



Noise Impact Assessment

River Itchen WTW – Permanent Centrifuge

Portsmouth Water Ltd.

Prepared by:

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Basis of Report

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1.0 Introduction

SLR Consulting Limited (SLR) has been instructed by Portsmouth Water Ltd to undertake a noise impact assessment in order to discharge Condition 7 of planning permission reference F/24/97844 for a new permanent building to house a centrifuge at River Itchen Water Treatment Works (WTW), Allington Lane, Southampton ('the site').

This report includes an assessment of the potential noise impact from the centrifuge on the nearest Noise Sensitive Receptor (NSR) locations in line with BS 4142:2014+A1:2019.

To assist the reader a glossary of terms is presented in **Appendix A** to assist the reader when reviewing this report.



2.0 Site Description

2.1 Existing Site

The site comprises a parcel of land to the north of Southampton within the Portsmouth Water Ltd site., located on Waterworks, accessed from Allington Lane, SO30 3HQ.

The site is bounded:

- To the north by the grasslands of Itchen Valley Country Park;
- To the east by a small number of residential properties and Allington Lane;
- To the south by the M27; and
- To the west by the River Itchen.

2.2 Nearest Noise-Sensitive Receptors

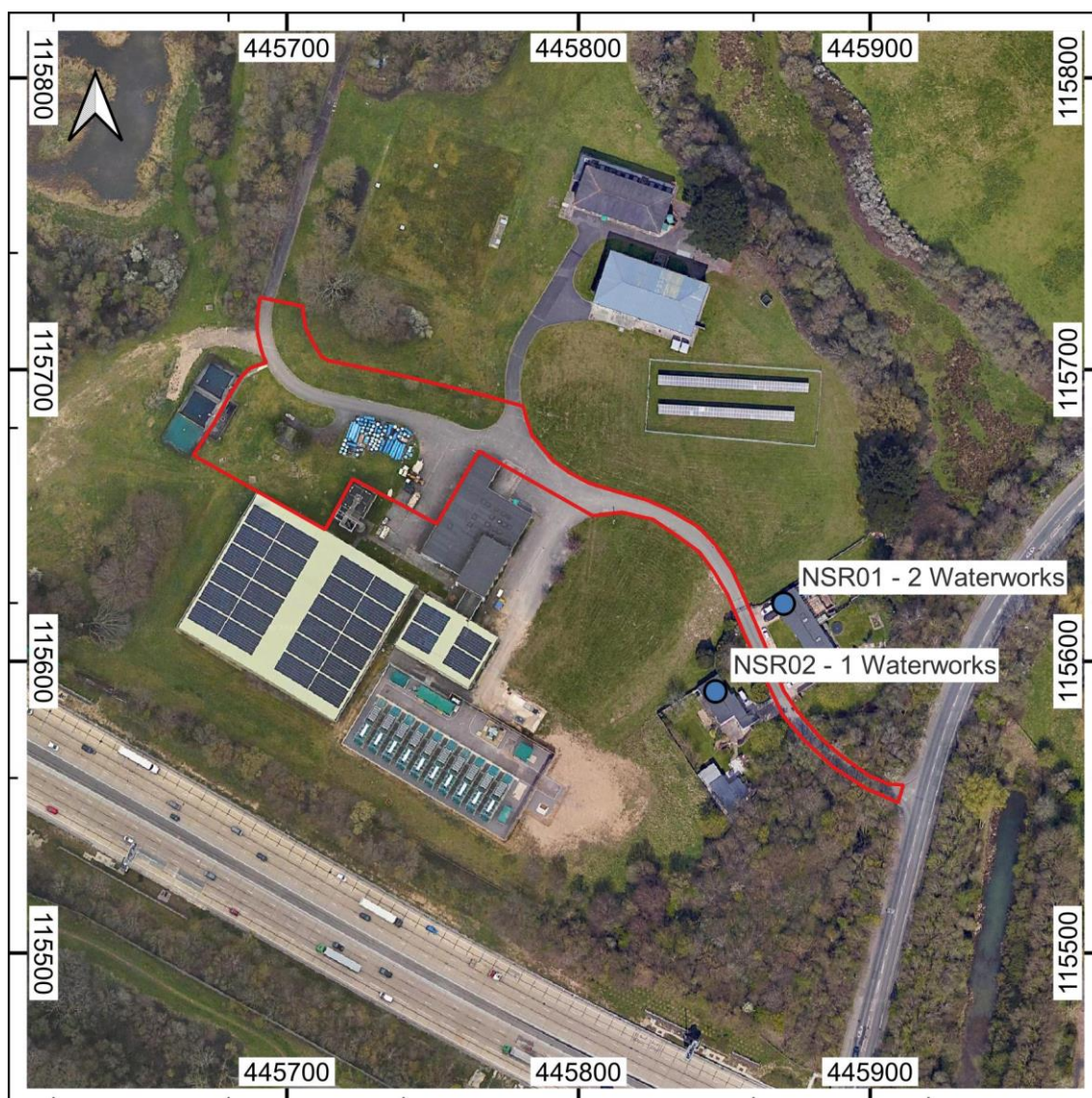
The nearest noise-sensitive receptors (NSRs) are located to the east of the site, and have been identified as the following:

- NSR01: 2 Waterworks, off Allington Lane; and
- NSR02 :1 Waterworks, off Allington Lane.

