

Noise Impact Assessment Report

In Support of a Planning Application to Extend the Operating Hours
of Jet Wash Bays

Three Mile Cross Service Station
Basingstoke Road
Reading
RG7 1BA

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1 INTRODUCTION

ES Acoustics Ltd have been instructed by Fraser's Retail Limited to prepare a noise impact assessment in support of a planning application to vary Condition 3 of an existing planning permission (Ref: 222416) to extend the operating hours for the jet wash bays on site.

The original application proposal description was as follows:

"Full application for the proposed erection of 1no jet wash bay, modification to existing jet wash bays, erection of 1no single storey plant room, and new jet wash covered enclosures following demolition of existing jet wash dividing screens."

Condition 3 of the permission restricts the operating hours of the jet wash bays, as follows:

"3. Hours of operation - The jet washers hereby permitted shall not operate other than between the hours of 7:00am to 19:00pm Mondays to Saturdays and 08:00am to 19:00pm on Sundays and Bank Holidays, and shall not operate at any other time unless otherwise first agreed in writing by the Local Planning Authority. Reason: To protect the occupants of nearby residential properties from noise. Relevant Policy: Core Strategy Policies CP1 & CP3 and MDD Local Plan Policy CC06."

The variation to Condition 3 seeks to extend the operating hours of the jet wash bays until 22:00 daily, and from 07:00 on Sundays and Bank Holidays, resulting in operating hours daily from 07:00 – 22:00.

The structure of this report is as follows:

- A review of the site context and background information relevant to the assessment, including the locations of the jet wash bays and the closest noise-sensitive receptor properties;
- A review of national planning policy, local planning policy and acoustic guidance relevant to the proposal to ensure that a suitable assessment methodology is established;
- Details of the environmental noise surveys undertaken on site to determine background sound levels representative of the closest noise-sensitive receptor locations;
- The noise impact assessment, including:
 - Details of a noise modelling exercise undertaken to establish the expected noise levels at the closest noise-sensitive receptors; and
 - The noise impact assessment in accordance with the requirements of BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.

2 SITE CONTEXT AND BACKGROUND INFORMATION

2.1 Site Description

The site in question is a fully operational service station, including 8 no. pumps, air/water/vacuum bays, 4 no. jet wash bays, a sales building, and several parking areas.

The application site is bounded by Basingstoke Road to the east, which is subject to medium traffic flows at 30 mph. The surrounding area would be considered mixed-use in nature, with commercial/residential properties extending beyond Basingstoke Road to the east, and residential properties to the north, south, and west.

An existing site layout plan is shown in Figure 1 below, which presents the jet wash bays subject of this report in red, and the closest noise-sensitive residential receptors in green:



Figure 1 Block plan (Image Reference: Frowsbury Design Ltd)

2.2 Background Information

It is understood that the operational hours of the service station are 07:00 – 23:00 Monday to Sunday.

The jet wash bays are currently permitted to operate between the hours of 07:00 – 19:00 on Mondays to Saturdays and 08:00 – 19:00 on Sundays and Bank Holidays.

The restricted hours for the jet wash bays were established as part of a previous noise impact assessment report prepared by 'Noise Air' dated 25th November 2022 (ref P5579-R1-V2), which noted:

“Given the potential for noise breakout from the jet wash facilities, it is advised that evening hours of operation are limited to between 19:00 to 20:00, Monday to Sunday and Bank Holidays. As such the subsequent assessment will only assess these hours of operation.”

Further to a review of this report, the environmental noise measurement position was at a location that would not be considered representative of the closest noise-sensitive receptors. This is acknowledged by the author of the report in paragraph 5.6.11:

“The sound level measurement could be considered to be taken at a location that benefited from additional shielding from Basingstoke Road, more than would be experienced at the residential properties that front straight onto said road. As such, background levels at these residential properties may have more contribution from road noise than our representative background level. It is therefore considered that the measured background sound levels are conservative.”

The “conservative background sound levels” measured have likely resulted in an overly onerous assessment, therefore resulting in the likelihood of adverse impact being incorrectly established during the evening hours.

ESA have therefore undertaken new environmental noise surveys on site at locations considered representative of the residential receptors noted in Figure 1 to ensure that the likelihood of adverse impact is accurately established. Full details of the surveys are provided in Section 4.

3 PLANNING POLICY AND GOOD PRACTICE GUIDANCE

This section of the report presents the key guidance and legislation relevant to the assessment.

3.1 National Policy

3.1.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) covers issues relating to noise and planning in England.

The paragraphs relating to noise state:

187. *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*
198. *Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; [...]*
200. *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.*

3.1.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010.

The long-term vision of the Government noise policy is to ‘Promote good health and good quality of life

through the effective management of noise within the context of Government policy on sustainable development.'

The NPSE vision noted above is supported by the following aims:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life*

The NPSE outlines observed effect levels relating to the above, as follows:

- *No observed effect level (NOEL): this is the level of noise exposure below which no effect at all on health or quality of life can be detected;*
- *Lowest observed adverse effect level (LOAEL): this is the level of noise exposure above which adverse effects on health and quality of life can be detected;*
- *Significant observed adverse effect level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;*

Noise effect levels are not set at absolute noise level targets, but instead vary depending on the context and character of the noise and site-specific factors which may impact on the severity of the effect. The NPSE states:

'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. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

3.1.3 National Planning Practice Guidance (NPPG)

The NPPG provides practical guidance on how the NPPF should be applied as well as and guidance on the factors influencing whether noise may be a concern at the planning stage and how adverse effects can be mitigated. The table below summarises the effect levels presented within the NPSE, as follows:

Response	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific Measures required

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

Table 1 Noise exposure hierarchy

3.2 Local Policy

3.2.1 Wokingham Borough Local Development Framework – Adopted Core Strategy Development Plan Document (January 2010)

The Core Strategy presents the following noise policy:

CP1 – Sustainable development

Planning permission will be granted for development proposals that:

8. *Avoid areas where pollution (including noise) may impact upon the amenity of future occupiers;*

3.2.2 Wokingham Borough Development Plan – Adopted Managing Development Plan Delivery Local Plan (February 2014)

Policy CC06: Noise

1. *Proposals must demonstrate how they have addressed noise impacts to protect noise sensitive receptors (both existing and proposed) from noise impacts in line with Appendix 1 of the MDD.*
2. *Noise impact of the development must be assessed. Where there is no adverse impact (No Observed Effect Level) then noise will not be a material consideration.*
3. *Where there is an adverse effect (Lowest Observed Adverse Effect Level to Significant Observed Adverse Effect Level), then*
 - a) *The development layout must be reviewed. Where this results in there no longer being an adverse impact then design and mitigation measures should be incorporated accordingly.*

- b) Where there is still an adverse impact then internal layout must be reviewed. Where this results in there no longer being an adverse impact then design and measures should be incorporated accordingly.*
- c) Where there is still an adverse impact then physical mitigation measures such as barriers/mechanical ventilation must be reviewed. Where this results in there no longer being an adverse impact then design and mitigation measures should be incorporated accordingly.*
- d) Where there is still an adverse impact and the development falls within the significant observed adverse effect level then planning permission will normally be refused.*

Appendix 1: Noise and Vibration

Annex 1: Establishing Effect Levels

- 1. When assessing the acceptability of a proposed noise sensitive development, the Council will determine the effect of noise from any adjacent and nearby sources will have on the noise sensitive receptors (NSRs) taking into account both daytime and night-time noise levels.*
- 2. When assessing the acceptability of a proposed development that emits noise, the Council will determine the effect the noise will have on nearby NSRs taking into account both daytime and night-time noise levels.*
- 3. The Noise Policy Statement for England 2010 (NPSE) adopts two concepts from toxicology that are currently being applied to noise impacts by, for example, the World Health Organisation (WHO); these are “Significant adverse” and “adverse”. These concepts have been applied to noise emission impacts on human receptors, as described below.*

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

- 4. The NPSE states “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. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available”.*
- 5. In order to assist the determination of applications in an appropriate manner and having regard to knowledge of existing noise levels within the Wokingham Borough Council area, the Council believes it is appropriate to provide some objective levels. The government has implemented the EU Directive 2002/49/EC (known as the Environmental Noise Directive) through the Environmental Noise (England) Regulations 2006. These regulations have resulted in the creation of noise maps of major*

urban areas (part of the Reading map covers areas within Wokingham Borough) and major transport sources (M4, A329(M) and A329). These maps identify existing receptors but provide a useful tool for identifying environmental noise levels within the Wokingham Borough area. The levels set out below are not absolute and applicants with open sites at outline application stages will need to demonstrate how the design criteria will reduce levels to below SOAEL, should noise levels defined as such occur on the site.

