

INFINITY ACOUSTICS

Noise Assessment

Former Morrisons Service Station,
Cold Harbour Road,
Graves End,
DA11 8AB



Project Description:

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

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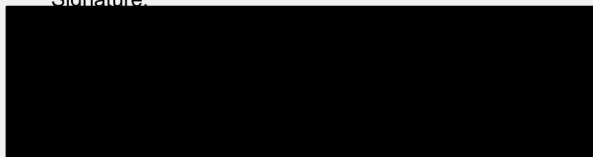
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1. Introduction

- 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, Cold Harbour Road, Gravesend, DA11 8AB.
- 1.2 The existing operational hours of the site between 06:00 – 22:30 Monday to Friday, 06:00 – 00:00 Saturday and 08:00 – 20:00 Sundays were outlined and approved by the local planning authority the Gravesham Council in a planning condition variation application reference 20161113.
- 1.3 The client will be submitting a further application to extend and vary the operational hours of the site to Gravesham Council. It is proposed that the operational hours of the site be extended to 06:00 – 22:00 Monday to Sunday 7 days a week. It is understood that the application relates solely to the operation of the petrol filling station and petrol filling activities and does not relate to the associated Carwash, Jet wash or valeting activities on 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 National Planning Policy Framework 2023 and the Noise Policy Statement for England 2010 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. BS4142 stipulates the context should be considered when defining the noise impact rating as the site is an existing development and is not a wholly new noise source in the area the following criteria are deemed appropriate. Should the rating noise levels from the petrol station fall below the background sound levels it is assumed that this would represent 'No Observed Effect Level' when assessed in accordance with the NPPF and NPSE. Should the rating noise levels from the petrol station fall below the level at which BS4142 states adverse impact would occur it is assumed this would equate to impact levels below the 'Lowest Observed Effect level' when assessed in accordance with the NPPF and NPSE.

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 of an industrial nature 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 $L_{Amax,t}$	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 on the outskirts of Gravesend and the general area surrounding the site is comprised of a mixture of commercial units and residential dwellings.
- 2.2 To the north of the site is Coldharbour Road which facilitates high levels of road traffic flow throughout the day time period. Road noise was deemed to be the dominant noise source in the area and all other noise sources were considered secondary.
- 2.3 There are multiple commercial units in the direct vicinity of the site including the main Morrisons Store which operates between 06:00 – 22:00 on weekdays and 10:00 – 16:00 on Sundays, Lidl which operates between 07:00 – 22:00 on weekdays and 10:00 – 16:00 on Sundays and Tile Station which operates between 08:00 – 18:00 among others.
- 2.4 The filling station itself has no.6 double-sided pumps providing facilities for 12 cars to fill with fuel at any one time.
- 2.5 To the rear of the kiosk building, there are a number of plant units including no.2 Hubbard chiller units and no.2 Dakin AC units. It is assumed that the no.2 chiller units already operate 24 hours a day and activate depending on the temperature of the internal fridge units. However, it is assumed that the Daikin RZQSG140L91B Unit and the Daikin RX20K5V1B9 Unit could operate at any time during the proposed extended operational hours and as such will 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 approximately 90m to the northeast and 120m to the northwest. It should also be noted that there is a care home with extension areas under construction on the opposite side of Coldharbour Road approximately 45m to the north of the site although not fully constructed yet this location was also identified during the site visit.

2.8 Given the proximity of these existing and proposed 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
- Tannoy Systems
- Noise From Car Radios
- Tyre Pumps
- Car Door Slams
- AC units

3. Survey

3.1 A noise survey of the site was undertaken between Friday the 21st of June 2024 and Monday the 24th of June 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 – 113251
- SVAN 958A Class 1 Sound Level Meter – SN - 69866
- Cassella CEL 120-1 Class 1 Calibrator – SN – 3864607

3.3 The long-term noise meter and associated microphone at Measurement Location 1 (ML1) were located 3m from the ground attached to a lamppost in proximity to the Noise Sensitive Receptors. The noise meter was located at a similar distance to the nearby roads as the noise sensitive receptors and as such the background sound levels at this location are deemed representative of those at the surrounding NSRs. The exact measurement location 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:

- 22.4 Degrees Celsius
- SW wind with speeds of 1.3m/s
- Low cloud cover and no precipitation

During the collection of the equipment, the weather was.

