



Former Canteen Building and Block H, Former Nestle Factory, Hayes

Noise Impact Assessment Report

On behalf of **BDW Trading Ltd (Barratt London)**

Project Ref: 332511069 | Rev: 01 | Date: May 2022

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1 Introduction

1.1 Background

- 1.1.1 Stantec (UK) Ltd has been commissioned by BDW Trading Ltd (Barratt London) to undertake a noise impact assessment in relation to the proposed health centre and nursery at the Former Canteen Building and Block H, Former Nestle Factory, Hayes.
- 1.1.2 An environmental sound survey was undertaken by Stantec (UK) Ltd (formerly Peter Brett Associates LLP) in March 2016 to establish the existing environmental sound levels at positions considered representative of the nearest noise sensitive receptors. The results of the environmental sound survey have been used to establish background and ambient sound levels which form the basis of our assessment of plant noise emissions and noise from use of the development.
- 1.1.3 This report presents the relevant results of the environmental sound survey, details the results of our assessment and, where considered necessary, proposes acoustic specifications to achieve the relevant criteria and to support the planning application.
- 1.1.4 An explanation of the acoustic terminology used in this report is included in [Appendix A](#).

1.2 Scope of Report

- 1.2.1 The scope of this report is to:
 - Present the results of the 72-hour daytime and night-time environmental sound survey undertaken at the site by Peter Brett Associates (now Stantec UK Ltd.) in March 2016.
 - Detail relevant plant noise emission criteria based on Local Authority requirements, and the results of the environmental sound survey.
 - Detail relevant criteria for the assessment of noise associated with the use of the nursery.
 - Present a detailed assessment of the likely airborne noise propagation to nearby noise sensitive receptors and determine the acoustic performance for any required items of acoustic mitigation to achieve the proposed criteria.

1.3 Site Description and Location

- 1.3.1 The application site is located at the Former Nestle Factory, Nestles Avenue, Hayes, UB3 4RF, in the southern part of London Borough of Hillingdon (LBH), West London. The existing Canteen building is located towards the south of the site, set back from Nestles Avenue.
- 1.3.2 The Application Site is bounded to the north by Block F, beyond which lies the Great Western Railway Line and Grand Union Canal. To the west lie Blocks C and D, beyond which is the existing Squirrels Industrial Estate. To the east is Wallis Gardens and Segro Industrial Estate.
- 1.3.3 A residential area lies immediately to the south of the site, on the opposite side of Nestles Avenue. The A312 (North Hyde Road) is located approximately 140 m to the south of the site and the M4 motorway is a further 1km away. Heathrow is approximately 4km to the south of the site.
- 1.3.4 A map showing the location of the site is shown in **Figure 1**.

Figure 1: Site Location



Image Source: Maxar and Microsoft

- 1.3.5 The former Nestle site has been demolished, and the residential redevelopment of the area is in progress. The nearest noise sensitive receptors to the proposed site will be receptors within the residential redevelopment of the Former Nestle Factory to the north.
- 1.3.6 The nearest existing noise sensitive receptors to the site will be on the opposite (south) side of Nestle's Avenue.

1.4 Noise Sensitive Receptors

1.4.1 The assessment has been undertaken at the nearest noise sensitive receptors, identified in **Figure 2** and **Table 1.1**. **Figure 2** includes outline locations of the development under construction.

