

NOISE TECHNICAL NOTE

Job Name: Land at Former Rainbow Industrial Estate
Job No: 332410017/NIA
Date: 12 April 2021
Prepared By: Stantec
Subject: Land at Former Rainbow Industrial Estate, Trout Road, West Drayton

1. Introduction

- 1.1. Stantec UK Limited is instructed by Troutbourne LLP to prepare a Noise Technical Note as an addendum to a Noise Impact Assessment (NIA) (**Appendix A**) prepared in June 2019 to support an appeal against the refusal of planning permission by LB Hillingdon (LBH) on 6th December 2018 for *'Continued use of land for car parking (sui generis use) and retention of two portacabin units for 24 months'* under LPA Ref: 38058/APP/2018/3554.
- 1.2. The conjoined planning appeal and enforcement notice appeals (PINS Ref: APP/R5510/C/19/3221239 & APP/R5510/W/19/3230443) were withdrawn in June 2020.
- 1.3. The airport parking use has now ceased and an alternative temporary use of the site is now sought by the Applicant for,

'Retention of two portacabins and entrance gates onto Trout Road and use of site for sui generis uses including container storage; open and closed storage of building, scaffolding and aggregate materials; vehicle storage and sales; and other commercial uses'
- 1.4. The Noise Technical Note supports this current application.
- 1.5. The proposed use is sought for a temporary period of three years as a meanwhile use of the site whilst a mixed use, residential-led scheme for the Rainbow and Kirby Industrial sites is discussed with the LPA during pre-application discussions and a formal planning application is then submitted and determined.
- 1.6. More details of the proposed use are set out in the Planning and Design and Access prepared by Stantec.
- 1.7. This Note reviews the previously submitted NIA to identify if its findings remain applicable to the proposed temporary use of the site. The key issues that are considered in this Note includes changes to:
 - i. Any changes to relevant development plan policy or noise impact guidance;
 - ii. The potential development related noise impacts, primarily relating to traffic generation; and
 - iii. The surrounding environment (receptor type, locations and baseline acoustic environment).

2. NIA (June 2019) Findings

- 2.1. The Noise Impact Assessment¹ (NIA) (appended to this Note at Appendix A) was prepared in 2019 to support the appeal against the refusal of planning permission for the temporary use of the site for airport parking. It provided an assessment of the car parking use operation and a separate assessment of the standby generator used as backup power generation for the portacabins.

¹ Land at Rainbow Industrial Estate, Noise Impact Assessment. PBA/Stantec – June 2019

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2.2. The NIA concluded at paragraphs 6.1.3 to 6.1.7,

“An environmental sound survey has been undertaken at the site inform the assessment. Based on the results of the surveys an assessment of the noise impact associated with the operation of the facility has been undertaken. Potential noise impacts are associated with the movement of cars and mini-bus on the site and the operation of a standby generator used in the event of a power failure. Due to the differences in assessment methodology the impact of the car park movement operations has been considered separately to the impact of the standby generator.

*Calculations indicate that vehicular movements associated with the operation of the car park are likely to have a **negligible impact on sound levels** at the identified noise sensitive receptors.*

The results of the preliminary assessment indicate that the level of impact associated with the operation of the standby generator is likely to be an indication of having a significant adverse impact, depending on the context. However, it should be recognised that the standby generator is only to be used in a very limited capacity in the event of a power failure, a situation which is only likely to occur a few times per year.

Considering the contextual and mitigating factors detailed above, it is likely that the associated noise impact of the proposed development at the nearby noise sensitive receptor can be reduced to a level that is between ‘an indication of having a low and adverse impact, depending on the context’. Therefore, provided suitable mitigation measures are adopted and secured by way of an appropriate planning condition, if the appeal is allowed, the operation of a suitably specified standby generator at the site should be considered acceptable.

Based on the results of the assessments undertaken and provided suitable mitigation measures.”

2.3. **Note** that the standby generator referenced above is not included in the current proposals and the portacabins are powered via a conventional electrical supply.

3. Review of previous AQA and comparison with proposed development

Any changes to relevant development plan policy or air quality guidance

3.1. Since the 2019 AQA was prepared the London Plan (2021) and the Hillingdon Local Plan Part 2 - Development Management Policies (2020) have been published.

London Plan 2021

3.2. Relevant policies in the London Plan includes Policy D14 Noise, which encourages development proposals to:

“...reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation [...] by:

1) avoiding significant adverse noise impacts on health and quality of life

2) reflecting the Agent of Change principle as set out in Policy D13 Agent of Change

3) mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses

4) improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)

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5) separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation

6) where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles

7) promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.”

- 3.3. The London Plan had not been published at the time of the previous NIA and Draft London Plan policies D14 and D13) were not assessed in the NIA. The proposals were, however, assessed against the National Planning Policy Framework 2019, Noise Policy Statement for England 2010, and Planning Practice Guidance 2018, and determined to be acceptable. The relevant provisions of these have not been substantially updated with regards to noise considerations since the original NIA.
- 3.4. Had the conjoined planning appeal and enforcement notice appeals not been withdrawn the proposals would have been assessed against Draft London Plan Policy D14 and D13 as part of the Inquiry proceedings. The key requirements for noise as set out in D14 reflect priorities in the previous London Plan (2016) policy 7.15.
- 3.5. Policy D13 (Agent of change) is a new policy requirement and advises that Boroughs should not normally permit development proposals that have not clearly demonstrated how noise and other nuisances will be mitigated and managed. The requirements to satisfy policy D13 and to ensure good design and explore mitigation measures at the design stage should be proportionate to the temporary status of the proposed application, notwithstanding the more intensive noise generating uses are set back from the site boundaries towards the southern (Grand Union Canal) boundary with the less intensive closed storage uses proposed off the Trout Road boundary to reduce potential noise impacts.
- 3.6. Overall it is considered that the proposals do not conflict with these new London Plan policies.

Hillingdon Local Plan Part 1 – Strategic Policies (2012)

- 3.7. Policy EM8 for noise was in effect at the time the NIA and continues to form part of the development in 2021. It advises with regards to noise that the Council will seek to ensure that noise sensitive development and noise generating development are only permitted if noise impacts can be adequately controlled and mitigated.

Hillingdon Local Plan Part 2 - Development Management Policies (2020)

- 3.8. Hillingdon Local Plan Part 2 replaces Hillingdon Local Plan: Part Two - Saved 2007 UDP policies (2012), and Policy OE01, which formed the basis of the policy assessment in the NIA.
- 3.9. Noise impacts are not addressed in a standalone policy in Hillingdon Local Plan Part 2 but is incorporated into the policy criteria for several new development policies. The principal strategic policy for noise is provided in Local Plan part 1 (2012) policy EM8.

4. Development Related Noise Impacts

- 4.1. The airport parking use was proposed across the extent of the application site with no specific marked bays or designated areas where parking and vehicle movements were not permitted.

