Arthian

Environmental Permit Noise Impact Assessment

For: Ringway Infrastructure Services Limited

Site: Drainage Service Ducts Area 1, Newport Pagnell Services

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Limitations

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Noise impacts from the operation of the proposed de-watering facility have been assessed. It is understood that activities associated with the facility will be undertaken during both daytime and night-time periods, therefore the assessment has included for both periods.

Unattended sound measurements were carried out at one location representative of the closest off-site sensitive receptors to quantify the prevailing sound climate. The assessment was based on the results of these measurements to determine whether acceptable noise rating levels can be achieved at the receptors.

Noise levels from the operation of the facility have been predicted based on information on activities and noise sources provided by the client.

The rating levels at the receptors are predicted to result in a negligible to low noise impact during daytime activities. At night, a low to adverse noise impact is predicted at the Ramada Hotel, and a low impact at 100 Rowditch Furlong. At all other receptors, a negligible to no impact is predicted.

As a potential adverse impact is predicted at night at the Ramada Hotel, mitigation in the form of a 2.5m high acoustic barrier to the western permit boundary has been investigated. With such a barrier, the rating levels at the Ramada Hotel are predicted to result in a negligible noise impact, and a low impact at apartments at 100 Rowditch Furlong.

As the assessment indicates that a 2.5m acoustic barrier to the western boundary of the permit application is required, a Noise Management Plan (ref. 316660-ART-NMP-001) has been prepared to accompany this noise impact assessment.

1. Introduction

1.1 Background

Ringway Infrastructure Services Ltd (the operator) (herein referred to as Ringway) intend to apply to the Environment Agency (EA) for a bespoke environmental permit under The Pollution Prevention and Control (England and Wales) Regulations 2000. The permit is to operate a De-watering facility at the existing National Highways Depot located to the north of the Newport Pagnell Northbound Services.

Ringway have commissioned Arthian Ltd to undertake the noise impact assessment to accompany to the bespoke permit application to the EA.

A summary of sound terminology is given in Appendix A. The permit application boundary is given in Figure 1.

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Figure 1: Permit Application Boundary

1.2 Site Description

The site is situated on land to the north of the Newport Pagnell M1 Northbound Services area, and to the south of Little Linford Lane, MK16 8DS, grid reference SP 85716 43527.

The site is bounded by the Newport Pagnell M1 Northbound Services to the south, the M1 motorway to the east, Little Linford Lane and with fields beyond to the north, and a residential area and hotel to the west.

The permit application covers a land area of approximately 230m^2.

1.3 Development Details

1.3.1 Site Information

The main National Highways Depot is an existing salt grit storage and distribution facility. There is a large grit storage dome in the northern area of the site. In the centre of the site is a warehouse and administration building. Access to the site is from two entrances – one to the south and one at the west.

The site operates 24 hours a day, with approximately 60 vehicle movements, including sweepers, tankers etc. There is also a loader on the site.

1.3.2 Development Activities

It is proposed that a De-watering Facility is included within the National Highways Depot boundaries. The location of the De-watering facility is illustrated in Figure 1.

Street sweepings and gully emptyings will be collected and deposited within the concrete storage bay. Some collections of sweepings and emptyings may be up to 80% water. The deposits will be allowed to gravity-drain with the water from the bays and then allowed to drain to a nearby foul sewer after passing through an oil-water interceptor.

It is expected that there will be approximately 10 deposits from road sweepers and gully tankers to the De-watering facility over a 24-hour period. During the day, a wheeled front loader will also be used to remove the waste road sweepings from the de-watering storage bay.

2. Assessment Location

2.1 Permit Area Layout and Noise Sources

The permit application site is understood to comprise the following elements:

- Movement of vehicles (road sweepers, gully machines), including access to, reversing of vehicles into tipping bay, and exit of vehicles.
- Tipping of material into bay (hydraulic lifting of storage tanks for gravity tipping, driven by vehicle engine); and
- Vehicle jet wash pump (to wash out vehicle storage tank).

The layout of the permit application site is provided in Figure 2.

Figure 2: Permit Application Layout

2.2 Receptor Locations

The location of the closest noise sensitive receptors relative to the permit application site are given below in Table 1 and are illustrated in Figure 3.

Table 1: Selected Noise Sensitive Receptors

Receptor	Address	Distance from Permit Boundary	Direction from Permit Boundary	Grid Reference
R1	Ramada Hotel	45	W	SP 85653 43502
R2	120 Rowditch Furlong (apartments)	52	NW	SP 85644 43590
R3	2 Pennycress Way	170	NE	SP 85832 43673
R4	100 Rowditch Furlong (apartments)	103	S	SP 85702 43401
R5	97 Rowditch Furlong	94	SW	SP 85673 43427

Imagery © 2026 Google Maps

Figure 3: Noise Receptor Locations

Between the permit application site and receptors, the ground cover is made up predominantly of hard covered areas (roads, car parking etc), with some areas of maintained grass.

2.3 Sound Monitoring Locations

2.3.1 Monitoring Locations

The location of the baseline sound monitoring location representative of the closest NSRs to the permit application site are given below in Figure 4.

Imagery © 2026 Google Maps

Figure 4: Sound Monitoring Locations

3. Equipment and Meteorology

3.1 Equipment

3.1.1 Instrumentation

All measurements were taken at approximately 1.5 m above ground level, and in general accordance with the requirements of British Standard BS 7445. The monitoring location was positioned at least 3.5 m from any reflecting surface, other than the ground (i.e. free-field). Details of ongoing activities and typical noise sources in the area were recorded during the set-up and retrieval of the monitoring equipment.