- 23.6 Degrees Celsius
- NNE wind with speeds of 1.8m/s
- Low 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 station.

Weather Data	
Description	Data
Temp (C)	9.3 – 26.7
Rain Fall (mm)	0.0 – 1.0*
Wind Speed (m/s)	0.0 – 3.5
Prevailing Wind	SSW
Mean Relative Humidity (%)	41.0 – 91.0

Table 4.0 – Weather Data

*Rain occurred 22/06/2024 – between 10:00 – 11:00 within existing operational hours of the development and thus not included within the assessment of background sound levels.

3.7 The summary results of the noise survey are presented in the table below and will be used in the subsequent Noise Assessment. As can be seen in the table below the noise levels day to day vary by just 1 dB throughout the survey and 2 dB night to night. The low variance in noise levels across the survey is indicative of road noise being the dominant feature in the environment as road noise is generally considered to be steady-state continuous noise.

16 & 8 Hour Results ML1				
Date	Time Period	L _{Aeq} (dB)	L _{Afmax} (dB)	L _{A90} (dB)
Day – 21/06/2024	12:15 – 23:00	61.0	89.0	58.0
Night – 21/06/2024	23:00 – 07:00	55.0	77.0	52.0
Day – 22/06/2024	07:00 – 23:00	60.0	93.0	57.0
Night – 22/06/2024	23:00 – 07:00	56.0	77.0	53.0
Day – 23/06/2024	07:00 – 23:00	59.0	84.0	55.0
Night – 23/06/2024	23:00 – 07:00	57.0	74.0	54.0
Day – 24/06/2024	07:00 – 14:30	60.0	84.0	56.0

Table 5.0 – Noise Survey Data ML1

3.8 The proposed extension to operational hours primarily relates to the extension of operational hours on Sundays. The proposal equates to an extension of 1 hour of operation in the nighttime (Early morning) period between 06:00 – 07:00 and an additional 3 hours of operation during the daytime between 07:00 – 08:00 & 20:00 – 22:00. Therefore the background sound levels used in the assessment will be taken from these periods.

3.9 The table below presents the L_{A90,15min} background sound level analysis for the proposed extended periods of operation during both the daytime and early morning/night time period.

Background Sound Level Results			
Time Period	Lowest L _{Aeq,15min} (dB)	SMR* L _{A90,15min} (dB)	Range of L _{A90,15min} (dB)
Nighttime 06:00 – 7:00	53.0	49.0	49.0 – 51.0
Daytime 07:00 – 08:00 & 20:00 – 22:00 (Sunday)	53.0	55.0	48.0 – 56.0

Table 5.0 – Background Sound Level Analysis

**Statistically Most Repeated*

3.10As can be seen in the table above the lowest measured L_{A90,15min} and the statistically most repeated L_{A90,15min} value in the nighttime period between 06:00 – 07:00 on Sunday is 49 dB L_{A90}. This level is deemed to be a robust and conservative baseline background sound level and will be used in the subsequent nighttime BS4142 Assessment.

