below.

Figure 2: Approximate Noise Survey Location

4.3 Instrumentation

4.3.1 The instrumentation used during the survey is presented in **Table 4.1** below.

Table 4.1 Instrumentation used during the survey

Description	Manufacturer	Type	Serial Number	Latest Verification
Type 1 Data Logging Sound Level Meter	Rion	NL-52	542903	Last calibration on 31/07/14
Type 1 Calibrator	Rion	4231	34746691	Last calibration on 31/07/14
½ inch Microphone	Rion	4231	00559	Last calibration on 31/07/14

4.3.2 The sound level meter, including the extension cable, was calibrated prior to and on completion of the survey. No significant change was found to have occurred (no more than 0.3 dB).

4.3.3 The sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. The microphone was fitted with a Rion WS-15 windshield.

5 Baseline Results

5.1 Results

5.1.1 The results have been plotted on Time History Graphs 32121/TH1 to 32121/TH2 enclosed in Appendix B, presenting the 15 minute A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} levels at the measurement position throughout the duration of the survey. A summary of these results is presented in **Table 5.1.**

Table 5.1 Summary of Results

$L_{Aeq, 16\ h}$	$L_{Aeq, 8\ h}$	Highest L_{Amax}	Typical Lowest $L_{A90, day}$	Typical Lowest $L_{A90, night}$
56 dB	47 dB	77 dB	47 dB	33 dB

5.2 Discussion of Noise Climate

5.2.1 Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the main noise source was noise emitting from Langford Lane and the occasional aircraft arriving or departing from nearby Oxford Airport.

6 Impact Arising Due to Road Traffic

6.1.1 The assessments of road traffic noise will follow the noise prediction procedures as detailed in the Department of Transport and Welsh Office's 'The Calculation of Road Traffic Noise' (CRTN). The assessment uses criteria to compare changes between the existing traffic noise levels and the potential future traffic noise levels at nearby sensitive receptors.

6.1.2 The noise assessment considers the 18 hour Average Annual Weekly Traffic flow (AAWT) information provided by the relevant transport department, and will compare the baseline traffic flows against the predicted future traffic flows associated with the development proposals.

6.1.3 Using the traffic data provided by the transport department within Peter Brett Associates a calculation using the methodology in CRTN has been undertaken.

6.1.4 Appendix C presents the results of the assessment undertaken using the traffic data provided.

6.1.5 Based on the results of the assessment it can be shown that there are no roads in the local area that will be subject to an increase in $L_{A10,18h}$ of more than 1 dB which could be the LOAEL level.

6.1.6 The results show that the noise impact from an increase in road traffic associated with the development will not trigger a detailed DMRB assessment and can be deemed as negligible.

7 Construction and Demolition Assessment

7.1.1 In accordance with modern working practices, the principles of 'best practicable means' (BPM), as defined in the Control of Pollution Act, 1974, would be used to reduce noise emissions throughout the demolition and construction works to a reasonable and practicable level.

7.1.2 The control of noise and vibration from demolition and construction would be incorporate into a site-specific Construction Environmental Management Plan (CEMP). The CEMP would be agreed in consultation with Cherwell District Council and should include and/or specify the following routine noise and vibration management controls:

- Breaking out of concrete structures would be undertaken, where possible, using low noise effect methods including bursting and splitting rather than percussive breaking;
- Careful selection of demolition/construction methods and plant to be used;
- Switching off of plant and vehicle engines when not in use;
- Restriction of drop heights onto lorries;
- Regular maintenance and servicing of vehicles, equipment and plant;
- Appropriate handling and storage of materials;
- Appropriate operational hours (to be agreed with Cherwell District Council);
- Enforcement of restricted working hours for excessively noisy activities;
- Implementation of an appropriate traffic management strategy;
- Use of temporary acoustic barriers where appropriate and other noise containment measures such as screens, sheeting and acoustic hoardings at the construction site boundary to minimise noise breakout and reduce noise levels at the potentially affected receptors.

7.1.3 To assist in controlling noise and vibration at specific receptor locations, provision would also be made for the setting of noise and vibration Site Action Values, in discussion with Cherwell District Council. On-site monitoring of noise and/or vibration may also be undertaken as part of the CEMP in order to ensure the Site Action Values are continuously achieved.

7.1.4 If the Site Action Values are exceeded, this would trigger a review of the working activities taking place at the time, and additional environmental management control options or suppression measures would be examined.

7.1.5 If a temporary source of noise or vibration cannot reasonably be prevented and the works being undertaken are crucial to progressing the particular project phase, then separate liaison with CDC and the appropriate neighbours would be held to reach an acceptable compromise.

