
Our ref: NIA/9630/21/9591/V1/Thurnscoe PFS

18th March 2021

Darwen Investments Limited
c/o Mr. Asif Neki
AN Design



By email only: asif@andesigns.eu

Dear Sir

NOISE IMPACT ASSESSMENT FOR PROPOSED NEW PETROL FILLING STATION (PFS), FORMER 'THE THURNSCOE' PUBLIC HOUSE SITE, HOUGHTON ROAD, THURNSCOE, S63 0JX

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Ltd (ENS) has been commissioned by Darwen Investments Ltd to undertake a noise impact assessment for a proposed petrol filling station (PFS) with an associated retail unit at a former public house site 'The Thurnscoe' Houghton Road, Thurnscoe, S63 0JX (hereafter referred to as the application site).

1.02 The objectives of the noise impact assessment were to:

- Measure existing ambient and background noise levels in the vicinity of the application site during representative daytime and night time periods.
- Assess the potential impact of the proposed development with reference to the National Planning Policy Framework (NPPF) and other pertinent guidance.
- Provide recommendations for a scheme of sound attenuation works, as necessary, such that the proposed development does not give rise to any unacceptable loss of amenity at adjacent noise sensitive receptors (NSRs).

1.03 This report details the methodology and results of the assessment. It has been prepared to accompany a planning application to be submitted to the Local Planning Authority for the proposed PFS and associated retail unit at the application site.

1.04 This report has been prepared for Darwen Investments Ltd for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Darwen Investments Ltd and ENS as to the extent to which the findings may be appropriate for their use.

1.05 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

2.00 SITE SETTING & DEVELOPMENT PROPOSALS

2.01 The application site is located on Houghton Road within a mixed-use setting in the village of Thurnscoe. An annotated aerial image of the site area, including an overlay of the proposed development, is shown in Appendix 2.

2.02 The application site is bound by:

- Houghton Road to the north with residential dwellings and retail units opposite the application site.
- Asda supermarket to the south-east.
- Asda supermarket car park to the east.
- Residential dwellings to the south and south-west on Kingsway Grove.
- Funeral directors to the west with residential dwellings beyond to the west.

2.03 The development proposals consist of a PFS with 3 no. fuel pumps serving 5 no. bays, a retail unit, a jet wash facility and 10 no. customer parking spaces. A proposed layout is shown in Appendix 2.

2.04 It is understood that the operating hours sought for both the PFS, associated retail unit and jet wash are 24 hours per day, 7 days per week.

3.00 BASELINE NOISE SURVEY

3.01 In order to determine prevailing ambient and background noise levels in the vicinity of the application site, a baseline noise survey was undertaken on Monday 8th March 2021 and the early hours of Tuesday 9th March 2021.

3.02 The nearest noise sensitive receptors (NSRs) were identified as follows (see Appendix 2 for locations):

- NSR1 – Dwellings opposite the application site on Houghton Road.
- NSR2 – Dwellings to the west of the application site on Houghton Road.
- NSR3 – Bungalow to the south on Kingsway Grove.

3.03 For the purpose of the noise impact assessment, the following noise monitoring positions (MPs) were adopted (the approximate locations are identified on the annotated plan in Appendix 2):

- MP1 was located on Houghton Road at circa 4 metres back from the near side kerb at 1.5 metres above ground level (AGL), representative of NSR1 and NSR2.
- MP2 was located on Kingsway Grove at 1.5 metres AGL, representative of NSR3.

3.04 Noise measurements were made in a free field environment at 1.5 metres above ground level using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. A windshield was fitted for all measurements. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring.