3.11The statistically most repeated L_{A90,15min} value in the daytime period of the proposed extended operation is 55 dB. However, this value sits at the top of the measured range of values. Given this, a more robust and conservative L_{A90} value for daytime assessment is 50 dB L_{A90,15min}. The background sound level of the area was equal to or higher than this level for 73% of the time throughout the proposed extended daytime hours and thus is deemed to be a robust baseline for the daytime 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 these are outlined in the section below:
- 4.2 The filling station should not operate outside of the hours permitted hours or 06:00 – 22:00 on Sundays. Should the station need to operate outside of these hours then further assessment may be required.
- 4.3 The fuel delivery time periods should remain the same and should not occur within the proposed extended hours of operation.
- 4.4 Jet washing, car valeting and or hoovering facilities should only be used within the existing permitted hours of operation.

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 has assumed that there will be 4 cars per pump per 1 hour day time assessment period equating to 24 cars per hour and 6 cars per 15-minute night-time assessment period equation to 1 car per pump. The $L_{A_{fmax}}$ assessment assumes 3 simultaneous car door slams.

Specific Noise Levels at NSR			
Location	Day $L_{Aeq,1hour}$ (dBA)	Night $L_{Aeq,15min}$ (dBA)	Night $L_{A_{fmax}}$ (dBA)
NSR 1	34.0	35.0	51.0
NSR 2	38.0	39.0	56.0
NSR 3	32.0	33.0	49.0

Table 6.0 – 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 during the day and night when considering an open window at the NSRs. This is a positive indication that the proposed extension of operational hours has a low potential for noise impact.

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 BS4142 Assessment is presented in the table below to provide a robust and conservative assessment the assessment below considers the most exposed NSR.

BS4142 Assessment		
Description	Day NSR 2 (dB)	Night NSR 2 (dB)
Specific Noise Level at NSR	38.0	39.0
Rating Noise Level +8 dB	46.0	47.0
Background L_{A90}	50.0	49.0
Level Above Background	-4.0	-2.0

Table 7.0 – BS4142 Assessment

6.4 The BS4142 assessment indicates rating noise levels would fall a minimum of 2 dB below the background sound level at the closest NSR. Rating noise levels at NSR 1 and NSR 3 fall a further 4 to 6 dB lower than those used in the assessment above.

6.5 This outcome indicates 'Low Impact – Depending on Context' When assessed in accordance with BS4142 and when assessed in accordance with the NPPF and NPSE this would indicate 'No Observed Effect Level'.

6.6 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.
- 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.
- 3) The assessment is considered a worst-case scenario including, a car arriving with a loud radio, tyre pumps and tannoy system. 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.

6.7 Considering the context of the assessment any potential impact from the proposed extension of operational hours is likely lower than stated in the assessment.

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 NSR 2 (dB)	Night NSR 2 (dB)
Specific Noise Level at NSR	38.0	39.0
Lowest Measured $L_{Aeq,15min}$	53.0	53.0
Resulting Noise Level	53.1	53.2
Increase in Noise Level	+0.1	+0.2
Impact Rating	Not Significant	Not Significant

Table 8.0 – 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 'Not Significant'. Further to this when assuming the rating noise levels the increase in ambient noise levels would be 1dB this would also be classed as 'Not Significant'. 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 - L_{Amax}

- 8.1 To further assess the potential for impact during the nighttime periods an L_{Amax} 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_{Amax} Assessment	
Description	NSR 2 (dB)
Car Door Slam L_{Amax} Noise Level at NSR	56.0
Attenuation from an Open Window	-15.0
Internal Noise Level In Bedroom NSR	41.0
W.H.O Criteria Bedrooms Night L_{Amax}	45.0
Level Below Criteria	-4.0

Table 9.0 – Open Window Assessment

- 8.3 The assessment above indicates that all internal noise criteria can be achieved within the bedroom of the NSR when considering L_{Amax} 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, Cold Harbour Road, Gravesend, DA11 8AB.
- 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 A BS4142 Assessment and IEMA Noise Assessment were undertaken and are presented in Sections 6.0 and 7.0. A further $L_{A_{fmax}}$ 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 adverse impact would not be expected. When assessed in accordance with the NPPF and NPSE this would equate to 'No Observed Effect Level'.