Figure 2: Noise Sensitive Receptors

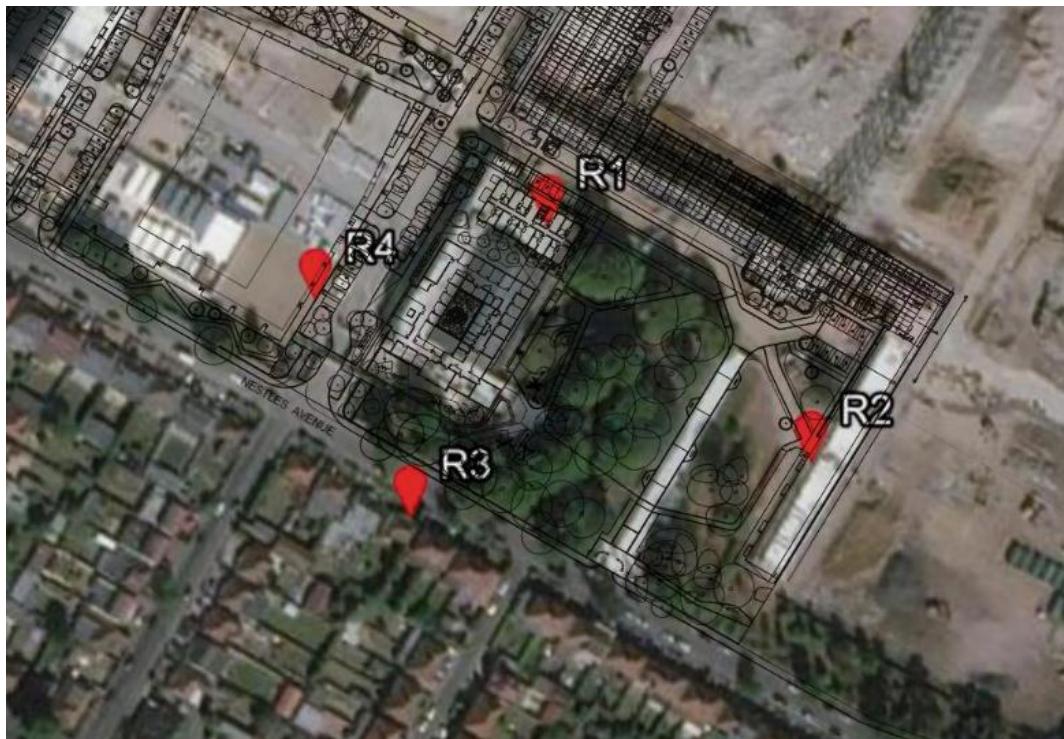


Image Source: Maxar, Microsoft, dmfk

Table 1.1: Noise Sensitive Receptors

Reference	Description
R1	Residential Receptor. South façade of Laurina Apartments.
R2	Residential Receptor. West façade of Laurina Apartments.
R3	Residential Receptor. Properties along Nestle's Avenue.
R4	Residential Receptor. East façade of new dwellings on Former Nestle Site.

1.4.2 Receptors R1, R2 and R4 are under construction, or have recently been constructed and are anticipated to be receptors prior to the proposed development being in operation.

2 Policy, Standards, Guidance and Criteria

2.1 Local Authority Consultation

2.1.1 Anderson Acoustics, acting on behalf of Hillingdon Council, were contacted to discuss and agree the survey and assessment methodology. It was agreed that:

- The results of the environmental sound survey undertaken in March 2016 can be used to inform the assessment, provided the suitability of its use can be justified.
- The assessment of noise from the external nursery area should consider guidance provided within BS 4142:2014+A1:2019, BS 8233:2014 and the Sport England Design Guidance Note Artificial Grass Pitch (AGP) Acoustics – Planning Implications.
- The specific sound level from use of the external nursery area should be no more than 10 dB above the background sound level at the nearest existing noise sensitive receptors.
- Noise impact should be minimised to a practicable minimum through design and management.

2.2 National Policy

The National Planning Policy Framework (NPPF)

2.2.1 The revised National Planning Policy Framework (NPPF) was published in July 2021. In respect of noise, paragraph 174 states that in relation to conserving and enhancing the natural environment:

“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 ... noise pollution...”

2.2.2 In relation to ground conditions and pollution, paragraph 185 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, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

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;

Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...”

2.2.3 In relation to the integration of new development with existing premises and community facilities, paragraph 187 states 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."

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

Planning Practice Guidance

2.2.5 The Planning Practice Guide (PPG) was launched in 2014 (with the latest update being in 2019) and provides additional guidance and interpretation to the Government's strategic policies outlined within the NPPF in a regularly updated, web-based resource.

2.2.6 The PPG provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the no observed effect level (NOEL) and, as exposure increases, the lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL).

2.2.7 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.

2.2.8 Exposure to noise above the LOAEL is described in PPG (Paragraph: 005 Reference ID: 30-005-20190722) as:

"...noise starts to cause small changes in behaviour and/or attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts 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)."

2.2.9 Exposure to noise above SOAEL is described as:

"...noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused."

Noise Policy Statement for England

2.2.10 The Noise Policy Statement for England (NPSE) was published in March 2010 and clarifies the underlying principles and aims of existing policy documents that relate to noise. It also sets out the long-term vision of Government noise policy which is: *"to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"*.

2.2.11 The NPSE states 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 its effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

2.2.12 Paragraphs 2.20 and 2.21 define 'significant averse' and 'adverse' impacts as applied to noise as follows:

"There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This 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.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur."

2.2.13 It is necessary to define the LOAEL and SOAEL for the potential source of noise to relate the potential impact to the aims and requirements of the NPSE.

2.3 Regional Policy

The London Plan 2021

2.3.1 The London Plan, titled 'The Spatial Development Strategy for Greater London' was published by the Mayor of London in March 2021.

2.3.2 The London Plan is the overall strategic plan for London and it sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years.

2.3.3 Policy D14: Noise states:

"A. In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:

- 1. Avoiding significant adverse 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 environmental and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity).*
- 5. Separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation.*
- 6. Where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles.*

7. *Promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.*

B. Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra's Noise Action Plan for Agglomerations."