3.05 Measurements consisted of A-weighted broadband parameters, together with linear octave band L_{eq} levels. Table 3.1 presents a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1 – Summary of Noise Measurement Data

Position	Date	Time	L _{Aeq, T} (dB)	L _{A90, T} (dB)	Comment
MP1	08/03/21	1013-1043	67	54	Dominated by road traffic Houghton Road
		1122-1153	65	54	
		1230-1301	65	52	
		1342-1413	65	53	
	08/03/21 – 09/03/21	2353-0023	53	31	
	09/03/21	0058-0128	51	30	
0204-0219		53	31		
MP2	08/03/21	1049-1119	49	42	Dominated by road traffic Houghton Road
		1157-1227	45	40	
		1304-1334	45	41	
		1417-1448	47	43	
	09/03/21	0025-0055	42	26	
		0131-0201	33	27	
		0222-0237	33	27	

- 3.06 During the course of the noise survey, road traffic was noted to be the dominant noise source.
- 3.07 Typical daytime and night time background noise levels at MP1 were circa 53 dB L_{A90} (15 min) and 31 dB L_{A90} (15 min), respectively.
- 3.08 Typical daytime and night time background noise levels at MP2 were circa 41 dB L_{A90} (15 min) and 27 dB L_{A90} (15 min), respectively.

N.B.: 'Typical' values are considered to be either the modal average (i.e. most occurring) or the mean average, whichever is the lower of the two data sets.

4.00 NOISE IMPACT ASSESSMENT CRITERIA

National Planning Policy Framework

- 4.01 The National Planning Policy Framework (NPPF) is a material consideration in planning decisions. At the heart of the NPPF is a presumption in favour of sustainable development, and the policies in Paragraphs 15 to 217 of the NPPF, taken as a whole, constitute the Government's view on what sustainable development in England means in practice for the planning system.
- 4.02 In terms of noise impact assessment criteria, Paragraph 180 of the National Planning Policy Framework 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:*
- 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.'*
- 4.03 In relation to 'adverse impacts', the NPPF refers to the Explanatory Note to the Noise Policy Statement for England (NPSE) for guidance.

- 4.04 The Noise Policy Statement for England (NPSE) and associated Explanatory Note were published by DEFRA in 2010 and set out the Government's noise management strategy to enable noise management decisions to be made within the wider context (i.e. guiding principles of sustainable development), in a cost-effective manner and in a timely fashion.
- 4.05 Fundamental to this approach is the statement:
'there is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors'.
- 4.06 The noise policy aims of NPSE are to (i) avoid significant adverse impact on health and quality of life, (ii) mitigate and minimise adverse impacts on health and quality of life, and (iii) where possible, contribute to the improvement of health and quality of life. The policy aims are always to be considered within the context of the Government's policy on sustainable development.
- 4.07 In relation to the mitigation and minimisation of adverse impacts, NPSE considers that *'in reality, although not always stated, the aim has tended to be to minimise noise 'as far as is reasonably practical'*. This is reinforced in Paragraph 2.24 of the Explanatory Note, which requires that *'all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur'*.
- 4.08 In relation to explaining the 'significant adverse' and 'adverse' effects quoted in the NPPF, NPSE uses the two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organisation (WHO), these 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 noise.
 - LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
- 4.09 The NPSE then extends these concepts to lead to a SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.
- 4.10 No specific criteria are presented in the NPSE, to provide the necessary policy flexibility until further evidence and suitable guidance is available. In lieu of specific criteria, for this assessment, ENS makes reference to existing guideline documents, which are summarised in the following paragraph(s).

Planning Practice Guidance on Noise

- 4.11 Planning Practice Guidance specifically dealing with noise was uploaded to the Government's Planning Portal in March 2014 as an accompaniment to the National Planning Policy Framework.
- 4.12 In order to determine noise impact, local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:
- Whether or not a significant adverse effect is occurring or likely to occur;
 - Whether or not an adverse effect is occurring or likely to occur; and
 - Whether or not a good standard of amenity can be achieved.
- 4.13 At the lowest extreme, when noise is not noticeable, there is by definition no effect. As the noise exposure increases, it will cross the no observed effect level as it becomes noticeable. However, the noise has no adverse effect so long as the exposure is such that it does not cause any change in behaviour or attitude. The noise can slightly affect the acoustic character of an area but not to the extent there is a perceived change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.