External Amenity Space for Dwellings

Annex 1, Table 1: Impact Levels - Amenity Spaces for Dwellings $L_{Aeq,T}$ dB

Noise Source	NOEL	LOAEL	SOAEL
Environmental Noise	$L_{Aeq,T}$	$L_{Aeq,T}$	$L_{Aeq,T}$
07.00 – 23.00	<55	56-69	>70
23.00 – 07.00	<45	46-64	>65

Note: Values in the table above are noise levels measured on an open site at the position of the proposed amenity space.

6. The above levels are only applicable where consideration is being given to introducing residential development into an area with an existing noise source, rather than the reverse situation where new noise sources are to be introduced into an existing residential area.
7. Higher noise levels (within LOAEL) at other locations such as balconies, roof gardens and terraces may be acceptable where their provision (with the higher noise levels) will outweigh the benefits of this external space not being available. This benefit will need to be demonstrated to the Local Planning Authority prior to any agreement.

Internal Noise Levels for Dwellings (including quasi residential uses and residential institutions)

8. For noise sensitive developments, which will mostly consist of dwellings, it is appropriate that internal noise levels are minimised to avoid the risk of adverse effects.
9. Internal ambient noise levels due to steady external noise sources for dwellings shall not exceed 35 dB L_{Aeq} (16 hour) 07:00-23:00 during the daytime and 30 dB L_{Aeq} (8 hour) 23:00-07:00 during the night-time in habitable rooms. If it is necessary to achieve these levels through design and/or insulation measures, they should be identified in the overall scheme and implemented and retained thereafter. If it is not possible to agree the scheme to the satisfaction of the Local Planning Authority, it may be necessary to refuse the application even if the internal levels can be met.

New Noise Sources near Noise Sensitive Receptors (NSRs)

11. Where a new industrial or commercial development is proposed near a residential area, the effect of the new noise source on the surrounding area shall be assessed in accordance with currently available and appropriate standards. External noise levels at the nearest NSRs should meet the NOEL levels as set out above. Where possible, noise should be mitigated at source and through appropriate site layout.

12. *In many cases where a new source of noise is to be introduced by a project that requires environmental impact assessment (EIA), the effect of noise will be considered in this context; but it must be accepted that in these circumstances the options to control noise are likely to be more limited than where residential development is proposed in an area with an existing noise source. It must also be borne in mind that when dealing with new roads, railways and aerodromes, schemes may exist to provide insulation in specified circumstances.*
13. *The planning system can be used to impose conditions to protect new noise sensitive receptors from an existing noise source but, in general, developers are under no statutory obligation to offer noise protection measures to existing receptors which will be affected by a proposed new noise source. Moreover, there would be no obligation on affected receptors to take up such an offer, and therefore no guarantee that all necessary noise protection measures would be put in place.*

Noise Measurements and Standards

14. *Traditionally, different indices have been used to describe noise from different sources, and limits have been set over different time periods. We would expect for proposed residential developments that BS 7445 be followed by expressing all noises in terms of $L_{Aeq,T}$ for the recommended time periods and BS 4142 for proposed commercial and industrial noise sources.*
15. *It is accepted that the appropriate standards as outlined in Policy CC06: Noise and this Appendix are being reviewed and will change over time. Where updates have been ratified and documents superseded we expect any application to follow the most recent version. Where the above assessment methods are not followed or appropriate, the applicant will be to have adequate justification for the deviation.*

Annex 2: Information on Noise from Different Sources

Noise from industrial and commercial developments

12. *The likelihood of complaints about noise from proposed development can be assessed using guidance in BS 4142. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard currently states that: "A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance." Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. This can be appropriate if the existing ambient background levels are already above the NOEL outlined above.*
13. *Commercial developments such as fast food restaurants, discos, night clubs and public houses pose particular difficulties, not least because associated activities are often at their peak in the evening*

and late at night. The Council will bear in mind not only the noise that is generated within the premises but also the attendant problems of noise that may be made by customers in the vicinity. The disturbance that can be caused by traffic and associated car parking should not be underestimated.

14. If the predicted impact of the development is 5 dB above background it would be considered to be the LOEL and 10 dB above would be SOAEL and could be refused.

3.3 Best Practice and Guidance

3.3.1 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

BS 4142:2014+A1:2019 provides a methodology for rating and assessing the impacts of industrial and commercial sound at noise sensitive receptors. The scope of the standard covers the following:

- *sound from industrial and manufacturing processes;*
- *sound from fixed installations which comprise mechanical and electrical plant and equipment;*
- *sound from the loading and unloading of goods and materials at industrial and/or commercial premises;*
- *sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site*

Whilst the noise emissions associated with the temporary generators and powered hand tools would fall within the scope of BS 4142:2014+A1:2019, noise associated with the games and human speech would not. However, in the absence of more suitable guidance, all activities would be assessed in accordance with BS 4142:2014+A1:2019 to ensure that a robust assessment scenario is considered.

The methodology involves comparing the Rating Noise Level due to the sound source/s under assessment with the existing background noise level (L_{A90}) when the noise source is not operating to estimate the initial impact, as follows:

Typically, the greater this difference, the greater the magnitude of the impact

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

Note that the assessment reference periods that should be considered are:

- *One hour period for a sound source operating during daytime hours (07:00-23:00 hours)*

- *Fifteen minute period for a sound source operating during the night-time (23:00-07:00 hours)*

The standard notes that a noise source under assessment will have a 'low impact' when the 'rating level' of a noise source is less than the existing background noise. It is also important to note that any quantitative assessment results are assessed in light of the context in which the sound occurs.

The definitions noted above are described below:

- **Specific sound** – sound source being assessed ($L_s = L_{Aeq, T}$)
- **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 ($L_r = L_{Aeq, T}$)
- **Ambient sound** – totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far ($L_a = L_{Aeq, T}$)
- **Background level** – sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval ($L_{A90, T}$)
- **Rating level** – specific sound level plus any adjustment for the characteristic features of the sound

With regards to background noise levels, BS 4142:2014+A1:2019 notes:

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

With regards to the 'rating level', the adjustments for the characteristic features of the sound are outlined below:

- *Tonality – +2 dB for a tone which is 'just perceptible' at the noise receptor, +4 dB where it is 'clearly perceptible', and +6 dB where it is 'highly perceptible'*
- *Impulsivity – +3 dB for a tone which is 'just perceptible' at the noise receptor, +6 dB where it is 'clearly perceptible', and +9 dB where it is 'highly perceptible'*
- *Intermittency – +3 dB if the intermittency is readily distinctive against the residual acoustic environment*
- *Other sound characteristics – where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.*

It must be noted that as the rating level is determined at the closest noise sensitive receptor, the acoustic feature corrections should be applied based on the level at receptor location, not at source. This is

particularly relevant when noise propagation characteristics cause differences in sound reduction at various frequency bands.