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- 4.2. The proposed temporary use will have restricted operating hours with 7am-7pm - weekdays and 7am - 1pm - Saturdays sought compared to the 24 hour, 365 days a year operating hours of the previous airport parking use.
- 4.3. The number of vehicles entering the site is also reduced compared to the airport parking use and the predicted traffic movements associated with the proposed uses is as follows:
- iv. Car - 40-50 per day
 - v. Vans - 20 per day
 - vi. Lorries/ HGV - 10 per day
- 4.4. Additionally, it should be noted that the portacabins no longer require a back up generator which formed a key part of the airport parking proposals and the assessment of noise impacts in the NIA. Mitigations measures in the previous NIA were only required for this element of the proposal and will not therefore be required as part of the current proposals.
- 4.5. The original NIA indicated that vehicular movements associated with the airport car parking development would increase the sound levels at specified noise sensitive receptors. The extent of this change is calculated in comparison with the baseline noise environment.
- 4.6. The environmental sound survey results, representing the baseline noise environment, are presented in the NIA in Section 3.4, and in full in Appendix A. Data is presented on Ambient Sound Levels (dB LAeq,T), and Background Sound Levels (dB LA90,T).
- 4.7. This data was used to measure the extent of change between the existing and future noise environments based on proposals, which assumed a site capacity of approximately 500 parking spaces, with principal access from Trout Road, operating on a 24 hour, 7 day a week basis. The assessment assumed the same traffic movements as those presented in the Transport Assessment for the same appeal, being between 83 and 153 arrivals and 84 and 140 departures across a 24-hour period on the assessed days.
- 4.8. The assessed level of change is presented as a value, with values between 0 and 4.9 being below the Lowest Observed Adverse Effect Level (LOAEL)³. Table 4.2 taken from the NIA assesses the level of change at three key sensitive receptors:
- A. Dwellings on Trout Road,
 - B. Dwellings on St Stephens Road, and
 - C. Dwellings on Peplow Close.

Table 4.2: Calculated Change in Ambient Sound Level at Noise Sensitive Receptor

Receptor	Calculated Change in Ambient Sound Level at Noise Sensitive Receptor (L _{Aeq,1hour})	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
A	< 1	< 3
B	< 1	< 1
C	0	< 1

³ See NIA Table 2.1 for relevant thresholds

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- 4.9. The NIA concluded that that vehicular movements associated with the operation of the airport parking use were likely to fall below the proposed LOAEL and would have a **negligible impact** on sound levels at the identified noise sensitive receptors.
- 4.10. The characterisation of the baseline noise environment within the previous NIA, the range of sensitive receptors and the conclusions are considered applicable to current proposals. However, the change calculations presented in the NIA are likely to represent a worst-case scenario of noise impacts, and in excess of those that would be generated by the current proposals which has a more limited hours of operation and vehicle movements. Additionally a generator for the portacabins is no longer required.
- 4.11. It is concluded that the proposed use of the site is considered acceptable and will have a negligible impact on noise.

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Appendix A Noise Impact Assessment (2019), Land at Rainbow Industrial Estate, Trout Road, Yiewsley, UB7 7XT



now part of



Land at Rainbow Industrial Estate, Trout Road, Yiewsley, UB7 7XT

Noise Impact Assessment

On behalf of **Troutbourne LLP**

Project Ref: 35321/3002 | Rev: 00 | Date: June 2019

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Revision	Date	Description	Prepared	Reviewed	Approved

This report has been prepared by Peter Brett Associates LLP ('PBA') on behalf of its client to whom this report is addressed ('Client') in connection with the project described in this report and takes into account the Client's particular instructions and requirements. This report was prepared in accordance with the professional services appointment under which PBA was appointed by its Client. This report is not intended for and should not be relied on by any third party (i.e. parties other than the Client). PBA accepts no duty or responsibility (including in negligence) to any party other than the Client and disclaims all liability of any nature whatsoever to any such party in respect of this report.

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1 Introduction

1.1 Background

1.1.1 Peter Brett Associates LLP (PBA, now part of Stantec) has been commissioned by Troutbourne LLP to provide a noise impact assessment to support an appeal against the refusal of planning permission by LB Hillingdon (LBH) on 6th December 2018 under application reference LPA Ref: 38058/APP/2018/3554 for 'Continued use of land for car parking (*sui generis* use) and retention of two portacabin units for 24 months'.

1.1.2 Reason 5 for refusal relates to noise and states,

The proposed development, by reason of the activities associated with the continued use as a car park, the overall size, extensive and constant use (24 hours a day, 7 days a week all year round) of the site, which could also easily accommodate double the number of vehicles currently estimated; the layout of the site (including the layout of the vehicular accesses and parking areas); and in the absence of a Noise Report and proposed mitigation measures regarding noise from the site including any machinery in relation to the nearby residential properties, the application has failed to demonstrate that the development will safeguard the amenities of adjoining residential properties. The proposal is therefore contrary to Policy OE1 and OE3 of the Hillingdon Local Plan: Part Two - Saved UDP Policies (November 2012).

1.1.3 An environmental sound survey has been undertaken at the site during May 2019. The results of this survey have been used to inform this assessment.

1.2 Site Location and Description

1.2.1 The site comprises of land located at Rainbow Industrial Site, Trout Road, West Drayton, UB7 7XT and is 1.25 ha in size.

1.2.2 The site has two access points, one from Trout Road to the north west and another from St Stephen's Road to the south east.

1.2.3 Vehicular and pedestrian access to the site is principally made from Trout Road with the secondary access from St Stephen's Road used as an emergency exit.

1.2.4 To the immediate north is a 4/5 storey residential block along with similar residential blocks opposite along Trout Road to the north west; to the east are small industrial units forming part of the Kirby Industrial Estate which range from 1 to 2 storeys and are accessed from Trout Road to the north east; to the south are residential properties and the Al-Falah Islamic Centre located on St Stephen's Road.; and directly to the west is The Grand Union Canal. Beyond the canal and towpath are two-storey terraced residential properties and associated gardens located on Peplow Close and industrial units located on Bentinck Road.

1.2.5 The site is cleared of development and is currently in use as airport car parking pending redevelopment of the wider Rainbow and Kirby Industrial Estates Site (see below). Two Portacabins are located close to the access point on Trout Road and are used as offices and as a waiting room for customers.

1.2.6 The site lies approximately 6 km from Heathrow Airport, with the M25 and M4 in close proximity. Trout Road is single carriageway, with the western end providing bridge access over The Grand Union Canal, which is signalised at both ends as the bridge can only allow a single lane of traffic to pass. St Stephen's Road is also single carriageway.