- 4.14 As the exposure increases further, it crosses the lowest observed adverse effect level boundary above which the noise starts to cause small changes in behaviour and 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).
- 4.15 Increasing noise exposure will at some point cause the significant observed adverse effect level boundary to be crossed. Above this level the 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 above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.
- 4.16 At the highest extreme, noise exposure would cause extensive and sustained changes in behaviour without an ability to mitigate the effect of noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be prevented from occurring.
- 4.17 Table 4.1 summarises the noise exposure hierarchy, based on the likely average response.

Table 4.1 – Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

- 4.18 The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- The source and absolute level of the noise together with the time of day it occurs.
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise.
- The spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features).
- The local acoustic character of the area.

BS 4142

- 4.19 The methods described in British Standard BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142) use outdoor sound levels to assess the likely effects of sound on people for the purposes of (i) investigating complaints, (ii) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature, and (iii) assessing sound at proposed new dwellings or premises used for residential purposes. BS 4142 states:

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. Typically, the greater this difference, the greater the magnitude of the impact. For example:

- *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*
- *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*

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

Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound.

- 4.20 The reference time interval of the specific sound is 1 hour during the day and 15 minutes at night.
- 4.21 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position (NSR) produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment.
- 4.22 The background sound level is the A-weighted sound pressure level of the residual sound at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels. The residual sound is described as the ambient sound remaining in a given position in a given situation when the specific sound source is suppressed to a degree such that it does not contribute to the ambient sound.
- 4.23 Based on BS 4142 and in the context of the NPPF, a rating level of <10 dB above the background noise level is not considered to represent a significant adverse impact (the prevention of which is the 1st aim of Para 123 of the NPPF), whilst a rating level not exceeding the background noise level is considered to be in keeping with the 2nd aim of Para 123 of the NPPF, i.e. to mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development.

WHO Guidelines on Community Noise (1999)

- 4.24 The World Health Organisation (WHO) Guidelines on Community Noise (1999) considers that if negative effects on sleep are to be avoided, noise events exceeding 45 dB L_{Amax} internally should be limited. The internal guideline value equates to outside bedroom (incident façade levels) of 60 dB L_{AFmax} based on the WHO approximation of 15 dB reduction from outside to inside for a partially open window.

IEMA Guidelines for Environmental Noise Impact Assessment

- 4.25 The Guidelines for Environmental Noise Impact Assessment provide recommendations for approaches to noise impact assessment in the context of the Environmental Impact Assessment (EIA) process. However, the principles in the guidelines are relevant to all types of project where noise effects are likely to occur, regardless of size including small developments which are not screened as EIA development.
- 4.26 The guidelines provide a number of examples regarding approach to impact assessment. Table 4.2 replicates an example of noise impact magnitude descriptors used to assess traffic generated onto the highway network by a proposed development. This has been adopted in this instance as a means of assessing potential changes in noise level due to car park activity.

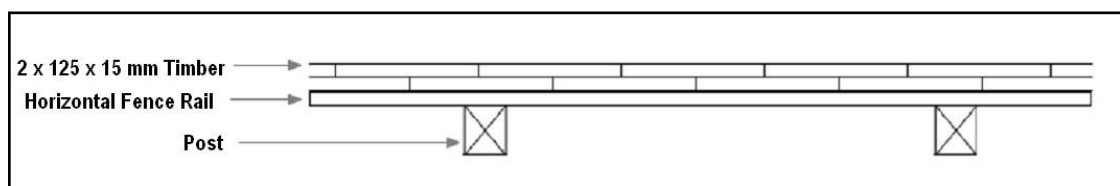
Table 4.2: Example Noise Impact Magnitude Descriptors

Relative Change dB(A)	Magnitude / Scale of Change
≤ 2.9	Negligible
3 – 4.9	Small
5 – 9.9	Medium
≥ 10	Large

