



ACOUSTIC
CONSULTANTS LTD

Noise Impact Assessment

**Proposed Extension of Operational Hours
Bounds Green Service Station, N11 2QH**

Reference: 10335/SF

Client:

Petrogas Group UK Limited

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

Petrogas Group UK Limited appointed Acoustic Consultants Limited (ACL) to undertake a noise assessment for the proposed extension of operational hours for Bounds Green service station.

This report provides a noise impact assessment of activities associated with service station on the nearby sensitive receivers around the site.

The noise impact assessment has been undertaken in accordance with the guidance in British Standard 4142:2014+A1:2019 (BS4142).

The author of this report is a Technician Member of the Institute of Acoustics (TechIOA) with over two years' experience in the field of Acoustics. This report has been reviewed by a full Member of the Institute of Acoustics (MIOA) with over seven years' experience in the field of acoustics and has been approved by a director of the company (MIOA) with over fifteen years' experience in the field of acoustics.

2. The Site & Proposals

The site is an existing service station off the A109. It is proposed to extend the service stations operational hours from 7am – 10pm to the full 24-hour period, 7 days a week.

The service station is in an urban, residential location with the nearest noise sensitive receiver (NSR) on the western boundary of the site. There is also railway line on the eastern boundary.

The service station has fuelling facilities that can accommodate 6 vehicles (not suitable for HGVs) at one time. There is also an automated car wash on site.

The site and NSR locations are provided in the figure below.

Figure 1: Site and NSR locations



3. Planning and Noise

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in July 2021. Section 15 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning. Paragraph 174 states:

"174. 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 185 states:

"185. 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 which are 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. 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 own 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 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. National Planning Practice Guidance, Noise

The National Planning Practice Guidance (NPPG) on noise, referred to here, is based on the current version (July 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."*

The document provides generic guidance on how to determine the impact of noise 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 NPPG 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 on the following page.

Table 1: NPPG Noise – Perception of Effect Levels

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
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 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			
Present 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			
Present 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.	Significant Observed Adverse Effect	Avoid

Response	Examples of Outcomes	Increasing Effect Level	Action
	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.		
Present 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

The table does not provide any objective assessment which equates to the noted effect levels.

The NPPG identifies that where noise is audible it is not necessarily intrusive. The effect and impact on people is based primarily on the level of noise.

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 when taken into account against all other planning considerations.

Section 4 of this report identifies guidance which is considered to provide noise criteria equivalent to effect levels below the Lowest Observed Adverse Effect Level. This is where the perception of noise is “not noticeable” or “noticeable but not intrusive” as indicated in Table 1 above.

4. Assessment Criteria

For commercial noise, the most relevant guidance is provided within British Standard 4142:2014+A1:2019. The methods described in the British Standard 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 initial estimate 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). Clause 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 Clause 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."

5. Noise Monitoring

A site noise survey was undertaken by ACL between the 16th and 19th of June 2023.

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-17200-E0	10/05/2022	UK-22-029
Pre-Amp, NTI, MA220	8848	10/05/2022	UK-22-029
Microphone, NTI, MC230A	A22973	10/05/2022	UK-22-029
Calibrator, B&K, 4231	2665006	25/11/2022	42612

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.

Table 3: Weather conditions during the survey

Date	Wind Speed (m/s)	Wind Direction	Temperature (°C)	Precipitation Time (hrs)
Friday 16/06/2023	≤4	W	13 - 27	0
Saturday 17/06/2023	≤5	E	13 - 26	0
Sunday 18/06/2023	≤5	S	16 - 27	1
Monday 19/06/2023	≤5	NE	14 - 25	0

Weather conditions are not expected to have had an adverse effect on the measured data.

5.3. Monitoring Procedure

A partially attended monitoring exercise was undertaken at the site, over a weekend period, from Friday the 16th to Monday the 19th of June 2023.

The microphone was situated in a free field position at an approximate height of 1.5 metres. Principle noise sources at the monitoring location include local road traffic, existing service station condensers, vehicular activity at the petrol station and pedestrian traffic along 'Bowes Park Walkpath'.