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. Larger 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 2.0 – Site and Measurement Location

APPENDIX C – Noise Survey History

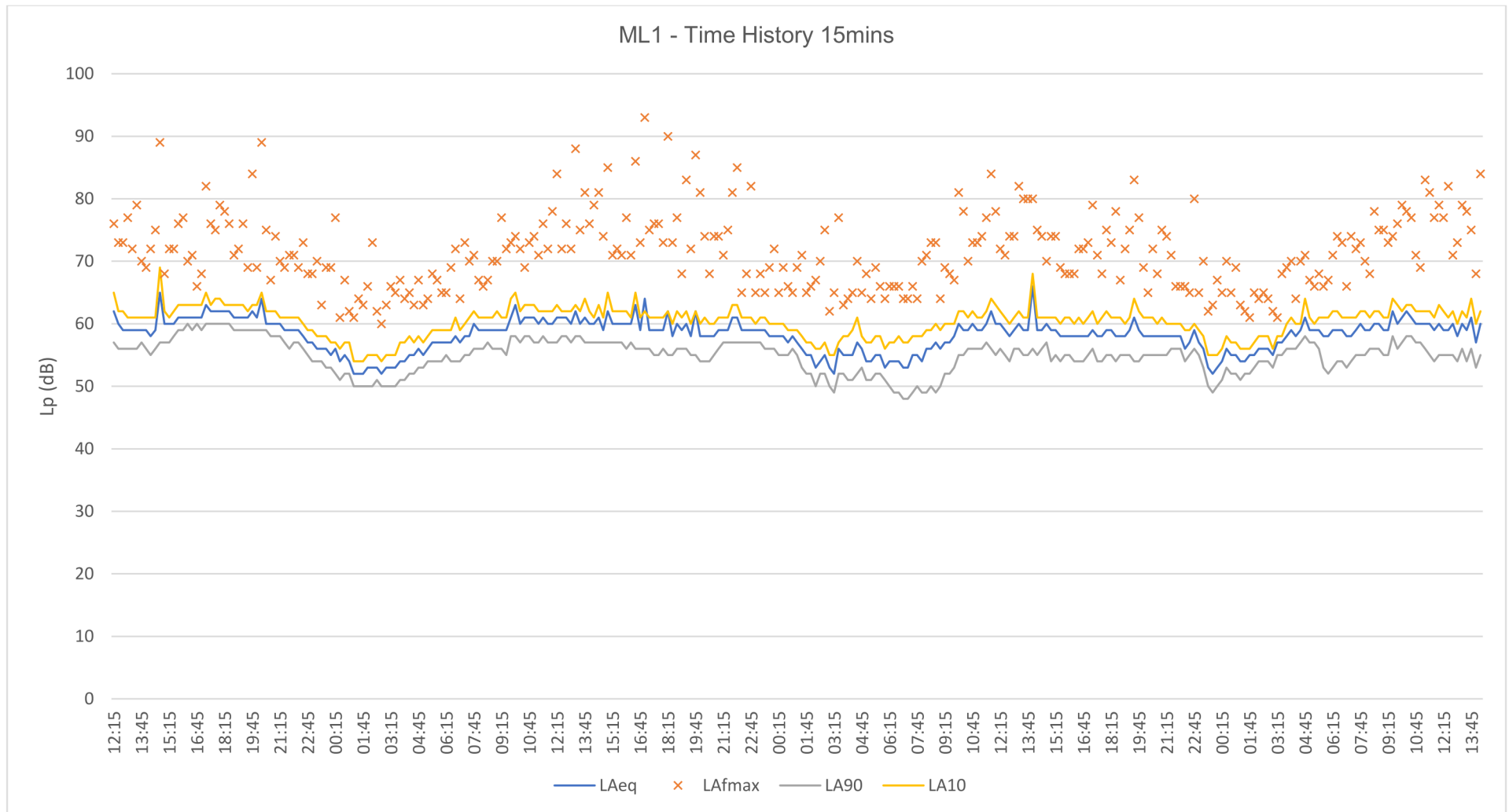


Figure 3.0 – Noise Survey Time History

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 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 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 $L_{A_{fmax}}$ events from car door slams.
- The tyre inflation pump has been inputted into the model as a point source 1m from the ground.
- The tannoy has been inputted into the model as a point source 3.5m from the ground.
- The Daikin AC units have been inputted into the model as point sources at 1m and 2m 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.