2.4 Local Policy

London Boroughs of Hillingdon, Hounslow and Richmond upon Thames Supplementary Planning Document: Noise Generating and Noise Sensitive Development

2.4.1 The London Boroughs of Hillingdon, Hounslow and Richmond upon Thames Supplementary Planning Document: Noise Generating and Noise Sensitive Development was published in April 2016 and has been produced to *"address common noise issues affecting all three Boroughs and assist in providing a consistent approach to development where noise is an issue"*.

2.4.2 Section 3.6 General Approach to Noise Generating Development (NGD) states:

"Much of the development which is necessary for the creation of jobs and the construction and improvement of essential infrastructure will generate noise. In some circumstances noise may be an inevitable consequence of an essential or desirable activity. The planning system should not place unjustifiable obstacles in the way of such development.

The LPA will consider carefully in each case whether proposals for new development that may generate noise (including by a change of use) would be incompatible with existing noise sensitive activities and any noise sensitive activities that may reasonably be expected in the foreseeable future. The applicant will be expected to demonstrate, as part of the planning application, that noise has been mitigated and reduced to a minimum and that the principles of good acoustic design have been followed.

For schemes that may generate noise, developers must consider the cumulative noise impact from their proposed scheme and the existing acoustic environment; and where appropriate the future cumulative impact of any already permitted or proposed noise generating development in the vicinity. There will be a general presumption against development which gives rise to significant adverse effects from noise unless it can be demonstrated that the economic and/or social and/or environmental benefits associated with the proposed development outweigh the adverse effects."

2.4.3 Section 6.1 Noise Standards for New Industrial and Commercial Development states:

"All industrial and commercial development with the potential to generate noise will be assessed and, where relevant, controlled by planning conditions in order to protect residential amenity. Conditions may be used, for example, to restrict noise levels and to control hours of operation. The most relevant standard for assessing new industrial and commercial development is BS4142:2014."

2.4.4 Section 6.2 BS4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound provides external noise standards for the noise impact from relevant proposed industrial or commercial premises or plant that the Borough will seek to achieve. These are outlined in **Table 2.1** below.

Table 2.1: New Industrial and Commercial Development - External Noise Standards

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

2.4.5 Section 2.4 goes on to state:

“The Boroughs will not impose unreasonable restrictions on businesses, but applicants should be aware that it is usually simpler and less expensive to design in noise management and noise control measures at the planning stage rather than wait for complaints to arise.”

2.5 Standards

British Standard 4142:2014 + A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

2.5.1 BS 4142:2014 +A1:2019 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.

2.5.2 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.

2.5.3 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 cannot be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.

2.5.4 The procedure contained in BS 4142 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. It is noted that a BS 4142 assessment is reliant on measuring relevant background sound levels.

2.5.5 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.

British Standard 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’

2.5.6 BS 8233:2014, sets out desirable guideline values in habitable rooms, such as living rooms and bedrooms.

2.5.7 The guideline values relate to steady external noise without a specific character, previously termed ‘anonymous noise’. According to the standard, noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate. Examples of noise with a character may include tonal/intermittent plant noise emissions, music playback, and workshop noise. Examples of external steady noise sources may include environmental noise sources such as busy road traffic.

2.5.8 The desirable internal ambient noise levels for dwellings are presented in **Table 2.2**.

Table 2.2: BS 8233 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	Desirable Internal Ambient Noise Level	
		07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35 dB L _{Aeq,16h}	-
Dining	Dining room/area	40 dB L _{Aeq,16h}	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq,16h}	30 dB L _{Aeq,8h}
*Note ⁴ Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L _{Amax,f} , depending on the character and number of events per night. Sporadic noise events could require separate values.			
Note ⁵ If relying on closed windows to meet the guide values, there needs to be an appropriate alternative source of ventilation that does not compromise the façade insulation or the resulting noise levels.			
Note ⁷ Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.			
*A selection of the available notes			

2.5.9 The Standard also provides advice in relation to desirable levels for external noise. It states that:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB L_{Aeq,T}, with an upper guideline value of 55 dB L_{Aeq,T} which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate.

Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation.