7.1.6 A further environmental management control option would be for the Construction Contractor to negotiate a formal Control of Pollution Act: 1974, Section 61 Agreement 'Prior consent in respect of Works on Construction sites', with Cherwell District Council, prior to commencement of works. The Contractor would be assisted during their negotiations by acoustic consultants, in order to ensure adequately detailed information is included with the application, in the form of Program Method Statements and lists of plant to be used on a best practical means basis throughout the works.

7.1.7 In addition to the above, reasonable steps would be taken to keep the local community informed of proposed demolition and construction operations. Measures for community liaison would be dealt with by a dedicated Community Liaison Officer to co-ordinate the dissemination of information (for example, by means of a regular newsletter) and to program those operations at times that would minimise the potential for disturbance.

7.1.8 The above range of environmental management controls represent measures that are regularly and successfully applied to construction projects in order to minimise noise effects on local communities. The application of similar control measures during the construction would likewise ensure that the works will proceed with the minimum disturbance to local residents and pedestrians.

8 Plant Noise Emission Criteria

8.1 Fixed Plant Noise Levels

8.1.1 These type of developments are associated with large amounts of building services related atmospheric noise pollution which required appropriate control. As is the norm at this stage of development, detailed information in relation to the building services design is not available. Therefore, suitable plant noise emissions criteria are presented in order to ensure that a significant adverse impact at neighboring noise sensitive premises will not occur.

8.1.2 Based on the results of the noise survey and typical requirements agreed with the environmental health officer at Cherwell District Council, we would propose that the future cumulative plant noise emissions criteria presented in **Table 7.1** to be achieved (with all relevant plant operating simultaneously) at 1 metre from the nearest residential windows.

Table 7.1: Plant Noise Emission Criteria

	Cumulative Plant Noise Emissions limits at 1 m from a residential window		
	Daytime (07:00 –23:00 hours)	Night Time (23:00 – 07:00 hours)	24-Hours
Residential windows	45 dBA	35 dBA	35dBA

8.1.3 It should be noted that the above plant noise emission criteria are subject to final approval by Cherwell District Council.

9 Conclusion

9.1.1 A detailed 24 hour daytime and night-time fully automated noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the site.

9.1.2 A quantitative assessment has shown that a noise impact associated with traffic in relation to the proposed development is unlikely to occur.

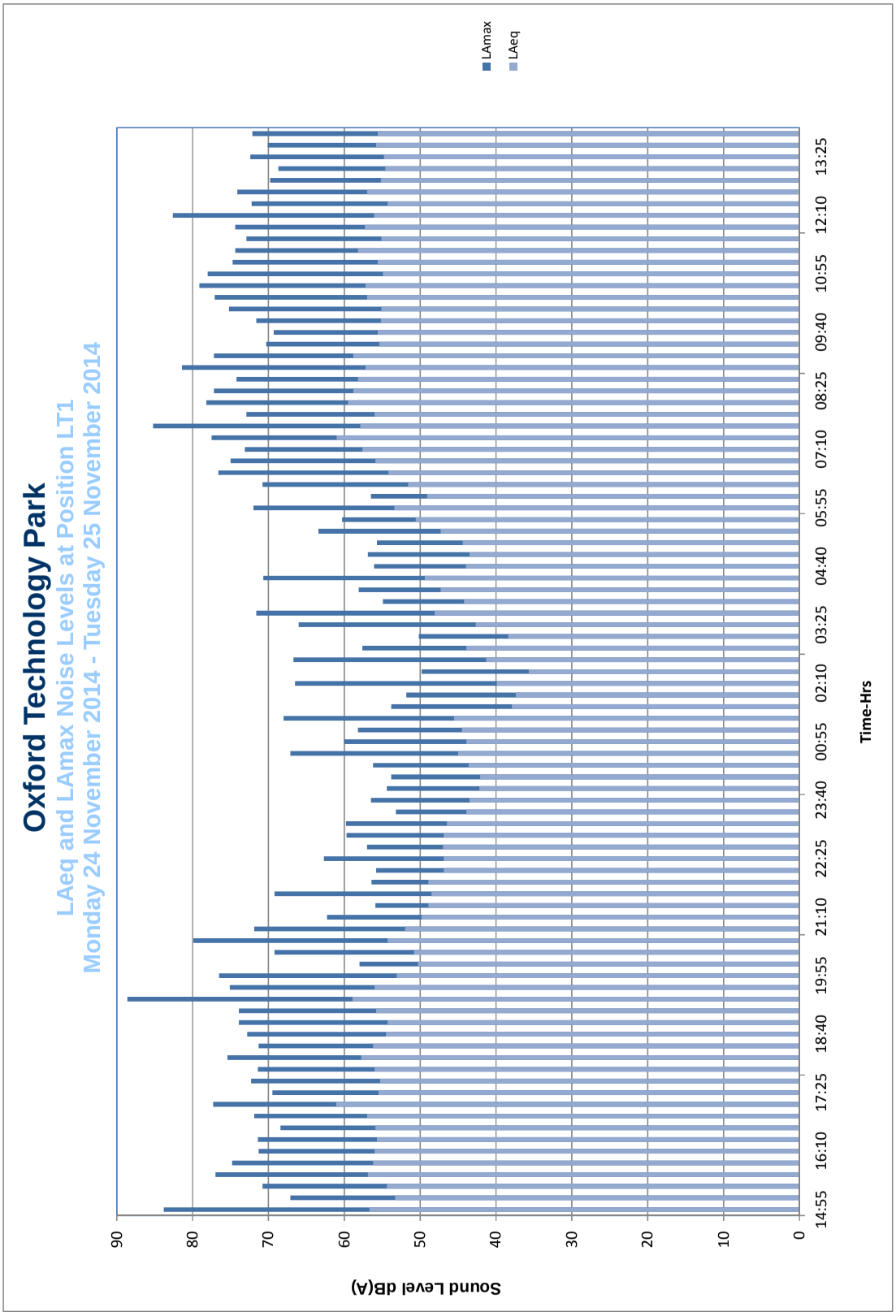
9.1.3 Suitable plant noise emission criteria have been recommended based on the results of the noise survey in order to ensure that significant adverse impact at neighbouring noise sensitive premises are avoided.