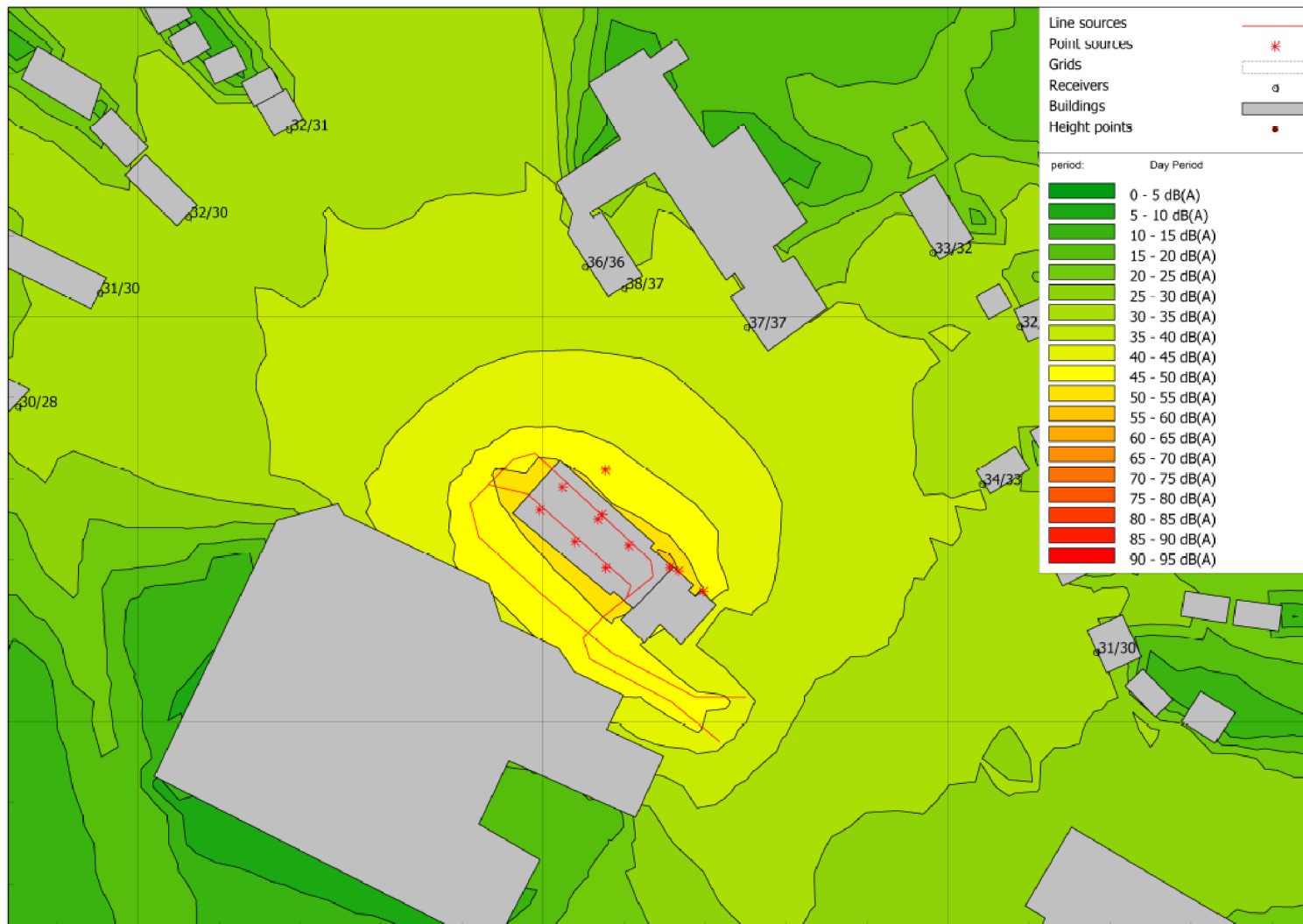


Figure 4.0 – Day Specific Noise Level Map – $L_{Aeq,1hour}$ – 1.5m Calculation Grid