The assessment reference periods that should be considered for daytime and night-time, as defined within the standard, are:

- *One hour period for a sound source operating during daytime hours (07:00-23:00 hours)*
- *Fifteen-minute period for a sound source operating during the night-time (23:00-07:00 hours)*

ES Acoustics Notes regarding Context:

The notes presented below are informed by the BS 4142:2014+A1:2019 Technical Note prepared by the Association of Noise Consultant Good Practice Working Group.

Assessment context is often misunderstood or applied incorrectly, and the notes are therefore presented to provide a clear picture on what aspects of context should be considered when assessing the overall impact of a particular scenario:

Subclause 11(1)

Absolute levels may be as, or more, important than relative outcomes where background and rating levels are low. It is important to note that both background and rating levels would need to be low for this particular caveat to apply.

BS 4142 does not indicate how the initial estimate of impact should be adjusted when background and rating levels are low, only that the absolute levels may be more important than the difference between the two values. It is likely that where the background and rating levels are low, the absolute levels might suggest a more acceptable outcome than would otherwise be suggested by the difference between the values. For example, a situation might be considered acceptable where a rating level of 30dB is 10dB above a background sound level of 20dB, i.e. an initial estimate of a significant adverse impact is modified by the low rating and background sound levels. However, there may be situations where the opposite is true, and it is for the assessor to justify any modifications to the initial estimate of impact.

BS 4142 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90} , and low rating levels as being less than about 35 dB $L_{Ar,Tr}$. We would consider that similar values would not be unreasonable in the context of the current edition of BS 4142.

The third paragraph states that "where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts".

In the ordinary application of BS 4142 the residual sound level is not compared with the background sound level to determine the level of impact. The third paragraph is therefore taken to mean that the level of impact caused by the residual level has been determined by professional judgement or with reference to another document, such as the Noise Insulation Regulations 1975 (as amended 1988). Where professional judgement is used, it should be appropriately justified.

Where the residual sound levels are very high, a significant adverse impact might be declared in a situation where the rating level exceeds the background sound level by, say, 4dB, i.e. since the residual sound levels are already considered to cause a significant impact, any worsening of the situation would be considered a significant adverse impact, even if the difference between the rating level and background sound level would not suggest this to be the case.

Subclause 11(2)

The second aspect of context described in BS 4142 relates to the character and level of the specific sound. In essence, whether or not the character of the sound is distinguishable from the character of the ambient or residual acoustic environment or is incongruous.

BS 4142 does not provide instruction as to how to treat the assessment outcomes in these circumstances, nor does it explain how to distinguish between this contextual consideration and the process for applying rating penalties. The latter is itself informed by the distinctive characteristics of the specific sound in the context of the residual sound environment.

Where character-based contextual matters are taken into account, the assessor should make it clear how these matters are distinct from those that informed the rating level corrections, and what the implications of these further character assessments should be. For example; new deliveries on an estate entailing rating penalties for reversing alarms and impulsive noise but these types of noise are already present at other existing premises, so contextually the impact is reduced. Conversely, where the residual level is largely comprised of natural sounds, such as the sea or birdsong, so the impact from the specific source might be increased.

Subclause 11(3)

The third contextual matter described in Clause 11 relates to the receptor itself. It is important to note that the reference at the start of this section of BS 4142 to 'the sensitivity of the receptor' refers to a generic receptor type, i.e. a dwelling, and not to the particular attitudes or responses of a particular person (although if the residential receptor type is specific it may have a bearing e.g. student accommodation).

The ANC working group notes that this part of BS 4142 allows the internal noise environment to be considered, despite BS 4142 excluding such matters from its Scope (Subclauses 1.1, 1.2 and 1.3). The working group considers that the consideration of the internal noise environment is only valid in a BS 4142 assessment where it relates to the contextual elements of the assessment.

4 ENVIRONMENTAL NOISE SURVEY

4.1 Measurement Location and Procedure

An appraisal of the site determined road traffic noise from Basingstoke Road and the existing service station to be the dominant noise source at the time of the site visits.

Noise surveys were undertaken on the site, as shown in Figure 2, which would be considered representative of the closest noise-sensitive receptors around the site (highlighted in green). The arrow identifies which noise survey position would be considered representative for each of the 5 no. noise-sensitive receptor buildings.

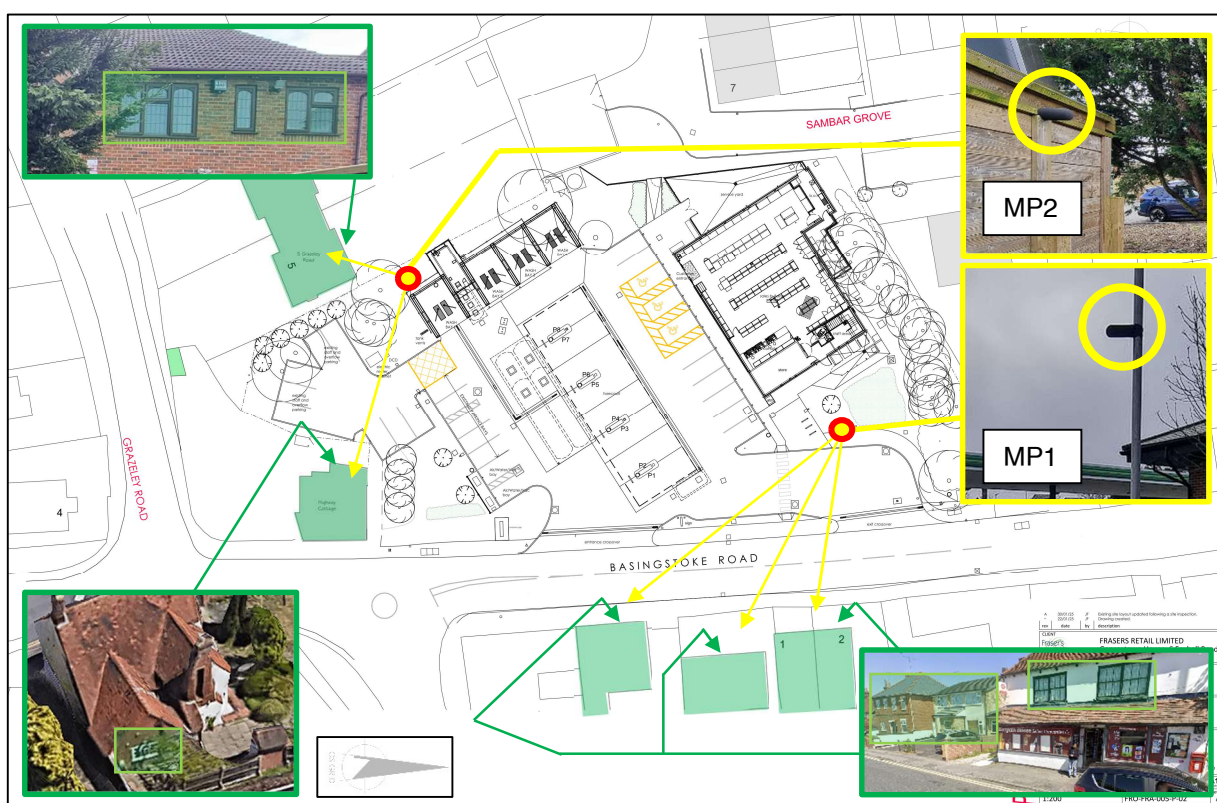


Figure 2 Noise survey measurement locations (Image Reference: Frowsbury Design Ltd)

The environmental noise measurement procedure complied with BS 7445 'Description and measurement of environmental noise', with automated monitoring undertaken between 11:15 on Friday 28th February 2025 and 10:15 on Monday 3rd March 2025 using a 5-minute integration period.