5.00 NOISE IMPACT ASSESSMENT

Boundary Treatment

- 5.01 In order to screen the bungalow to the south (NSR3) from the proposed PFS, it is recommended that a 2.4 metre solid timber fence fencing (mass per unit area ≥ 10 kg /m²) or masonry / brick wall (or equivalent) be installed along the southern boundary of the application site (see appendix 3 for boundary treatment).
- 5.02 In order to screen the residential dwellings to the north from the proposed jet wash bays, it is recommended that a 2.4 metre solid timber fence fencing (mass per unit area ≥ 10 kg /m²) or masonry / brick wall (or equivalent) be installed along the easter boundary of the jet wash bays and should continue along the northern site boundary and return south down the side of the electric vehicle charging bays (see Appendix 3 for locations of recommended boundary treatment).
- 5.03 Where a timber fence is used, the fence should be built in double-thickness (2 x 15 mm) solid timber construction as illustrated below fencing (mass per unit area ≥ 10 kg/m²). The fence should have no gaps or holes and should be fully sealed at the ground (i.e. include a gravel board).



Noise Sources

- 5.04 Potential source of noise impact, associated with the proposed development, are considered to be:
- Noise associated with the use of the petrol filling station.
 - Noise associated with customer parking provision
 - Noise associated with the Jet Wash.
 - Noise associated with fixed external plant.
- 5.05 The following section assesses the potential noise impact of the noise sources associated with the proposed PFS, retail unit and services.

Use of Petrol Filling Station

- 5.06 It is understood that the proposed PFS may dispense fuel on a 24/7 basis. With reference to the proposed application site layout and the location of the NSRs, the closest pumps are circa:
- 38 metres from the dwellings to the north (NSR1).
 - 52 metres from the dwellings to the west (NSR2).
 - 35 metres from the dwellings to the south (NSR3).
- 5.07 In order to assess the impact at the NSRs, a noise survey was undertaken by ENS at a distance of 10 metres from an existing 'pay at pump' PFS outside Doncaster. It is noted that the measurements made by ENS included other noise sources such as distant road traffic (notably from the M18 motorway, resulting in high background noise levels), and the actual impact of the PFS may be lower.
- 5.08 The measured $L_{Aeq,T}$ over a 15 minute period of regular use of the pumps was 44 dB at 10 metres from source. The survey engineer commented that the noise levels were not significant and were influenced by background traffic levels, with the pump noise emissions being inaudible at circa 20 metres from source. It was concluded from the survey that L_{AFmax} noise levels associated with the use of the petrol station were 59 dB L_{AFmax} at 10m from cars using the PFS.
- 5.09 In order to predict the resultant PFS general use noise level at the NSRs, the following relationship may be employed:

$$SPL_{NSR} = SPL_{REF} - DA - SA$$

Where:

SPL_{NSR} is the resultant sound pressure level at the NSR (dB).
 SPL_{REF} is the measured sound pressure level at 10 metres (dB).
 DA is the distance attenuation of noise.
 SA is the screening attenuation of noise (where applicable)

- 5.10 Distance attenuation (DA) is calculated as follows:

$$DA = 20 \times \log (D_{source} / D_{rec})$$

Where:

D_{SOURCE} = distance to source (10 metres in this case).
 D_{REC} = distance to receiver (taken from the centre of the pumps)

- 5.11 Table 5.1 summarises the calculated noise levels associated with the PFS general use at the NSRs.

Table 5.1 Calculated PFS General Use Noise at NSRs

NSRs	Calculated Noise Level (dB) L_{Aeq} (15 mins)	Calculated Maximum Noise Level (dB) L_{AFmax}
NSR1	32	48
NSR2	20	35
NSR3	24	39

- 5.12 The calculated L_{AFmax} levels associated with the PFS general use are significantly below the proposed night time target criterion detailed in Para. 4.24 at all receptors. This is below the World Health Organisation upper limit of 60 dB L_{AFmax} to avoid sleep disturbance due to noise ingress through a partly open window.
- 5.13 In terms of acoustic feature corrections the general use of the PFS pumps is not considered tonal or impulsive and is in constant use. However, the use of the PFS pumps may be considered readily distinctive against the residual acoustic environment, therefore in accordance with BS 4142 a + 3dB penalty is applied.
- 5.14 Based on the above, Tables 5.2 and 5.3 summarise the BS 4142 assessments for the daytime and night time periods.