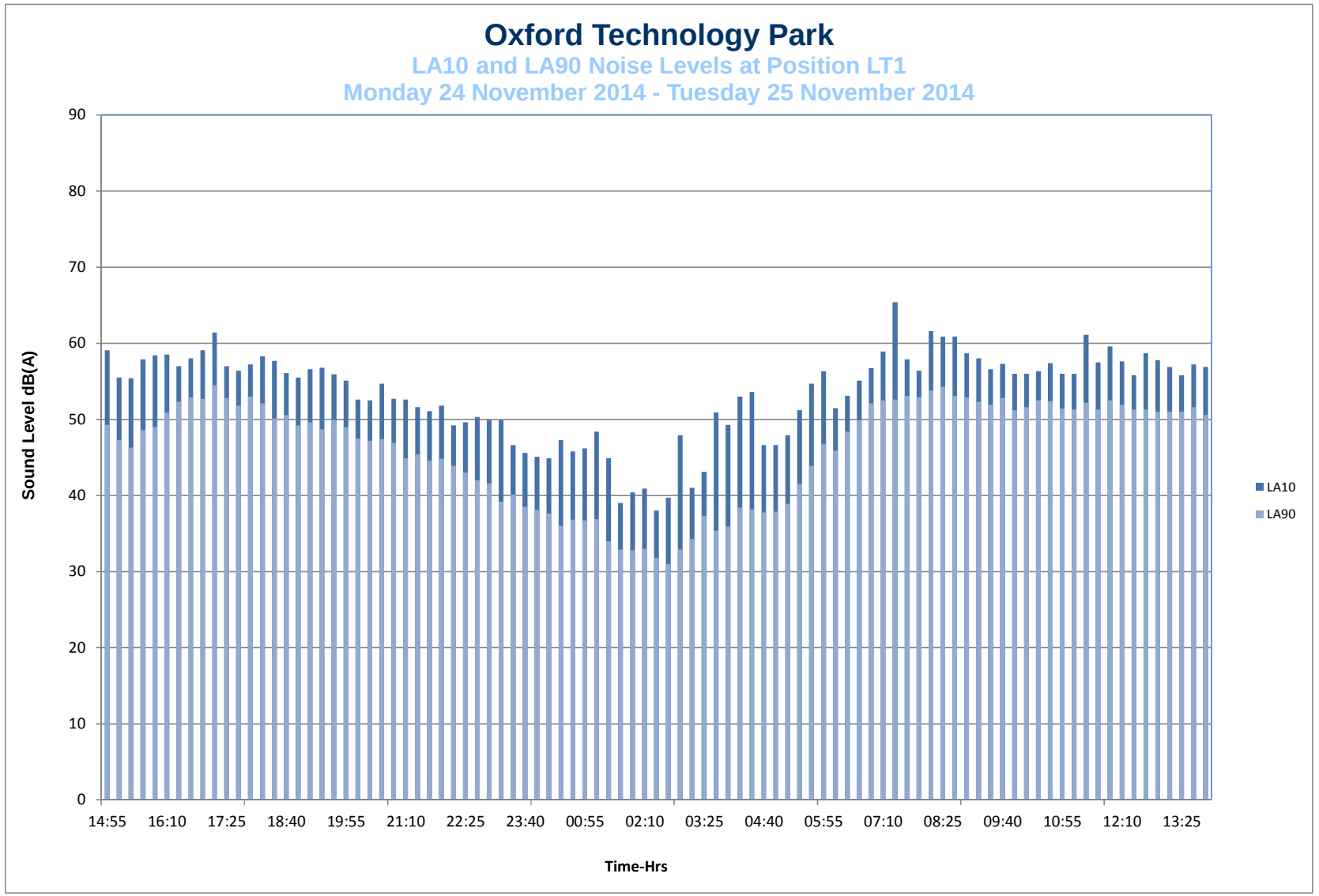
9.1.4 A qualitative statement regarding the potential noise and vibration impacts from the construction and demolition works has been provided.