The key acoustic descriptors measured for this assessment are as follows:

- $L_{Aeq,T}$ (the continuous equivalent A-weighted noise level over a given time period, T); and
- $L_{A90,T}$ (the noise level exceeded for 90% of the measurement period T , referred to as the 'background' noise level).

The measurement period selected would ensure that representative background sound levels can be established during the proposed extended operating hours from 19:00 – 22:00 on weekdays and Saturday and Sunday.

4.2 Measurement Equipment

The table below presents the equipment used for the baseline noise survey. The equipment calibration was verified before and after use and no abnormalities were observed.

Equipment	Make and Model	Serial Number
Sound Level Meter	Convergence Instruments NSRT MK4	CFP2plUyWX03iDngwwJ5vD
Sound Level Meter	Convergence Instruments NSRT MK4	CNN8pfW4U9U3CJti44pZFD
Calibrator	Svante SV36 Class 1 Sound Calibrator	122255

Table 2 Noise survey equipment

The equipment was calibrated to comply with Section 4.2 of BS7445-1:2003 before and after the noise monitoring periods. No drift was observed.

4.3 Weather Conditions

Temperature and precipitation data have been sourced from a local weather station¹. Measurements of wind speed were undertaken with a handheld anemometer on site during the installation and collection visits, with wind speeds reported below 5 m/s on both occasions.

A summary of the weather data is reported in the table below:

Date	Temperature min to max ° C	Precipitation mm
26/04/2024	-2 – 8.4	0
27/04/2024	-2.7 – 9.3	0.018
28/04/2024	-3.3 – 10.0	0
29/04/2024	-3.6 – 11.2	0

Table 3 Weather data

Weather conditions during the automated monitoring were considered suitable for the measurement of environmental noise.

4.4 Survey Results

Environmental noise time history graphs of the noise survey data are presented in Appendix B, with a summary of the measurement results presented in Table 4.

Monitoring Position	Period	Residual Sound Level $L_{Aeq, T}$ (dB)	Background Sound Level L_{A90} (dB)
MP1	Daytime 07:00-23:00	67 – 68	55 – 60
	Night-time 23:00-07:00	59 – 61	42 – 44
MP2	Daytime 07:00-23:00	55 – 57	47 – 54
	Night-time 23:00-07:00	48 – 49	41 – 42

Table 4 Measured noise level summary

¹ Weather Station: EW0805 Binfield UK, ID: E0805, located 13 km from the site at Latitude 51.417 Longitude -0.782

A further daily breakdown analysis of the noise levels is presented in Table 5 for MP1 and Table 6 for MP2.

Monitoring Position 1 (MP1)			
Date	Period	Ambient Sound Level $L_{Aeq, T}$ (dB)	Background Sound Level L_{A90} (dB)
28/02/2025	Daytime 11:15-23:00	67	60
28/02-01/03/2025	Night-time 23:00-07:00	60	44
01/03/2025	Daytime 07:00-23:00	68	58
01-02/03/2025	Night-time 23:00-07:00	59	43
02/03/2025	Daytime 07:00-23:00	67	58
02-03/03/2025	Night-time 23:00-07:00	61	42
03/03/2025	Daytime 07:00-10:15	67	55

Table 5 Measured noise levels for each daytime and night-time period at Monitoring Position 1

Monitoring Position 2 (MP2)			
Date	Period	Ambient Sound Level $L_{Aeq, T}$ (dB)	Background Sound Level L_{A90} (dB)
28/02/2025	Daytime 11:15-23:00	55	47
28/02-01/03/2025	Night-time 23:00-07:00	48	42
01/03/2025	Daytime 07:00-23:00	57	52
01-02/03/2025	Night-time 23:00-07:00	48	41
02/03/2025	Daytime 07:00-23:00	56	52
02-03/03/2025	Night-time 23:00-07:00	49	41
03/03/2025	Daytime 07:00-10:15	56	54

Table 6 Measured noise levels for each daytime and night-time period at Monitoring Position 2

A summary of the noise levels during the proposed extended operating hours are presented in Table 7 for MP1 and

Monitoring Position 1 (MP1)				
Date	Day	Time Period	Residual Sound Level $L_{Aeq, T}$ (dB)	Background Sound Level L_{A90} (dB)
28/02/2025	Friday / Weekday	19:00 – 20:00	67	58
		20:00 – 21:00	66	54
		21:00 – 22:00	65	53
01/03/2025	Saturday	19:00 – 20:00	67	56
		20:00 – 21:00	65	55
		21:00 – 22:00	64	51
02/03/2025	Sunday	07:00 – 08:00	63	48
		19:00 – 20:00	65	54
		20:00 – 21:00	64	55
		21:00 – 22:00	63	54

Table 7 Measured noise levels during proposed extended operating hours at Monitoring Position 1

Monitoring Position 2 (MP2)				
Date	Day	Time Period	Residual Sound Level L _{Aeq, T} (dB)	Background Sound Level L _{A90} (dB)
28/02/2025	Friday / Weekday	19:00 – 20:00	54	50
		20:00 – 21:00	53	48
		21:00 – 22:00	52	48
01/03/2025	Saturday	19:00 – 20:00	54	50
		20:00 – 21:00	52	49
		21:00 – 22:00	50	48
02/03/2025	Sunday	07:00 – 08:00	52	46
		19:00 – 20:00	52	48
		20:00 – 21:00	53	49
		21:00 – 22:00	52	50

Table 8 Measured noise levels during proposed extended operating hours at Monitoring Position 2

With regards to the background sound level, BS 4142:2014+A1:2019 notes that “...it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

In terms of quantifying what background sound levels are typical during particular time periods, ESA have derived representative background sound levels as the modal values during the time periods in question.

In terms of particular circumstances and periods of interest, the lowest representative background sound level measured within each 1-hour time period is as follows:

Time	Lowest Background Sound Level at MP1 L _{A90} (dB)	Lowest Background Sound Level at MP2 L _{A90} (dB)
07:00 – 08:00 (Sunday only)	48	46
19:00 – 20:00	54	47
20:00 – 21:00	54	48
21:00 – 22:00	51	48

Table 9 Measured noise levels during proposed extended operating hours at Monitoring Position 2

To ensure a worst-case scenario and assessment, we would consider the background sound levels of 50 dB(A) for nearby receptors to the east overlooking Basingstoke Road, and 48 dB(A) for the rear façades of the properties to the south (Highway Cottage) and west (5 Grazeley Road).

5 NOISE IMPACT ASSESSMENT

The following sections present noise emissions from all proposed operations and assessment scenarios in accordance with BS 4142:2014+A1:2019.

5.1 Noise Modelling Exercise

Noise modelling of the assessment scenario would be undertaken using SoundPlan 8.2 to present a clear representation of the expected noise levels at the closest noise-sensitive receptor properties. The model uses the calculation methodology presented in ISO 9613-2:1996 "*Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation*" to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings or structures.

All surrounding buildings, structures, and boundary fencing have been included within the noise model.

The mitigation measures that were installed as part of the previous application are also considered i.e. the sides and roof of the jet wash bays.

5.1.1 Noise Sources

The noise model includes the following noise sources:

- Jet wash facilities –Point sources set to a height of 1 m above local ground level. Each point source has been set to a sound power level of 88.7 dB(A) L_{WA} . Noise data has been sourced from the SoundPLAN internal noise data library.
- Plant room - Area source set to a sound power level of 70dB(A) L_{WA} on the front of the plant room building façade as detailed within Noise Air report P5579-R1-V2.

In order to assess a worst-case scenario, all jet wash bays would be assessed simultaneously. No correction would be applied for 'on-time', as it would be assumed that all bays are fully operational for a full 1-hour period. While this would be unlikely to occur in practice, the assessment would consider this worst-case scenario in the interest of providing a robust and onerous assessment.

