ACOUSTIC CONSULTANTS LTD

Noise Impact Assessment

Proposed Service Station Redevelopment
Moor Lane, South Sheilds

Reference: 10561/NIA/SF

Client
SRJ Energy Limited t/a Hedworth Services (Sunderland)

Document Control

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The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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1. Introduction

SRJ Energy Limited t/a Hedworth Services (Sunderland) appointed Acoustic Consultants Limited (ACL) to undertake a noise impact assessment for proposed new plant associated with the redevelopment of Moor Lane Service Station, South Sheilds.

A noise impact assessment is undertaken using on-site measured baseline noise data, provided plant noise data and guidance in the National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE), Planning Practice Guidance (PPG) and British Standard 4142:2014+A1:2019 (BS4142).

This report has been prepared by a Technician Member of the Institute of Acoustics (TechIOA). This report has been reviewed and approved by a director of the company who is a full Member of the Institute of Acoustics (MIOA) with over 16 years' experience in the field of acoustics.

2. The Site

The proposed site is an existing service station, shop and vehicle garage to the south of Moor Lane, South Shields.

Existing residential receivers lie directly south of the proposed site on Moore Avenue.

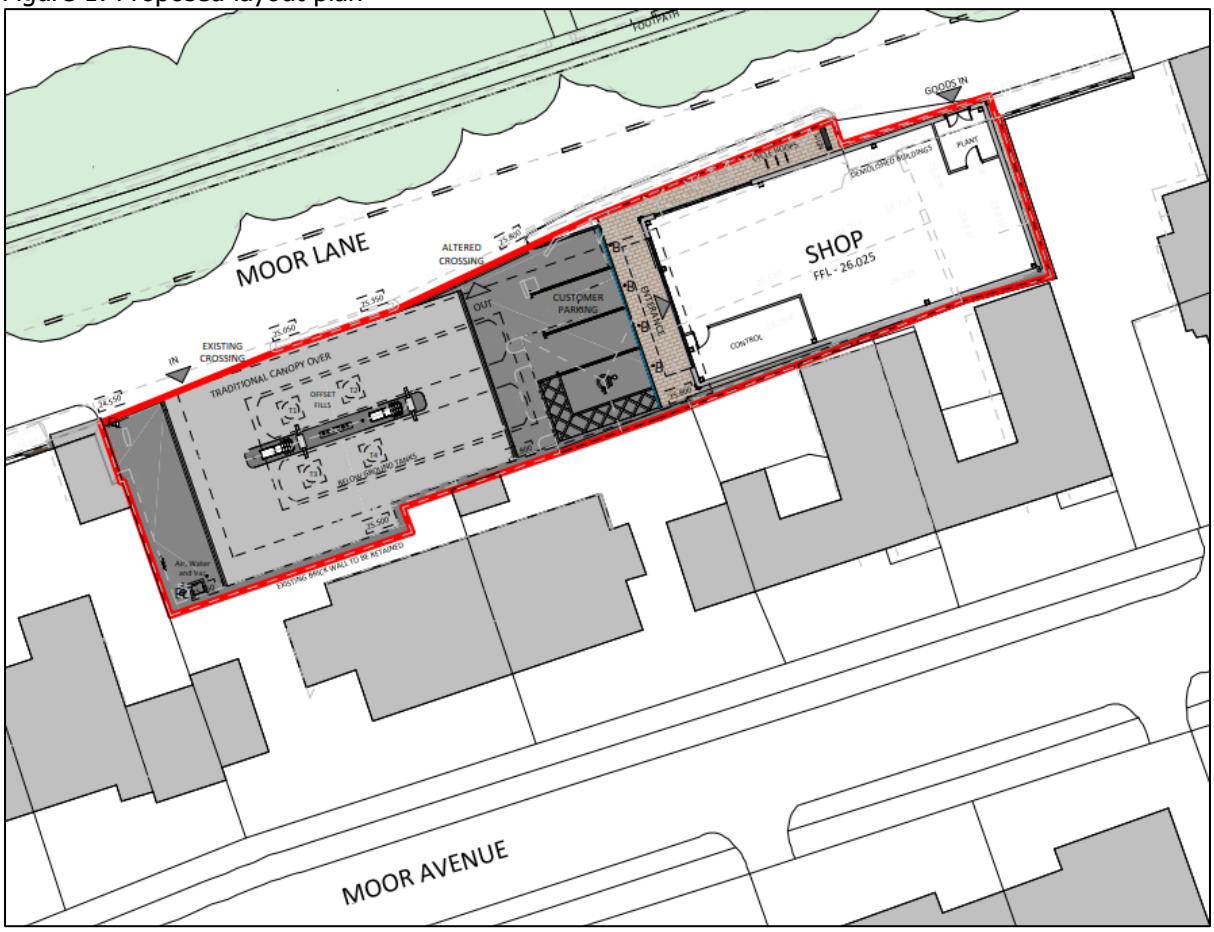
New plant associated with the proposals is understood to be located within a dedicated plant room on the Northeast of the shop façade.