The monitoring location is provided in the figure below.

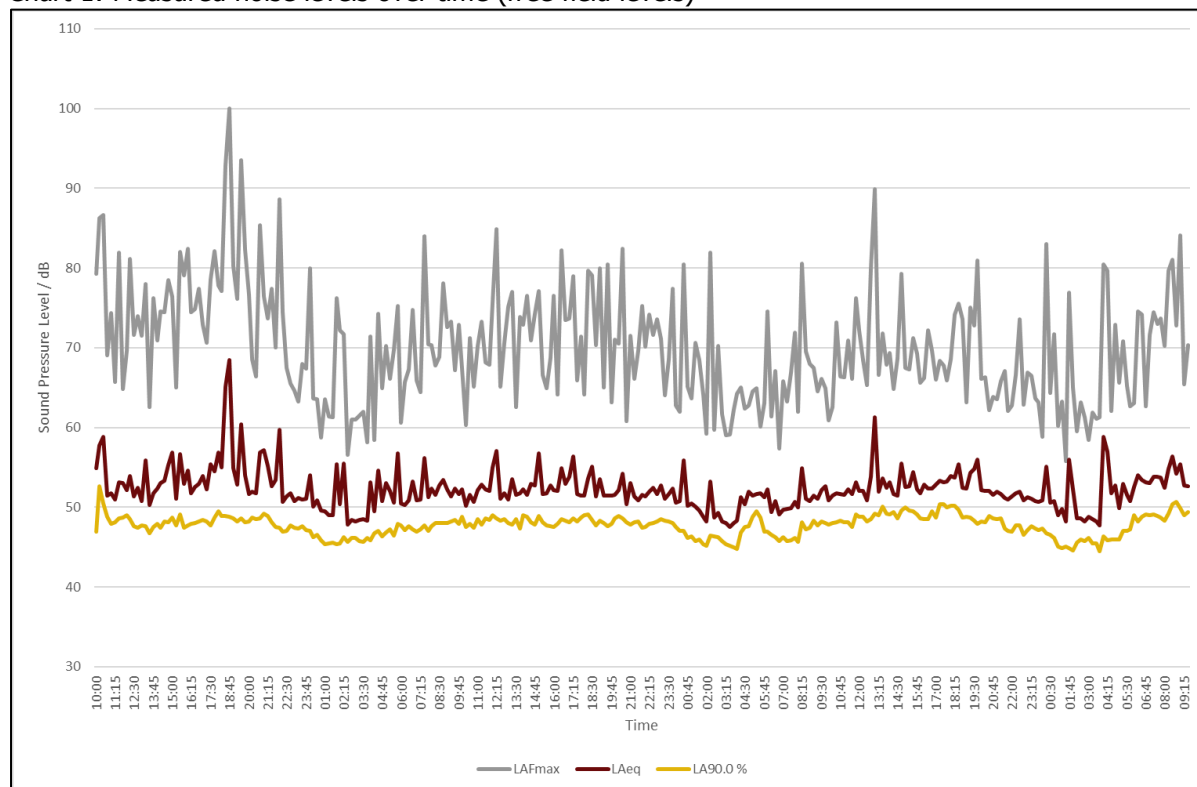
Figure 2: Monitoring Location



5.4. Measured Noise Levels

The chart below details the measured maximum (L_{AFmax}) equivalent ($L_{Aeq, 15 \text{ minutes}}$) and background ($L_{A90, 15 \text{ minutes}}$) over the duration of the survey period.

Chart 1: Measured noise levels over time (free field levels)



The table below summarises the measured noise levels over the periods of proposed extension of operational hours. Please note that we have considered Friday & Saturday nights as weekend nights and Sunday nights as weekday nights.