5.1.2 Noise Mapping Results

The noise model results are presented as a grid map at a height of 1.5m above ground and receptor façade heights of 1.5m and 4m to reflect two-storey dwellings.

Note that for Highway Cottage to the south of the site, receptor windows are only present on the rear façade at ground floor level. Therefore, additional screening is provided by the boundary fence of the property. Façade noise levels for all other façades are presented as the highest level.

The noise levels presented on the noise map should be considered as the Specific Sound Level, i.e. no acoustic feature corrections have been applied at this stage.

The resultant noise map is presented in Figure 3. Full-sized maps are presented in Appendix C.

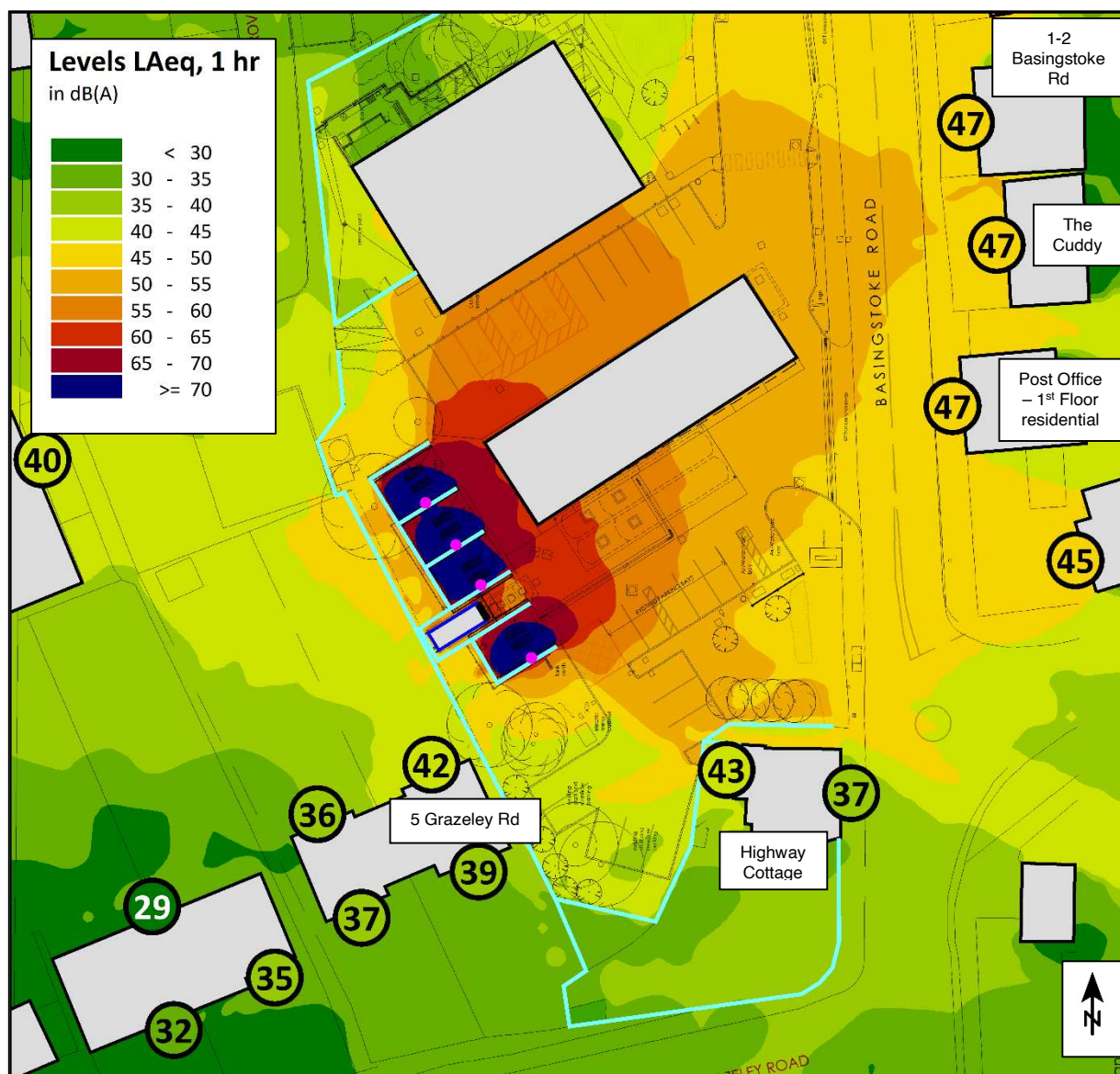


Figure 3 Noise model summary

5.2 Specific Sound Levels

Table 10 compares the highest Specific Sound Level calculated at each receptor against the representative background noise levels established for the proposed extended operating hours:

Receptor	Background Sound Level dB L _{A90}	Specific Sound Level at Receptor Façade dB L _{Aeq, T}
5 Grazeley Road	48 dB(A)	42 dB(A)
Highway Cottage	48 dB(A)	43 dB(A)
Post Office – 1 st floor residential	50 dB(A)	47 dB(A)
The Cuddy	50 dB(A)	47 dB(A)
1-2 Basingstoke Road	50 dB(A)	47 dB(A)

Table 10 Comparison of the Specific Sound Level vs Background Sound Level

5.3 Rating Levels

To establish the Rating Level as required by BS 4142:2014+A1:2019, appropriate acoustic feature corrections should be applied to the Specific Sound Level. It must be noted that the acoustic feature corrections are applied based on the level at the receptor location, not at the source, as they are reflective of the sound perceived by the receptor.

Basic acoustic theory states that when one sound source is 10 dB louder than another, the louder source will mask the quieter sound. Therefore, the Specific Sound Levels calculated at the receptor locations would be considered relative to the background level when applying acoustic feature corrections, i.e. if the Specific Sound Level is sufficiently below the background level, then it would be highly unlikely that acoustic features would be perceptible.

Tonality refers to the degree to which a sound contains distinct, identifiable pitches or tones, often described as a “hum”, “whistle” or “screech”. Noise associated with the jet wash activity would be considered broadband in nature, and therefore, no correction for tonality would be considered suitable.

With regards to intermittency, the use of each jet wash would switch on and off depending on user operation. When considering the 4 no. jet wash bays as a whole, there would be periods where some are in use and others aren't. Therefore, the source under assessment would be considered intermittent, and a correction of 3 dB would be applied.

Operational noise emissions from the jet washing activity would not be considered impulsive, and therefore, no correction is applied.

Table 11 compares the highest Rating Levels calculated for each scenario against the background noise levels on a typical weekday and Saturday:

Receptor	Background Sound Level dB L _{A90}	Specific Sound Level at Receptor Façade dB L _{Aeq, T}	Acoustic Feature Corrections	Rating Level at Receptor Façade dB L _{Aeq, T}	+/- compared against background dB
5 Grazeley Road	48 dB(A)	42 dB(A)	+3 intermittency	45 dB(A)	-3
Highway Cottage	48 dB(A)	43 dB(A)	+3 intermittency	46 dB(A)	-2
Post Office – 1 st floor residential	50 dB(A)	47 dB(A)	+3 intermittency	50 dB(A)	0
The Cuddy	50 dB(A)	47 dB(A)	+3 intermittency	50 dB(A)	0
1-2 Basingstoke Road	50 dB(A)	47 dB(A)	+3 intermittency	50 dB(A)	0

Table 11 Comparison of the Rating Level vs Background Sound Level

BS 4142:2014+A1:2019 notes that a noise source under assessment will have a low impact when the Rating Level of a noise source is less than the existing background sound. It is also important to note that any quantitative assessment results are assessed considering the context in which the sound occurs.