Table 5.2 – Daytime BS 4142 Assessment at NSRs – PFS General Use

Parameter	NSR1	NSR2	NSR3
Typical daytime background sound level	53 dB L_{A90} (15min)	53 dB L_{A90} (15min)	41 dB L_{A90} (15min)
Specific noise level (See Table 5.1)	32 dB L_{Aeq} (1hr)	20 dB L_{Aeq} (1hr)	24 dB L_{Aeq} (1hr)
Acoustic feature correction	+ 3 dB	+ 3 dB	+ 3 dB
Rating level	35 dB $L_{Ar,Tr}$	23 dB $L_{Ar,Tr}$	27 dB $L_{Ar,Tr}$
Excess of rating level over background sound level	- 18 dB	- 30 dB	- 14 dB
Assessment (depending on context)	Low impact	Low impact	Low impact

Table 5.3 – Night Time BS 4142 Assessment at NSRs – PFS General Use

Parameter	NSR1	NSR2	NSR3
Typical night time background sound level	31 dB L_{A90} (15min)	31 dB L_{A90} (15min)	27 dB L_{A90} (15min)
Specific noise level (See Table 5.1)	32 dB L_{Aeq} (15mins)	20 dB L_{Aeq} (15mins)	24 dB L_{Aeq} (15mins)
Acoustic feature correction	+ 3 dB	+ 3 dB	+ 3 dB
Rating level	35 dB $L_{Ar,Tr}$	23 dB $L_{Ar,Tr}$	27 dB $L_{Ar,Tr}$
Excess of rating level over background sound level	+4 dB	-8 dB	0 dB
Assessment (depending on context)	Below a level deemed to be an adverse impact	Low impact	Low impact

- 5.15 It can be seen that daytime rating levels (associated with the general use of the PFS pumps) are predicted to be no greater than existing background noise levels at the nearest noise sensitive receptors. In accordance with BS 4142 this is an indication of a low impact depending on context. At night time, low impacts are expected at NSR2 and NSR3. Whilst the rating levels are expected to be slightly above the background level at NSR1, they are expected to be below a level deemed to be an adverse impact.

Noise Associated with the Customer Parking Provision

- 5.16 The proposed plan shows 10 no. customer parking spaces and 3 no. electric vehicle charging bays are located around the north, south and western boundaries of the application site.
- 5.17 Distance is taken from the centre of the car parking area to the NSRs as follows:
- 47 metres from NSR1 (unscreened).
 - 40 metres from NSR2 (significantly screened by the proposed development).
 - 24 metres from NSR3 (screened by the proposed 2.4-metre-high boundary treatment).
- 5.18 Previous noise survey work, in close proximity to supermarket car parking spaces, has determined the following noise levels at 10 metre distance:

Table 5.4: Car Park Source Noise Data

Parameter	Single Event Noise Level (SEL) at 10m	Maximum Noise Level, L _{AFmax} (dB) at 10m
Car pass by	67 dB(A)	66
Door slam	64 dB(A)	71
Car ignition and depart	72 dB(A)	70

- 5.19 In lieu of trip rate information, it is assumed that within 1 hour, each car parking space would accommodate 1 no. vehicle every hour. For assessment purposes, it is assumed that 75% of all car parking spaces are in use at any time.

The following formula may be used for calculating the L_{Aeq} level from the SEL:

$$L_{Aeq, T} = 10 \log_{10} [(n \times 10^{SEL/10}) / T]$$

where:

SEL = the Single Event / Sound Exposure Level
 n = number of event occurrences
 T = reference time period, in seconds

- 5.20 Processing the above formula, for example purposes calculated car park noise levels are presented in Table 5.5 for the closest NSR (NSR1).