1.2.7 A site location plan is shown in **Figure 1**.

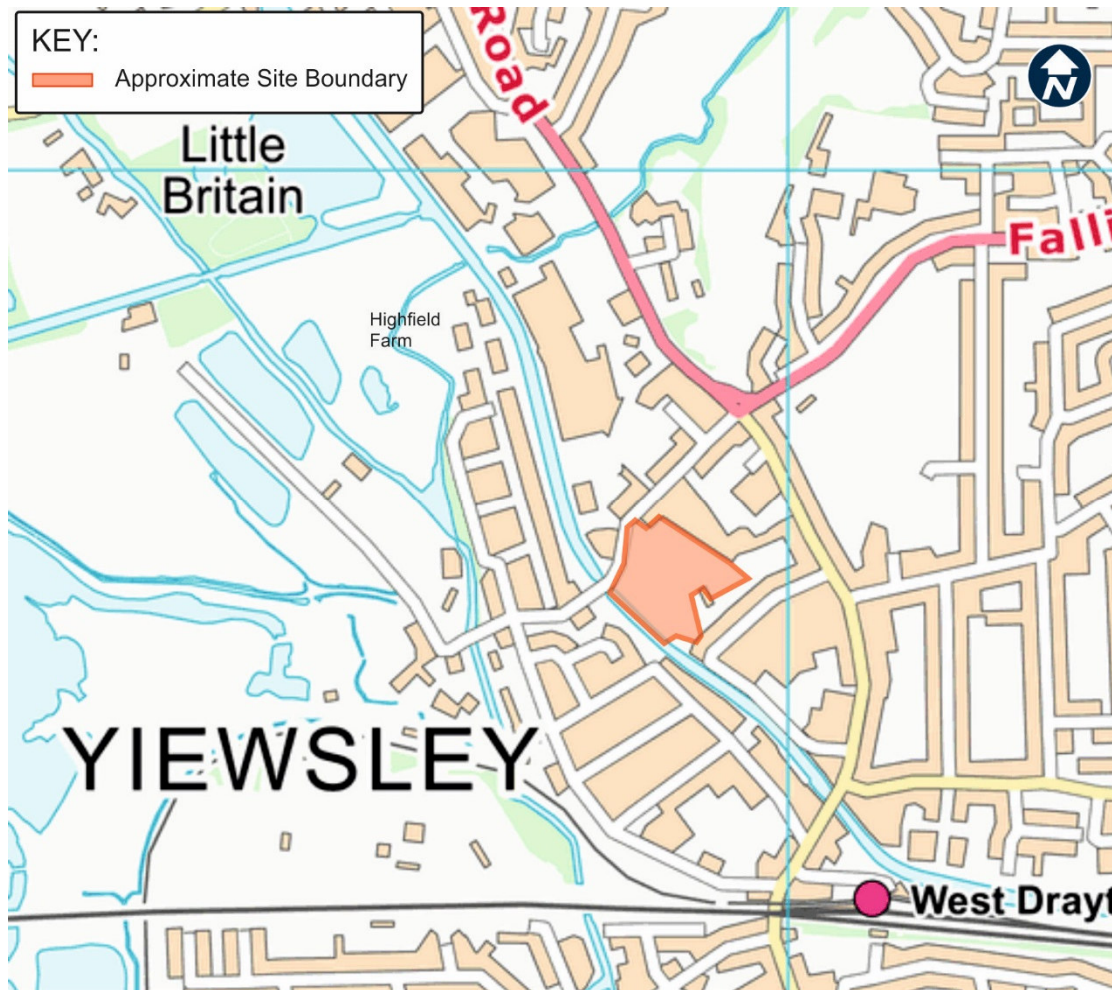


Figure 1: Site Location Plan (Image Contains Ordnance Survey © Crown Copyright and Database Right 2019)

1.3 Appeal Proposals and Relevant Planning History

- 1.3.1 A full planning application for 'Continued use of land for car parking (*sui generis* use) and retention of two Portacabin units' (Description as amended by LBH and agreed by Appellant on validation) was submitted on 5th October 2018.
- 1.3.2 The application was validated on 23rd October 2018 under LPA Ref: 38058/APP/2018/3554.
- 1.3.3 The submitted Planning and Design and Access Statement identifies that the application followed planning permission allowed on appeal in June 2017 for car parking for a temporary 12-month period which has now expired and that the proposals sought to renew permission for a further 24-month period.
- 1.3.4 The Planning and Design and Access Statement also advised:
 - The site is currently leased to 'Drivefly' who use the site to operate airport related meet and greet valet car parking. Drivefly also provide hotel overflow parking.
 - Access to the site is made from Trout Road.
 - The capacity of the site is approximately 500 car parking spaces.
 - The site operates on a 24 hour, 7 day a week basis.

- Parking is provided in unmarked bays across the site.
 - Two portacabins are erected on site and are used as offices and a waiting room for park and ride customers.
- 1.3.5 In considering noise impacts as part of the planning application, LBH's conclusion on noise at paragraph 7.18 of the Committee Report is identical to reason 5 for refusal.
- 1.3.6 LBH did not request a Noise Assessment from the Appellant during the determination of the Appeal Proposals and the LPA has not relied on a Noise Assessment to come to its conclusions at 7.18 in the Committee Report or reason 5 for refusal.
- 1.3.7 Paragraph 7.19 of the Committee Report identifies that local residents' objections had been received and that the Council's Environmental Protection Unit were notified however they were unable to substantiate claims made by local residents. Contrary to the Officer assessment at 7.18 the paragraph 7.19 goes on to state '*In any event they have also added that the proposed use would be acceptable in regards to noise*'.
- 1.3.8 The GLA Stage 1 Report does not consider noise as a strategic issue in its assessment of the proposals.
- 1.3.9 Also relevant to the current appeal is:

PINS Refs: APP/R5510/C/16/3163200 and APP/R5510/C/16/3163365

- 1.3.10 An appeal against the Enforcement Notice 3E04/VA/10341 was allowed on 8th June 2017 and planning permission was granted for use of the land for car parking for 12 months from the date of date decision i.e. from 8th June 2017 until 8th June 2018.
- 1.3.11 In considering the appeal, the Inspector did not identify noise as a main issue and the Inspector's Report states at paragraph 42 and 43,

'42. For completeness, given the indication that vehicular movements to and from the site are focussed in the period up to 0030 hours, I have considered the effect of such movements on neighbours' living conditions. However it is material that this is not a matter that has been raised by the Council in its statement. Moreover, despite notifying neighbours about the appeal, no correspondence has been received raising concerns about these movements. Given the relatively modest total number of vehicular movements likely to be involved and the broader noise climate, including the nearby main railway line and sources of traffic noise in the area, there is no evidence to show that such movements would harm neighbours' living conditions, still less disturb sleep.'

Conditions

43. The Council has suggested 4 conditions, which I have tested against the policy in paragraph 206 of the Framework. The first is a condition precedent that seeks a scheme for the control of noise emanating from the site, but given that the use subsists this form of condition is inappropriate. I have considered whether a condition should be imposed to deal with the substantive issue of noise, but as the permitted use would be parking the likely sources of noise arise as a direct consequence of what is permitted. Thus, by way of example, noise might arise from vehicles being manoeuvred on site or taken to and from the site, but that is inherent to the permitted use and, as I have noted, there has been no complaint on the grounds of harm to neighbours' living conditions. In the circumstances, taking account of the temporary nature of the planning permission that will be granted, which would mean that substantive works such as a noise barrier would be unreasonable, I decline to impose such a condition' (PBA underlining)

1.4 Scope of Assessment

1.4.1 The scope of the noise impact assessment and report is as follows:

- To present the results of the environmental sound survey undertaken at the site;
- To undertake a noise impact assessment of the operation of the existing airport parking development;
- To suggest mitigation measures, if necessary, to minimise any noise impact identified;
- To present the results of the assessment and subsequent recommendations in a detailed technical report to support the appeal against the refusal of planning permission.

1.5 Acoustic Terminology

1.5.1 A glossary of acoustic terminology used within this report is contained in **Appendix A**.

2 Planning Policy, Standards and Guidance

2.1 National Policy

Revised National Planning Policy Framework (NPPF) (2019)

- 2.1.1 The revised NPPF was published in May 2019. With respect to noise, Paragraph 170 states that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by: ...

e) 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”.

- 2.1.2 Paragraph 180 of the NPPF states that:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health and living conditions, as well as the potential sensitivity of 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 quality of life;*
- b) Identify and protect tranquil areas which may have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

- 2.1.3 The NPPF goes on to advise, in Paragraph 182, that:

“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”.

Noise Policy Statement for England (NPSE) (2010)

- 2.1.4 The NPSE 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 in Paragraph 1.6:

“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 (Paragraph 2.20) 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 is 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 is 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 (Paragraph 2.21):

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

2.1.8 The NPSE notes in Paragraph 2.22:

"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 (2018)

2.1.9 The Government's Planning Practice Guidance (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 Paragraph 005 of the PPG for Noise 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 The 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."