5.4 Contextual Factors

As noted within the BS 4142:2014+A1:2019 guidance, a crucial and important step in assessing the noise impact is the consideration of the context in which the sound under assessment occurs. As outlined in Section 3.3.1, the three types of context which should be considered are:

- *aspects of the absolute level;*
- *aspects of character; and*
- *aspects of the receptor, including physical measures designed to reduce noise.*

5.4.1 Aspects of the Absolute Level

With respect to the absolute level, the worst-case Rating Level of 50 dB(A) would fall within the NOEL (no observed effect level) defined in Appendix 1 of the “Wokingham Borough Development Plan – Adopted Managing Development Plan Delivery Local Plan (February 2014)” (see Section 3.2.2).

With regards to the receptor properties overlooking Basingstoke Road, residual sound levels associated with road traffic noise are in the range of 67-68 dB(A) during daytime hours, meaning that the worst-case Rating Level (50 dB(A)) is significantly below the general prevailing environmental noise level of the area.

With regards to the other receptor properties (5 Grazeley Road and Highway Cottage), residual sound levels range from 55-57 dB(A) during daytime hours, meaning that the levels calculated at these receptors are around 10 dB below the prevailing environmental noise level.

5.4.2 Aspects of Character

With regards to aspects of character at the receptor property, the dominant source of the prevailing background noise at the receptor façades is road traffic noise from Basingstoke Road. This is the case for all receptors, albeit that the rear façades of 5 Grazeley Road and Highway Cottage would be exposed to lower levels of traffic as they do not face onto Basingstoke Road.

It is understood that the jet wash bays have been operating since they were permitted without any noise complaints. This demonstrates that the mitigation measures implemented when the jet wash bays were established have been effective at controlling noise and mitigating any potential adverse effects.

Given that the assessment only concerns an extension of operating hours, and not a brand-new noise source, it should also be acknowledged that the receptors would have grown accustomed to observing the jet wash in use and occasionally hearing some noise associated with it. Based on the fact that the noise emissions calculated are no higher than the background sound level, and considering the existing jet wash use, it is therefore unlikely that extending operating hours would harm the surrounding receptors.

Finally, it should be noted that the assessment considers all jet wash bays being used for a full 1-hour period, which would be highly unlikely to occur in the extended operating hours period. Peak usage would be expected earlier in the day rather than late in the evening.

5.4.3 Aspects of the Receptor

With regards to aspects of the receptor properties themselves, it is understood that as the receptor properties are of a certain age, the only means to reduce internal heat gains during hot summer months would be via openable windows. The calculations above consider the noise emissions at 1m from the external face of the window to account for the fact that the occupant may need to open their window for enhanced rates of ventilation. Appendix 1 of the “Wokingham Borough Development Plan – Adopted Managing Development Plan Delivery Local Plan (February 2014)” (see Section 3.2.2) notes that internal noise levels within residential properties should ideally not exceed 35 dB $L_{Aeq}(16 \text{ hour})$ during the daytime (07:00-23:00). This is taken from BS 8233:2014, which provides recommended internal noise levels for residential dwellings. BS 8233:2014 also notes that a partially open window would provide up to 15 dB attenuation from outside to inside, meaning that the resultant worst-case internal noise level due to the assessment scenarios would be in the range of 30-35 dB(A) while the window is partially open. In all cases, this would be either equal to or below the recommended internal noise level of 35 dB(A) stipulated in the standard and Wokingham’s guidance. In cases where the receptor window is closed, higher levels of attenuation would be provided by the window itself. As a worst-case, a single-glazed window would provide in the region of 25 dB attenuation, meaning that the expected internal noise level would be no higher than 25 dB(A), which would be considered non-significant.

5.5 Assessment of Impacts

Considering the calculated Rating Levels compared to the background sound level, and the context in which the sound occurs, we would consider noise emissions from the use of the jet wash bays during the proposed extended hours to have a low likelihood of adverse impact in accordance with BS 4142:2014+A1:2019.

Appendix 1, Annex 2 of the “Wokingham Borough Development Plan – Adopted Managing Development Plan Delivery Local Plan (February 2014)” (see Section 3.2.2) notes that *“if the predicted impact of the development is 5 dB above background it would be considered to be the LOEL and 10 dB above would be SOAEL”*. Given that the Rating Level is equal to the background sound level, this is likely to fall within the NOEL (no observed effect level) given the chosen designation of effect levels to Rating Levels vs background sound levels

6 CONCLUSION AND SUMMARY

ES Acoustics Ltd have been instructed by Fraser's Retail Limited to prepare a noise impact assessment in support of a planning application to vary Condition 3 of an existing planning permission (Ref: 222416) to extend the operating hours for the jet wash bays on site.

The original application proposal description was as follows:

"Full application for the proposed erection of 1no jet wash bay, modification to existing jet wash bays, erection of 1no single storey plant room, and new jet wash covered enclosures following demolition of existing jet wash dividing screens."

Condition 3 of the permission restricts the operating hours of the jet wash bays, as follows:

"3. Hours of operation - The jet washers hereby permitted shall not operate other than between the hours of 7:00am to 19:00pm Mondays to Saturdays and 08:00am to 19:00pm on Sundays and Bank Holidays, and shall not operate at any other time unless otherwise first agreed in writing by the Local Planning Authority. Reason: To protect the occupants of nearby residential properties from noise. Relevant Policy: Core Strategy Policies CP1 & CP3 and MDD Local Plan Policy CC06."

The variation to Condition 3 seeks to extend the operating hours of the jet wash bays until 22:00 Monday to Sunday.

An environmental noise survey has been conducted on site to establish background sound levels representative of the closest noise-sensitive receptors relative to the application site.

Calculations of expected noise levels at the closest noise-sensitive receptors have been undertaken in accordance with BS 4142:2014+A1:2019 for comparison with representative background sound levels.

In all cases, the calculated Rating Level would not exceed the background sound level at the receptor façades. Predictions of the Rating Level ranged from equal to background to -3 dB below background.

When considering the calculated Rating Levels vs the background sound level, and the context in which the sound occurs, It has been concluded that noise emissions from the jet wash bays during the proposed extended operating hours would have a low likelihood of adverse impact in accordance with BS 4142:2014+A1:2019.

Appendix 1, Annex 2 of the "Wokingham Borough Development Plan – Adopted Managing Development Plan Delivery Local Plan (February 2014)" (see Section 3.2.2) notes that *"if the predicted impact of the development is 5 dB above background it would be considered to be the LOEL and 10 dB above would be SOAEL"*. Given that the Rating Level is equal to the background sound level, this is likely to fall within the NOEL (no observed effect level) given the chosen designation of effect levels to Rating Levels vs background sound levels

It is concluded that the proposed use of the jet wash bays between the hours of 19:00-22:00 would be acceptable and would not cause a negative impact on the surrounding residential properties.

GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel scale - dB

The decibel (dB) is a relative unit of measurement used in acoustics. The dB is a logarithmic ratio between a measured level and a reference level of 0 dB (i.e the threshold of human hearing). Simply put, the decibel compresses the wide range of sounds we hear into more manageable numbers.

Addition of noise from several sources

Sound produced by multiple sound sources are added logarithmically e.g. power ratio of 2 = 3dB, power ratio of 10 = 10dB. Therefore, two equally intense sound sources operating simultaneously produce a sound level which is 3dB higher than a single source e.g. 60dB + 60dB = 63dB.

Subjective impression of noise

Human response to sound is highly individualized and often based on psychological factors such as emotion and expectation. Sensitivity to sound typically depends on the loudness, pitch, duration of the occurrence, and time of occurrence (e.g. a sound source could cause annoyance during the night where it would not during the day). The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level	Change in perceived loudness
1 dB	Imperceptible
3 dB	Just barely perceptible
6 dB	Clearly noticeable
10 dB	About twice as loud

'A' Weighted Frequency Filter - dB(A)

The human ear is not equally sensitive in all frequencies. The A-weighting filter was devised to take this into account when undertaking noise measurements and allows a sound level meter to replicate the human ears response to sound.