Table 5.5: Calculated Car Park Noise Level at NSR1

Activity	No. of Events Per Space Per Hr	No. of Spaces in Use	Total No. of Events Per Hr	Noise Level (dB L _{Aeq,1hr})
Car pass by	1	10	10	41
Door slam	2	10	20	41
Car ignition and depart	1	10	10	46
Cumulative				48
Distance Correction at NSR1 [20log(10/47)]				-13
Total Calculated Car Park Noise Level at NSR1				35

- 5.21 The lowest night time ambient noise level measured at MP1 (representative of NSR1) was 51 dB L_{Aeq, T}. The total combined noise level for NSR1 is calculated (via logarithmic addition) at 51 dB L_{Aeq, T} resulting in an overall increase of 0 dB L_{Aeq}. Therefore, in accordance with the IEMA Guidelines for Environmental Noise Impact Assessment (see section 4) this is considered a **Negligible** impact.
- 5.22 Table 5.6 summarises the calculated noise levels for all NSRs using the same procedure outlined within paragraph 5.19 and Table 5.5 and includes screening attenuation where applicable.

Table 5.6 Calculated Night Time Car Park Noise Level for all NSRs

NSRs	Calculated Noise Level (dB) L_{Aeq}	Lowest measured night time ambient Noise Level (dB) L_{Aeq}	Combined Noise Level (dB) L_{Aeq}	IEMA Assessment Result
NSR1	35	51	51	Negligible
NSR2	26	51	51	Negligible
NSR3	30	33	35	Negligible

5.23 Consideration should also be given to the maximum L_{AFmax} noise levels at the NSRs associated with car park use at night.

5.24 Distance is taken from the closest customer parking bay to the NSRs as follows:

- 35 metres from NSR1 (unscreened).
- 40 metres from NSR2 (significantly screened by the proposed development).
- 16 metres from NSR3 (screened by the proposed 2.4-metre-high boundary treatment).

5.25 Assuming point source propagation and adopting the worst case L_{AFmax} value of 71 dB for a door slamming at 10 metres (as per Table 5.4) the following maximum noise levels associated with the customer parking provision are summarised for all NSRs in Table 5.7 as follows.

Table 5.7 Calculated Maximum Noise Level for all NSRs

NSRs	Calculated Maximum Noise Level (dB) L_{AFMax}
NSR1	60
NSR2	49
NSR3	57

5.26 As per para 4.24, the WHO Guidelines set an internal target of 45 dB L_{AFMax} and state that the internal guideline value equates an external level of 60 dB L_{AFmax} (based on the WHO approximation of 15 dB reduction from outside to inside for a partially open window). Therefore, there is no issue with regard to the customer parking provision and maximum noise levels.

Noise Associated with Jet Wash

5.27 It is understood that the proposed PFS will have a jet wash facility, plans show two jet wash bays located in the north-eastern corner of the application site. With reference to the proposed application site layout and the location of the NSRs, the jet wash bay is circa:

- 34 metres from NSR1.
- 82 metres from NSR2.
- 55 metres from NSR3.

5.28 Previous measurements undertaken by ENS in close proximity to a high-pressure jet washing facility have been measured at circa 70 dB $L_{Aeq,T}$ at a distance of 2 metres from source.

5.29 It is assumed that that jet wash will be used typically 4 no. times per hour in the daytime period and once every 15 minutes in the night time period. A typical jet wash session lasts 5 minutes, therefore a time correction of 5 dB can be applied.

5.30 Based on the calculation procedure outlined in paragraphs 5.09 and 5.10, Table 5.8 summarises the calculated noise levels associated with the jet wash at all NSRs incorporating both distance and screening attenuation afforded by the recommended boundary treatments within paragraphs 5.01 and 5.02.

Table 5.8 Calculated Jet Wash Noise Level for all NSRs

NSRs	Calculated Jet Wash Noise Level (dB) L_{Aeq}
NSR1	30
NSR2	23
NSR3	23

- 5.31 In terms of acoustic feature corrections the use of the jet wash will be intermittent therefore in accordance with BS 4142 a + 3dB penalty for intermittency is considered appropriate.
- 5.32 Tables 5.9 and 5.10 summarise the BS 4142 assessments for jet wash use during daytime and night time periods.