2.2 Development Plan policy

Hillingdon Local Plan: Part Two - Saved 2007 UDP policies (2012)

2.2.1 Reason 5 for refusal refers to policies OE01 and OE03.

2.2.2 Policy OE01 states:

"Planning permission will not normally be granted for uses and associated structures which are, or are likely to become, detrimental to the character or amenities of surround properties or the area generally, because of:

...iv. Noise and vibration or the emission of dust, smell or other pollutants

Unless sufficient measures are taken to mitigate the environmental impact of the development and ensure that it remains acceptable."

2.2.3 Policy OE03 states:

"Buildings or uses which have the potential to cause noise annoyance will only be permitted if the impact is mitigated within acceptable levels by engineering, lay-out or administrative measures."

2.3 Guidance

Effect of Changes in Noise Levels

- 2.3.1 There is no specific guidance or standard methodology which addresses the potential noise impact associated with car parks.
- 2.3.2 The magnitude of impact from the resultant change in noise level due to the movement of vehicles arriving, departing and manoeuvring at the proposed site has been assessed using the Effect of Changes in Noise Levels table below, which equates to Planning Practice Guidance effect levels. Advice from the Design Manual for Roads and Bridges has been used in order to produce the guidance contained in **Table 2.1**.

Table 2.1: Effect of Changes in Noise Levels

Noise change	Magnitude of Impact	Perception from Increase
0	No Change	Not Noticeable
0.1 - 2.9	Negligible	Noticeable and not intrusive
3 - 4.9	Minor	Noticeable and intrusive
LOAEL		
5 - 9.9	Moderate	Noticeable and disruptive
SOAEL		
10+	Major	Noticeable and very disruptive

2.4 Standards

BS4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound

- 2.4.1 BS4142: 2014 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.
- 2.4.2 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.

2.4.3 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.

2.4.4 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:

- Typically, the greater this difference, the greater the magnitude of the impact;
- 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.

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

- 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 such as:
 - Façade insulation treatment;
 - Ventilation and/or cooling that will reduce the need to have windows open to provide rapid or purge ventilation; and
 - Acoustic screening.

2.5 Proposed Assessment Criteria

2.5.1 Activities generating noise at the proposed site include the following:

- i. Customer vehicles arriving, parking and departing;
- ii. Movement of cars around the site;
- iii. Arrival and departure of the mini bus taxi service;
- iv. Operation of a portable generator.

2.5.2 The assessment of vehicle movements has been assessed in terms of the resulting change in sound levels as detailed in **Section 2.4**.

- 2.5.3 The assessment of noise from the portable generator has been assessed in general accordance with BS4142:2014 as detailed in **Section 2.45**

3 Environmental Sound Survey

3.1 Methodology

- 3.1.1 A fully automated, unattended environmental sound survey was undertaken from approximately 12:00 hours on Saturday 18th May to approximately 12:00 hours on Tuesday 21st May 2019 in order to determine the current sound climate at the site.
- 3.1.2 The survey was undertaken over a weekend period so to obtain critical period daytime and night-time sound levels over both weekday and weekend periods.
- 3.1.3 Measurements were taken at a single position at the site, selected so to represent the typical background sound climate experienced at nearby noise sensitive receptors which are residential properties.
- 3.1.4 The measurement position is shown in **Figure 2** below.

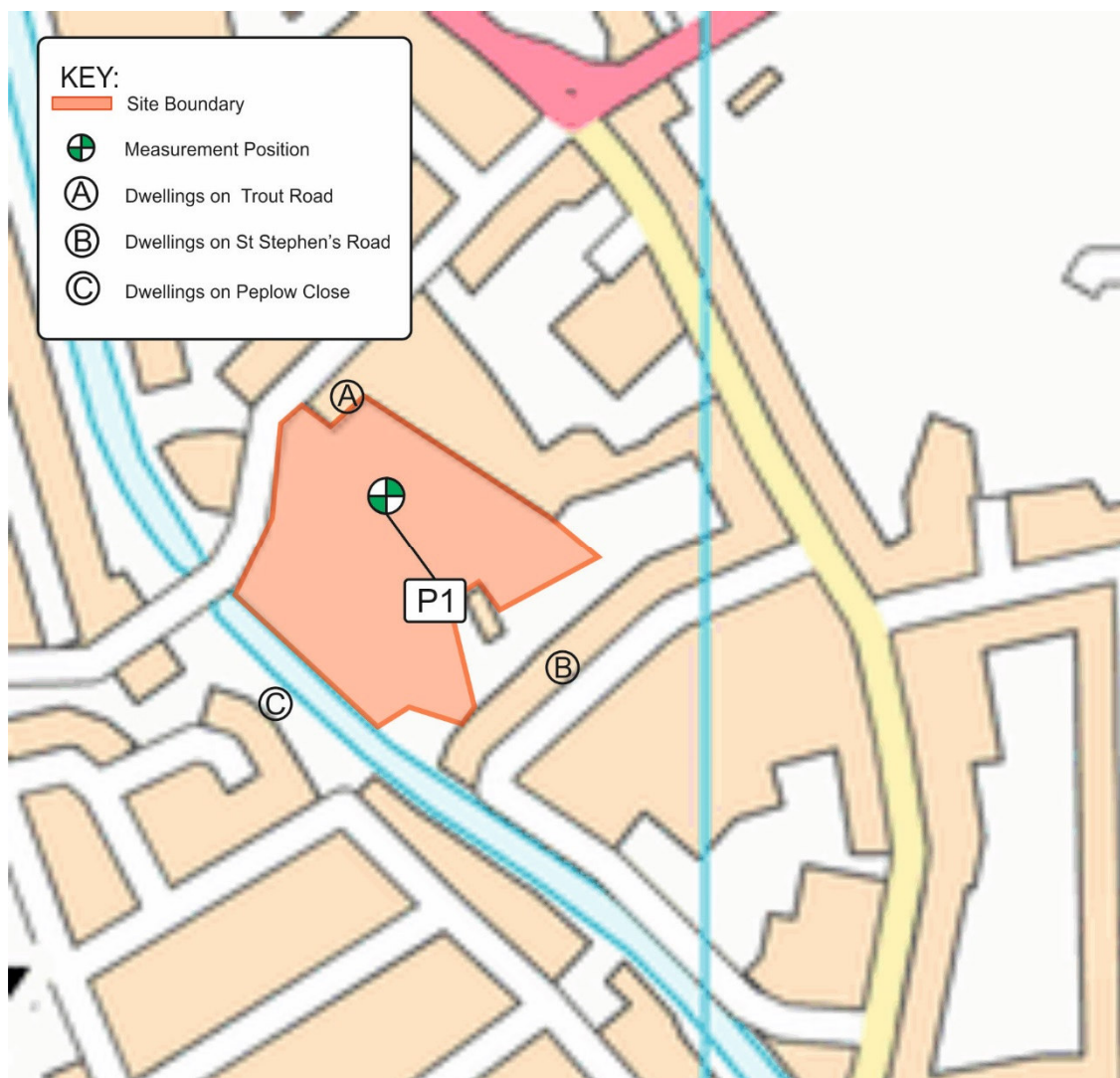


Figure 2: Site Location Plan (Image Contains Ordnance Survey © Crown Copyright and Database Right 2019)

- 3.1.5 The microphone was positioned at an approximate height of 2.5 m above ground level in a free-field position, on an extending pole and was located approximately 50m from Trout Road.