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

2.6 Guidance

Artificial Grass Pitch (AGP) Acoustics – Planning Implications

- 2.6.1 Sport England published Artificial Grass Pitch (AGP) Acoustics – Planning Implications (Revision 01) in August 2015. The document provides details of acoustic implications associated with such facilities and follows on from an acoustic research programme involving detailed analysis of relevant noise guidance documents and site testing in a range of locations.
- 2.6.2 The document proposes appropriate noise criteria and assessment methods and outlines practical measures that can be applied to reduce noise in particularly sensitive areas. It refers to the World Health Organisation (WHO) Guidelines for Community Noise published in 1999.
- 2.6.3 The levels within the WHO guideline correlate with those outlined in BS 8233:2014, although the Sport England document suggests that a 1-hour assessment period should be used ($L_{Aeq,1hour}$) rather than a 16-hour assessment period ($L_{Aeq,16hour}$).
- 2.6.4 The document also states, based on a report by the National Physical Laboratory (CMAM16), that “*...it is not necessarily the case that where these levels are exceeded, the noise will adversely affect nearby residential properties*”.
- 2.6.5 The Sport England document states that in some circumstances, an alternative assessment methodology may be appropriate where existing noise levels in the area are high. In these situations, reference is made to the IOA/IEMA Working Party Consultation Draft 2002 (which has been superseded by the IEMA Guidelines for Environmental Noise Impact Assessment published in 2014).
- 2.6.6 Where there are high ambient noise levels, it states that increases of no more than 3 dB (which relate to a ‘slight’ impact according to the IOA/IEMA Working Party Consultation Draft 2002), are unlikely to be perceived.

Guidelines for Environmental Noise Impact Assessment

2.6.7 The IEMA Guidelines for Environmental Noise Impact Assessment 2014 detail an assessment process applicable to a wide range of potential environmental noise sources where a specific assessment method either does not exist or is not considered to be appropriate.

2.6.8 The guidelines suggest that by defining the sensitivity of receptors, the change in noise environment as a result of the source under consideration, and considering the type of noise, an assessment of the potential noise impact can be undertaken.

2.6.9 Receptors are those aspects of the environment sensitive to changes in baseline conditions. The sensitivity of a particular receptor depends upon the extent to which it is susceptible to such changes. Residential receptors are typically considered to have a high sensitivity with commercial and industrial receptors considered to have a low or negligible sensitivity.

2.6.10 Based on the IEMA guidelines, **Table 2.3** details the relative change in sound level and the corresponding magnitude of change at a typical receptor of high sensitivity (e.g. a residential receptor).

Table 2.3: Magnitude of Change and Description of Effect at a Receptor with High Sensitivity

Relative Change in Sound Level	Magnitude of Change	Description of Effect
Greater than 10 dB change	Large	Noticeable and Very Disruptive Very Substantial Impact
5 to 9.9 dB change	Medium	Noticeable and Disruptive Substantial Impact
3 to 4.9 dB change	Small	Noticeable and Intrusive Moderate Impact
2.9 dB or less change	Negligible	Noticeable and Not Intrusive

2.7 Proposed Assessment Criteria

Nursery External Area Noise

2.7.1 The assessment of noise generated through use of the nursery has been based on:

- A comparison of the specific sound level generated by the nursery, and the background sound level. As agreed with the representatives of the Local Authority, an exceedance of the background sound level by more than 10 dB is anticipated to result in significant adverse impact.
- The relative noise change in the ambient sound level at the nearest noise sensitive receptors. As described within AGP Acoustics – Planning Implications, an increase of more than 3 dB of the ambient sound level may be perceivable and therefore could result in adverse impact.

Plant Noise Emissions

2.7.2 **Table 2.4** details the proposed criterion for the assessment of the impact of noise from plant installed at the proposed development. The criterion is specified in terms of the difference between the rating and existing background sound level, when determined at 1 metre from the façade (in free field condition) of the nearest residential noise sensitive receptors. The criterion is based on the requirements of the Local Authority.

Table 2.4: Proposed Assessment Criteria – Plant Noise Emissions

Location	Difference Between Rating Level ($L_{Ar,T}$) and Background Sound Level ($L_{A90,T}$), dB
1m from nearest noise sensitive residential receptor	-5

2.7.3 Compliance with the proposed assessment criteria outlined above is likely to ensure that an appropriate LOAEL is achieved.

3 Environmental Sound Survey

3.1 Procedure

- 3.1.1 An unattended environmental sound survey was undertaken from approximately 12:00 hours on Monday 21 March 2016 to approximately 14:00 hours on Thursday 24 March 2016 to determine the existing background sound climate at locations considered representative of the nearest noise sensitive receptors.
- 3.1.2 The survey was undertaken over a weekday period. Measurements were logged in 15-minute periods of the L_{Aeq} , L_{A90} and L_{AFMax} sound levels.
- 3.1.3 The sound level meters were in environmental cases. The microphones were connected to the meters via an extension cable and fitted with the manufacturer's windshield.
- 3.1.4 The instrumentation used in the survey (including calibration information) is listed in **Appendix B**. Field calibrations were performed before and after the measurements with no significant fluctuations recorded (< 0.5 dB). Calibration certificates are available upon request.

3.2 Measurement Locations

- 3.2.1 Sound measurements were undertaken at two positions at the site. The survey was undertaken in advance of the construction of the development. The measurement positions are detailed in **Figure 3** and are described in **Table 3.1**.