Table 4: Summary of measured noise levels over (free field)

Period		Background, dB L_{A90}		Equivalent, dB L_{Aeq}	
		Range	Typical	Range	Typical
Weekday	Daytime, L, 1 hour (22:00 – 23:00)	-	47	-	55
	Night Time, L, 15 min (23:00 – 07:00)	45 - 49	46	48 - 59	51
Weekend	Daytime, L, 1 hour (22:00 – 23:00)	47 - 48	47	51 - 52	52
	Night Time, L, 15 min (23:00 – 07:00)	45 - 50	47	48 - 57	51

6. Noise Modelling

6.1. Expected Site Traffic

To predict the number of vehicles entering the site during the proposed extension of operational hours, we were provided with transaction counts for the existing Bounds Green service station and for a similar service station (Enfield Bush Hill) that is open 24 hours. It is assumed that all transactions included using the fuel pumps.

From the provided data of Enfield Bush Hill transactions, it was found that:

- Approximately 60% of the total number of customers that visited Enfield Bush Hill service station between 9pm & 10pm, visited the service station between 10pm & 11pm.
- Approximately 8% of the total number of customers that visited Enfield Bush Hill service station during daytime hours (07:00 – 23:00), visited the service station during night-time hours (23:00 – 07:00).
- Approximately 40% of the total night time customers visited the service station during its busiest hour.

Applying the above percentages to existing transaction counts of Bounds Green Service Station, we have predicted the following number visitations to the Bounds Green service station during the proposed extension of operational hours, shown in the table below.

Table 5: Expected visits to Bounds Green service station during proposed extended hours

Time Period	Expected Number of Visits
Daytime (22:00 – 23:00)	13
Night Time (23:00 – 07:00)	37
Busiest Night Time Hour	15

It is assumed that all visitors to the service station will use the fuel pumps.

6.2. Source Noise Levels

6.2.1. Fuel Pump

ACL have previously measured service station fuel pumps. Sound pressure levels from fuel pumps do not typically tend to have lots of variation. As such, 62 dB $L_{Aeq, T}$ at a 2-metre distance is considered representative of the fuel pumps in use at Bounds Green service station.

It is understood that, to fill up a typical car with fuel, it takes approximately 2 minutes.

6.2.2. **Vehicular Traffic**

ACL have previously measured cars moving at slow speeds in car parks, etc. A car moving at 10 kmph is typically 56 dB $L_{Aeq, T}$ at 5 metres. This is considered representative of traffic moving through the service station.

6.2.3. **Fixed Plant**

It is understood that existing fixed plant associated with the service station runs 24/7. The client should confirm that, with the proposed extension to operational hours, there will be no change to plant operations at the site.

6.3. **Modelling Parameters**

To determine noise levels across the site, noise modelling has been undertaken using computer modelling package Cadna:A by DataKustik and the plant noise data noted above. Calculations are undertaken using the General Method of Calculation from ISO 9613. The models are available on request.

- All buildings are considered reflective, and third order reflections have been calculated.
- The heights of all existing buildings have been determined from google street view and on-site observations.
- The ground surrounding the site has been modelled as hard and reflective.
- The noise map is predicted for a 1x1 metre grid at a height of 1.5 meters above the ground during the day (22:00 – 23:00) and at a height of 4.5 metres during the night (23:00 – 07:00).
- The surrounding topography has been determined as flat.
- Noise levels on the existing NSR building façade are the highest levels determined at façade.
- The existing boundary walls have been modelled and are considered hard and reflective.
- Fuel pumps have been modelled as point sources at a height of 1 metre.
- Vehicle movements have been modelled as moving point sources in an assumed transport path considered reasonable with the existing site layout.
- Vehicle trip counts through the site have been determined from the site traffic predictions within section 6.1.
- Noise levels from sources are as described in section 6.2. Noise levels from fuel pumps have been time corrected to the respective assessment period.