Appendix A Acoustic Terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Daytime	The period 07:00-23:00 hours.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by 20 $\log_{10}$ (s_1/s_2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.

Appendix B Time History Graphs




Oxford Technology Park
LA10 and LA90 Noise Levels at Position LT1
Monday 24 November 2014 - Tuesday 25 November 2014
Sound Level dB(A)
90
80
70
60
50
40
30
20
10
0
14:55
16:10
17:25
18:40
19:55
21:10
22:25
23:40
00:55
02:10
03:25
04:40
05:55
07:10
08:25
09:40
10:55
12:10
13:25
Time-Hrs
LA10
LA90

Appendix C Traffic Noise Impact Assessment

Link	2025 Baseline (Do Minimum)							Baseline + Phase 2 Development (Do Something)							Difference
	Total Flow (AAWT)	%HGV	Speed (kmph)	Predicted Basic L_{10} (uncorrected) (dB)	Basic L_{10} Corrected for v&p (dB)	Correction for distance (dB)	Predicted Basic L_{10} (corrected) (dB)	Total Flow (AAWT)	%HGV	Speed (kmph)	Predicted Basic L_{10} (uncorrected) (dB)	Basic L_{10} Corrected for v&p (dB)	Correction for distance (dB)	Predicted Basic L_{10} (corrected) (dB)	DS v DM
A44 Oxford Road	16457	7.2	48	71.3	-0.6		**70.7**	16847	7.1	48	71.4	-0.6		70.7	**0.1**
Bladon Road	19648	5.2	48	72.0	-1.1		**70.9**	19939	5.2	48	72.1	-1.1		70.9	**0.1**
Upper Campsfield Road	13189	7.2	48	70.3	-0.6		**69.7**	13297	7.2	48	70.3	-0.6		69.7	**0.0**
A44 Woodstock Road (North)	26517	6.2	48	73.3	-0.9		**72.5**	27306	6.2	48	73.5	-0.9		72.6	**0.1**
A44 Woodstock Road (South)	26084	6.7	48	73.3	-0.7		**72.5**	26974	6.7	48	73.4	-0.7		72.7	**0.1**
Langford Lane (West)	15031	5.2	48	70.9	-1.1		**69.7**	16709	5.3	48	71.3	-1.1		70.2	**0.5**
Langford Lane (West)	15268	5.5	48	70.9	-1.1		**69.9**	16877	5.6	48	71.4	-1.0		70.3	**0.5**
Langford Lane (East)	15356	6.1	48	71.0	-0.9		**70.1**	16964	6.1	48	71.4	-0.9		70.5	**0.4**
The Boulevard	10741	7.6	48	69.4	-0.5		**68.9**	10741	7.6	48	69.4	-0.5		68.9	**0.0**
Oxford Motor Park	2801	2.9	48	63.6	-1.9		**61.7**	2801	2.9	48	63.6	-1.9		61.7	**0.0**
A4260 Banbury Road (North)	13989	4.7	48	70.6	-1.3		**69.3**	14626	4.7	48	70.8	-1.3		69.5	**0.2**
A4260 Banbury Road (South)	20132	6.3	48	72.1	-0.8		**71.3**	21104	6.4	48	72.3	-0.8		71.5	**0.2**
A4260 Banbury Road (South)	20098	7	48	72.1	-0.7		**71.5**	20797	7	48	72.3	-0.7		71.6	**0.1**
Bicester Road (West)	8212	4.5	48	68.2	-1.4		**66.9**	8485	4.6	48	68.4	-1.3		67.1	**0.2**
Bicester Road (South West)	8933	6.7	48	68.6	-0.7		**67.9**	8986	6.7	48	68.6	-0.7		67.9	**0.0**
Oxford Road	3977	2.5	48	65.1	-2.0		**63.1**	4006	2.5	48	65.1	-2.0		63.1	**0.0**
A4260 Frieze Way	12151	3.4	48	69.9	-1.7		**68.2**	12367	3.5	48	70.0	-1.7		68.3	**0.1**
A4165 Oxford Road	20011	7.3	48	72.1	-0.6		**71.5**	20412	7.3	48	72.2	-0.6		71.6	**0.1**