- 3.1.6 Sound levels across the site were noted to be consistent with no obviously dominant noise source. The measurements undertaken are therefore considered to be representative of the typical ambient and background sound levels likely to be experienced at the noise sensitive receptors located adjacent to the site.
- 3.1.7 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, at the beginning of the survey period, the temperature was cool (approx. 15 °C) with no wind or no precipitation. At the end of the survey period, the temperature was cool (approx. 15 °C) with light air from the south west (approx. 2 ms⁻¹) and approximately 50% cloud cover with no precipitation. It is understood that the weather conditions were similar to those described above for the duration of the survey and are therefore considered suitable for obtaining representative measurements.
- 3.1.8 The L_{Aeq,T}, L_{A90,T} and L_{AFMax} levels were measured over 15 minute periods for the duration of the survey.
- 3.1.9 The sound level meter was located in an environmental case, with the microphone and connected to the meter via an extension cable. The microphone was fitted with the manufacturer's windshield.
- 3.1.10 The instrumentation used in the survey is listed in **Table 3.1**. Field calibrations were performed before and after the measurements with no significant fluctuation recorded (< 0.5 dB). Calibration certificates are available on request.

Table 3.1: Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	Bruel & Kjaer	2250	2626233	10/11/2017
Pre-amplifier		ZC0032	28103	
½" Pre-polarised microphone		4189	3148083	
Calibrator	Bruel & Kjaer	4231	2619375	11/01/2019

3.2 Assumptions/Limitations

- 3.2.1 The engineer noticed nothing unusual in terms of the noise climate at the time of the survey. This report refers to, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at different times.

3.3 Environmental Sound Climate

- 3.3.1 Due to the nature of the survey (i.e. unmanned) it is not possible to accurately comment on the dominant noise sources or specific noise events during the entire survey period. However, at the beginning of the survey period, it was noted that the dominant noise source across the site was noted to be distant road traffic associated with vehicular movements on the surrounding road network.

3.4 Environmental Sound Survey Results

- 3.4.1 A time history graph detailing the full results of the environmental sound survey is contained in **Appendix A**.

Ambient Sound Levels (dB L_{Aeq,T})

- 3.4.2 **Table 3.2** and **Table 3.3** detail the measured ambient sound levels at Position 1 during the daytime period (07:00 – 23:00 hours) and the night-time period (23:00 – 07:00 hours).

Table 3.2: Daytime Ambient Sound Levels (dB L_{Aeq,1hour})

Time Period	Measured Ambient Sound Level (dB L _{Aeq,1hour})		
	18/05/2019 & 21/05/2019	19/05/2019	20/05/2019
07:00	52	48	49
08:00	55	50	53
09:00	55	48	53
10:00	52	49	54
11:00	51	49	51
12:00	50	50	50
13:00	48	50	51
14:00	50	48	52
15:00	48	46	51
16:00	48	47	55
17:00	47	48	49
18:00	49	46	50
19:00	49	46	48
20:00	49	46	46
21:00	47	46	48
22:00	47	45	47
Minimum	47	45	46
Average (Minimum)	46		

Table 3.3: Night-time Ambient Sound Levels (dB L_{Aeq,1hour})

Time Period	Measured Ambient Sound Level (dB L _{Aeq,1hour})		
	18/05/2019	19/05/2019	20/05/2019
23:00	49	44	46
00:00	45	40	43
01:00	44	38	40
02:00	42	37	41
03:00	45	42	46
04:00	48	46	48
05:00	46	46	48
06:00	47	48	49
Minimum	42	37	40
Average (Minimum)	40		

Background Sound Levels (dB L_{A90,T})

- 3.4.3 The typical measured background sound levels at Position 1 during the daytime and night-time periods are presented in **Table 3.4**. The measured background sound levels are considered representative of those at the nearest noise sensitive receptors.

Table 3.4: Typical Background Sound Levels (dB L_{A90,15minutes})

Date	Typical Background Sound Level (dB L _{A90,15minutes})	
	Daytime (07:30 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
18/05/2019	41	37
19/05/2019	39	33
20/05/2019	40	38
21/05/2019	44	-

4 Car Park Operational Assessment

4.1 Purpose of Assessment

- 4.1.1 An assessment has been undertaken in order to determine the potential noise impact at the nearest noise sensitive receptors due to vehicular movements associated with the operation of the airport car parking facility.
- 4.1.2 Due to the existing operation of the car park facility it has been necessary to make a number of assumptions with respect to the environmental sound climate in the absence of the car park based on the results of the environmental sound survey. For the purposes of the assessment it has been assumed that the minimum measured ambient sound levels (1 hour) are representative of the environmental sound climate without the car park in operation.
- 4.1.3 The assessment considers the change in the ambient sound level between a 'without car park' scenario and a 'with car park' scenario during the typical peak hours.
- 4.1.4 The assessment considers the noise impact of vehicular movements at the nearest noise sensitive receptors as indicated on **Figure 2**.

4.2 Assessment Assumptions

- 4.2.1 The vehicle trip information used for the assessment has been provided by the operator. It is understood that:
 - The capacity of the site is approximately 500 car parking spaces. Principal access to the site is made from Trout Road with St Stephen's Road generally only used as an emergency exit.
 - The site operates on a 24 hour, 7 day a week basis. The operator advises that the movement of vehicles to and from the site typically takes place between the hours of 10:00 and 12:00, 13:30 and 15:00 and 21:00 and 00:30;
 - Up to date traffic surveys of the Trout Road access undertaken between Thursday 16th May to Sunday 19th May 2019 as part of the Transport Assessment for the appeal identified between 83 and 153 arrivals and 84 and 140 departures across a 24 hour period on those days. Traffic movements to and from the site were less than trips in the 2014 Outline Permission with more limited movements in night-time hours.
 - Parking is provided in unmarked bays across the site.
 - The location of the sources can vary depending upon the occupancy of the car park. For the purposes of the assessment we have considered that vehicle movements occur in the areas detailed in **Figure 3**. The assessment at each noise sensitive receptor considers all vehicle movements occurring in the area closest to the noise sensitive receptor.
 - The location of the noise sensitive receptor has been assessed at the centre of the amenity area serving the relevant property (where applicable) during the daytime and the façade of the relevant property during the night-time.