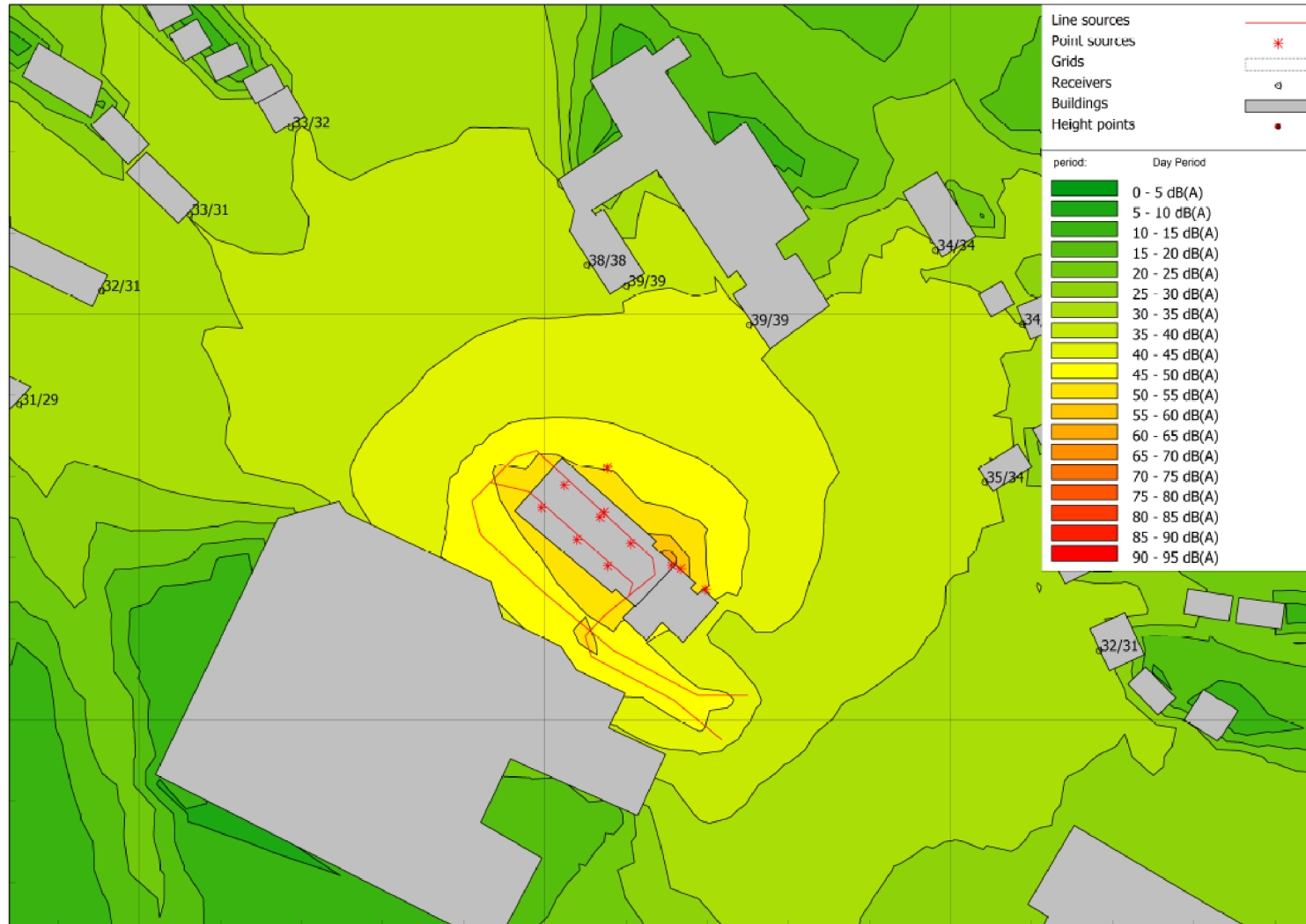


Figure 5.0 – Night Specific Noise Level Map – $L_{Aeq,15min}$ – 1.5m Calculation Grid