Figure 3: Environmental Sound Measurement Locations



Image Source: Maxar and Microsoft

Table 3.1: Description of Measurement Locations

Position	Description
P1	The microphone was located 1.5 m above ground level, in a free field position on the southern site boundary, approximately 8 m from Nestles Avenue.
P2	The microphone was located 1.5 m above ground level, in a free field position on the southern site boundary to the south of Unit 4, approximately 113 m from Nestles Avenue.

3.3 Meteorological Conditions

3.3.1 During the survey, temperatures were mild to cold, ranging between 10 and 14 °C during the daytime period and between 1 and 6 °C during the night-time period. Wind speeds were observed to be less than 5 m/s. No precipitation was recorded throughout the duration of the survey.

3.3.2 The weather conditions, as described above, are considered to be suitable for obtaining representative sound level measurements.

3.4 Assumptions/Limitations

3.4.1 The engineer noticed nothing unusual in terms of the sound climate at the time of the survey. This report refers, 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. No warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

3.5 Environmental Sound Climate

3.5.1 Due to the nature of the survey (i.e. unattended), it is not possible to accurately comment on the dominant noise sources or specific noise events during the entire survey period. However, **Table 3.2** outlines the dominant noise sources at the measurement positions.

Table 3.2: Dominant Noise Sources

Position	Dominant Noise Sources
P1	Vehicular movements on Nestles Avenue. Distant traffic noise from the M4 and the A312 The Parkway.
P2	Distant traffic noise from the M4 and the A312 The Parkway.

3.6 Environmental Sound Survey Results

3.6.1 A summary of the survey results is detailed in **Table 3.3**. Full results of the survey are presented in the time history graphs in **Appendix C**.

Table 3.3: Summary of Measured Environmental Sound Survey Results

Location	Daytime (07:00 to 19:00 hours)		Evening (19:00 – 23:00 hours)		Night-Time (23:00 – 07:00 hours)	
	dB L _{Aeq,T}	Typical dB L _{A90,15minutes} *	dB L _{Aeq,T}	Typical dB L _{A90,15minutes} *	dB L _{Aeq,T}	Typical dB L _{A90,15minutes} *
P1	52	45	50	45	54	43
P2	52	45	49	44	50	44

* Calculated based on the statistical distribution of background sound levels during the measurement period in general accordance with BS 4142:2014+A1:2019.

3.6.2 The results of the environmental sound survey undertaken in March 2016 are considered to be representative of the existing sound climate at the site.

3.6.3 Environmental sound levels are unlikely to have significantly changed at the site. The environmental sound climate was noted to be dominated by vehicular movements on the surrounding road network. With reference to the Calculation of Road Traffic Noise (CRTN) (Department for Transport Welsh Office, 1988) and The Design Manual for Roads and Bridges (DMRB) (Highways England, 2019), a 25% increase in traffic flows would be required to result in a 1 dB increase in sound levels and a 100 % increase in traffic flows would be required to result in a 3 dB increase in sound levels. Therefore, it is unlikely that existing on-site environmental sound levels are significantly higher than those measured in March 2016.

3.6.4 The survey was undertaken at a time when the former use of the site had ceased. With the exception of the new development, there have been no other major changes to the surrounding area. Furthermore, the new development is not considered likely to affect background sound levels, based on the location of the dominant noise sources.

3.6.5 Therefore, the results of the environmental sound survey undertaken in March 2016 are considered to be representative of the existing sound climate at the site and are considered suitable for use within the assessment.

3.6.6 The use of historical sound survey data was considered acceptable by Anderson Acoustics, acting on behalf of Hillingdon Council, based on suitable justification for the use of the survey data being provided. Based on the above, the use of the historical survey data is considered to be justified.

4 Noise Assessment of Nursery

4.1 General

- 4.1.1 A review of traffic flows of the consented redevelopment of the Former Nestle Factory, and the redevelopment including the scheme assessed within this report has been undertaken. Traffic flows have been provided by the Transport Consultant Markides Associates.
- 4.1.2 The with development traffic flows are anticipated to increase by less than 1% on all roads within the traffic assessment compared to the consented scheme. Based on this, a detailed review of noise from the change of traffic flows has not been undertaken, as an increase of less than 1% is not likely to lead to a perceptible change in noise levels.
- 4.1.3 The proposed development is to feature a nursery, of which an external play area is proposed, in the southern area of the site and to the south of the proposed nursery. An assessment has been undertaken to determine the likely noise impact associated with the use of this area. The external area is indicated in blue in **Figure 4**.