Table 5.9 – Daytime BS 4142 Assessment at NSRs – Jet Wash

Parameter	NSR1	NSR2	NSR3
Typical daytime background sound level	53 dB L_{A90} (15min)	53 dB L_{A90} (15min)	41 dB L_{A90} (15min)
Specific noise level (See Table 5.8)	30 dB L_{Aeq} (1hr)	23 dB L_{Aeq} (1hr)	23 dB L_{Aeq} (1hr)
Acoustic feature correction	+ 3 dB	+ 3 dB	+ 3 dB
Rating level	33 dB $L_{Ar,Tr}$	26 dB $L_{Ar,Tr}$	26 dB $L_{Ar,Tr}$
Excess of rating level over background sound level	- 20 dB	- 27 dB	- 15 dB
Assessment (depending on context)	Low impact	Low impact	Low impact

Table 5.10 – Night Time BS 4142 Assessment at NSRs – Jet Wash

Parameter	NSR1	NSR2	NSR3
Typical night time background sound level	31 dB L_{A90} (15min)	31 dB L_{A90} (15min)	27 dB L_{A90} (15min)
Specific noise level (See Table 5.8)	30 dB L_{Aeq} (15mins)	23 dB L_{Aeq} (15mins)	23 dB L_{Aeq} (15mins)
Acoustic feature correction	+ 3 dB	+ 3 dB	+ 3 dB
Rating level	33 dB $L_{Ar,Tr}$	26 dB $L_{Ar,Tr}$	26 dB $L_{Ar,Tr}$
Excess of rating level over background sound level	+2 dB	-5 dB	-1 dB
Assessment (depending on context)	Below a level deemed to be an adverse impact	Low impact	Low impact

- 5.33 It can be seen that daytime rating levels (associated with the proposed jet wash) are predicted to be no greater than existing background noise levels at the nearest noise sensitive receptors. In accordance with BS 4142 this is an indication of a low impact depending on context. At night time, low impacts are expected at NSR2 and NSR3. Whilst the rating levels are expected to be slightly above the background level at NSR1, they are expected to be below a level deemed to be an adverse impact.

Plant Noise

- 5.34 Details of external plant are not currently available; therefore, an accurate assessment cannot be made at this time. It is assumed however, that external plant will primarily consist of condenser units serving internal refrigeration units and air conditioning units.
- 5.35 Notwithstanding the above, it is considered that the control of noise emissions associated with external plant is amenable to a planning condition with the following criteria (based on the noise data detailed in Section 3.00):
- The cumulative rating level of external plant operating during the daytime period should not exceed 53 dB $L_{Ar,T}$ at NSR1 and NSR2 and should not exceed 41 dB $L_{Ar,T}$ at NSR3.
 - The cumulative rating level of external plant operating during the night time period should not exceed 31 dB $L_{Ar,T}$ NSR1 and NSR2 and should not exceed 27 dB $L_{Ar,T}$ at NSR3.
- 5.36 It is considered that the above criteria may be achieved using judicious selection and location/orientation of plant, together with localised screening as required.

6.00 CONCLUSIONS

- 6.01 A noise impact assessment has been undertaken for a proposed petrol filling station (PFS) with an associated retail unit at a former public house site 'The Thurnscoe' Houghton Road, Thurnscoe, S63 0JX.
- 6.02 The ambient noise climate in the vicinity of the application site is characterised by road traffic on Houghton Road.
- 6.03 When assessed in accordance with BS 4142 the noise levels associated with the PFS pumps and jet wash are predicted to be no greater than existing background noise levels at the nearest noise sensitive receptors. In accordance with BS 4142 this is an indication of a low impact depending on context. At night time, low impacts are expected at NSR2 and NSR3. Whilst the rating levels are expected to be slightly above the background level at NSR1, they are expected to be below a level deemed to be an adverse impact.
- 6.04 The noise impact due to customer parking provision is expected to be negligible at all NSRs.
- 6.05 The control of noise associated with any fixed external plant servicing the development is amenable to a planning condition setting limiting noise levels, which could be achieved with the judicious selection and siting of plant and/or standard noise mitigation techniques

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely

Richard Whitaker BSc (Hons)
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Appendix 1 Glossary of Acoustic Terms

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μPa).