$L_{Aeq, T}$

Sound can fluctuate widely over a given period. L_{Aeq} is the A-weighted equivalent continuous sound level, with T denoting the time period over which the fluctuating sound levels were averaged e.g. $L_{Aeq, 16h}$ is the equivalent continuous noise level over an 16 hour period.

L_{A90}

A-weighted sound level exceeded for 90% of the measurement period, calculated via statistical analysis. The L_{A90} descriptor is typically used to establish background sound levels for noise impact assessments

L_{A10}

A-weighted sound level exceeded for 10% of the measurement period, calculated via statistical analysis.

L_{AFmax}

A-weighted sound level maximum sound pressure level that has been measured over a given time period

GLOSSARY OF ACOUSTIC TERMINOLOGY

Octave Bands

The audio or frequency spectrum of the human ear is in the range of 20Hz to 20 kHz. The spectrum tells how the energy of the sound signal is distributed in frequency. Octave bands divides the audio spectrum into 10 equal parts. The International Standards Organisation defines the centre frequency of these bands as 31.5Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1kHz, 2kHz, 4kHz, 8kHz and 16kHz.

Noise Rating (NR) Curves

A method of rating noise using a set of curves relating octave band sound pressure levels. Typically used for building services systems within offices

Airborne sound

Sound radiated from a source into the surrounding air e.g. musical instruments, tv/radio, machinery/equipment. Airborne sound insulation refers to the reduction or attenuation of airborne sound, usually via a solid partition between a source and receiver.

Impact sound

Sound resulting from the impact between colliding objects, e.g. footfall impact upon a floor. Impact sound insulation refers to the resistance of a floor to the transmission of impact sound, typically via the installation of a 'resilient layer'

Flanking sound

The transmission of airborne sound between two adjacent rooms by paths other than via the separating partition between the rooms, e.g. the abutment point of a wall and floor.

Structure-borne noise

Noise caused by the vibration of elements of a structure. This can result in reradiated noise, whereby the vibrating element transmits airborne sound into a space e.g. vibration caused by mechanical plant installed within a plant room which is not adequately isolated from the structure, or construction/demolition work in an adjacent building.

Reverberant sound

Sound in an enclosed space (usually a room), which results from repeated reflections at the boundaries. Reverberation time is the time taken for a steady sound level in an enclosed space to decay by 60dB, measured from the moment the sound source is switched off. A example of a typically reverberant space would be a classic church. Absorptive materials can be used to reduce reflections and reverberation times.