It is also understood a new proposed air vac unit is to be located in the Southwestern corner of the site.

It should be noted that the hours of use are not proposed to change.

The proposed layout plan is provided below.

Figure 1: Proposed layout plan



3. Planning and Noise

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in December 2023. Section 15 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning. Paragraph 180 states:

"180. 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; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

Paragraph 191 states:

"191. 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; and
c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation. "

The document does not prescribe any assessment methodology or criteria to assess the adverse effect of noise and refers you to the NPSE.

3.2. Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long term vision of Government noise policy. This long term vision is supported by three noise policy aims as follows:

"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 introduces the concept of "Significant adverse" and "Adverse" impacts of noise which relate to the noise policy aims. These are applied as follows:

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.

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning where reduced to a minimum.

With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:

"The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It 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 (paragraph 1.8). This does not mean that such adverse effects cannot occur."

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its merits.

The NPSE does, however, emphasise that in dealing with noise Local Planning Authorities are required to take a balanced approach in considering the benefits of development as against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

"There is a need to integrate consideration of the economic and social benefits 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 focusing solely on the noise impact without taking into account other related factors."

The planning need is outside the scope of noise and acoustics and will need to be addressed by others.

3.3. Planning Practice Guidance, Noise

The Planning Practice Guidance (PPG) on noise referred to here is based on the current version (January 2019) as provided on the Planning Guidance Website. It states that, *"Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."*

It provides generic guidance on how to determine the noise impact and what factors could be a concern.

It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation.

Paragraph 5 of the PPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated below:

Table 1: PPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
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
Lowest Observed Adverse Effect Level			
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 and reduce to a minimum
Significant Observed Adverse Effect Level			
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

The table does not provide any objective assessment which equates to the noted effect levels. However, the PPG identifies that where noise is audible, it is not necessarily intrusive. The effect and impact on people are based primarily on the level of noise.

4. Assessment Criteria

British Standard 4142:2014 entitled 'Method for rating and assessing industrial and commercial sound' use outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes. The principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'.

The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours).

Section 9 entitled 'Rating Level' states: *"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location.

In Section 11 of the Standard, entitled 'Assessment of the Impacts', it states: *"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9) and consider the following.*

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *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."*

In all instances the context needs to be considered when determining the overall impact. In terms of context BS 4142:2014 states: *"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.*

1) *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.*

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

   NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
   i) façade insulation treatment;
   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
   iii) acoustic screening."

In terms of good internal acoustic conditions, the most relevant criteria and methodology is provided in BS8233:2014. This is in accordance with a March 2020 Technical published by the ANC Working Group, which provided comments and guidance to clear any ambiguity in BS414:2014+A1:2019.

The March 2020 Technical Note later states:

"Whilst BS 4142 can be used to assist in the determination of the likelihood of an adverse or significant adverse impact, guidance on internal design criteria and mitigation is provided elsewhere. BS 8233:2014, for example, provides guidance on indoor ambient noise levels."