The location of the site and the identified NSRs is shown in Figure 2-1 overleaf.



Figure 2-1: Site Location

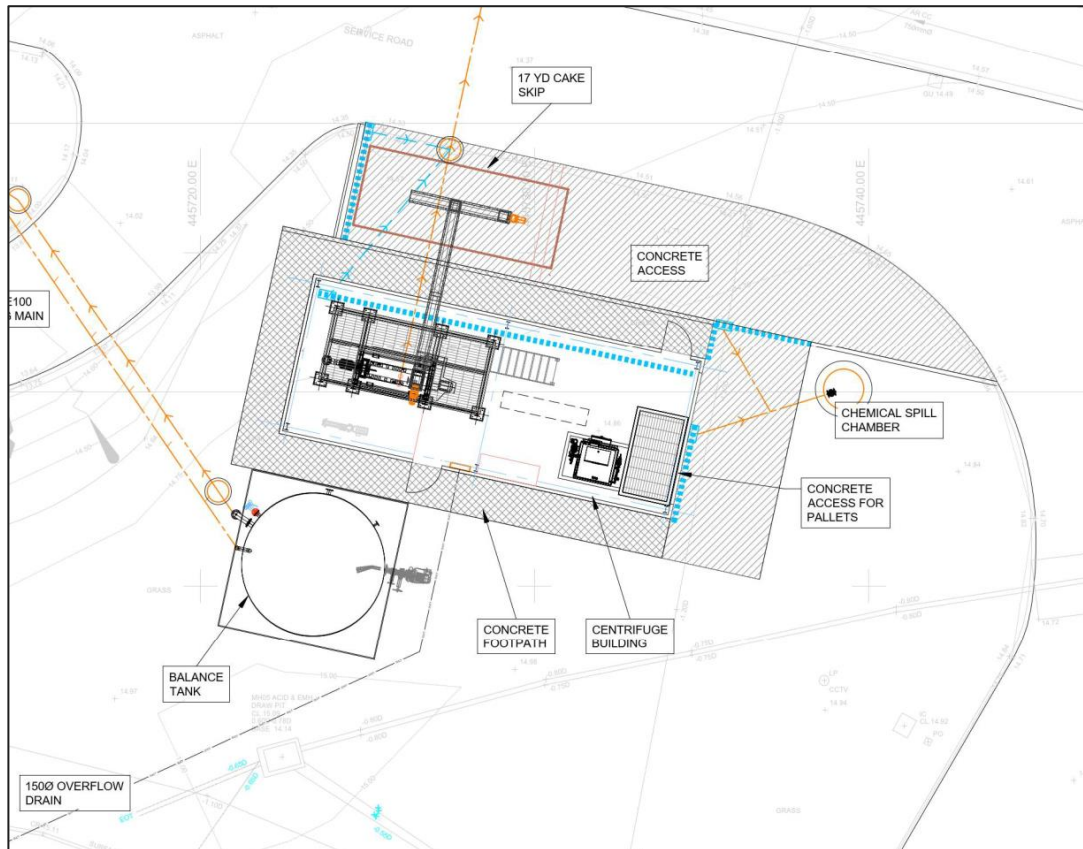


2.3 Consented Development

The consented development is a new permanent building to house a centrifuge and other associated works, as consented by Eastleigh Borough Council under notice reference F/24/97844 dated September 2024. The proposed site layout is shown in Figure 2-2 overleaf.



Figure 2-2: Consented Site Layout



3.0 Relevant Guidance and Planning Condition

The noise assessment has been undertaken in conjunction with BS4142:2014+A1:2019, a summary of which provided below.

3.1 British Standard 4142:2014+A1:2019

British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) is intended to be used to assess the potential adverse impact of sound, of an industrial and/or commercial nature, at nearby noise-sensitive receptor locations within the context of the existing sound environment.

The assessment of impact contained in BS 4142 is undertaken by comparing the sound rating level, i.e. the specific sound level of the source plus any penalties, to the measured representative background sound level immediately outside the noise-sensitive receptor location. Consideration is then given to the context of the existing sound environment at the noise-sensitive receptor location to assess the potential impact.

To account for the acoustic character of proposed sound sources, BS 4142 provides the following with respect to the application of penalties to account for *“the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention”*.

- **Tonality** – *“For sound ranging from not tonal to predominantly tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible;*
- **Impulsivity** – *A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible;*
- **Intermittency** – *When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied; and*
- **Other Sound Characteristics** – *Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”*

Once an initial estimate of the impact is determined, by subtracting the measured background sound level from the rating sound level, BS 4142 states that the following should be considered:

- typically, the greater the difference, the greater the magnitude of the impact;
- a difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- a difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,
- the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. It is an indication that the specific sound source has a low impact, depending on the context.

BS 4142 notes that:

“Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”



Finally, BS 4142 outlines guidance for the consideration of the context of the potential impact including consideration of the existing residual sound levels, location and/or absolute sound levels. With specific reference to low background and rating noise levels, the standard states the following:

“Where background sound levels and rating levels are low, absolute levels might be as, or more relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

3.2 F/24/97844 Condition 7

Condition 7 of the planning permission reads as follows:

“7 Prior to the installation of the proposed DP37 centrifuge, an acoustic assessment shall be submitted to the Local Planning Authority to demonstrate that the sound rating level $L_{A,T,r}$ of the plant when operating does not exceed the representative background sound level (LA90) at any residential curtilage established for the daytime (07:00 hours to 18:00 hours); evening (18:00 hours to 23:00 hours) and nighttime (23:00 hours to 07:00 hours) periods of interest. The assessment shall include full details of any mitigation measures necessary to achieve this standard for approval by the Local Planning Authority. Approved mitigation measures shall be implemented before the first operation of the plant and thereafter maintained.

Reason: To protect the amenity of nearby residents.”



4.0 Baseline Sound Survey

4.1 Survey Date

To determine baseline sound levels in the vicinity of the proposed development, a baseline noise survey was undertaken between Thursday 24th and Monday 28th October 2024. The survey was undertaken at a location representative of the nearest NSRs. Details of the survey are presented below.

4.2 Equipment

The noise monitoring equipment used during the survey is detailed in Table 4-1. All measurement instrumentation was calibrated before and after the survey. No significant drift was observed. The calibration chain is traceable via the United Kingdom Accreditation Service to National Standards held at the National Physical Laboratory.

Table 4-1: Survey Equipment

Location	Equipment	Serial Number
M01	Cirrus CR:831B Class 1 Sound Level Meter	C17175FF
	Cirrus CR:515 Acoustic Calibrator	72210

4.3 Weather Conditions

Weather conditions were measured at installation and collection and third-party data from the survey period has been considered.

Weather conditions at the installation and through the majority of the survey period were appropriate for environmental sound monitoring, with precipitation only occurring during the daytime period of Monday 28th October, and wind speeds measured at 2.0 m/s at installation and below 5.0 m/s for the survey period.

In summary, the weather conditions were appropriate for the noise monitoring survey until the daytime period of Monday 28th October.

4.4 Survey Locations

The prevailing noise climate was measured at the location in the vicinity of the site as shown on Figure 4-1. The locations are considered broadly representative of the background sound levels at the nearest noise sensitive dwellings in the vicinity. A photograph of the monitoring position can be seen in **Appendix B**.



Figure 4-1: Environmental Sound Survey Location

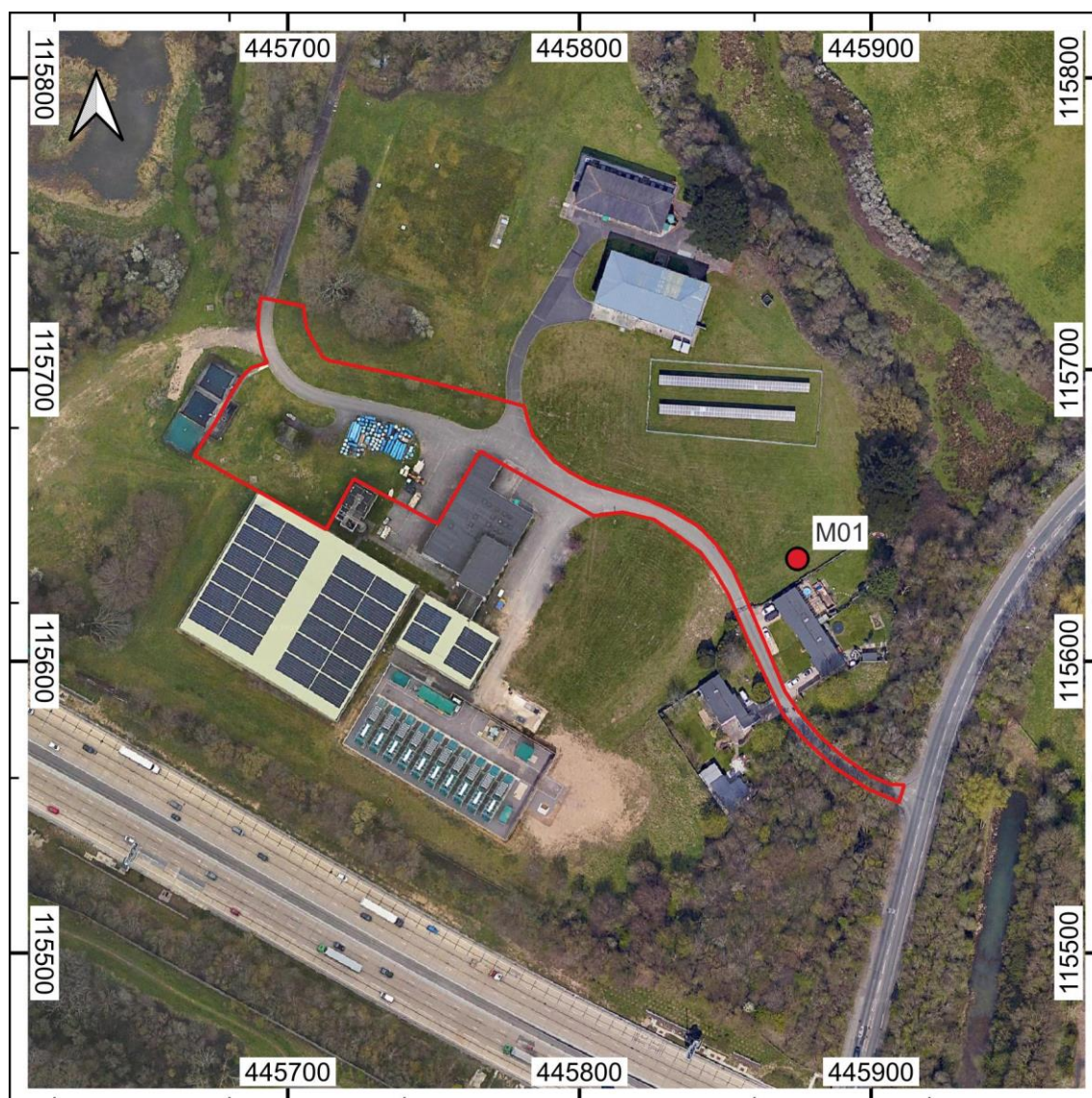


Table 4-2: Noise Monitoring Location

Location	Approximate OS Grid Reference	
	Easting	Northing
M01	445875	115635

The sound environment at the measurement location was dominated by noise from road traffic using the M27 to the south-west. Occasional traffic using Allington Lane to the east, particularly heavier vehicles, were faintly audible. On installation of the monitoring equipment, noise from the nearest resident's garden (garden work and birdsong) was also present. A noise from the vicinity of the diesel generators to the south-west was also briefly audible during the installation, however it sounded more akin to works being undertaken at that site rather than the generators themselves.

At the monitoring location, the microphone was placed 1.5 m above the local ground level in free-field conditions, i.e., at least 3.5 m from the nearest vertical, reflecting surface. The following noise level indices were recorded:

- $L_{Aeq,T}$: the A-weighted equivalent continuous sound level over the sample period;



- $L_{A90,T}$: the A-weighted sound level exceeded for 90% of the sample period. This parameter is often used to describe background noise;
- $L_{A10,T}$: The A-weighted sound level exceeded for 10% of the sample period. This parameter is often used to describe road traffic noise; and
- $L_{Amax(F)}$: The maximum A-weighted sound level during the sample period.

4.5 Baseline Sound Level Results

A summary of the survey results at the monitoring locations are presented in Table 4-3 below and graphically in **Appendix C**.

Table 4-3: Summary of Measured Sound Levels, free-field, dB

Measurement Details			Residual sound level dB $L_{Aeq,15min}$		Background sound level dB $L_{A90,15min}$	
Day Date Range	Period	Time HH:MM	Range	Typical	Range	Typical
Thu 24/10/2024 - Mon 28/10/2024	Day	07:00 - 18:00	52 - 59	54	47 - 56	51
	Evening	18:00 - 23:00	49 - 58	54	46 - 57	51
	Night	23:00 - 07:00	44 - 57	48	41 - 55	44

Histograms of the daytime, evening, and night-time baseline residual and background sound levels can be seen in **Appendix D**. These have been used to help derive the 'typical' residual and background sound levels at each of the monitoring locations which will inform the subsequent BS 4142 assessments.

4.6 Rating Level Limit

Condition 7 of the planning permission states that *"the sound rating level $L_{Ar,Tf}$ of the plant when operating does not exceed the representative background sound level (L_{A90}) at any residential curtilage established for the daytime (07:00 hours to 18:00 hours); evening (18:00 hours to 23:00 hours) and nighttime (23:00 hours to 07:00 hours) periods of interest"*.

On this basis, the rating level from the proposed centrifuge must not exceed the typical background sound levels outlined in Table 4-3.

4.7 Measurement Uncertainty

In accordance with BS 4142, the uncertainty associated with measured baseline sound levels requires discussion. Baseline sound level measurement uncertainty was minimised using the following steps:

- Measurement locations were representative of the nearest noise-sensitive receptors to the site;
- Measurements were undertaken using a suitable logging period considered to provide representative background sound levels;
- The sound measurements included an extended period;
- Measurements were rounded to the nearest one decimal place before the final calculations; and
- Instrumentation was appropriate and in accordance with Section 5 of BS 4142.



5.0 BS 4142:2014+A1:2019 Assessment

5.1 Noise Model Assumptions

A noise model has been utilised to predict the specific sound levels at the receptor locations. The sound predictions in this assessment have been undertaken using a proprietary software-based noise model, CadnaA, which implements the full range of UK noise-based calculation methods. The calculation algorithms set out in ISO 9613-2:2024 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors* have been used, the model has been based on, and has made the following assumptions:

- A ground absorption factor of 0.5.
- OS 10 m Contour Data.
- A reflection factor of 3.
- Downwind propagation between the source and receiver.
- Average humidity of 70% and an average temperature of 10°C; and
- A receiver height of 1.5 m as both the receptor locations are bungalows.

5.2 Noise Model Sources

The consented plant at the Site consists of a Hiller DT37 centrifuge, with a sound power level of 101 dB L_{WA} , which is to be contained within a building which is to be constructed from brick and Kingspan KS1000RW panels. The building will also have a roller shutter door on the eastern façade.

This has been modelled as a building with, based on the building dimensions, an internal sound level of 111 dB, the Kingspan KS1000RW with a sound reduction index (SRI) of 25 dB, and the roller shutter with an SRI of 22 dB.

5.3 Noise Model Results – BS 4142 Specific Sound Levels

Based on the above, the following specific sound levels from the centrifuge building are shown in Table 5-1 below.

Table 5-1: Predicted Specific Sound Levels free field dB

Location	Predicted Specific Sound Level, $L_{Aeq,T}$
NSR01	39
NSR02	37

In order to determine the rating level of the operations of the site in line with BS 4142, any distinctive features of the specific sound discernible at the receptor locations may merit a rating penalty to the specific sound level of the proposed operations. These corrections should be applied for sounds that are tonal, impulsive, intermittent, or otherwise readily distinctive against the background sound environment.

It is not anticipated that the centrifuge will exhibit any tonal, impulsive, or intermittent characteristics, as these are typically designed out of units such as these. However, it is considered conservative to attribute a 3 dB rating penalty in the case that the source is distinctive compared to the background environment.

5.4 Assessment Results

The numerical assessments in Table 5-2 below have been provided in accordance with BS 4142 to provide a comparison between rating sound levels of the proposal against the typical sound levels existing prior to development.



It must be noted that only NSR01 has been considered for the assessment as this receptor is subject to the highest predicted specific sound level; any impact at NSR02 will therefore be lower.

Table 5-2: BS 4142 Assessment of Proposed Development – NSR01

Results	Day 07:00 – 18:00	Evening 18:00 – 23:00	Night 23:00 – 07:00	Commentary
Residual sound level, dB $L_{Aeq,T}$	54	54	48	Representative residual and background sound levels from M01 of the assessment as directly representative of NSR01.
Rating level limit, dB $L_{A90,T}$	51	51	44	
Reference time interval	1-hour	1-hour	15-mins	
Specific sound level, dB $L_{Aeq,T}$	39	39	39	Predicted noise level.
Acoustic feature correction, dB	+3	+3	+3	Correction in case of distinctive qualities compared to background environment.
Rating level, dB $L_{A,T}$	42	42	42	Specific sound level plus acoustic feature correction.
Excess of rating over rating level limit	-9	-9	-2	Rating level minus rating level limit.
Assessment indicates likelihood of *depending on context	Low Impact*			Where the rating level does not exceed the representative background sound level this is an indication of low impact, depending on context.
Uncertainty of the assessment	Not significant			Uncertainty was minimised by measuring over an extended period and at a location directly representative of the nearest residential NSRs.

It can be seen that, across all time periods, there is a likelihood of low impact from the proposed centrifuge.

5.5 Assessment Context

It has been acknowledged assessments needs to be considered in context, following the requirements of BS 4142. The concept of “context” has been notably emphasised in Section 11 of BS 4142 when considering numerical impacts established from applying the standard.

- The residual sound level is high and highly dominated by noise from road traffic using the M27, implying a necessarily high tolerance to noise for residents.
- The assessment has been undertaken at the nearest and most affected residential receptors, the impact on all other residential properties will be lower due to distance/screening losses.
- The site has been in long-standing use, including similar noise sources to the proposed fixed plant.
- The assessment has taken a robust view of activity noise to present the worst-case scenario when in reality the specific sound level will likely be lower than the predictions with plant not in constant use.



- It is understood that the intention is to only run the centrifuge during the daytime, during periods where the receptors experience a higher residual sound level, and the rating level of the proposed source will be well below the rating level limit.

The consideration of context relevant to the proposed plant has been viewed to support the notion of a “low impact” assessment, in accordance with BS 4142.



6.0 Conclusions

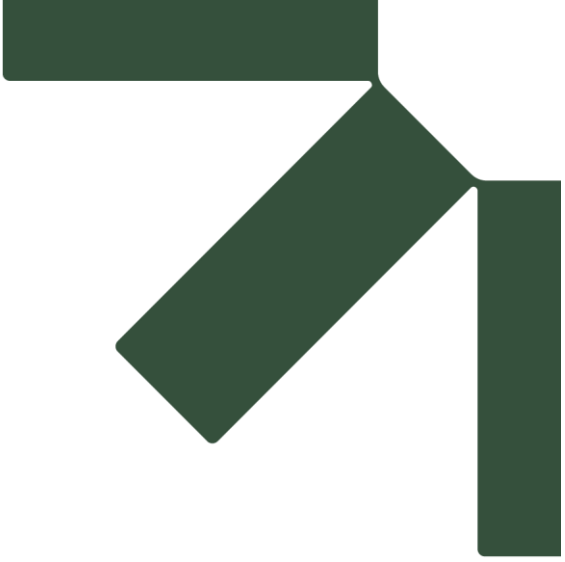
SLR has been instructed by Portsmouth Water Ltd to undertake a noise impact assessment in order to discharge Condition 7 of planning permission reference F/24/97844 for a new permanent building to house a centrifuge at River Itchen Water Treatment Works.

Operational sound levels associated with the proposed centrifuge have been predicted at the closest receptors using the calculation methodologies in ISO 9613-2:2024 using the proprietary sound modelling software CadnaA®.

An assessment has been made with reference to British Standard 4142:2014+A1:2019.

It has been concluded that, during all time periods, the rating level of proposed plant would not exceed the background sound level at all assessed receptors considered; therefore Condition 7 can be discharged.





Appendix A Glossary of Terminology

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Portsmouth Water Ltd.

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The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

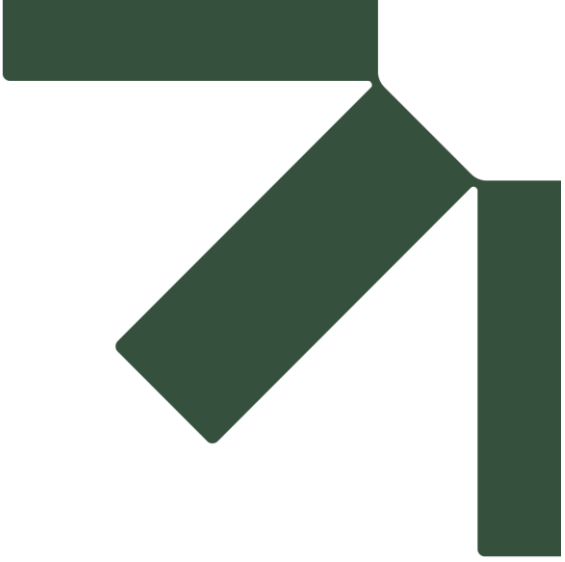
Table A.1: Sound Levels Commonly Found in the Environment

Sound Level	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of Pain

A.1 Acoustic Terminology

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (of 20 μ Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	$L_{Aeq,T}$ is defined as the notional steady sound level which, over a stated period T , would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
$L_{A10,T}$ & $L_{A90,T}$	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence $L_{A10,T}$ is the level exceeded for 10% of the time period and as such can be regarded as the 'average maximum level'. Similarly, $L_{A90,T}$ is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the $L_{A10,T}$ index to describe traffic noise.
$L_{Amax(f)}$	$L_{Amax(f)}$ is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.





Appendix B Photograph of Meter Location

Noise Impact Assessment

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Portsmouth Water Ltd.

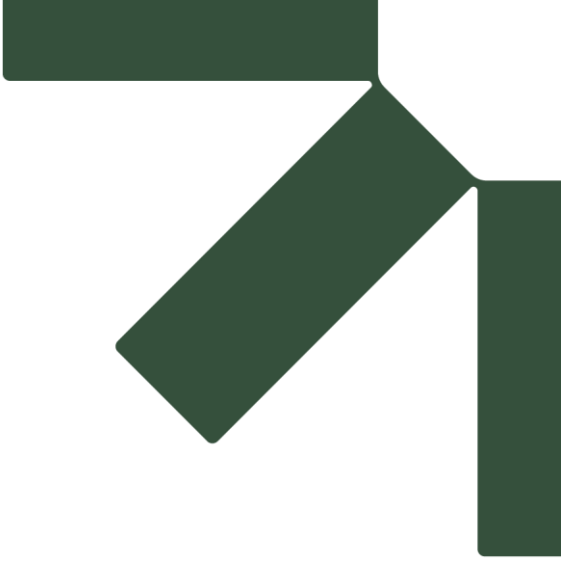
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Figure B-1: Monitoring Location





Appendix C Survey Data

Noise Impact Assessment

River Itchen WTW – Permanent Centrifuge

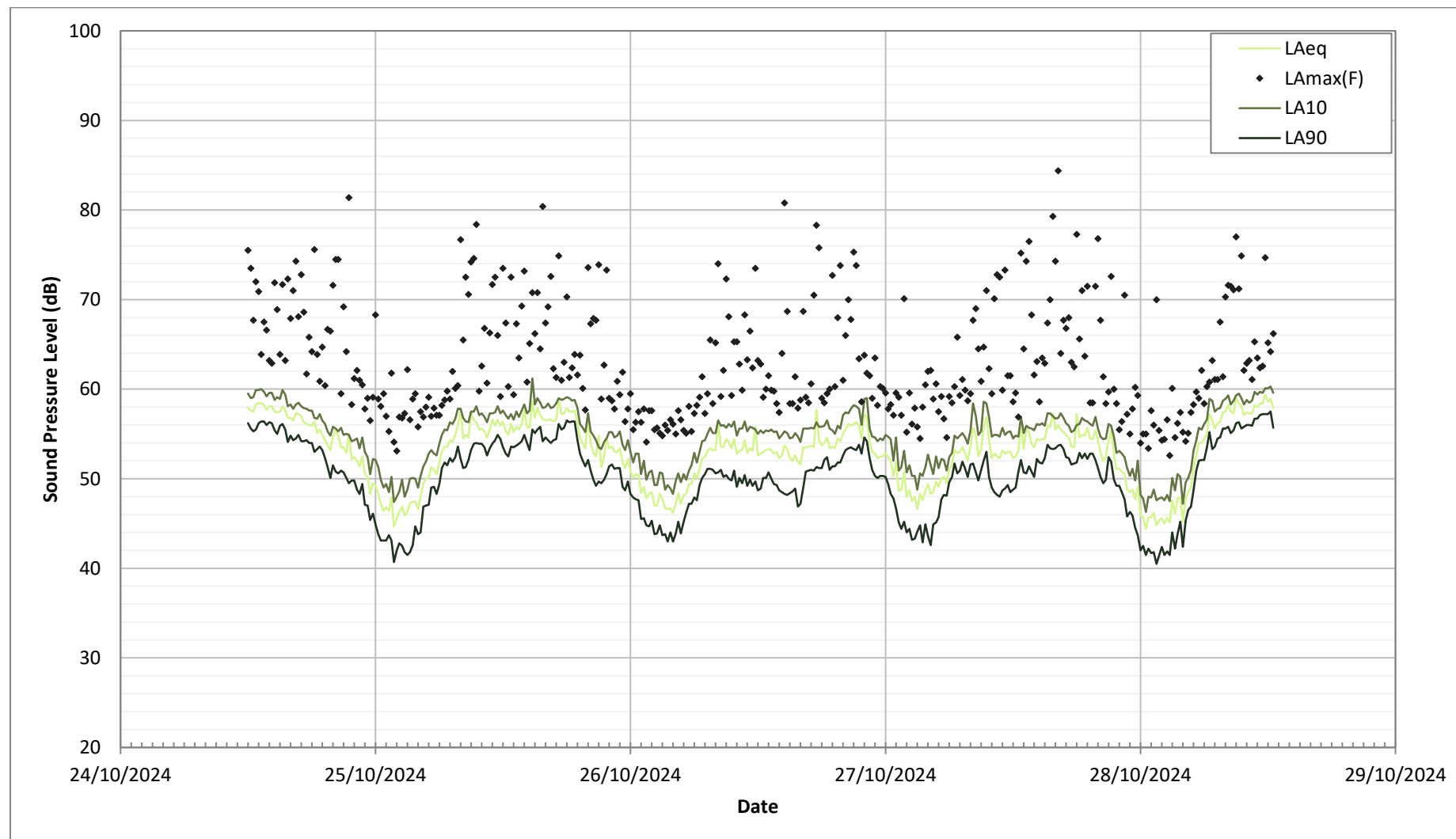
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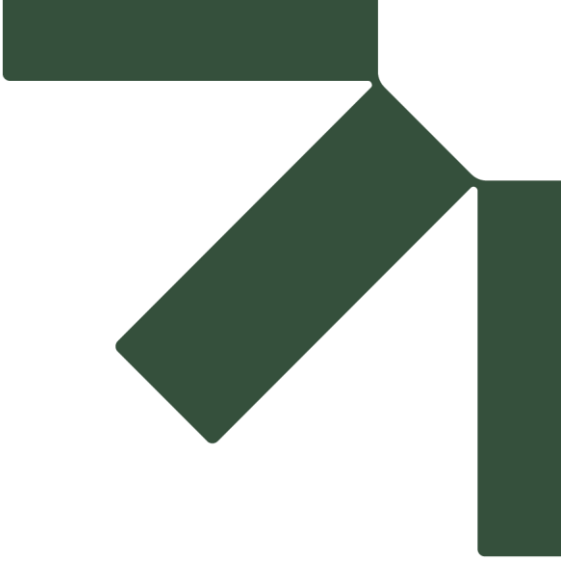
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Figure C-1: Baseline Sound Survey Results





Appendix D Histograms

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Figure E-1: Residual ($L_{Aeq,15min}$) Histogram

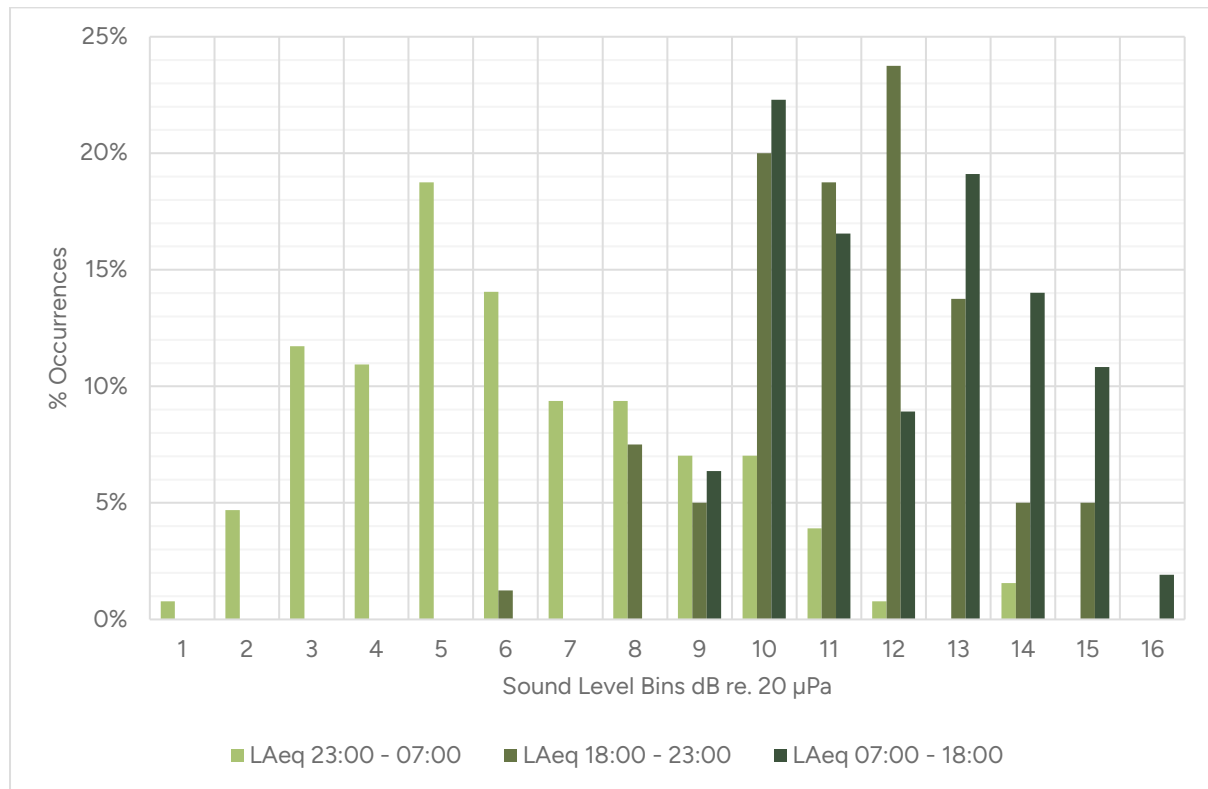
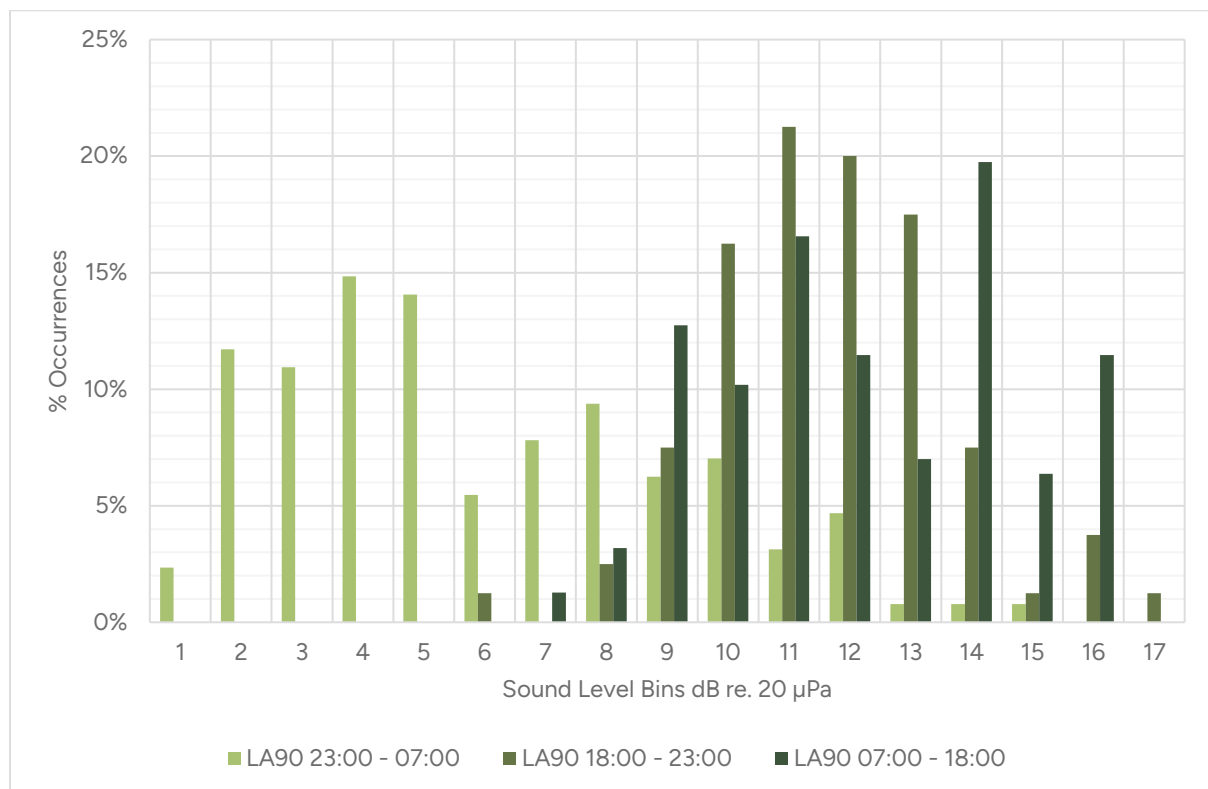


Figure E-2: Background ($L_{A90,15min}$) Histogram





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