Figure 3: Noise propagation during the daytime hours of 22:00 - 23:00, L_{Aeq} , 1 hour

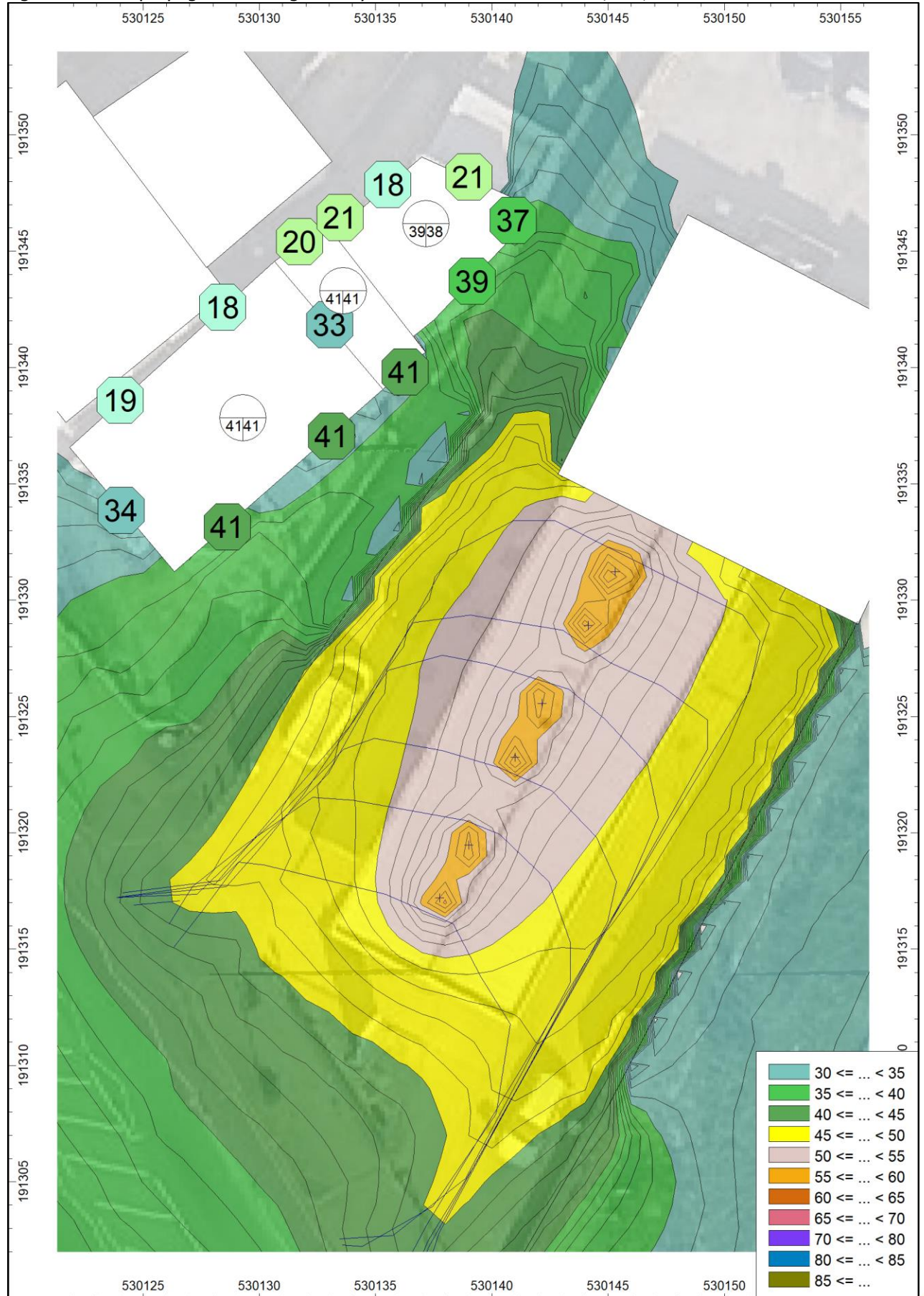
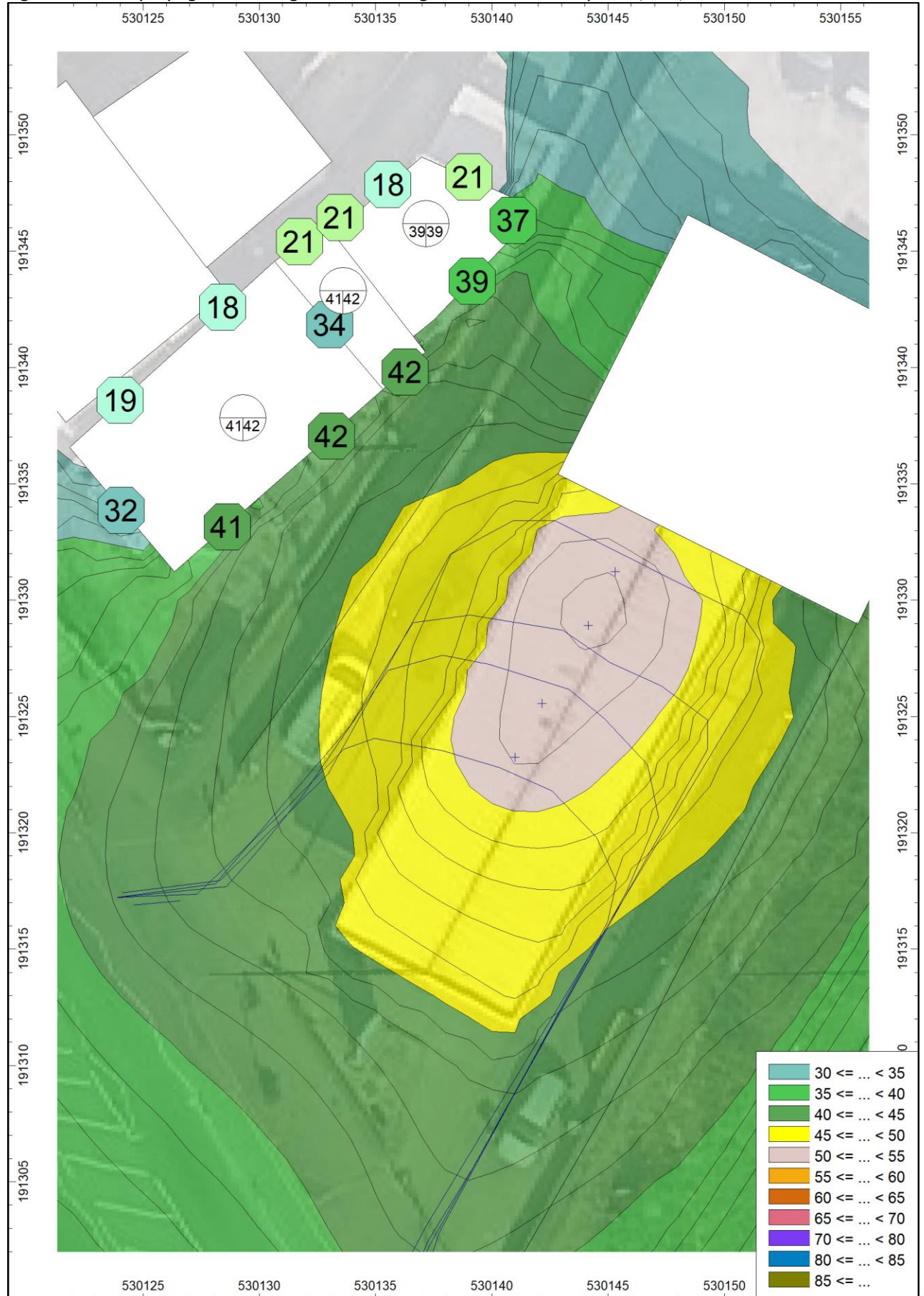