Figure 4: Layout Indicating Nursery External Area

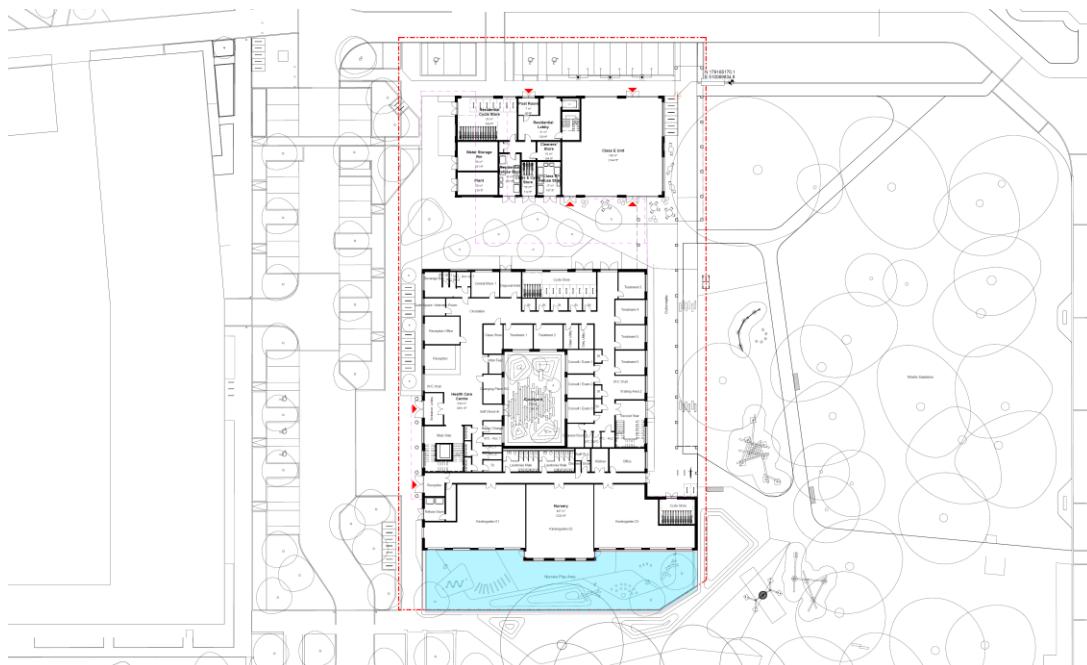


Image source: dmfk

- 4.1.4 The proposed nursery opening times are 07:00 to 19:00 hours Monday to Friday.

4.2 Source Activity Noise Levels

- 4.2.1 **Table 4.1** details the typical source sound levels associated with the use of an external school/nursery play area. Measurements were taken at the boundary of the school playground area. The source sound level has been taken from Stantec's in-house database.

Table 4.1: Source Sound Levels of School/Nursery Playground

Description	dB L _{Aeq,1hour}
Use of school playground	65

4.2.2 The assessment has been based on the following:

- It is assumed that the proposed external nursery play area is in continuous use for the one-hour assessment period. This is considered a worst-case use scenario.
- The assessment of the change in ambient sound levels at the receptor is based on the average existing ambient sound level (dB L_{Aeq,16hour}) measured during the survey daytime survey period. This position is considered representative of incident sound levels at the receptors.
- For the purpose of the assessment, it is considered that the average 16-hour ambient sound level is representative of the ambient sound level for a one-hour assessment period.
- The proposed nursery external area is not in use outside of the proposed opening times.

4.3 Results of Assessment

Assessment Against Background Sound Levels

4.3.1 **Table 4.2** summarises the calculated specific sound levels at the receptors and compares the results with the typical background sound level.

Table 4.2: Assessment Against Background Sound Level

Parameter	Sound Level at Receptor			
	R1	R2	R3	R4
Calculated Source Sound Level at Receptor dB L _{Aeq,1hour}	47	47	54	53
Typical Background Sound Level at Receptor, dB L _{A90,15min}			45	
Exceedance of Specific Sound Level at Receptor dB	+2	+2	+9	+8

4.3.2 The results of the assessment indicate that the specific sound level generated through use of the external nursery area would be no more than 10 dB above the typical background sound level at the noise sensitive receptors. The calculated sound levels are within the target criteria at all receptors.

Assessment Against Ambient Sound Levels

4.3.3 A summary of the results of the change in ambient sound level assessment is presented in **Table 4.3**.

Table 4.3: Assessment Against Ambient Sound Levels

Parameter	Sound Level at Receptor			
	R1	R2	R3	R4
Calculated Source Sound Level at Receptor dB $L_{Aeq,1hour}$	47	47	54	53
Ambient Sound Level at Receptor dB $L_{Aeq,16hour}$			52	
Cumulative Ambient Sound Level at Receptor dB $L_{Aeq,1hour}$	53	53	56	56
Change in Ambient Sound Level at Receptor dB	+1	+1	+4	+4
Magnitude of Change and Description of Effect	Negligible Noticeable and Not Intrusive	Negligible Noticeable and Not Intrusive	Small Noticeable and Intrusive Moderate Impact	Small Noticeable and Intrusive Moderate Impact

4.3.4 The results of the assessment indicate that at Receptors 1 and 2, the ambient sound level would increase by 1 dB while the external area of the nursery area is in use. Based on guidance within AGP Acoustics – Planning Implications, this is unlikely to be perceivable or result in adverse impact.