A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

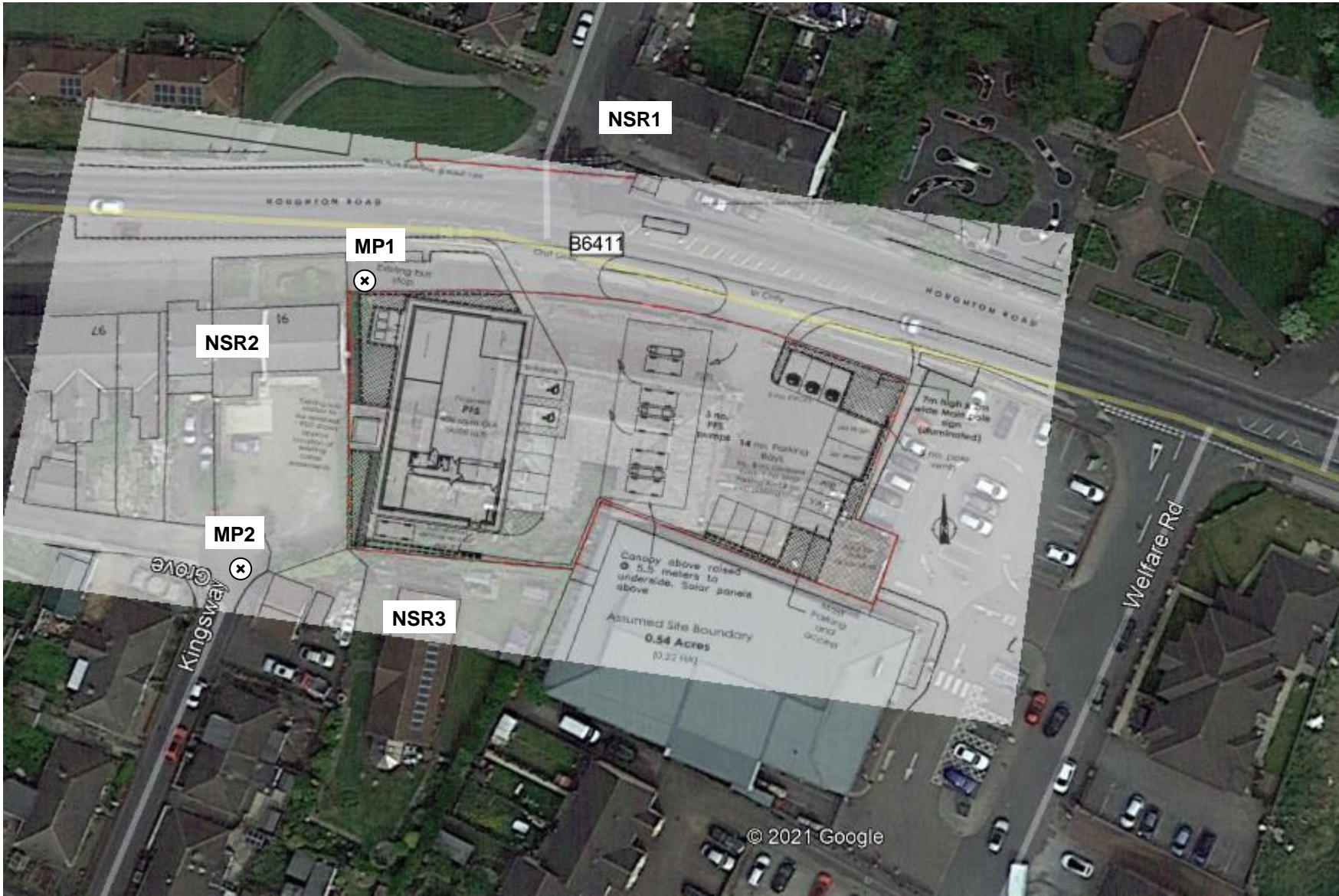
Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Weighted Airborne Sound Insulation ($D_{nT,w}$)

Single number quantity which characterises the airborne sound insulation between rooms.

Appendix 2: Annotated aerial image indicating the approximate noise monitoring positions (MPs) and NSRs



Appendix 3: Boundary Treatments

 =2.4 metre solid timber fence or equivalent