The Sound Level Meter used was a Class 1 precision instrument, programmed to log a number of parameters including L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} values, in 15-minute contiguous intervals.

The calibration levels were checked prior to and following all measurements. No significant drift, more than 0.5 dB, occurred during the monitoring. Full calibration details are available upon request.

The following equipment was used for the sound monitoring exercise:

Table 2: Sound Monitoring Equipment Information

Monitoring Location	Equipment Item	Model & Type	Meter Serial Number	Calibration Date
L1	Sound Level Meter	CR:171B	G303957	02 July 2024
	Microphone	MK:224	215828D	24 June 2024
	Acoustic Calibrator	CR:515	107940	01 April 2025

Photos of the measurement location and equipment are shown below in Figure 5 and Figure 6.

Figure 5: Sound Monitoring Location

Figure 6: Sound Monitoring Location

3.1.2 Calibration Details

Table 3: Calibration Details

Monitoring Location	Start Calibration dB	Off-set	End Calibration dB	Drift dB
L1	93.7	-0.71	93.2	-0.5

Monitoring data was downloaded using the Noise Tools software and exported to Microsoft Excel for manual analysis.

3.2 Meteorology

Weather conditions during the sound monitoring are detailed in Table 4.

Table 4: Typical Weather Conditions during Sound Monitoring

Date	Period	Temperature Range	Wind Speed Range	Typical Wind Direction	Conditions	Notes
05/05/2026	Day	11.7-18.3°C	0-1.3 ms^{-1}	NE	Dry	
	Night	8.8-11.5°C	0-1.3 ms^{-1}	NE	Dry	
06/05/2026	Day	8.3-14.2°C	0-1.8 ms^{-1}	NE	Dry	
	Night	7.0-9.1°C	0 ms^{-1}	NE	Dry	
07/05/2026	Day	9.3-18.3°C	0-0.9 ms^{-1}	NE	Dry	
	Night	9.4-13.1°C	0 ms^{-1}	NE	Dry	
08/05/2026	Day	10.8-20.6°C	0-0.4 ms^{-1}	NE	Dry	
	Night	7.3-13.5°C	0 ms^{-1}	NE	Dry	
09/05/2026	Day	9.7-22.0°C	0-1.8 ms^{-1}	NE	Dry	
	Night	10.4-12.1°C	0.9-1.3 ms^{-1}	NE	Dry	
10/05/2026	Day	6.9-15.0°C	0-2.2 ms^{-1}	NE	Dry	
	Night	3.3-7.1°C	0-0.9 ms^{-1}	NE	Dry	
11/05/2026	Day	7.7-14.6°C	0-1.8 ms^{-1}	NE	Predominantly dry	Some short periods of rain – analysis of measured sound data indicates rain did not affect sound levels
	Night	2.7-7.2°C	0 ms^{-1}	NE	Dry	
12/05/2026	Day	5.4-15.8°C	0-1.8 ms^{-1}	NE	Dry	

4. Methodology

4.1 Sound Measurements

The baseline sound monitoring was carried out in accordance with the guidance in British Standard BS 7445: 2003 'Description and Measurement of Environmental Noise'[1].

The sound level meter was set to measure the L_{Aeq}, L_{A90} and L_{AFmax} values, logging in contiguous periods of 15 minutes. All noise measurements were taken at approximately 1.5 metres above ground level and located in free-field conditions (at least 3.5 metres from any vertical reflecting surfaces).

All equipment was checked with a field calibrator before and after each measurement. No significant drift in the calibration was noted. Calibration certificates are available on request.

4.2 Calculations and Assessment

4.2.1 BS 4142 Operational Noise Assessment

Response to sound is subjective and affected by many factors, both acoustic and non-acoustic. In general, the likelihood of complaints in response to sound depends on factors, including:

- the margin by which it exceeds the background sound level;
- the absolute sound level;
- the character of the sound;
- the time of day;
- the change in the sound environment; and
- the nature of the local area.

The standard used for assessing industrial sound and determining community reaction is British Standard BS 4142: 2014 'Methods for rating and assessing industrial and commercial sound'[2]. According to the standard, it can be used for:

- investigating complaints;
- assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and
- assessing sound at proposed new dwellings or premises used for residential purposes.

1 BS 7445: 2003 'Description and Measurement of Environmental Noise'. British Standards Institution.
2 BS 4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'. British Standards Institution.

The basis of BS 4142 is a comparison between the rating level of the noise source under consideration and the background sound level in the vicinity of residential locations. The relevant parameters in this instance are as follows:

- Background Sound Level – $L_{A90,T}$ – defined as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T. This is measured using time weighting F and quoted to the nearest whole number of decibels;
- Specific Sound Level – $L_{Aeq,Tr}$ – the equivalent continuous 'A' weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T;
- Residual Sound Level - $L_{Aeq,T}$ - the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
- Rating Level – $L_{Ar,Tr}$ – the specific sound level plus any penalties applied for the characteristic features of the specific sound source such as tonality, impulsivity and intermittency.

To determine the overall Rating Level, characteristics of the specific sound need to be considered, and corrections applied (if deemed appropriate). These corrections can include the following:

<u>Subjective Assessment of Tonality</u>:

- +2 dB if tonal noise was slightly perceptible;
- +4 dB if tonal noise was clearly perceptible; and
- +6 dB if tonal noise was highly perceptible.