4.3.5 The results of the assessment indicate that at Receptors 3 and 4, the ambient sound level would increase by 4 dB while the external area of the nursery area is in use. Based on guidance within AGP Acoustics – Planning Implications, this is likely to be perceivable and could result in adverse impact, depending on the context. Based on the background sound level not being exceeded by 10 dB as outlined in **Table 4.2** at either of these receptors, the likelihood of adverse impact at these receptors is considered to be low. However, as there is a possibility of adverse impact, practicable measures of noise mitigation have been considered.

4.4 Acoustic Mitigation

4.4.1 Measures to reduce noise could include management of the use of the external area and physical forms of mitigation.

4.4.2 Measures to reduce noise impact through management of the space could include: limiting the number of children which can use the space at any time, restricting the use of the space to

particular hours of the day or considering the types of activities which can take place within the external area.

- 4.4.3 Physical forms of mitigation could include acoustic barriers or bunds around the external area of the nursery. Given the relative height of receptors 1, 2 and 4 overlooking the external area, it is unlikely that acoustic barriers or bunds would significantly reduce the resultant sound level at these receptors. An acoustic barrier or bund along the south of the external nursery area may reduce noise levels at Receptor 3 by up to 5 dB, depending on the exact height, location and extent of the barrier.
- 4.4.4 While an acoustic barrier may reduce noise impact at Receptor 3, its installation would have other implications in the design of the development, including reducing the permeability of the site from Nestles Avenue. With this in mind, an acoustic barrier or bund is not considered a practicable noise mitigation solution.

5 Plant Noise Emissions

- 5.1.1 The proposed opening times for the health centre are 08:00 hours to 22:00 hours Monday to Friday and 08:00 hours to 20:00 hours on Saturdays and Sundays.
- 5.1.2 The exact details and specifications of the external plant are at this stage unknown, and it is not known whether plant could operate outside of the proposed health centre opening hours.
- 5.1.3 Based on the results of the environmental sound survey and the requirements of the Local Authority, plant noise emission criteria have been suggested for external plant installed at the proposed development.
- 5.1.4 **Table 5.1** presents the proposed plant noise emissions criteria. These should be achieved with all plant items operating simultaneously at 1 metre from the window of the nearest residential receptor.

Table 5.1: Proposed Plant Noise Emission Criteria

Location	Proposed Plant Noise Emission Limit (dB L _{Ar,Tr})	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
All Receptors	40	38

- 5.1.5 Where the noise emissions from the installed plant is considered to be tonal, impulsive, be readily distinctive against the residual sound climate or operate intermittently the proposed plant noise emissions criteria should be reduced by a further 5 dB.
- 5.1.6 It should be noted that the proposed plant noise emission limits are subject to the approval of Hillingdon Council.

6 Conclusions

- 6.1.1 Stantec (UK) Ltd has been commissioned by BDW Trading Ltd (Barratt London) to undertake a noise impact assessment in relation to the Former Canteen Building and Block H, Former Nestle Factory, Hayes.
- 6.1.2 An environmental sound survey was undertaken by Stantec (UK) Ltd (formerly Peter Brett Associates LLP) in March 2016 to establish the existing environmental sound levels at positions considered representative of the nearest noise sensitive receptors. The results of the environmental sound survey have been used to establish background and ambient sound levels which form the basis of our assessment of plant noise emissions and noise from use of the development.
- 6.1.3 Sound levels associated with the worst-case use of the proposed external nursery play area are likely to have a 'negligible' impact at Receptors 1 and 2 (new residents on the Former Nestle Factory Site), and a 'small' impact at Receptors 3 (existing residents along Nestles Avenue and 4 (new residents on the Former Nestle Factory Site). Potential noise mitigation measures have been reviewed, although incorporating physical acoustic mitigation in the form of barrier of bunds is not considered to be practicable due to the reduced permeability of the site from Nestles Avenue which would result.
- 6.1.4 Plant noise emission criteria have been suggested for external plant installed at the proposed development. It should be noted that the proposed plant noise emissions criteria are subject to the approval of Hillingdon Council.
- 6.1.5 Based on the results of the assessments undertaken, the site should be considered suitable for the proposed development.

Appendix A Glossary of Acoustic Terminology

Table A.1: Glossary of Acoustic Terminology

Parameter	Description
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 pW.
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.
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.
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 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 μ Pa. Defined as:

Parameter	Description
	$L_p = 20 \log \left(\frac{p}{p_0} \right)$
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.