Figure 4: Noise propagation during the busiest night time 15 minute period, L_{Aeq} , 15 minutes



7. British Standard 4142 Assessment

7.1. Initial Estimate of Impact

A British Standard 4142:2014+A1:2019 assessment has been undertaken at the existing noise sensitive receivers on the site.

7.1.1. Background Noise Level and Sound Level Criteria

Background noise levels for the proposed extension of hours have been determined from the measured data detailed in Section 5.4.

7.1.2. Predicted Specific Sound Level

The specific sound level at the NSR, is 41 dB $L_{Aeq, 1 \text{ hour}}$ during the daytime period of 22:00 – 23:00 and 42 dB $L_{Aeq, 15 \text{ minutes}}$ during the busiest night time period.

These are the levels determined at the noise sensitive receiver without any character corrections applied.

7.1.3. 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. The corrections are as follows:

- *Tonality* – Traffic or petrol pumps are not normally tonal in nature. No correction for tonality has been applied.
- *Intermittency* – Intermittency is expected to be somewhat perceivable at the NSR. A character correction of +3 dB is required for intermittency.
- *Impulsivity* – The impulsive noise of shutting a car door is expected to be perceivable at the receiver. A character correction of +3 is required for impulsivity.
- *Other Sound Characteristics* – We do not believe any correction is necessary for other sound characteristics.

7.1.4. Initial Estimate

Therefore, the British Standard 4142:2014 initial estimate at the NSR is as follows.

Table 6: British Standard 4142:2014 initial estimate for existing & proposed NSRs

Parameter	Weekday		Weekend	
	Daytime, 10pm – 11pm	Night Time, 11pm – 7am	Daytime, 10pm – 11pm	Night Time, 11pm – 7am
Background Sound Level, $L_{A90, T}$	47 dB	46 dB	47 dB	47 dB
Specific Sound Level, $L_{Aeq, T}$	41 dB	42 dB	41 dB	42 dB
Character correction	+6 dB	+6 dB	+6 dB	+6 dB
Rating Level, $L_{Ar(T)}$	47 dB	48 dB	47 dB	48 dB
Excess of rating over background level	0 dB	+2 dB	0 dB	+1 dB

During both weekdays and weekends, rating noise levels at the NSR will be of low impact during the day (22:00 – 23:00) and have low impact during the night when assessed to BS4142.

However, the context of the site must also be considered.

7.2. Context

With regard to context, British Standard 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".

7.2.1. Residual Sound Levels

- 1) *"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."

The night time typical free-field residual sound level is 51 dB $L_{Aeq, 15 \text{ minutes}}$

The predicted specific sound level is 42 dB $L_{Aeq, 15 \text{ minutes}}$. This is 9 dB below the residual sound level, and as such, the specific sound level is not expected to be an incongruous sound by comparison to the acoustic environment.

It should also be of note that the proposals are within an urban acoustic environment and as such, noise character from vehicular movements and events (such as shutting car doors) is not expected to be distinguishable above the residual noise climate.

This suggests noise will have no impact to the existing noise sensitive receivers during the proposed extension of operational hours when residual sound levels are considered.

7.3. **Summary of Assessment**

With context considered, we would consider the noise impact of service station activities during the proposed extension of operational hours, to fall within the Low Observed Adverse Effect Level (LOAEL) of the NPPG and NPSE. Noise from the proposals, during the proposed extension of operational hours, would not cause a change in behaviour or attitude and achieves the aims of the National Planning Policy Framework (NPPF).

8. Summary & Conclusions

Petrogas Group UK Limited appointed Acoustic Consultants Limited (ACL) to undertake a noise impact assessment proposed extension of operational hours for Bounds Green service station.

A baseline noise survey was completed, and background noise levels representative of the nearby noise sensitive receiver were obtained.

Using transaction counts of existing service stations and representative field noise measurements, a noise model was made to predict the specific sound level of the service station's commercial activities at the NSR, during the proposed extension of operational hours.

The BS4142 initial estimate of impact suggests that noise, with character corrections, from the service station will have low impact upon the nearest NSR during the proposed extension of operational hours.

With context considered, noise from the proposals, during the proposed extension of operational hours is not expected to be distinguishable above the residual noise climate and as such, noise would not cause a change in behaviour or attitude and achieves the aims of the National Planning Policy Framework (NPPF).

9. Appendix 1 – Glossary of Acoustic Terminology

A-weighted sound pressure p_A – 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 μ Pa)

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, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

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

where:

p_0 is the reference sound pressure (20 μ Pa); 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, $L_s = L_{Aeq,T_r}$ – 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_{A,r,T_r} – 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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