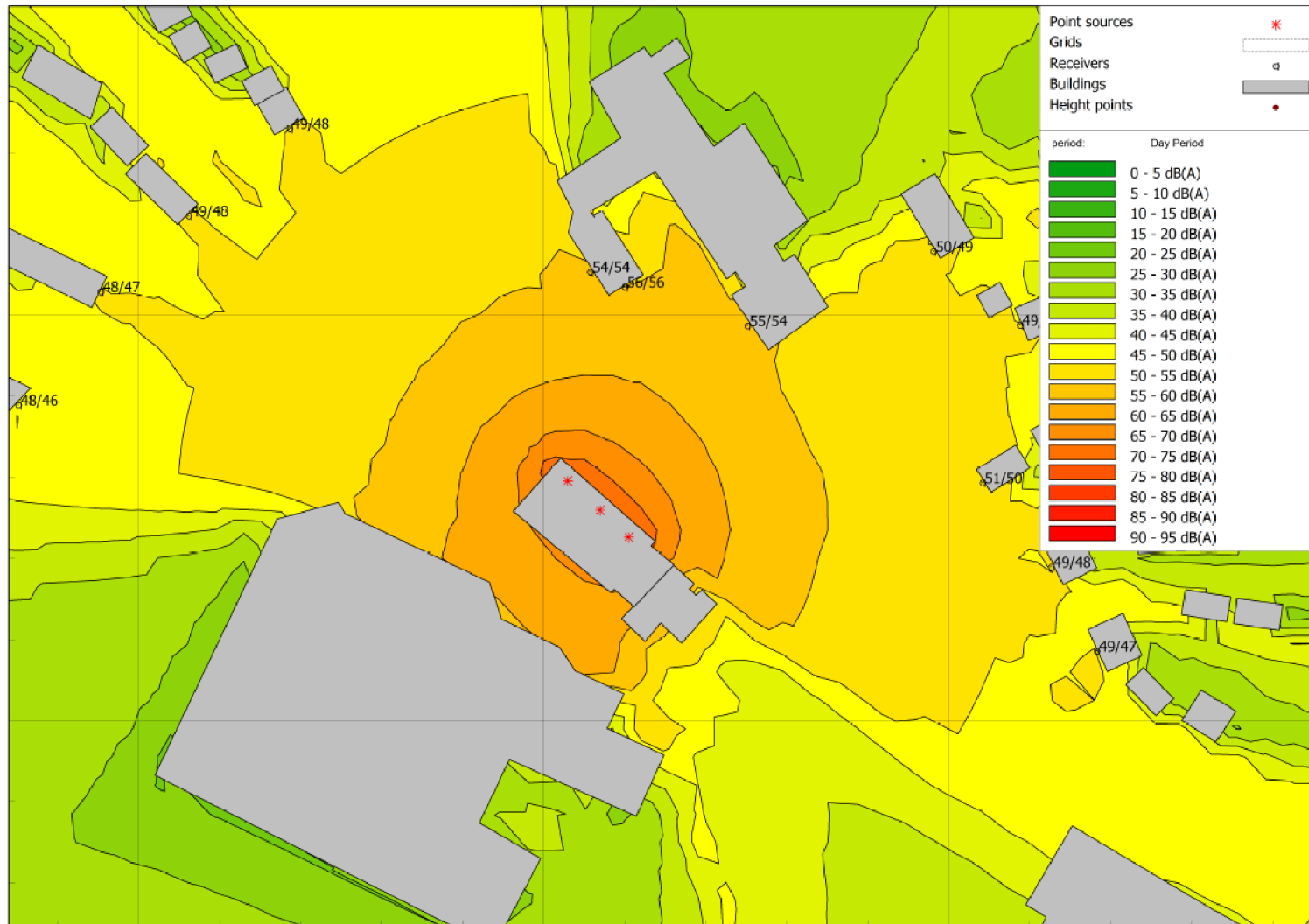


Figure 6.0 – Specific Noise Level Map – L_{Amax} – 1.5m Calculation Grid Height

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	Z Weighted Octave Band Frequency (Hz) (dB)						
	(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
Fuel Pump at Lp at 1m	72.0	75.0	69.0	65.0	62.0	67.0	68.0	62.0
Fuel Pump Calculated Lw Q2	80.0	83.0	77.0	73.0	70.0	75.0	76.0	70.0
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
Large Daikin Lp at 1m	56.0	66.0	52.0	56.0	52.0	54.0	42.0	44.0
Large Daikin Calculated Sound Power Q2	64.0	74.0	60.0	64.0	60.0	62.0	50.0	52.0
Small Daikin Calculated LwA	55.0	64.0	50.0	54.0	50.0	52.0	40.0	42.0
Car Door Slam Lp at 1m	85.0	--	--	--	--	--	--	--
Car Door Slam Sound Power Q2	93.0	--	--	--	--	--	--	--

Table 10.0 – 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 15mins. 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 when the main supermarket was open. The client has indicated that during the evenings and early mornings, there will be a significant decrease in movements especially when the main Morrisons store is not open with numbers dropping as low as 10 per hour day time and 5 per hour night time. Therefore, the number of vehicle movements used in the model will be 24 per 1-hour daytime period equating to 4 cars per pump per hour and during the early morning period between 06:00 – 07:00 the model will assume 6 cars per 15min night time assessment equating to 1 per pump.