Appendix B Instrumentation

B.1.1 The instrumentation used in the survey is listed in **Table B.1**.

Table B.1: Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date*
Sound Level Meter	Rion	NL-52	542901	31/07/2014
½" Pre-Polarised Microphone		UC-59	06478	
Pre-Amplifier		NH-25	42929	
Sound Level Meter	Rion	NL-52	542902	31/07/2014
½" Pre-Polarised Microphone		UC-59	07374	
Pre-Amplifier		NH-25	43580	
Calibrator	Rion	NC-74	34746693	07/01/2016

* Calibration dates correct at time of environmental sound survey.

Appendix C Sound Time History Graphs

Figure C.1: Environmental Sound Survey Results at Position P1

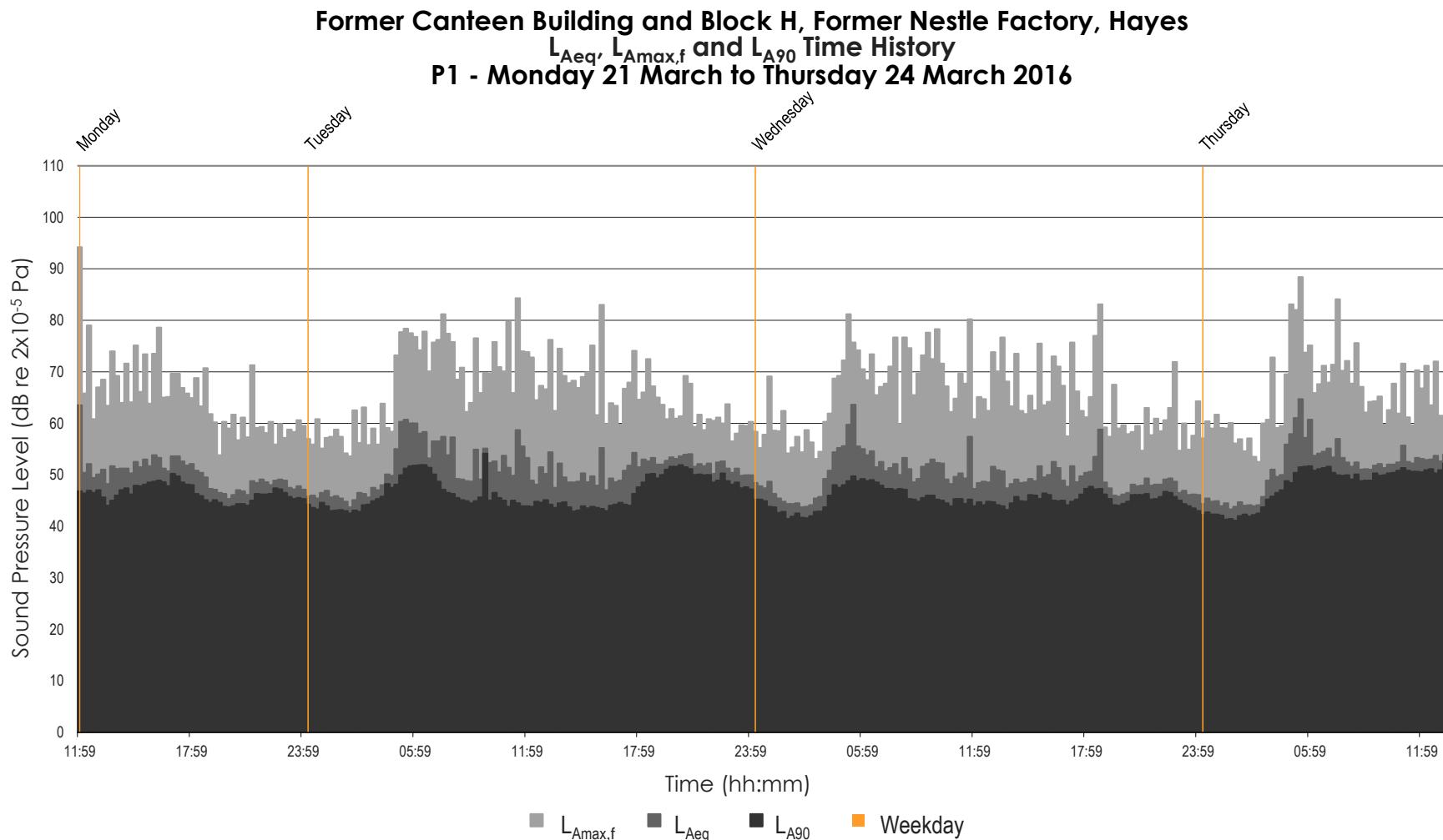


Figure C.2: Environmental Sound Survey Results at Position P2