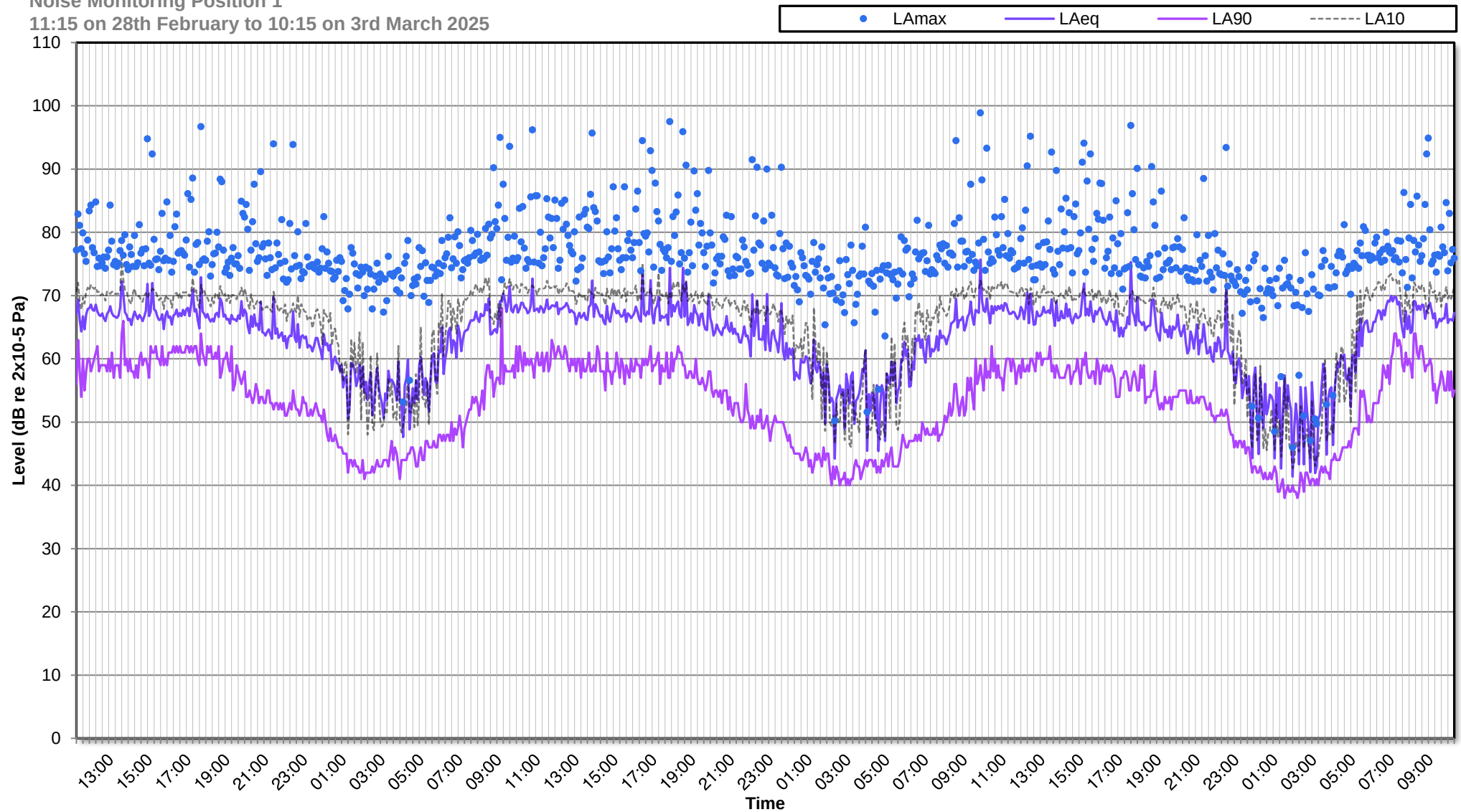
APPENDIX B

ENVIRONMENTAL NOISE TIME HISTORY GRAPH

22012.NIA-RPT.01

Noise Monitoring Position 1

11:15 on 28th February to 10:15 on 3rd March 2025



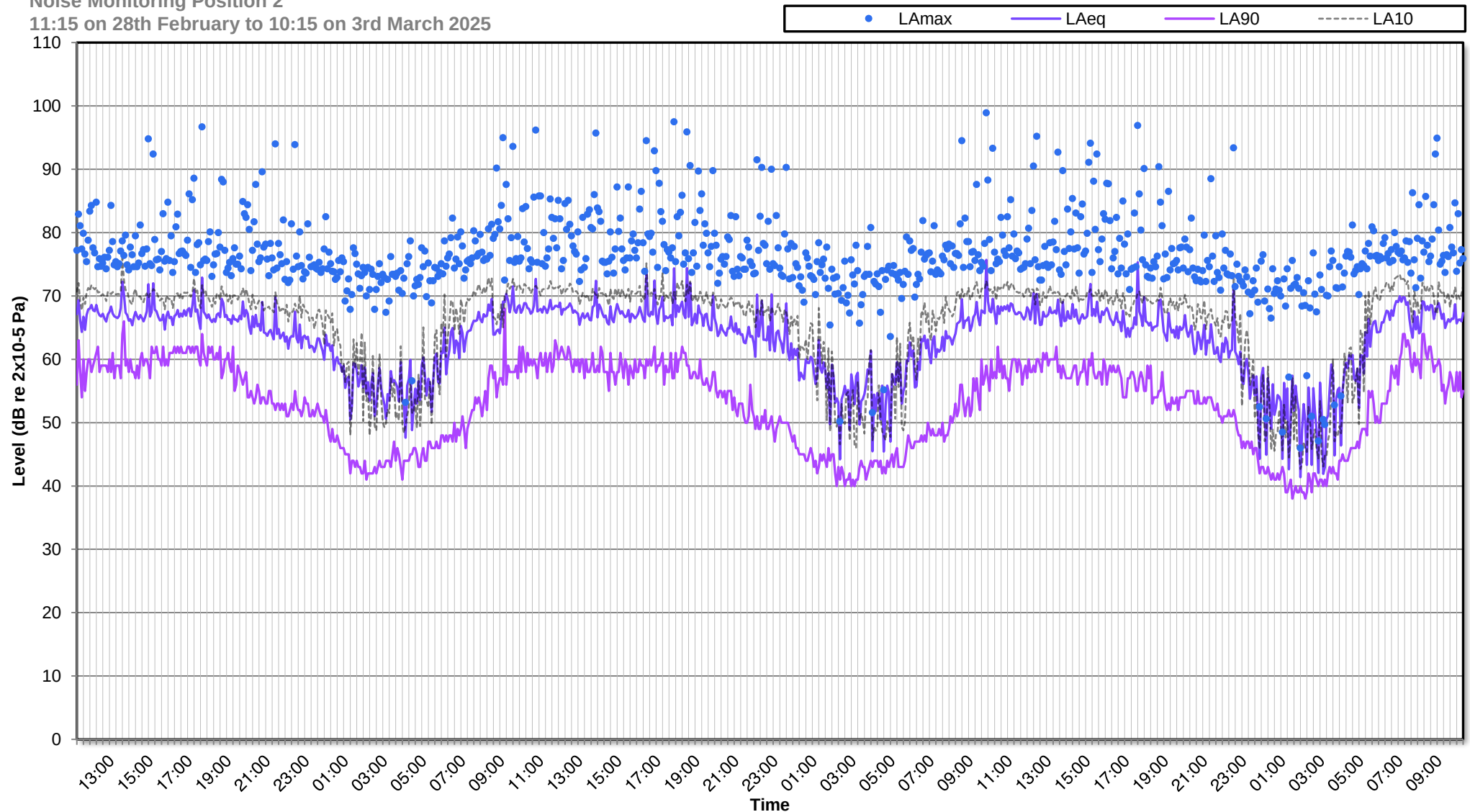
APPENDIX B

ENVIRONMENTAL NOISE TIME HISTORY GRAPH

22012.NIA-RPT.01

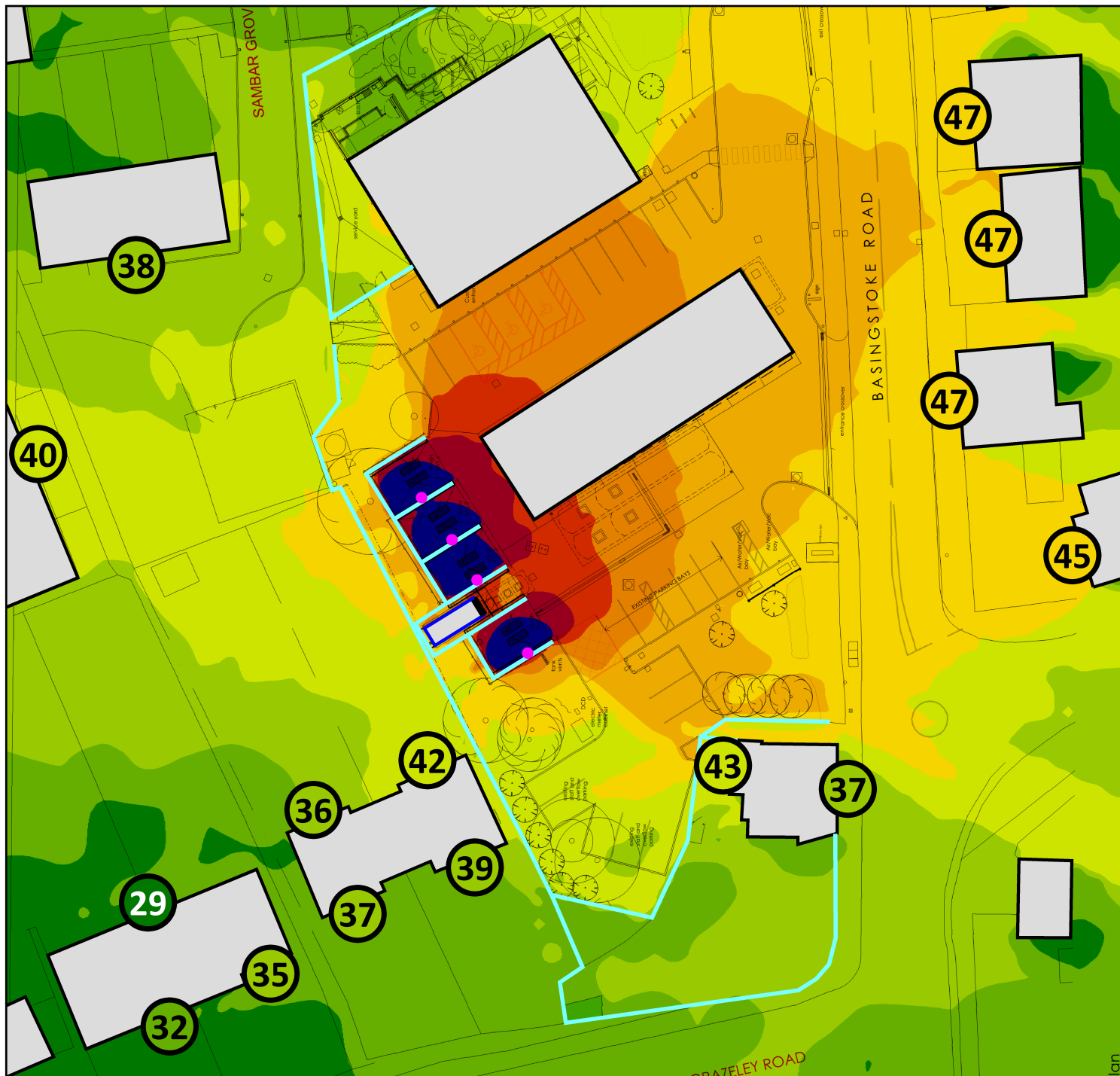
Noise Monitoring Position 2

11:15 on 28th February to 10:15 on 3rd March 2025



APPENDIX C

NOISE MAP



Customer:
Project: Three Mile Cross Service Station
Project-No. 22012

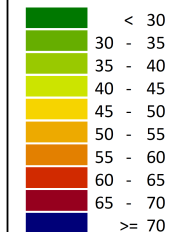


Map
1

All Jet Wash Bays In Use
Grid Map Calculation at 1.5 m above ground
Facade Map Calculation at 1 m from building facade

Project engineers: Daniel Green MIOA
Created: 05/03/2025
Processed with SoundPLAN 8.2, Update 09/11/2022

Levels LAeq, 1 hr
in dB(A)

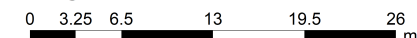


Legend

- Building
- Facade Point
- Wall / Fence
- Noise Source (Jet Wash)
- Noise Source (Plant Room)



Length scale 1:379



Noise Modelling
& Map Prepared By:

