INFINITY ACOUSTICS

Noise Assessment

Former Morrisons Service Station,

Ruthin Road,

Wrexham,

LL13 7UA



Project Description:

BS4142 Assessment of a Petrol Filling Station Due to Extension of Operational Hours

Project Reference Number:

A198MF

Version Number & Amendment Tracker:

001 – Original Version

002 – Amended Planning App Number, Extended Operational Times to 23:00

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1. Introduction

1.1 Infinity Acoustics Ltd has been appointed to undertake a noise assessment to analyse the potential impact due to the extension of operational hours at the Former Morrisons Service Station, Ruthin Road, Wrexham, LL13 7UA.

1.2 The existing operational hours approved by the local planning authority Wrexham County Borough Council in application P/2010/0883 are 07:00 – 23:00 Monday to Saturday and 08:00 – 23:00 on Sundays

1.3 The client will be submitting an application to vary the operational hours of the site to Wrexham County Borough Council. It is proposed that the operational hours of the site be altered to 06:00 – 23:00 Monday to Sunday 7 days a week. It is understood that the application relates solely to forecourt operations and does not relate to any of the car washing or valeting activities associated with the site.

1.4 The aim of the noise survey and assessment below is to provide the relative information to assist the client and local planning authority in approving the planning application specifically in relation to the noise impacts from the site. The noise levels at the site will be measured and assessed according to the relative standards and noise control measures will be provided where necessary to ensure the amenities of the nearby residents can be protected from any potential noise impact caused by the development. Before the installation of any noise control measures or sound insulation works outlined in this report, the contents of this report should be fully approved by the local authority.

1.5 The following noise assessment will be undertaken with reference to the Planning Policy Wales 2018 Edition 10 and Technical Advice Note 11 – Noise as well as the following standards.

1.6 BS4142:2014+A1:2019 - Methods for Rating and Assessing Industrial and Commercial Sound.

BS4142 is a British Standard that provides guidance and a standardised methodology for assessing industrial and commercial noise sources. BS4142 outlines methods for defining specific sound levels from a given development and/or noise source. Rating penalties are then applied to account for the acoustic characteristics of the noise source. Rating penalties can be applied for the following:

- Tonality
- Impulsivity
- Intermittency

Using the subjective method, the penalties vary in magnitude depending on how perceptible the acoustic characteristic is to the human ear. The rating noise level is then compared to the underlying L_{A90} background sound level of the area without the source under assessment operating to assess the likely noise impact. The level by which the rating noise level exceeds the background L_{A90} defines the potential for noise impact. The table below outlines the relevant criteria bandings described in BS4142.

Description	Impact Rating
Rating noise levels +10 dB above the background	Significant adverse impact, depending on the context.
Rating noise levels +5 dB above the background	Adverse impact, depending on the context.
Where the rating level does not exceed the background	Low impact dependent on Context

Table 1.0 – BS4142 Noise Criteria

This methodology will be used to assess the noise from the petrol filling station during the proposed extended operational hours.

1.7 WHO Guidelines on Community Noise

The general noise criteria used in the assessment will be obtained from the World Health Organisation Guidelines on Community Noise. This document outlines specific absolute noise criteria at which community noise incident on a residential receiver could be considered to cause annoyance and potentially be detrimental to health. The W.H.O Guidelines define community noise as noise emitted from all sources in the community other than that within the industrial workplace given this, it is deemed that these criteria are appropriate to assess the noise from the petrol station. An overview of the criteria is outlined below:

Location	Criteria	Description
Inside Dwellings Day	>35 dB $L_{Aeq,16hour}$	Adverse effects on speech intelligibility and moderate annoyance.
Inside Dwellings Night	>30 dB $L_{Aeq,8hour}$ >45 dB $L_{Afmax,t}$	Adverse effects on speech intelligibility and moderate annoyance. Sleep disturbance

Table 2.0 – W.H.O Noise Criteria

The criteria above will be utilised as supplementary noise criteria to provide further context to the BS4142 Assessment.

1.8 *IEMA Guidelines for Noise Impact Assessments*

The IEMA Guidelines for Noise Impact Assessment specify general methods for assessing noise and the potential for noise impact. Specifically, this guidance can be used to assess the potential impact of noise sources for which there are no specifically designed standards or guidance or to provide further context to a noise assessment. In order to assess the potential for noise impact these guidelines outline an approach whereby the increase or change in noise levels in the assessment area due to the operation of the new source or development is calculated. The magnitude by which the ambient acoustic environment increases directly relates to the potential for noise impact. The table below indicates the significance of changes in noise levels in incremental intervals.

IEMA Guidelines for Noise Impact Assessment Criteria	
Effect Description	**Definition**
None / Not significant	Less than 2.9dB L_{Aeq} change in sound level and/or all receptors are of negligible sensitivity to noise.
Slight	A 3dB to 4.9dB L_{Aeq} change in sound level at a receptor of some sensitivity.
Moderate	A 3dB to 4.9dB L_{Aeq} change in sound level at a sensitive or highly sensitive receptor, or a greater than 5dB L_{Aeq} change in sound level at a receptor of some sensitivity.
Substantial	Greater than 5dB L_{Aeq} change in sound level at a noise-sensitive receptor, or a 5dB to 9.9dB L_{Aeq} change in sound level at a receptor of high sensitivity to noise.
Severe	Greater than 10dB L_{Aeq} change in sound level at a receptor of high sensitivity to noise.

Table 3.0 – IEMA Guidelines on Noise Impact Assessment Criteria

The above assessment will be used to provide further context to the initial BS4142 Assessment.

2. Site & Surroundings

2.1 The proposed development site is situated to the west of Wrexham town centre the surrounding area is a mixture of commercial units and residential dwellings. In general, the area surrounding the site could be considered suburban.

2.2 To the south of the site is High Street which facilitates moderate to high levels of road traffic flow throughout the day time period.

2.3 There are multiple commercial units in the direct verticity of the site including the main Morrisons Store which operates between 06:00 – 22:00 Monday to Saturday and 10:00 – 16:00 on Sundays, Aldi 08:00 – 22:00 Monday to Saturday and 10:00 – 16:00 on Sundays, Wrexham Central 09:30 – 16:30 and Trading Standards which operates between 09:00 – 17:00.

2.4 The filling station itself has no.6 double-sided pumps and provides facilities for 12 cars to fill with fuel at any one time. The pumps were identified as No.6 Global Star C33 Fuel Dispensers.

2.5 To the south of the kiosk building, there is no.1 chiller unit. No other external mechanical plant units such as air conditioning were noted. It is assumed this chiller unit already operates 24 hours a day and activates in relation to the temperature of the internal fridge units. Given this, this will not be included in the assessment below.

2.6 The petrol filling station and the closest residential dwellings are highlighted in the figure below:

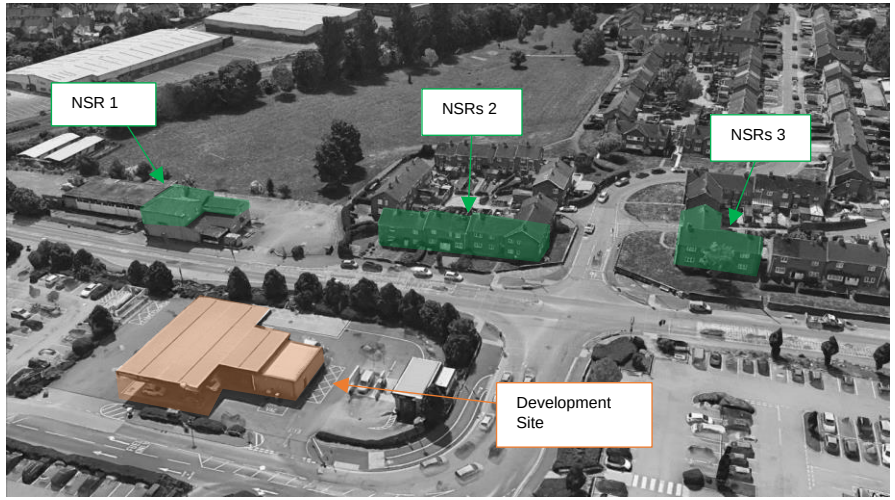


Figure 1.0 – Site and Surroundings

2.7 As highlighted in the figure above the closest existing residential dwellings to the site are located to the south of the development the closest of which are the first-floor flats above the nearby public house approximately 37m from the forecourt.

2.8 Given the proximity of these existing dwellings to the site they will be considered the closest Noise Sensitive Receptors (NSRs) in the subsequent assessment. Should low impact be indicated in these locations it is assumed that low impact would also occur at all other surrounding NSRs due to the greater intervening distance between source and receiver.

2.9 In summary, the noise sources identified at the site are as follows and will be included in the subsequent noise assessment. Vehicle Movements, Petrol Pumps, Noise From Car Radios, Tyre Pumps, Car Door Slams and Tannoy Speakers.

3. Survey

3.1 A noise survey of the site was undertaken between Thursday the 29th of August and Monday the 2nd of September 2024.

3.2 The following equipment was used to undertake the noise survey. All equipment used was field-calibrated with a drift of less than 0.1 dB before and after the measurement. Calibration certificates for the equipment can be provided upon request.

- SVAN 971A Class 1 Sound Level Meter – SN – 139411
- SVAN SV33B Class 1 Calibrator – SN – 122241

3.3 The long-term noise meter and associated microphone at Measurement Location 1 (ML1) were located 2.7m from the ground and attached to a lamppost in proximity to the Noise Sensitive Receptors. The location was at a similar distance to the nearby road as the NSRs and as such the background sound levels at this location are deemed representative of those at the closest NSRs. The location of the monitoring position can be found in Appendix B.

3.4 Further spot noise measurements of various activities at the site have been undertaken. In these instances, the noise meter was positioned in proximity to the noise source and 1.5m from the ground.

3.5 The weather during the setup of the equipment is outlined below:

- 18.0 Degrees Celsius
- NNW wind with speeds of 1.5m/s
- Low cloud cover and no precipitation

During the collection of the equipment, the weather was.

- 21.7 Degrees Celsius
- NNE wind with speeds of less than 2.9m/s.
- Partial cloud cover and no precipitation

3.6 Generally, the weather across the majority of the survey complied with the requirements of BS 7445-2. A full weather summary for the duration of the survey is outlined in the table below and has been taken from the nearest functioning weather stations.

**Periods of increased rain between on the 1st of September between 20:45 – 21:00 are not included in the BS4142 assessment below.*

Weather Data	
Description	**Data**
Temp (C)	7.9 – 22.8
Rain Fall (mm)	0.0 – 21.0*
Wind Speed (m/s)	0.0 – 6.2
Prevailing Wind	W

Table 4.0 – Weather Data

3.7 The summary results of the noise survey are presented in the table below and will be used in the subsequent Noise Assessment.

16 & 8 Hour Results ML1				
Date	**Time Period**	**$L_{Aeq\ (dB)}$**	**$L_{Afmax\ (dB)}$**	**$L_{A90(dB)}$**
Day – 29/08/2024	12:15 – 23:00	60.0	82.0	51.0
Night – 29/08/2024	23:00 – 07:00	54.0	79.0	44.0
Day – 30/08/2024	07:00 – 23:00	61.0	86.0	51.0
Night – 30/08/2024	23:00 – 07:00	53.0	80.0	41.0
Day – 31/08/2024	07:00 – 23:00	61.0	96.0	49.0
Night – 31/08/2024	23:00 – 07:00	54.0	83.0	40.0
Day – 01/09/2024	07:00 – 23:00	61.0	89.0	50.0
Night – 01/09/2024	23:00 – 07:00	54.0	78.0	42.0
Day – 02/09/2024	07:00 – 15:15	62.0	86.0	53.0

Table 5.0 – Noise Survey Data ML1

3.8 The proposed operational hours are 06:00 – 23:00 every day of the week. Given this, the extension of operating hours relates to additional daytime operations on Sundays between 07:00 – 08:00. There will also be an additional hour of operation during the nighttime period between 06:00 – 07:00 each day. Given this, both daytime and nighttime BS4142 assessments will be undertaken.

3.9 The table below presents the analysis of the L_{A90} background sound levels from the nighttime / early morning periods and additional daytime periods. The background sound levels are taken from the periods when the petrol station is due to operate but doesn't currently operate and/or periods just before and after the periods of operation to ensure the background sound levels used in the assessment are free from petrol station noise generated by existing operations.

L_{A90} Background Sound Level Analysis				
Time Period	**Min $L_{Aeq\ (dB)}$**	**Average $L_{A90,15min}$**	***SMR $L_{A90,15min}$**	**Range of $L_{A90,15min}$**
Day Time	54.0	40.0	**40.0**	**40.0** – 41.0
Night / Early Morning	51.0	41.0	41.0	**37.0** – 45.0

Table 6.0 – L_{A90} Analysis

**Statistically Most Repeated*

3.10 The lowest statistically most repeated L_{A90} value in the daytime period of the proposed extended operation on Sundays is 40 dB. This level also matches the lowest measured L_{A90} level for the extended periods. The range of measured values is small and thus the statistically most repeated value is deemed representative. Therefore the background sound level of **40 dB L_{A90}** will be used in the daytime BS4142 Assessment below.

3.11 The lowest statistically most repeated background sound levels in the nighttime early morning periods prior to 07:00 is 41 dB $L_{A90,15min}$. However, to provide a robust and conservative assessment the lowest level of **37 dB L_{A90}** is deemed representative and will be used in the subsequent nighttime BS4142 Assessment.

4. Proposed Noise Control Measures & Management Plan

4.1 In order to ensure the noise impact from the petrol filling station is as low as possible a set of noise control measures and noise management processes have been devised.

4.2 The filling station should not operate outside of the proposed hours or 06:00 – 23:00 daily.

4.3 The tannoy system should not operate within the proposed extended hours of operation.

4.4 The fuel delivery time periods should remain the same and should not occur within the proposed extended hours of operation.

4.5 Any car washing, valeting, & hoovering facilities should only be used within the existing permitted hours of operation.

4.6 The two pumps closest to the NSRs should not operate during the proposed extended hours of operation. These pumps are indicated in the figure below:

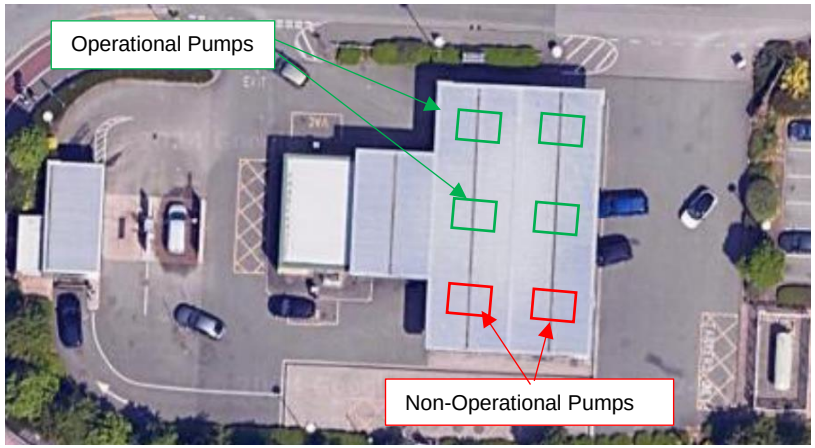


Figure 2.0 – Non-Operational Pumps

5. Computer Noise Model Results

5.1 A computer sound model of the site has been generated using DGMR Noise Prediction Software. This software undertakes calculations using the methods outlined in ISO 9613-2:1996 Attenuation of Sound During Propagation Outdoors. The model assumes the noise control measures in Section 4.0 have been implemented.

5.2 The results of the noise model can be found in the table below. Full noise contours, model assumptions and input noise levels can be found in Appendix D. The model when considering the proposed mutgation has assumed that there will be 24 cars per 1-hour daytime assessment period thus equating to 6 cars per pump per hour. The nighttime assessment has assumed 1 car per pump per 15-minute assessment period equating 4 cars in total. The L_{Afmax} assessment assumes three car doors shutting simultaneously.

Specific Noise Levels at NSR			
Location	**Day $L_{Aeq,1hour}$ Façade (dBA)**	**Night $L_{Aeq,15min}$ (dBA)**	**Night L_{Afmax} (dBA)**
NSR 1	34.0	32.0	53.0
NSR 2	32.0	31.0	51.0
NSR 3	27.0	26.0	46.0

Table 7.0 – Calculated Specific Noise Levels

5.3 The table above indicates that the expected specific noise levels from the site are low and would generally fall below the W.H.O Guidelines criteria for bedrooms when considering an open window at the NSR. This is a positive indication that the proposed extension of operational hours has a low potential for noise impact provided the recommendations in Section 4.0 of the report are implemented.

6. BS4142 Noise Assessment

6.1 The following section of the report assesses the noise from the petrol filling station during the proposed extended operational hours by undertaking a BS4142 Assessment. The assessment has been undertaken assuming all noise control measures outlined in Section 4.0 of the report have been implemented.

6.2 In order to establish the rating noise level for the assessment the following rating penalties have been applied:

+2 dB for tonality associated with pumps.
+3 dB for intermittent activity
+3 dB for impulsivity associated with car doors shutting/opening.

6.3 The daytime BS4142 Assessment is presented in the table below. To provide a robust and conservative assessment the assessment below considers the most exposed point on each NSR which is typically 1st floor level.

BS4142 Assessment Day			
Description	**NSR 1 (dB)**	**NSR 2 (dB)**	**NSR 3 (dB)**
Specific Noise Level at NSR	34.0	32.0	27.0
Rating Noise Level +8 dB	42.0	40.0	35.0
Background L_{A90}	40.0	40.0	40.0
Level Above Background	+2.0	0.0	-5.0

Table 8.0 – BS4142 Assessment – Day

6.4 The nighttime BS4142 Assessment is presented in the table below. To provide a robust and conservative analysis the assessment below considers the most exposed point on each NSR which is typically 1st floor level.

BS4142 Assessment Night			
Description	**NSR 1 (dB)**	**NSR 2 (dB)**	**NSR 3 (dB)**
Specific Noise Level at NSR	32.0	31.0	26.0
Rating Noise Level +8 dB	40.0	39.0	34.0
Background L_{A90}	37.0	37.0	37.0
Level Above Background	+3.0	+2.0	-3.0

Table 9.0 – BS4142 Assessment – Night

6.5 The BS4142 assessment indicates rating noise levels during the day would fall equal to or below the background sound level by -5dB at the NSRs 2 and 3 and during the nighttime – 3 below the background sound level at NSR 3. When assessed in accordance with BS4142 this would equal 'Low Impact – Dependent on Context'.

6.6 The BS4142 at NSR 1 during the day and NSR 1 and 2 during the nighttime period indicates rating noise levels would fall +2 to +3 dB above the background sound level. This falls below the level at which BS4142 states Adverse Impact would occur. A review of the outcome in relation to the criteria outlined in TAN 11 indicates that when Rating Noise levels fall below 5 dB above the background sound level noise complaints are unlikely and are of 'Marginal Significance'. This would indicate the noise from the development would likely not cause noise complaints considering the wider context of the assessment.

6.7 BS4142 stipulates that the context of the assessment should be fully considered when considering the potential for noise impact. The important context surrounding the assessment is as follows:

1) The overall magnitude of the specific noise levels and rating noise levels is relatively low and the W.H.O Guideline Criteria for bedrooms during the night would be readily achieved when considering an open window at the NSR. The W.H.O. criteria for bedrooms would also be readily achieved.

2) The noise from the petrol station is not a wholly new noise source being introduced into the area and therefore residents will likely have a higher tolerance level to petrol station noise than typical thus lowering the potential noise impact.

3) The assessment is considered a worst-case scenario including, a car arriving with a loud radio, and a tyre pump. It is apparent that the vast majority of the time noise levels from the site will be lower due to lower activity levels than what has been used in the assessment scenario. For large periods of time during the extended hours, it is apparent that the tyre pump and car radios may not be active.

7. Increase In Ambient Noise Level Assessment

7.1 To provide further context to the assessment above an increase in ambient noise levels assessment has been undertaken at the most exposed NSR.

7.2 The increase in ambient noise level assessment is undertaken by logarithmically adding the specific noise level from the site to the ambient noise levels during the proposed extended hours of operation. The higher the increase in noise levels the higher the likely noise impact.

7.3 The increase in ambient noise level assessment is outlined in the table below.

IANL Assessment		
Description	**Day Most Exposed NSR (dB)**	**Night Most Exposed NSR (dB)**
Specific Noise Level at NSR	34.0	32.0
Lowest Measured $L_{Aeq,15min}$	54.0	51.0
Resulting Noise Level	31.0	51.1
Increase in Noise Level	+0.0	+0.1
Impact Rating	‘None’	‘Not Significant’

Table 10.0 – IANL Assessment

7.4 When assessed in accordance with the IEMA Guidelines on Noise Impact the increase in ambient noise levels due to the extension of operational hours at the site will be ‘None’ to ‘Not Significant’ at the most exposed NSRs. This is a strong indication that the proposed extension of operational hours will not cause a significant impact on the surrounding NSRs.

8. Open Window Assessment - LAfmax

8.1 To further assess the potential for impact during the nighttime periods an L_{Afmax} Car Door Slam Open Window Assessment has been undertaken at the most exposed NSR in order to analyse a worst-case scenario.

8.2 The assessment below assumes a nominal 15 dB attenuation of an open window at the NSR as well as three car door slams occurring simultaneously at the development site which is unlikely. This is deemed a robust and conservative assessment methodology and scenario.

L_{Afmax} Assessment	
Description	**Most Exposed NSR (dB)**
Car Door Slam L_{Afmax} Noise Level at NSR	53.0
Attenuation from an Open Window	-15.0
Internal Noise Level in Bedroom NSR	38.0
W.H.O Criteria Bedrooms Night L_{Afmax}	45.0
Level Below Criteria	-7.0

Table 11.0 – Open Window Assessment

8.3 The assessment above indicates that all internal noise criteria can be achieved within the bedroom of the most exposed NSR when considering L_{Afmax} events from car door slams and an open window. This indicates that the development would have a low impact on the NSR.

9. Conclusion

9.1 In conclusion, a noise survey has been undertaken at the Former Morrisons Service Station, Ruthin Road, Wrexham, LL13 7UA.

9.2 The noise levels obtained during the survey have allowed a noise assessment to be undertaken in order to assess the potential noise impact on the surrounding dwellings due to the extension of operating hours at the filling station.

9.3 A set of noise control measures and a brief noise management plan have been outlined in Section 4.0 of the report. The measures have been devised to ensure the noise impact from the development is as low as possible.

9.4 BS4142 and IEMA Noise Assessments were undertaken and are presented in Sections 6.0 and 7.0. A further L_{Afmax} assessment was undertaken in Section 8.0. The assessments indicate that provided all recommendations and noise control measures are implemented suitable noise criteria can be achieved and noise levels would fall below the level at which adverse impact would expected.

APPENDIX A – List of Terms and Glossary

The following section of the report outlines a glossary of terms used in the assessment to assist the reader in understanding the assessment above which is by necessity technical in nature.

Decibel DB - The decibel often denoted as dB is the logarithmic unit used to describe the magnitude of sound or noise levels. The typical range of sound pressure levels is from 0 dB, defined as the threshold of hearing to 120dB defined as the threshold of pain.

Frequency Hz – As well as the decibel sound and noise is also measured and defined in frequency. Frequency or Hertz (Hz) is an expression of the number of cycles a sound wave will complete per second. Lager frequencies may be expressed in Kilo Hertz (kHz). The typical range of human hearing is from 20 Hz to 20,000Hz however with age the audible frequency range decreases in most humans.

A - Weighting – The A-weighting is the most commonly used weighting curve taken IEC 61672:2003 and is applied to sound pressure level measurements. The A-weighting is applied to measured sound levels to account for the loudness perceived by the human ear, as the ear is less sensitive to low audio frequencies.

LAeq - The A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over any given time period. L_{Aeq} is the level of a continuous noise that has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. The A-weighting represents a curve that is applied to the measured noise levels to represent the way the human auditory system perceives sound.

LAfmax - The maximum A-weighted noise level that was recorded during the monitoring period using a fast time weighting. This acoustic parameter represents more transient sound levels within the acoustic environment which may only occur for a few seconds or minutes.

LA10 - This is the A-weighted noise level exceeded for 10% of a given time period. This parameter is typically used to measure and predict road traffic noise.

LA90 - This is the A-weighted noise level exceeded for 90% of any given time period. Generally, this acoustic parameter represents the underlying background sound level in a given area and doesn't generally include transient or short-term noise events that may occur within the surroundings.

Sound Pressure – Sound pressure is the difference between the instantaneous pressure at a point in the presence of a sound wave and the static pressure of the medium. Sound pressure fluctuates due to refractions and compressions of air molecules.

Sound Reduction Index – The sound reduction index denoted by the parameter 'R' is the laboratory-measured sound reduction given material or construction. R is measured in 1/3 octave band frequencies. The R_w sound insulation parameter stands for the weighted standardised sound reduction index and is a single-figure global rating of the sound insulation of a given material or construction.

APPENDIX B – Plans, Site Surroundings and Location

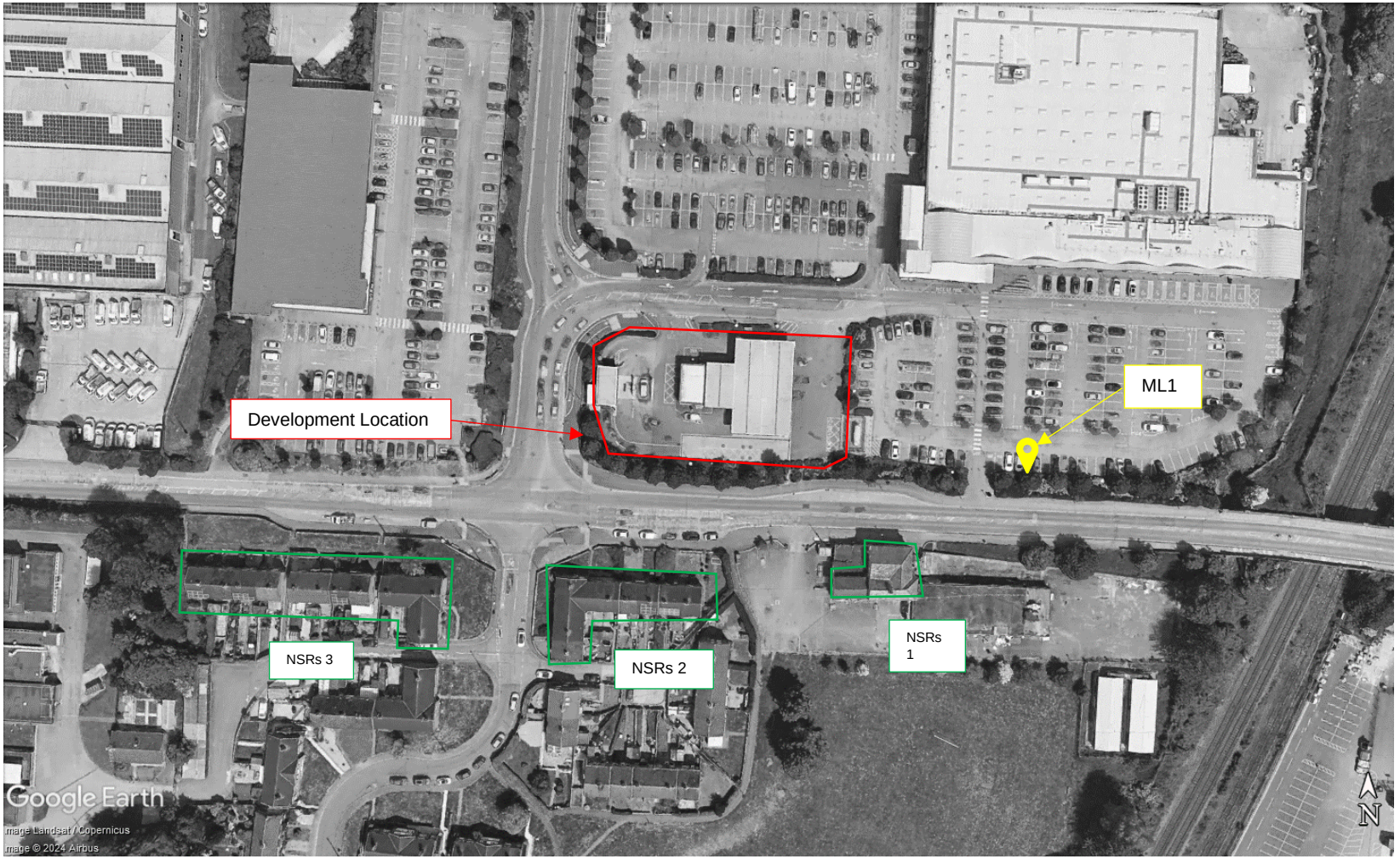


Figure 3.0 – Site and Measurement Location

APPENDIX C – Noise Survey History

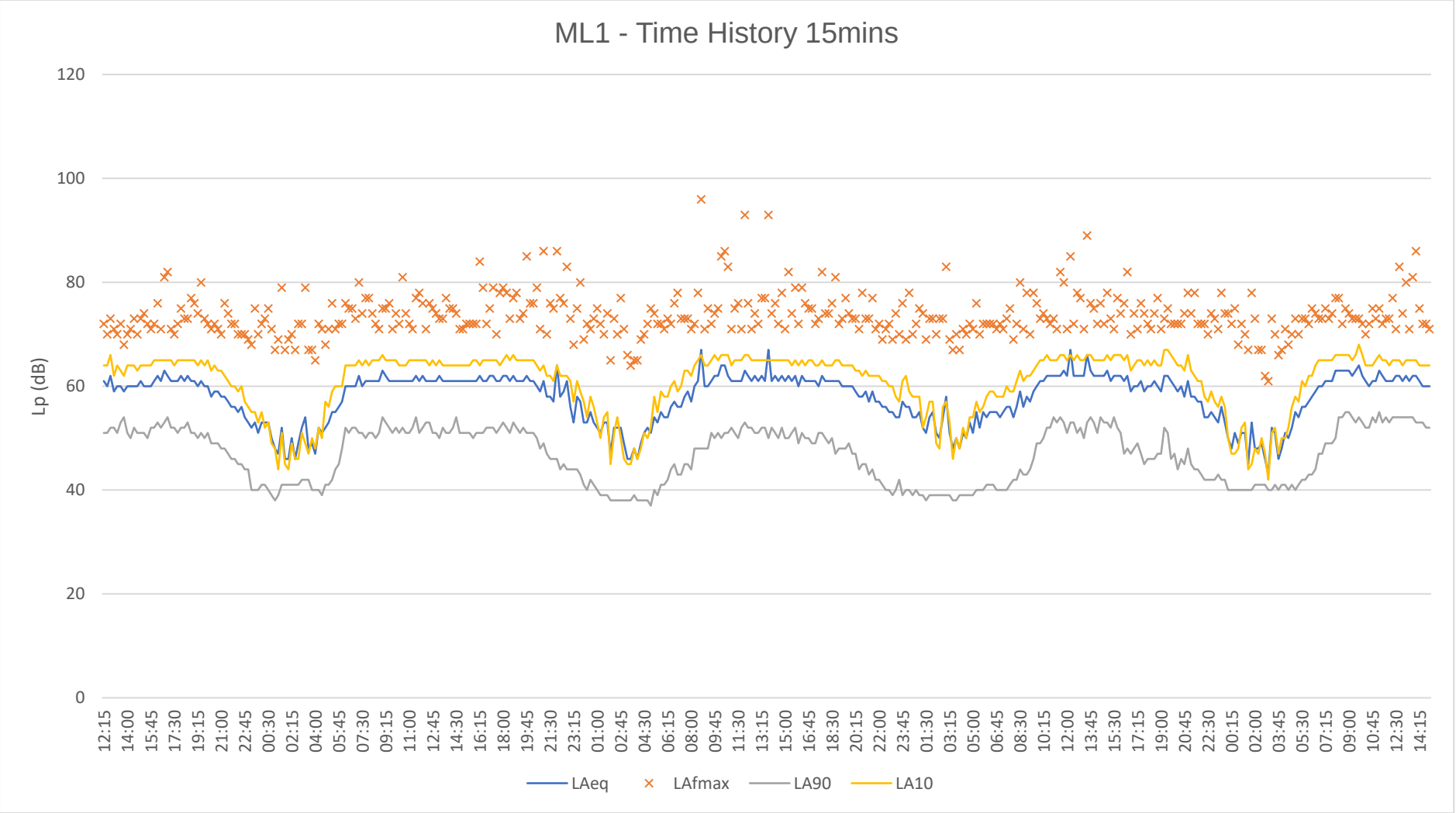


Figure 4.0 – Noise Survey Time History

APPENDIX D – Calculations and Noise Contours

D1 – Noise Contours and Model Assumptions

The following assumptions have been made within the computer sound model:

- The ground in the area has been considered primarily hard.
- The topography of the site and surrounding land has been taken from Google Earth and information gained on-site.
- The elevations and building heights have been obtained from information gained on-site.
- The fuel pumps have been inputted in the model as point sources at 1m from the ground.
- The vehicle movements to and from the filling station have been inputted into the model as line source/moving point sources at a height of 0.5m from the ground. The noise levels from each lane of traffic have been calculated based on the calculated sound power level of the total cars by the number of vehicles using each lane of traffic.
- The car with a loud radio has been inputted into the model as point sources approximately 1m from the ground.
- No.3 point sources have been inputted at a height of 1m to represent L_{Afmax} events from car door slams.
- The tyre inflation pump has been inputted into the model as a point source 1m from the ground.
- The sound power of each source has been calculated based on the octave band data of each operation measured on-site and stock data. Full noise source model input sound power calculations can be seen in Appendix D2 & D3.

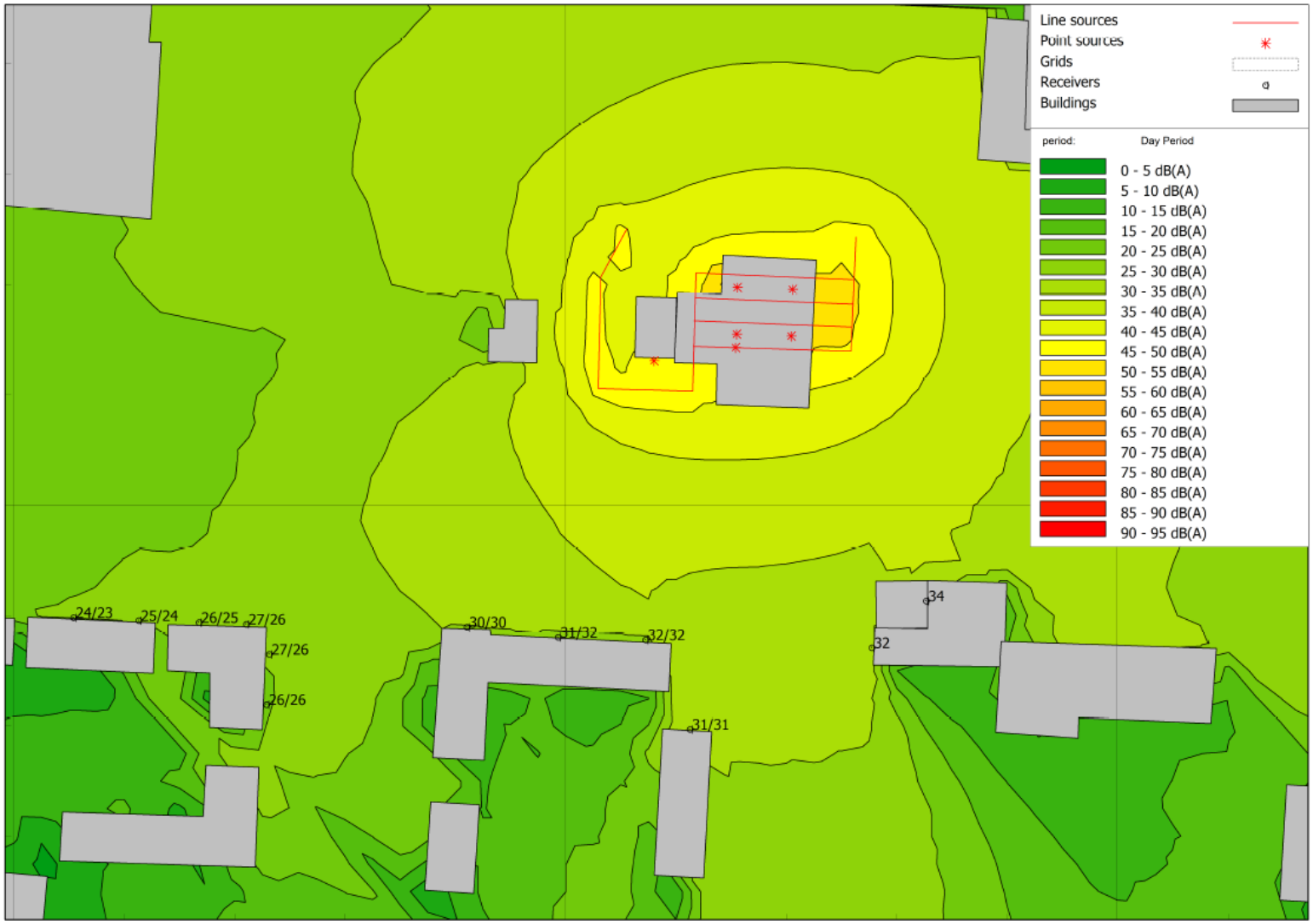


Figure 5.0 - $L_{Aeq,1hour}$ Specific Noise Levels - Day - 1.5m Contour Grid Height

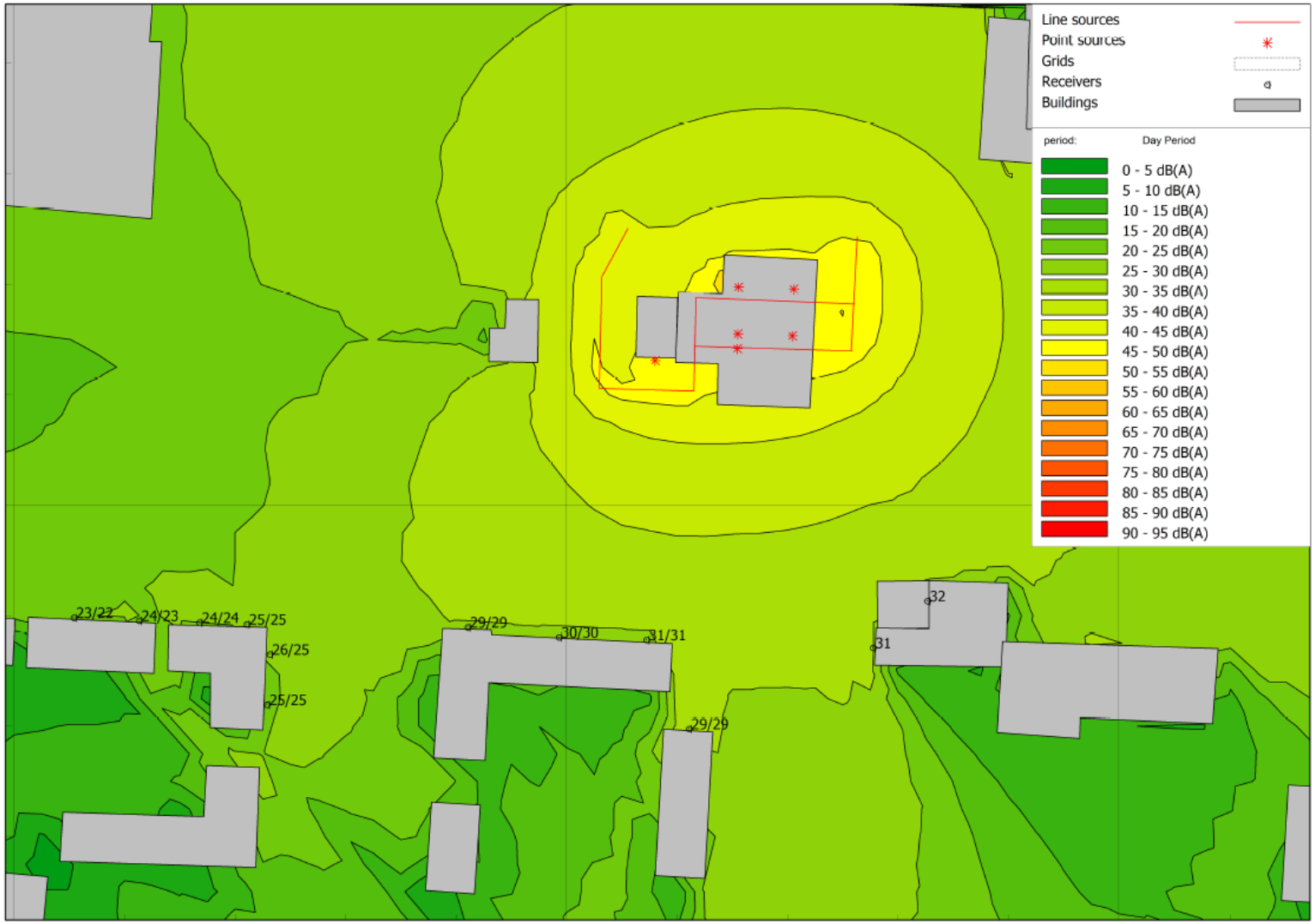


Figure 6.0 - $L_{Aeq,15min}$ Specific Noise Levels - Night - 1.5m Contour Grid Height