5. Baseline Noise Survey

A baseline noise survey was undertaken at the site between the 26th and 28th of January 2024.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Sound Level Analyser with half-inch condenser microphones using the "fast" setting. The equipment is checked annually using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2005 and in accordance with British Standard EN 10012:2003 and traceable to the National Standards. This equipment was checked and calibrated as noted below.

Table 2: Monitoring equipment

Equipment Description	Serial Number	Date of Calibration	Calibration Certification Number
SLM, NTI, XL2	A2A-18928-E0	10/05/2023	UK-23-059
Pre-Amp, NTI, MA220	9785	10/05/2023	UK-23-059
Microphone, NTI, MC230A	A20919	10/05/2023	UK-23-059
Calibrator, Larson Davis, CAL200	17656	07/02/2023	44552-17656-CAL200

The measuring systems were checked for calibration before and after the tests and no significant drift was detected.

5.2. Weather Conditions

Below were the weather conditions over the duration of the survey at the monitoring location.

Table 3: Weather conditions during the survey period

Date	Wind Speed (m/s)	Wind Direction	Temperature (°C)	Precipitation Time (hrs)	Cloud cover (%)
26th January 2024	≤5	SW	5 - 7	0	50
27th January 2024	≤5	SW	6 - 10	0	40
29th January 2024	≤8	S	6 - 11	0	70

Wind speeds on the 29th may have had an adverse effect on the collected data during that period; this has been omitted from the assessed dataset.

5.3. Monitoring Procedure

The microphone was situated in a free field position, secured to a lamppost, at an approximate height of 3 metres. Traffic on the surrounding road network formed the baseline noise climate.

The monitoring location, proposed site and nearest noise sensitive receivers are provided on the figure below.

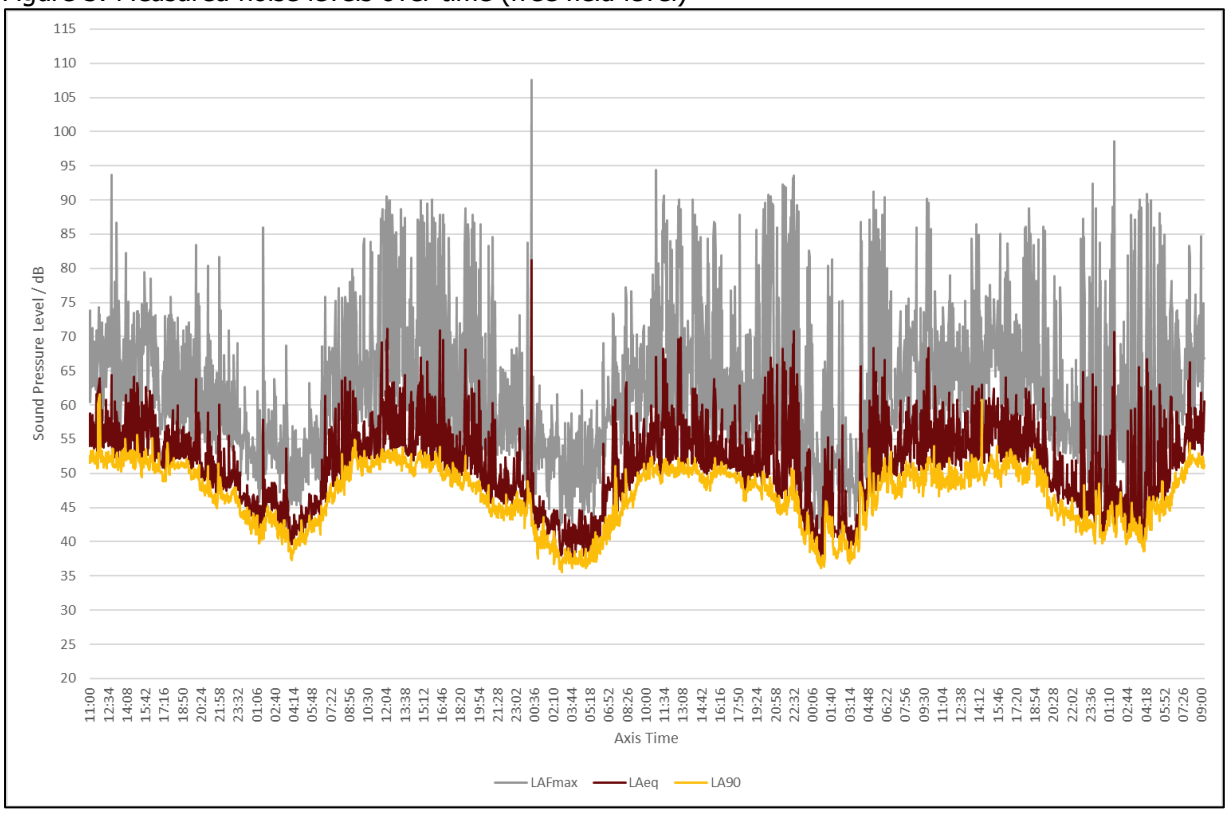
Figure 2: Monitoring location



5.4. Measured Noise Levels

The chart below details the measured maximum (L_{AFmax}), equivalent (L_{Aeq}) and background (L_{A90}) noise levels measured over the survey period. Measurements below are detailed in 2-minute intervals.

Figure 3: Measured noise levels over time (free field level)



The table below details the measured 15-minute daytime and night time background and residual noise levels, representative of existing residential receivers.

Table 4: Measured representative residual and background noise levels (free field)

Period	Background, dB $L_{A90,15minutes}$		Equivalent, dB $L_{Aeq,15minutes}$	
	Range	Typical	Range	Typical
Daytime, 0700 – 2300hrs	44 - 53	46	47 - 67	57
Night Time, 2300 - 0700hrs	38 - 47	43	41 - 55	46

6. Proposed Plant

6.1. Proposed Air Vac

The use of the proposed air vac is not expected to change with the proposals as the existing site included a similar unit in the same location. As such, this unit is excluded from the assessment.

6.2. Proposed New Plant

It is understood that a single condenser unit is to be located within the plant room on the northern façade of the shop.

The proposed condenser is a Danfoss OP-MSXM046MLW05E. The provided datasheet for this unit states a Sound Power Level of 72 dBA.

Please advise of any discrepancies in the determination of the above. Any additional plant/ relocation of plant/ changes to proposed plant will require reassessment.

6.2.1. Predicted Specific Sound Level

The reverberant sound pressure level within the plant room is expected to be 73 dBA.

The nearest noise-sensitive receiver window is approximately 13 metres from the louvered door of the plant room.

It should also be noted that the receiver lies behind the plant room and therefore the plant room wall will act as a noise barrier.

Accounting for distance and barrier attenuation the predicted specific sound level of plant at the NSR is 43 dB $L_{Aeq,15minutes}$.

7. Noise Assessment

A British Standard 4142:2014 assessment has been undertaken at the sensitive receivers on the site.

7.1. Background Sound Level

From the measured data we have determined a background sound level of 46 dB $L_{A90,1hour}$ during the day and a level of 43 dB $L_{A90,15minutes}$ during the night.

7.2. Specific Sound Level

The predicted specific sound level of noise from proposed plant at the NSR is 43 dB $L_{Aeq,15\ minutes}$. It is assumed plant will run 24/7.

7.3. Character Corrections

Character corrections should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other specific characteristics and/or intermittency at the assessment location. Based on our understanding of proposed plant type, character corrections are as follows.

- ***Tonality*** – The plant proposed is not considered tonal. The plant supplier should confirm this is the case.
- ***Impulsivity*** – Plant such as this is not normally impulsive. The plant supplier should confirm this is the case.
- ***Intermittency*** – We do not expect that the intermittency of the plant will be distinguishable at the sensitive receiver over the residual noise climate, and we have not applied correction for intermittency. We have also assumed all plant is running continuously.
- ***Other Sound Characteristics*** – We do not believe any correction is due to other characteristics.

7.4. Initial Estimate of Impact

The British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 5: British Standard 4142:2014 initial estimate for NSR

Parameter	Day	Night
Background Level, $L_{A90,T}$	46 dB	43 dB
Specific Sound Level, $L_{Aeq,T}$	43 dB	43 dB
Character Correction	0 dB	0 dB
Rating Level, $L_{Ar,T}$	43 dB	43 dB
Excess of rating over background level	-3 dB	0 dB

The plant rating noise level is 3 dB below the design background noise level during the day and is equal to the design background noise level during the night. Noise is expected to have no impact on the NSR during both the day and night.

7.5. Context

With regard to context, BS4142 states *"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following:"*

7.5.1. Absolute Levels

With regard to 'absolute levels', the most relevant guidance is British Standard 8233:2014. Section 7.7.2 Table 4 of the British Standard provides internal ambient noise levels for dwellings from noise sources 'without a specific character'. We would advise the rating level is considered to allow for the character of the source.

The guideline states that noise levels should not exceed 35 dB $L_{Aeq(16hr)}$ within habitable rooms during the day, and 30 dB $L_{Aeq(8hr)}$ within night-time rooms. The internal level is approximately 15 dB quieter than the external free-field level (as stated by the BS8233:2014 and WHO 1999) allowing for the attenuation of a partially open window. Therefore, based on the predicted rating levels noted above, the internal absolute levels are as follows.

Table 6: Comparison with British Standard 8233:2014 at Worst-Case Receiver

Parameter	Predicted Level dB L_{Ar}	Open Window Correction dB(A)	Predicted Internal Level dB(A)	Within BS8233 Criteria?
Daytime, 0700 – 2300hrs	43	-15	28	YES
Night Time, 2300 – 0700hrs	43	-15	28	YES

As can be seen from the above table, the predicted level internally to the NSR is within the internal limits stated within British Standard 8233.

7.6. Summary of Assessment

Noise from proposed plant is expected to be of no impact during both day and night when assessed to British Standard 4142:2014+A1:2019.

On this basis, we would consider the noise impact of the proposed plant to fall in the No Observed Effect Level (NOEL) of the NPSE and PPG and achieves the aims of National Planning Policy Framework (NPPF).

8. Summary & Conclusions

SRJ Energy Limited t/a Hedworth Services (Sunderland) appointed Acoustic Consultants Limited (ACL) to undertake a noise impact assessment for the plant associated with the proposed redevelopment of Moor Lane Service Station, South Sheilds in support of a planning application.

Using on-site measured baseline noise data representative of nearby noise-sensitive receivers, noise from proposed plant has been assessed in accordance with the guidance in the National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE), Planning Practice Guidance (PPG) and British Standard 4142:2014+A1:2019 (BS4142).

Noise from proposed plant is expected to be of no impact during both day and night when assessed to British Standard 4142:2014+A1:2019 and therefore will achieve the aims of the National Planning Policy Framework (NPPF).

We consider that noise should not be considered a material constraint in determining the plant noise aspects of the planning application.

9. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure pA – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level, L_{pA} - quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$L_{pA} = 10 \log_{10} (p_A/p_0)^2$

where:

p_A is the A-weighted sound pressure in pascals (Pa);
p_0 is the reference sound pressure (20 µPa)

Background sound level, $L_{A90,T}$– A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = t2 – t1, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{AeqT} = 10\lg_{10}\left\{(1/T)\int_{t_1}^{t_2}[p_A(t)^2/p_0^2]dt\right\} \quad (1)$$

where:

p_0 is the reference sound pressure (20 µPa); and
$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of L_{pA} are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

Free-field level – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Octave and Third Octave Bands – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

Sound pressure level – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

Sound reduction index, R – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.

Structure-borne noise – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

Rating level, $L_{Ar,Tr}$ – Specific sound level plus any adjustment for the characteristic features of the sound.

Reverberation Time, T – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

Vibration Dose Value, VDV – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index, R_w – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).



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