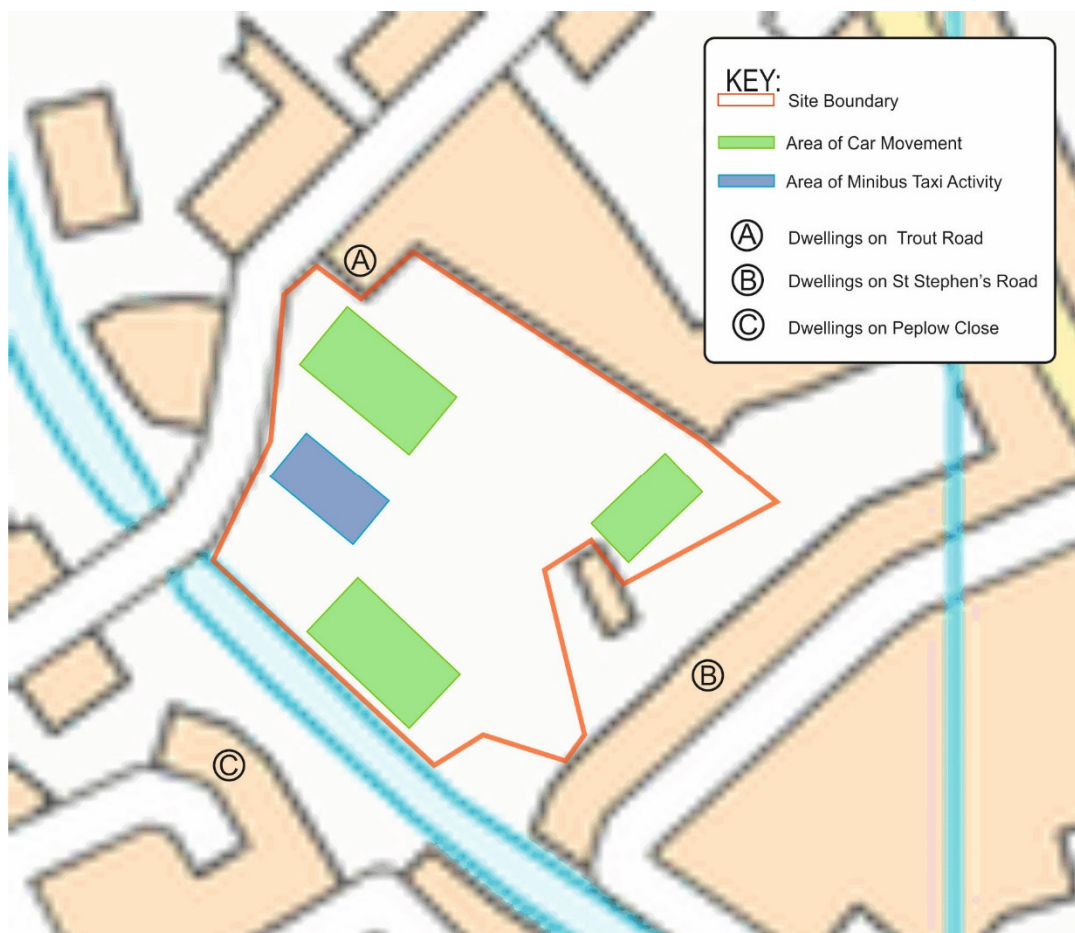


Figure 3: Site Location Plan (Image Contains Ordnance Survey © Crown Copyright and Database Right 2019)

4.2.2 **Table 4.1** details the activities associated with vehicle movements, the associated noise level and the maximum number of activities taking place in a one-hour period.

Table 4.1: Sound Level Associated with Vehicle Movements

Measurement Description	Sound Pressure Level SEL (dB) at 4 metres	Number of Events During Assessment Period (1 hour)
Car driving in, manoeuvring and stopping including door slam (on gravel)	73	10
Driver and occupants getting in car, slamming door and driving away (on gravel)	77	10
Mini-bus manoeuvring and entering/exiting the site (on gravel)	78	4

4.3 Noise Impact Assessment

4.3.1 The results of the noise impact calculations are presented in **Appendix C**.

4.3.2 The sound levels contained in **Table 4.1** have been used to calculate the dB $L_{Aeq,1hour}$ sound level associated with vehicle movements during the assessment period. This has then been combined with the lowest measured dB $L_{Aeq,1hour}$ ambient noise level during the daytime and

night-time periods respectively to allow a comparison to be made of the existing sound levels and the future sound levels including these vehicle movements.

- 4.3.3 Calculations indicate that vehicular movements associated with the operation of the development are likely to increase the $L_{Aeq,1hour}$ sound level during the assessed periods by the levels detailed in **Table 4.2**.

Table 4.2: Calculated Change in Ambient Sound Level at Noise Sensitive Receptor

Receptor	Calculated Change in Ambient Sound Level at Noise Sensitive Receptor ($L_{Aeq,1hour}$)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
A	< 1	< 3
B	< 1	< 1
C	0	< 1

- 4.3.4 With reference to **Table 2.1**, calculations indicate that vehicular movements associated with the operation of the car park are likely to fall below the proposed LOAEL and have a **negligible impact on sound levels at the identified noise sensitive receptors**.

5 Standby Generator Assessment

5.1 Purpose of Assessment

- 5.1.1 An assessment has also been undertaken in order to determine the potential noise impact at the nearest noise sensitive receptor due to the operation of a small standby generator which provides power to the Portacabins serving the car park should there be a failure in the power supply to the facility.
- 5.1.2 An assessment of the likely noise impact associated at Receptors A, B and C as identified in **Figure 2** due to the operation of the standby generator has been undertaken in general accordance with BS4142:2014.

5.2 Assessment Parameters

- 5.2.1 The following has been assumed:
- The generator could operate for the duration of the assessment period at any time in a 24-hour period;
 - The generator is not tested on a regular basis;
 - The generator is operational only when there has been a mains power failure to the facility.
 - The generator is rarely operational (1-2 times per year) for no more than a 24-hour period.

5.3 Calculation Procedure

- 5.3.1 Calculations have been undertaken of the likely sound levels at the nearest noise sensitive receptors during a worst case 15-minute period during the night-time (23:00 – 07:00 hours). Calculations assume that the generator is in continuous operating for the duration of the assessment period.
- 5.3.2 **Table 5.1** details the source sound levels associated with the operation of the standby generator based on the sound levels provided by the manufacturer.

Table 5.1: Sound Source Levels Used Within Assessment

Manufacturer	Model	Sound Power Level, dB L _{WA}
Clarke Power	FG3050	97

- 5.3.3 A photo of the generator in situ s shown in **Figure 4**.



Figure 4: Photo of the Standby Generator In-Situ

5.4 Acoustic Feature Correction

- 5.4.1 Some sources can be considered to emit noise that is tonal. Impulsive or intermittent in nature. For these sources, corrections should be applied (maximum of +6 dB for tonality, +9 dB for impulsivity and +3 dB for intermittency). A correction of +3dB should also be applied if the sound is considered to feature characteristics which are not tonal or impulsive but are otherwise readily distinctive against the residual acoustic environment.
- 5.4.2 Source sound data for the generator is only available in terms of the broadband A-weighted sound power level. Therefore, it is not possible to undertake 1/3 octave band spectral analysis to determine the presence of a tone. Furthermore, it was not possible to measure the generator during the site visit. However, based on experience it is not considered that the generator will exhibit tones.
- 5.4.3 It is not considered that the generator will be intermittent or impulsive once in use however it is considered that the generator will be readily distinctive against the residual acoustic environment. Therefore, a +3dB acoustic feature correction has been applied.

5.5 Preliminary Assessment Results

- 5.5.1 **Table 5.2** details the preliminary results of the BS4142:2014 assessment. The specific sound level has been calculated at first floor height (4 metres) for the assessment of impact during the night-time period.

Table 5.2: BS4142:2014 Preliminary Assessment Results

Description	Receptor		
	A	B	C
Calculated Specific Sound Level at Receptor (dB L _{Aeq,T})	51	51	49
Acoustic Feature Corrections (dB)	+3	+3	+3
Calculated Rating Sound Level at Receptor (dB L _{Ar,Tr})	54	54	52
Background Sound Level (dB L _{A90,15mins})	33-38		
Excess of Rating over Daytime Background Sound Level (dB)	21 - 16	21 - 16	19 - 14
Assessment of Impact	Likely to be an indication of having a significant adverse impact, depending on the context.		

5.6 Context and Mitigating Factors

- 5.6.1 The above assessment details the results of the initial numerical assessment of sound levels at the nearest noise sensitive receptor. It is important to recognise context in the assessment of the likely noise impact on the proposed development site arising from deliveries to the approved store.
- 5.6.2 The following factors should be taken into consideration:
- The absolute sound level;
 - The character and level of the residual and specific sound levels; and
 - The sensitivity of the receptor and use of mitigation measures.
- 5.6.3 In this instance it is considered that the above numerical assessment represents an accurate assessment of noise from the standby generator when in operation and it is not necessary to modify the calculated impact based on the context.
- 5.6.4 However, it should be recognised that the standby generator is only to be used in a very limited capacity in the event of a power failure, a situation which is only likely to occur a few times per year.

Absolute Sound Levels

- 5.6.5 The calculated specific sound level falls below the relevant criteria in World Health Organisation and BS8233:2014 guidelines with respect to noise in external amenity areas during the daytime at Receptors B and C and just above the criteria at Receptor A.

Character and Level of the Residual and Specific Sound Levels

- 5.6.6 The character and level of the specific sound exceeds that of the residual sound and is different in character to the prevailing residual sound climate. This is accounted for by the addition of a +3 dB acoustic feature correction.

Receptor Sensitivity

- 5.6.7 It is likely that the residential dwelling at the receptors will incorporate external building fabric elements that are likely to ensure internal noise levels are below the relevant criteria in

BS8233:2014. Therefore, it is likely that suitable internal noise levels associated with the operation of the proposed development can be achieved

5.6.8 Note 2 in 'Section 11 Assessment of the Impacts' of BS4142:2014 states:

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

5.6.9 It is understood that some complaints have been made to the relevant authorities due to the operation of the standby generator but this was not upheld by Officers (refer to Committee Report) and therefore this should be considered when determining the overall impact of the proposed development.

Mitigation

5.6.10 Mitigation measures exist that are likely to reduce the indication of impact at the receptor. Measures that should be considered are:

- Replacing the standby generator with a quieter generator unit;
- Providing localised screening to the generator unit in the form of an acoustic screen.

5.6.11 The above measures would be subject to a detailed acoustic assessment but could be secured by a suitably worded planning condition, if the appeal were allowed to prevent an adverse impact at the noise sensitive receptors.

5.7 Uncertainty

Measured Environmental Sound Levels

5.7.1 The assessment relies on the results of the environmental sound survey. Uncertainty in measured background sound levels can occur due to variation in temporary/non-representative meteorological conditions. All possible steps were taken to minimise the risk of meteorological conditions affecting the survey results. However, it should be recognised that there is a degree of uncertainty inherent in the baseline environmental sound data.

Calculation and Assessment Procedure

5.7.2 Uncertainty in the sound power levels used in the assessment can occur due to variations in the sound emissions of the source and the operating conditions under which the source is expected to operate. For the purposes of the assessment, it has been assumed that measurement uncertainty has been addressed as part of the testing process.

5.7.3 Source data for the proposed standby generator has been provided in terms of the broadband A-weighted sound power level. Whilst the assessment has been undertaken based on the best information available, it should be recognised that uncertainty exists in the calculation process in the absence of 1/3 octave band data.

5.7.4 The assessment undertaken has been based on typical operational hours and conditions provided to us. However, it should be recognised that there is a degree of uncertainty associated with the exact operating conditions if different from those assumed. Nevertheless, it is considered that the assessment undertaken is suitably robust in determining the likely noise impact of the proposed development.

5.8 Assessment Summary

- 5.8.1 The results of the preliminary assessment indicate that the level of impact associated with the operation of the standby generator is likely to be an indication of having a significant adverse impact, depending on the context.
- 5.8.2 It should be recognised that the standby generator is however only to be used in a very limited capacity in the event of a power failure, a situation which is only likely to occur a few times per year.
- 5.8.3 Considering the contextual and mitigating factors detailed above, it is likely that the associated noise impact of the generator at the nearby noise sensitive receptor can be reduced to a level that is between 'an indication of having a low and adverse impact, depending on the context'.
- 5.8.4 A suitable mitigation measure is identified and could be secured by way of an appropriate planning condition if the appeal is allowed so that the operation of a suitably specified standby generator at the site should be considered acceptable.

6 Conclusions

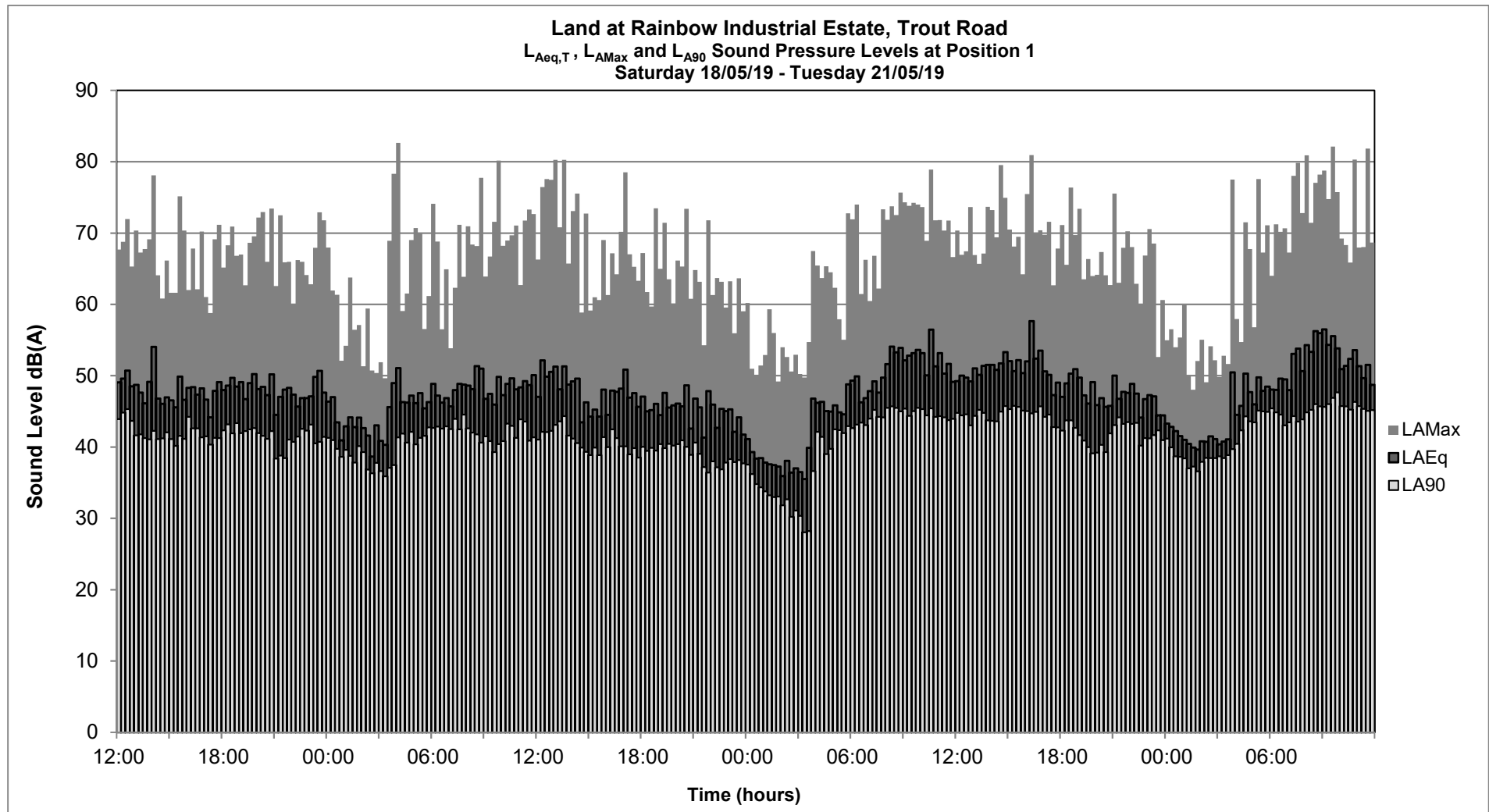
- 6.1.1 Peter Brett Associates LLP (PBA, now part of Stantec) has been commissioned by Troutbourne LLP to provide a noise impact assessment to support an appeal against the refusal of planning permission by LB Hillingdon (LBH) on 6th December 2018 under application reference LPA Ref: 38058/APP/2018/3554 for *'Continued use of land for car parking (sui generis use) and retention of two portacabin units for 24 months'*.
- 6.1.2 Reason 5 for refusal relates to noise.
- 6.1.3 An environmental sound survey has been undertaken at the site inform the assessment. Based on the results of the surveys an assessment of the noise impact associated with the operation of the facility has been undertaken. Potential noise impacts are associated with the movement of cars and mini-bus on the site and the operation of a standby generator used in the event of a power failure. Due to the differences in assessment methodology the impact of the car park movement operations has been considered separately to the impact of the standby generator.
- 6.1.4 Calculations indicate that vehicular movements associated with the operation of the car park are likely to have a **negligible impact on sound levels** at the identified noise sensitive receptors.
- 6.1.5 The results of the preliminary assessment indicate that the level of impact associated with the operation of the standby generator is likely to be an indication of having a significant adverse impact, depending on the context. However, it should be recognised that the standby generator is only to be used in a very limited capacity in the event of a power failure, a situation which is only likely to occur a few times per year.
- 6.1.6 Considering the contextual and mitigating factors detailed above, it is likely that the associated noise impact of the proposed development at the nearby noise sensitive receptor can be reduced to a level that is between 'an indication of having a low and adverse impact, depending on the context'. Therefore, provided suitable mitigation measures are adopted and secured by way of an appropriate planning condition, if the appeal is allowed, the operation of a suitably specified standby generator at the site should be considered acceptable.
- 6.1.7 Based on the results of the assessments undertaken and provided suitable mitigation measures for the generator element are provided the site is considered suitable for the existing car parking development.