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	218	1	24.0	24	74.0
Night 15min	78.0	218	1	6.0	6	74.0

Table 11.0 – On-Time Corrections Vehicle Movements

Fuel Pump On-Time Correction Calculations					
Assessment Period	Calculated L_{WA} of Fuel Pump (dB)	Time to fill the car	Cars Per Pump	On-Time Per Pump	Time Corrected L_{WA} (dB)
Day 1 hour	80.0	1.5 min	4	6.0	70.0
Night 15min	80.0	1.5 min	1	1.5	70.0

Table 12.0 – 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	2	60.0
Night 15min	76.0	1.5	1	2	66.0

Table 13.0 – 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 14.0 – On-Time Corrections Tyre Pump

Tannoy On-Time Correction Calculations			
Assessment Period	Calculated L_{WA} of Tannoy Speaker (dB)	Total On-Time (Mins)	Time Corrected L_{WA} (dB)
Day 1 hour	94.0	0.5	73.0
Night 15min	94.0	0.5	79.0

Table 15.0 – On-Time Corrections Tannoy speakers

Specifications Table for RX-K

				RX20K2V1B	RX20K5V1B9	RX20K5V1B	RX25K2V1B	RX25K5V1B9	RX25K5V1B	RX35K2V1B	RX35K5V1B
Sound pressure level	Heating	High	dBA	47	47	47	47	47	47	48	48
		Nom.	dBA								
	Cooling	High	dBA	46	46	46	46	46	46	48	48
		Nom.	dBA								

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