<u>Impulsivity</u>:

- +3 dB if impulsive noise was slightly perceptible;
- +6 dB if impulsive noise was clearly perceptible; and
- +9 dB if impulsive noise was highly perceptible.

<u>Intermittency</u>:

When the specific sound is identified as being of an inherently intermittent in nature, and the intermittency is perceived to be distinctive against the residual acoustic environment, a correction of +3 dB can be applied to the specific noise level.

<u>Other Sound Characteristics</u>:

Where the specific sound features characteristics that are neither tonal nor impulsive but is perceived to be distinctive against the residual acoustic environment, a correction of +3 dB can be applied to the specific noise level.

Following the calculation of the rating level, this is then compared to the background noise level in order to estimate the potential impact of the noise on the receptor. Generally, as the margin by which the rating level exceeds the background level increases, the magnitude of impact also increases.

Section 11 of BS 4142 provides the following guidance:

Table 5: BS 4142 Magnitude of Impact from Industrial Noise

Excess of Rating Level over Background Level	Indicative Outcome	Arthian Assessment
Around 10 dB or more	Likely to be an indication of a significant adverse impact, depending upon the context.	Significant Adverse Impact
Around 5 dB to 10 dB	Likely to be an indication of an adverse impact, depending upon the context.	Adverse Impact
0 dB to 5 dB	Some impact, but less likely to be an adverse impact, depending upon the context.	Low Impact
0 dB or below	Indication of no/low impact, depending on the context.	Negligible/No Impact

Importantly, BS 4142:2014+A1:2019 also requires that the rating level of the sound source under assessment is considered in the context of the environment when defining the overall significance of the impact. The standard suggests that in assessing the context, all relevant factors should be taken into consideration, including the following:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

5. Noise Monitoring Data and Predictions

5.1 Baseline Sound Monitoring

5.1.1 Sound Monitoring Details

A survey of the background sound levels was carried out from Tuesday 5th to Tuesday 12th May 2026, at a location representative of the closest noise sensitive receptors to the proposed de-watering facility. This location was:

Table 6: Sound Monitoring Locations

Monitoring Location Reference	Details	Grid Reference
L1	Located on the western boundary fence of the National Highways Depot, representative of the closest receptors at Ramanda Hotel and Rowditch Furlong	SP 85710 43525

5.1.2 Survey Results

The measured data were processed to define the L_{Aeq}, L_{A90} and L_{AFmax} sound levels during the daytime and night-time periods, and the results are presented below. A time history plot is provided in Figure B.1 in Appendix B.

Table 7: Unattended Sound Monitoring Results

Monitoring Location	Sound Levels		
	$L_{Aeq,T}$ dB	Typical $L_{A90,T}$ dB	L_{AFmax} dB
DAYTIME			
Tuesday 5th May 2026	61	57	70-86
Wednesday 6th May 2026	61	58	68-85
Thursday 7th May 2026	60	57	67-90
Friday 8th May 2026	60	57	67-90
Saturday 9th May 2026	59	56	65-94
Sunday 10th May 2026	61	59	68-89
Monday 11th May 2026	61	57	68-87
Tuesday 12th May 2026	59	56	65-86
TYPICAL	*60*	*56**	-

NIGHT-TIME			
Tuesday 5th May 2026	58	54	60-84
Wednesday 6th May 2026	56	51	58-82
Thursday 7th May 2026	56	50	62-84
Friday 8th May 2026	56	53	51-83
Saturday 9th May 2026	56	53	59-83
Sunday 10th May 2026	56	53	58-83
Monday 11th May 2026	55	50	55-84
TYPICAL	*56*	*51**	-

* See Figures B.2 and B.3 in Appendix B

At the monitoring location the dominant daytime and night-time noise source is road traffic on the M1, located approximately 80m to the east. Other noise sources included occasional vehicle movements within the National Highways depot, and also along the service road between the depot and the Ramada Hotel, and vehicle movements along the exit road leading to the entry slip road onto the northbound carriageway of the M1 motorway.

It must be noted that as the survey has been undertaken within spring, the number of movements associated with the grit store located to the north of the permit area being assessed are low. During the colder winter months movements are likely to be much higher to allow the gritting of the highways network. The measured levels given in this assessment are therefore deemed conservative, resulting in a worst-case assessment of noise impacts.

5.2 Operational Noise

5.2.1 Noise Generating Plant

The following plant will be used in the operation of the de-watering plant:

- Whale MVC Gully Sucker
- Mega Whale Gully Machine
- Schmidt Street King 660 Road Sweeper
- JCB 531-700 wheeled front loader

It is understood that tipping of waste road sweepings will be undertaken during both daytime and night-time periods, with approximately 10 deposits made per 24-hour period. It is unlikely that there will be more than one tip of road sweeping waste occurring in any one 15-minute night-time assessment period.

During the day, the tipped waste is allowed to dry and is then removed using a wheeled front loader.

Based on the above, the following noise sources for the operation of the permit area have been input into the noise model:

Daytime Activities

- Movement of vehicles (road sweepers, gully tankers), including access to, reversing of vehicles into tipping bay, and exit of vehicles. 2 x vehicle per 60-minute assessment period.
- Tipping of material into bay (hydraulic lifting of storage tanks for gravity tipping, driven my vehicle engine). 2 x tip per 60-minute assessment period (6 minutes, 10% on-time); and
- Vehicle jet wash pump (to wash out vehicle storage tank). 2 x jet wash activity per 60-minute assessment period (4 minutes, 7% on-time).
- Movement of front loader – removing tipped waste road sweepings from tipping bay and transporting to other area of the Highways Depot site for removal. Estimated to be approximately 10-15 minutes in any one-hour assessment period.

Night-time Activities

- Movement of vehicles (road sweepers, gully tankers), including access to, reversing of vehicles into tipping bay, and exit of vehicles. 1 x vehicle per 15-minute assessment period.
- Tipping of material into bay (hydraulic lifting of storage tanks for gravity tipping, driven my vehicle engine). 1 x tip per 15-minute assessment period (3 minutes, 20% on-time); and
- Vehicle jet wash pump (to wash out vehicle storage tank). 1 x jet wash activity per 15-minute assessment period (2 minutes, 13% on-time).

Sound data for the plant are provided in Appendix C. The sound power levels have been obtained from similar projects and information provided by the Client.

5.2.2 Operational Sound Predictions

An acoustic model of the de-watering facility and the surrounding area has been developed using the SoundPLAN (v9.1) sound modelling software. The software implements the standard sound prediction methodology detailed in ISO 9613:2024[3].

The model has been used to calculate sound levels at representative sensitive receptors based on information provided by the client on noise emissions and sound reductions of building elements.

The acoustic model includes the ground topography, all buildings surrounding the site, and all the potential sound sources detailed in 5.2.1.

Full details of the acoustic model are included in Appendix C.

3 International Organization for Standardization (2024) ISO 9613: 2024 Part 2 Attenuation of sound during propagation outdoors, ISO.

5.2.3 Predicted Operational Sound Levels

Table 8 presents the predicted free-field specific sound levels at each selected receptor, based on potential noise sources on the site.

Table 8: Predicted Operational Sound Levels

Receptor		Specific Sound Level $L_{Aeq,Tr}$ (dB)	
		Daytime 0700 – 1900	Night-time 2300 – 0700
R1	Ramada Hotel	54	53
R2	120 Rowditch Furlong (apartments)	51	51
R3	1 Pennycress Way	37	41
R4	100 Rowditch Furlong (apartments)	39	37
R5	97 Rowditch Furlong	38	40

6. Noise Impact Assessment

6.1 BS 4142 Assessment

Sound sources associated with the de-watering facility activities are considered likely to be broadband in nature, with no distinguishable tones, therefore no penalty has been applied for tones.

There are not expected to be any impulsive features associated with the sound from development and hence no penalty has been applied for impulsiveness.

As the proposed activities would not be continuous, a penalty of +3dB has been applied for intermittency.

Following the procedures outlined in BS 4142: 2014, the rating level of the specific sound has been compared to the daytime background sound level, as shown in Table 9, and the night-time background sound level, as given in Table 10.

Table 9: BS 4142 Assessment - Daytime

Receptor	Specific Sound Level $L_{Aeq,Tr}$ dB	Acoustic Feature Correction dB	Rating Level $L_{Ar,Tr}$ dB	Typical Background Level $L_{A90,T}$ dB	Excess of Rating Level over Background dB	BS 4142 Assessment Outcome
R1	54	+3	57	56	+1	Low impact
R2	51	+3	54	56	-2	Negligible impact
R3	37	+3	40	56	-16	No impact
R4	39	+3	42	56	-14	No impact
R5	38	+3	41	56	-15	No impact

Table 10: BS 4142 Assessment – Night-time

Receptor	Specific Sound Level $L_{Aeq,Tr}$ dB	Acoustic Feature Correction dB	Rating Level $L_{Ar,Tr}$ dB	Typical Background Level $L_{A90,T}$ dB	Excess of Rating Level over Background dB	BS 4142 Assessment Outcome
R1	53	+3	56	51	+5	Low/adverse impact
R2	51	+3	54	51	+3	Low impact
R3	41	+3	44	51	-7	Negligible impact
R4	37	+3	40	51	-11	No impact

Receptor	Specific Sound Level $L_{Aeq,Tr}$ dB	Acoustic Feature Correction dB	Rating Level $L_{Ar,Tr}$ dB	Typical Background Level $L_{A90,T}$ dB	Excess of Rating Level over Background dB	BS 4142 Assessment Outcome
R5	40	+3	43	51	-8	Negligible impact

As indicated in Table 9 and Table 10, the predicted noise levels from the de-watering plant operations are not likely to result in adverse noise impacts upon the closest noise sensitive receptors both the during the daytime and night-time periods. Only a low impact is predicted at the closest Ramada hotel rooms.

However, at night, the Rating level is slightly greater than the background level at Receptors R1 and R2.

Context

The context is that the operation of the de-watering facility is within an existing highways depot where there are currently regular tipping and filling activities and vehicle movements. Its operation is unlikely to result in a significant change to the sound climate in the surrounding area.

7. Mitigation

7.1.1 Operational Sound Predictions with Mitigation

As there is the potential for an adverse noise impact upon the Ramada Hotel, mitigation in the form of a 2.5m high acoustic barrier to the western permit boundary has been inputted to the noise model.

7.1.2 Predicted Operational Sound Levels

Table 11 presents the predicted free-field specific sound levels at each selected receptor with the 2.5m high acoustic barrier to the western permit boundary.

Table 11: Predicted Operational Sound Levels – With Mitigation

Receptor		Specific Sound Level $L_{Aeq,Tr}$ (dB)	
		Daytime 0700 – 1900	Night-time 2300 – 0700
R1	Ramada Hotel	45	45
R2	120 Rowditch Furlong (apartments)	50	50
R3	2 Pennycress Way	37	41
R4	100 Rowditch Furlong (apartments)	38	36
R5	97 Rowditch Furlong	37	37

7.2 BS 4142 Assessment – With Mitigation

Following the procedures outlined in BS 4142: 2014, the rating level of the specific sound with mitigation employed has been compared to the daytime background sound level, as shown in Table 12, and the night-time background sound level, as given in Table 13.

Table 12: BS 4142 Assessment – Daytime – With Mitigation

Receptor	Specific Sound Level $L_{Aeq,Tr}$ dB	Acoustic Feature Correction dB	Rating Level $L_{Ar,Tr}$ dB	Typical Background Level $L_{A90,T}$ dB	Excess of Rating Level over Background dB	BS 4142 Assessment Outcome
R1	45	+3	48	56	-8	Negligible impact
R2	50	+3	53	56	-3	Negligible impact
R3	37	+3	40	56	-16	No impact
R4	38	+3	41	56	-15	No impact
R5	37	+3	40	56	-16	No impact

Table 13: BS 4142 Assessment – Night-time – With Mitigation

Receptor	Specific Sound Level $L_{Aeq,Tr}$ dB	Acoustic Feature Correction dB	Rating Level $L_{Ar,Tr}$ dB	Typical Background Level $L_{A90,T}$ dB	Excess of Rating Level over Background dB	BS 4142 Assessment Outcome
R1	45	+3	48	51	-3	Negligible impact
R2	50	+3	53	51	+2	Low impact
R3	41	+3	44	51	-7	Negligible impact
R4	36	+3	39	51	-12	No impact
R5	37	+3	40	51	-11	No impact

As indicated in Table 12 and Table 13, the predicted noise levels from the de-watering plant operations with a 2.5m high acoustic barrier are not likely to result in adverse noise impacts upon the closest noise sensitive receptors both the during the daytime and night-time periods.

A low impact is predicted at the closest apartments located at 100 Rowditch Furlong during the night-time period, with all other receptors experiencing a negligible impact or no impact during the daytime and night-time periods.

8. Uncertainty

Some uncertainty in the measured data and calculations is unavoidable. Arthian have undertaken the following reasonable steps with a view to minimising the level of uncertainty in the results.

With regards to the measured data, this has been minimised as follows:

- Undertaking baseline sound monitoring at a location representative of the closest receptors to the site for representative periods of time. This enabled a comprehensive consideration of the baseline sound levels at the receptors, giving representative background sound levels for the relevant time periods.
- Consideration of weather conditions based on observations while onsite using a Davis Vantage weather station. Uncertainties due to weather conditions are considered to be low, as during the monitoring conditions remained dry and windspeeds were below 5 m/s. Please refer to Section 3 for details of the prevailing weather data recorded.
- Use of a suitable Class 1 sound level meter which complies with the relevant standards.
- Field calibration of the measurement system on site at the start and end of each monitoring period, and offset and drift noted.
- Local sound generating facilities (i.e. background industrial and commercial noise) and road traffic noise was noted during the survey.

With regards to the calculations, uncertainties have been minimised as follows:

- The predictions have been completed using a reputable noise mapping software package (SoundPLAN) which implements a validated method of calculation (ISO 9613-2:2024). This methodology predicts sound propagation under typical down-wind conditions, and hence presents a reasonable worst case in terms of sound levels at the receptor locations.
- Ground absorption properties for input to the noise propagation model have been identified from aerial photography and the site visit.
- Input data for the calculations was taken from manufacturers data, the BS5228 noise source library and similar projects.

9. Conclusions and Recommendations

Noise impacts from the operation of the proposed de-watering facility have been assessed. It is understood that activities associated with the facility will be undertaken during both daytime and night-time periods, therefore the assessment has included for both periods.

Unattended sound measurements were carried out at one location representative of the closest off-site sensitive receptors to quantify the prevailing sound climate. The assessment was based on the results of these measurements to determine whether acceptable rating levels can be achieved at the receptors.

Noise levels from the operation of the facility have been predicted based on information on activities and noise sources provided by the client.

The rating levels at the receptors are predicted to result in a negligible to low noise impact during daytime activities. At night, a low to adverse noise impact is predicted at the Ramada Hotel, and a low impact at 100 Rowditch Furlong. At all other receptors, a negligible to no impact is predicted.

As a potential adverse impact is predicted at night at the Ramada Hotel, mitigation in the form of a 2.5m high acoustic barrier to the western permit boundary has been investigated. With such a barrier, the rating levels at the Ramada Hotel are predicted to result in a negligible noise impact, and a low impact at apartments at100 Rowditch Furlong.

As the assessment indicates that a 2.5m acoustic barrier to the western boundary of the permit application is required, a Noise Management Plan (ref. 316660-ART-NMP-001) has been prepared to accompany this noise impact assessment.

Appendix A: Glossary

For the avoidance of confusion, the terms used in this report follow the definitions given below:

Fundamentally, ‘sound’ are vibrations of the air which are detectable by the ear. Noise is defined as a sound or sounds which is unwanted, considered unpleasant or loud. Sound or noise levels are commonly measured in terms of the sound pressure level in terms of decibels (dB). The sound pressure level is commonly given as ‘A’-weighted to simulate the human ear’s response to sounds at different frequencies. Examples of typical A-weighted sound pressure levels from typical noise sources are shown in the table below.

Sound Level dB(A)	Typical Noise Source
130	Threshold of pain
120	Large jet aircraft on take-off
110	Rock Band
100	Pneumatic Drill
90	Heavy lorry
80	Medium-sized lorry
70	Passenger car
60	Normal conversation
50	Suburban residential neighbourhood
40	Quiet living room
30	Quiet rural setting, within a bedroom at night
20	Speaking in a whisper
10	
0	

In this report, the terms sound and noise are used interchangeably.

Noise levels are usually expressed with an associated measurement parameter. Commonly used measurement parameters are presented below.

Parameter	Definition
dB	Decibel – A logarithmic scale applied to acoustic units such as sound pressure and sound power.
L_{PA}	The instantaneous A-weighted sound pressure level measured in terms of dB
L_{A90}	This is the ‘A’-weighted sound pressure level exceeded for 90% of the measurement period over which the measurement is taken. It is commonly used to represent the “background noise level”.

Parameter	Definition
L_{Aeq}	This is the equivalent 'A'-weighted sound pressure level of steady noise which, under the period under consideration, contains the same amount of (A-Weighted) sound energy as the time-varying noise over the same period. Also called the time-averaged sound level.
L_{A10}	This is the 'A'-weighted sound pressure level exceeded for 10% of the measurement period over which the measurement is taken. It is the accepted noise metric for describing road traffic noise.
L_{AMax}	This is the maximum root-mean-square (RMS) 'A'-weighted sound pressure level measured during the measurement period.

Other relevant acoustic parameters are defined below:

Parameter	Definition
R_w	The weighted Sound Reduction Index is the single figure value of laboratory measured sound reduction according to the procedures in British Standard BS EN ISO 717-1 and used for rating and comparing partitions and based on the measured sound reductions at different frequencies
$D_{nT,w}$	The weighted standardised level difference is a single figure value of airborne sound insulation performance, derived according to the procedures in British Standard BS EN ISO 717-1 and used for rating and comparing partitions and based on the measured sound level difference at different frequencies and standardised to a reverberation time (normally 0.5 seconds).
$D_{ne,w}$	The weighted normalised sound level difference is used to describe the sound insulation provided by small building elements and derived according to the procedures in British Standard BS EN ISO 717-1 and used for rating and comparing partitions and based on the measured sound level difference at different frequencies and normalised to an absorptive area (normally $10m^2$).
C	A spectral adaptation term used in connection with the measurement and assessment of airborne sound insulation and defined in British Standard BS EN ISO 717-1. This is considered equivalent to the A-weighted weighted normalised sound level difference ($D_{nT,A}$)
C_{tr}	A spectral adaptation term used in connection with the measurement and assessment of airborne sound insulation and defined in British Standard BS EN ISO 717-1. This is considered equivalent to the normalised sound level difference weighted for road traffic noise ($D_{nT,tr}$)
$L'_{nT,w}$	The weighted standardized impact sound pressure level is a single-figure value of impact sound insulation performance, derived according to the procedures in British Standard BS EN ISO 717-2, used for comparing and rating floors and based on the values of measured impact sound pressure level at different frequencies and standardised to a reverberation time (normally 0.5 seconds).

Appendix B: Sound Monitoring

Time History Plot

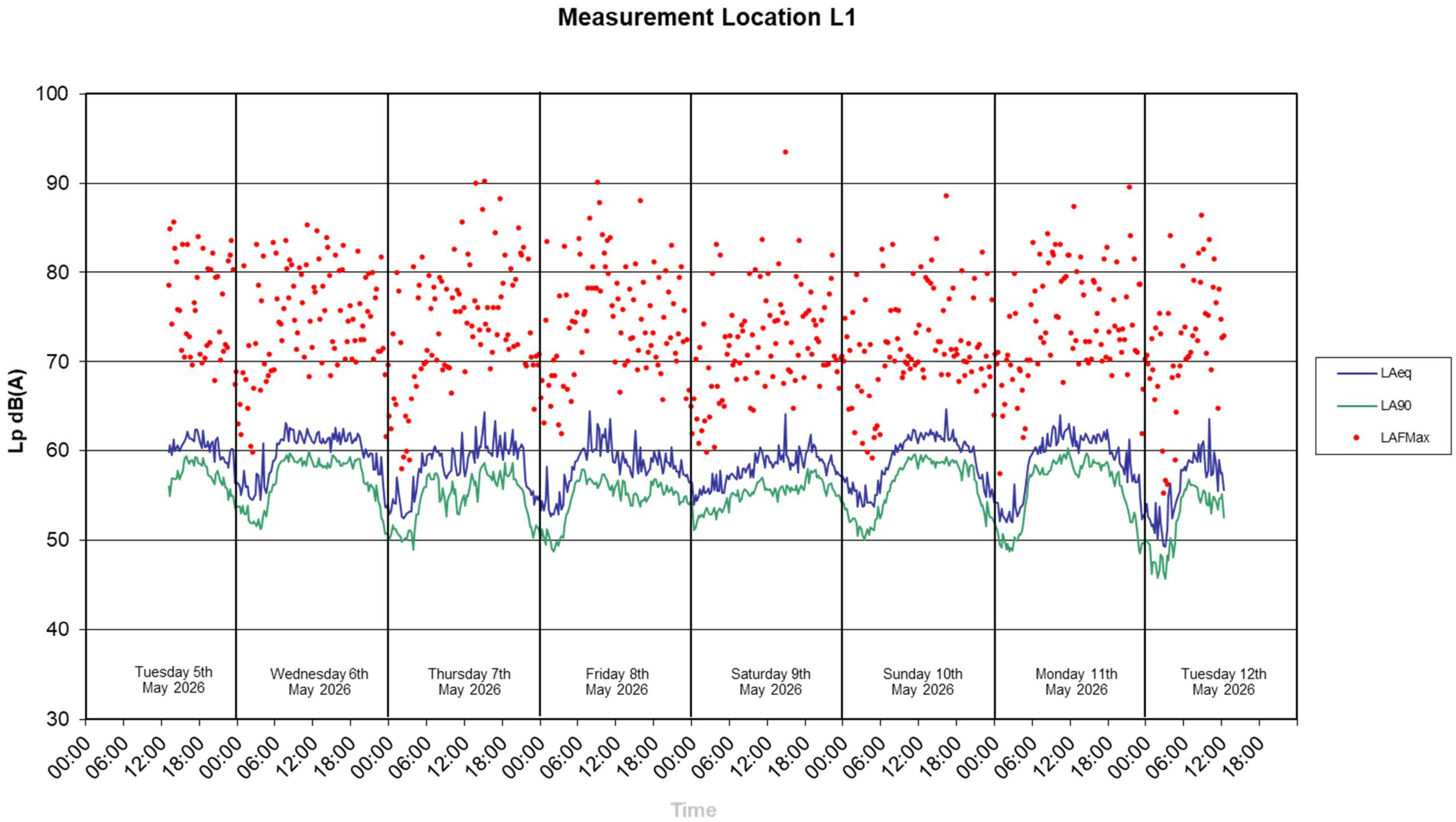

Figure B.1: Time History Plot – Monitoring Location L1

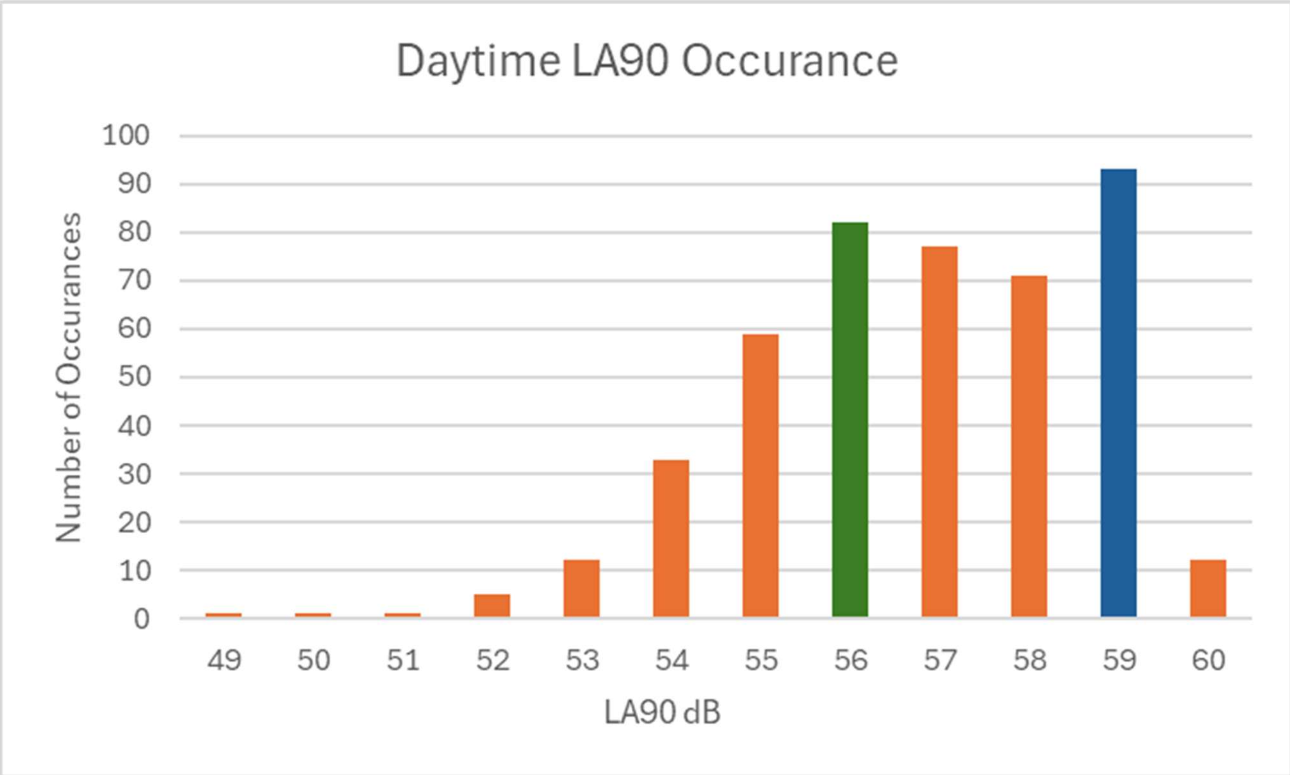

Figure B.2: LA90 Occurrences - Daytime

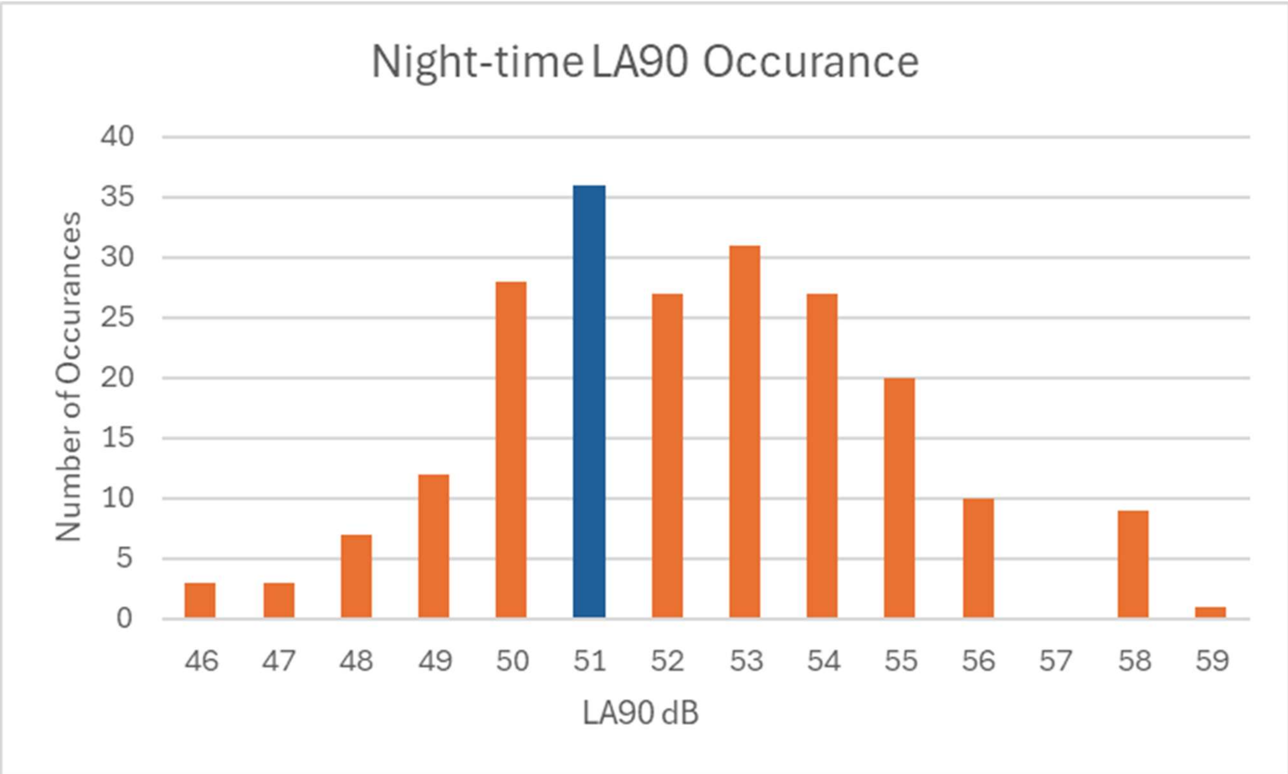

Figure B.3: LA90 Occurrences – Night-time

Appendix C: Sound Model Inputs

Data sources

OS mapping: 1:10,000 Vector Raster Map, purchased from EmapSite.

Terrain data: OS 5m Terrain, purchased from EmapSite

Modelling assumptions & parameters

Ground absorption: 0.6 – residential areas

Ground absorption: 0.8 - rural/grassland areas

Ground absorption: 0.0 – industrial/commercial areas and road network

(Note: Acoustically Soft = 1, Acoustically Hard = 0)

Calculation grid size: 3m

Other Settings

Order of Reflections = 3

ISO 9613-2:2024 prediction methodologies

Grid height = 1.5 metres for ground floor height

Grid height = 4 metres for first floor height

Grid height = 6.5 metres for second floor height

Noise Source Data

Table C.1: Operational Noise Source Data – Sound Power Levels

Plant/Equipment	Octave Band Centre Frequency (Hz)								LwA dB
	63	125	250	500	1000	2000	4000	8000	
Sweeper/gully tanker movement	108	103	97	103	99	95	89	86	104
Sweeper/gully tanker engine to operate hydraulic tipper (corrected for 20% on-time)	96	91	85	91	87	83	77	74	92
Sweeper/gully tanker engine to operate hydraulic tipper (corrected for 10% on-time)	93	88	82	88	84	80	74	71	89
Sweeper/gully tanker jet wash (corrected for 13% on-time)	91	82	87	85	85	84	79	71	90
Sweeper/gully tanker jet wash (corrected for 7% on-time)	88	79	84	82	82	81	76	68	87
Front loader (15% on-time)	117	106	104	103	99	98	91	83	105

Appendix D: Author Details

Qualifications and Experience

Ruth Sargent MSc BSc(Hons) MIOA –Assessment

Ruth has worked on sound and vibration related projects for over 20 years. Since completing a Bachelors Degree in Environmental Science, a Masters in Environmental Management, and a Diploma in Acoustics and Noise Control, she has gained a wide range of practical experience in Environmental acoustics and vibration in a consultancy role. Ruth is a Member of the Institute of Acoustics.

The majority of Ruth's experience relates to the provision of sound and vibration impact assessments to support planning applications and full Environmental Impact Assessments. These include large residential and mixed use schemes, waste management facilities, power generation schemes and mineral/quarry facilities.

She is experienced in the use of environmental sound modelling software SoundPLAN, which implements a range of methodologies including Calculation of Road Traffic Sound (CRTN), Calculation of Railway Sound (CRN), BS 5228 and ISO 9613-2.

Sarah Radcliffe MEng CEng MIOA – Review

Since graduating from the University of Southampton with a degree in Engineering Acoustics and Vibration, Sarah has gained 30 years of experience working in consultancy. She is a Chartered Engineer and a Corporate Member of the Institute of Acoustics.