Appendix A Glossary of Acoustic Terminology

Parameter	Description
Acoustic Environment	Sound at the receiver from all sound sources as modified by the environment.
Ambient Sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. Comprises of the residual sound and the specific sound when present.
Ambient Sound Level ($L_A = L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
A-Weighted Decibel (dBA)	A decibel level that has been corrected for the A-Weighting curve.
A-Weighting	Octave band and 1/3 octave band filters that correlate to the response of the human hearing system to sound pressure levels at different frequencies.
Background Sound Level ($L_{A90,T}$)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using a fast time-weighting and quoted to the nearest whole number of decibels.
Decibel (dB)	A logarithmic unit used to describe the ratio between the measured level and a reference level of 0 dB. The ratio can be sound pressure, intensity or power. The reference value for sound pressure is 20 μ Pa and for sound power is 1 ρ W.
Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$)	Value of the time-averaged A-weighted sound pressure level, in decibels (dB), of a continuous steady sound for the duration of the specified time interval, T.
Fast Time Weighted	The speed at which the instrument responds to changes in amplitude of the measured signal. The response time of a fast time-weighted instrument is 0.125 seconds.
Free-Field Level	The sound pressure level measured away from any reflective surfaces.
Frequency (f)	The number of cycles of pressure fluctuations within a given period of time. Measured in Hertz.
Hertz (Hz)	The unit of frequency or pitch of a sound. One hertz is equal to one cycle per second.
Octave Band	Band of frequencies where the upper limit of the band is twice the frequency of the lower limit. E.g., the 1000 Hz band contains noise energy at all frequencies from 707 to 1414 Hz.
Percentile Level ($L_{AN,T}$)	The A-Weighted Sound Pressure Level which is exceeded for N% of the specified time interval. E.g., the $L_{A90,1\text{hour}}$ is the A-weighted sound level exceeded for 90% of 1 hour.
Rating Level ($L_{Ar,Tr}$)	Specific sound level plus any adjustment for the characteristic features of the sound.
Reference Time Interval (T)	Specified interval over which the specific sound level is determined.

Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual Sound Level ($L_r = L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Sound Energy	The energy present in a sound field that causes mechanical vibration in any medium through which a sound wave passes. Measured in Joules (J).
Sound Energy Level (L_J)	The logarithm of the ratio of the sound energy (J) to the reference sound energy level (J_0). The reference value for sound energy is 1 pJ. Defined as: $L_J = 10 \log \left(\frac{J}{J_0} \right)$
Sound Exposure Level (L_{AE})	The level of sound, equal to 1 second of duration, that has the same sound energy as the actual noise event considered. Is also referred to as the SEL, or the LAX. Defined as: $L_{AE} = L_{Aeq} + 10 \log_{10}(t)$
Sound Power	The total sound energy radiated by a source, in all directions. Measured in watts (W).
Sound Power Level (L_W)	The logarithm of the ratio of the sound power (W) to the reference sound power level (W_0). The reference value for sound power is 1 pW. Defined as: $L_W = 10 \log \left(\frac{W}{W_0} \right)$
Sound Pressure	The difference between the pressure caused by a sound wave and the ambient pressure of the medium the sound wave is passing through. Measured in Pascals.
Sound Pressure Level (L_p)	The logarithm of the ratio of a given sound pressure (p) to the reference sound pressure (p_0). The reference value for sound pressure is 20 µPa. Defined as: $L_p = 20 \log \left(\frac{p}{p_0} \right)$
Sound Sources	Sounds generated by nature or human activity.
Specific Sound Level ($L_r = L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
Specific Sound Source	Sound source under assessment.
Third Octave Band	Octave bands sub divided into three frequency bands, equal to 23 % of the centre frequency.
Wavelength (λ)	The distance a sound wave travels in one cycle.

Appendix B Time History Graph



Appendix C Summary of Calculations

Daytime Assessment (07:00 – 23:00 hours)										
Receptor	Activity	Single Event Level (dBA)	Number of Events	Calculated Sound Level (dB LAeq,1hr)	Distance Loss (dB)	Calculated Sound Level at Receptor (dB LAeq,1hr)	Calculated Cumulative Sound Level at Receptor (dB LAeq,1hr)	Minimum Measured Ambient Sound Level at Receptor (dB LAeq,1hr)	Calculated Sound Level at Receptor (dB LAeq,1hr) (Cumulative Sound Level + Minimum Measured Ambient Sound Level)	Change in Noise Level (dB)
A	Car Arrival	73	10	47	-13	34	40	46	47	<1
	Car Departure	77	10	51	-13	38				
	Mini-bus	78	4	48	-21	28				
B	Car Arrival	73	10	47	-11	36	41	46	47	<1
	Car Departure	77	10	51	-11	40				
	Mini-bus	78	4	48	-28	20				
C	Car Arrival	73	10	47	-18	30	36	46	46	<0
	Car Departure	77	10	51	-18	34				
	Mini-bus	78	4	48	-26	22				

Night-time Assessment (23:00 – 07:00 hours)										
Receptor	Activity	Single Event Level (dBA)	Number of Events	Calculated Sound Level (dB LAeq,1hr)	Distance Loss (dB)	Calculated Sound Level at Receptor (dB LAeq,1hr)	Calculated Cumulative Sound Level at Receptor (dB LAeq,1hr)	Minimum Measured Ambient Sound Level at Receptor (dB LAeq,1hr)	Calculated Sound Level at Receptor (dB LAeq,1hr) (Cumulative Sound Level + Minimum Measured Ambient Sound Level)	Change in Noise Level (dB)
A	Car Arrival	73	10	47	-13	34	40	40	43	<3
	Car Departure	77	10	51	-13	38				
	Mini-bus	78	4	48	-21	28				
B	Car Arrival	73	10	47	-20	27	33	40	41	<1
	Car Departure	77	10	51	-20	31				
	Mini-bus	78	4	48	-28	20				
C	Car Arrival	73	10	47	-20	27	33	40	41	<1
	Car Departure	77	10	51	-20	31				
	Mini-bus	78	4	48	-26	22				