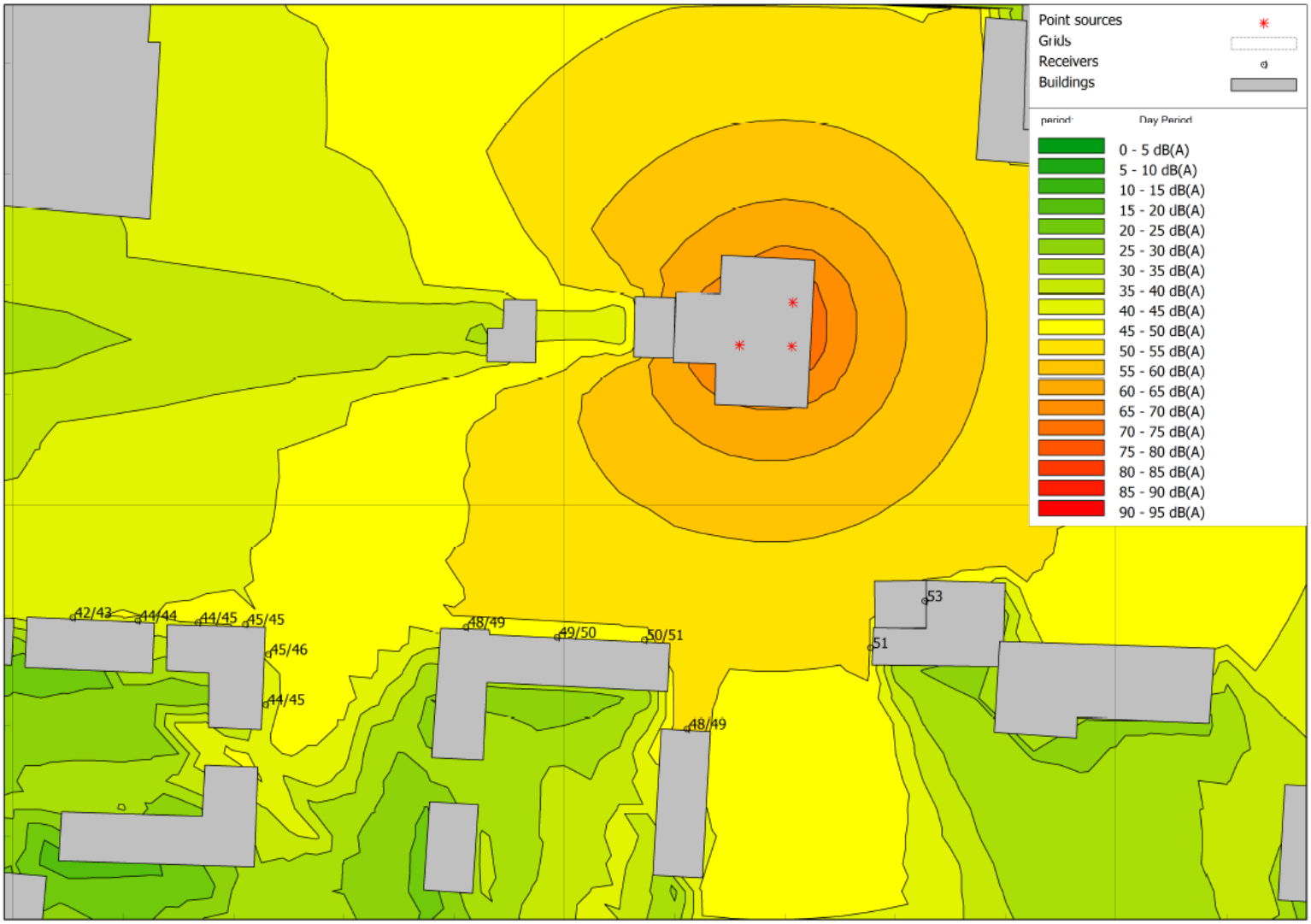


Figure 7.0 - L_{Afmax} Specific Noise Levels - Night - 1.5m Contour Grid Height

D.2 - Noise Model Input Calculations – Specific Source Levels

The table below presents the source noise data used in the assessment. The noise data below was obtained by specific noise measurement of operations and plant at the site as well as taken from Infinity Acoustics Sound Database of noise data obtained from other Morrison filling stations and manufacturers data.

Description	Global A (dB)	Z Weighted Octave Band Frequency (Hz) (dB)						
		63	125	250	500	1k	2k	4k
Car Pass/Pullup/Departure by 3m	60.0	68.0	60.0	60.0	58.0	55.0	53.0	50.0
Car Calculated Sound Power Q2	78.0	86.0	78.0	78.0	76.0	73.0	71.0	68.0
C33 Fuel Pump at Lp at 1m	69.0	67.0	65.0	64.0	65.0	65.0	61.0	58.0
C33 Fuel Pump Calculated Lw Q2	77.0	75.0	73.0	72.0	73.0	73.0	69.0	66.0
Car with Loud Radio Lp at 4m	56.0	72.0	64.0	56.0	51.0	49.0	48.0	44.0
Car with Loud Radio Calculated Sound Power Q2	76.0	92.0	84.0	76.0	71.0	69.0	68.0	64.0
Tyre Pump Lp at 1m	64.0	69.0	70.0	65.0	63.0	53.0	51.0	55.0
Tyre Pump Calculated Sound Power Q2	72.0	77.0	78.0	73.0	71.0	61.0	59.0	63.0
Tannoy Lp at 2m	80.0	65.0	66.0	71.0	78.0	72.0	75.0	69.0
Tannoy Calculated Sound Power Q2	94.0	79.0	80.0	85.0	92.0	86.0	89.0	83.0
Car Door Slam Lp at 1m	85.0	--	--	--	--	--	--	--
Car Door Slam Sound Power Q2	93.0	--	--	--	--	--	--	--

Table 12.0 – Specific Noise Level Measurements and Sound Power Levels

D3 – Model Inputs - On Time Corrections

In order to establish the number of vehicles using the site during the extended hours vehicle counts over a 15-minute period have been undertaken at three Morrisons petrol filling stations. It was found that on average there were 16 vehicle movements occurred per 15 minutes. Therefore over 1 hour, this would equate to up to 64 movements on average. The above vehicle movements were counted during peak daytime operational periods. The client has indicated that during the early mornings and evenings, there will be a significant decrease in movements with numbers dropping as low as 10 per hour daytime and 5 per hour at nighttime this is especially true when the main Morrisons store is not open. Therefore, for the number of vehicle movements used in the model between 06:00 – 07:00 the model will assume 1 car per pump per 15-minute period equating to 4 cars when considering the proposed mitigation. For the daytime assessment, it will be assumed there will be 6 cars per pump per hour equating to 24 cars per assessment period.

Vehicle Movement On-Time Correction Calculations						
Assessment Period	**Calculated $L_{wA\ (dB)}$**	**Total Dist (In and Out) (m)**	**Time to Cover Distance 10mph (mins)**	**no. Cars per Assessment Period**	**Total On-Time per Assessment Period (min)**	**Time Corrected L_{wA} (dB)**
Day 1 hour	78.0	103	0.5	24.0	12.0	71.0
Night 15min	78.0	103	0.5	4	2.0	69.0

Table 13.0 – On-Time Corrections Vehicle Movements

Fuel Pump On-Time Correction Calculations						
Fuel Pump Type	**Assessment Period**	**Calculated L_{wA} of Fuel Pump (dB)**	**Time to fill the car**	**Cars Per Pump**	**On-Time Per Pump (mins)**	**Time Corrected $L_{wA\ (dB)}$**
Helix 6000 C33	Day 1 hour	77.0	1.5min	6	9.0	69.0
	Night 15min	77.0	1.5 min	1	1.5	67.0

Table 14.0 – On-Time Corrections Fuel Pumps

Car Loud Radio On-Time Correction Calculations					
Assessment Period	**Calculated L_{wA} of Car Radio Loud (dB)**	**Time To Fill Car (Mins)**	**no. Cars**	**Total On-Time (Mins)**	**Time Corrected L_{wA} (dB)**
Day 1 hour	76.0	1.5	1	1.5	60.0
Night 15min	76.0	1.5	1	1.5	66.0

Table 15.0 – On-Time Corrections Car with Loud Radio

Tyre Pump On-Time Correction Calculations					
Assessment Period	**Calculated L_{wA} of Tyre Pump (dB)**	**Time To Fill Tyres (Mins)**	**no. Cars**	**Total On-Time (Mins)**	**Time Corrected L_{wA} (dB)**
Day 1 hour	72.0	1	2	2	57.0
Night 15min	72.0	1	1	1	60.0

Table 16.0 – On-Time Corrections Tyre Pump

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