

NOISE IMPACT ASSESSMENT

BS 4142:2014+A1:2019

**Industrial Noise - Battery
Storage Facility**




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REPORT DETAILS

Client	LIFETIME PROPERTY LIMITED
Report Title	Noise Assessment: Industrial Noise
Site Address	322 Broomloan Rd, Glasgow G51 2JW
Project No.	NALPRO050222
Consultant Contact	jonathan@noiseassessment.org

QUALITY ASSURANCE

Issue No.	Status	Issue Date	Comments	Author	Approved
1	FINAL	10/03/22	-	 J Mape BSc (Hons) PgDip IOA Cert. Environ. Noise TechIOA Noise Consultant	D Warren Director

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Assessment Summary

Noise Assessments Ltd have been contacted to undertake a noise impact assessment. The client has been requested by the Local Council to complete a noise assessment on Land at 322 Broomloan Rd, Glasgow G51 2JW.

A noise assessment is required to assess the likely noise impact from noise generated from the continuous operation of a Battery storage facility with 22 no. battery storage containers during the daytime and night-time.

The noise level of the AC units (attached to containers) has been taken in situ at a similar site.

The measured noise level is tabulated below:

Measured Noise Level

Equipment	L _{Aeq} (dB)	r, m
AC units (attached to containers)	75	6.0

The nearest noise sensitive receptors (NSRs) have been identified as residential properties northeast and school to the south of the site.

Various unattended background noise measurements were undertaken outside the of the nearest sensitive receptor NSR1 during the daytime and NSR2 daytime and night-time. The data collected during this period has been used to characterise the existing acoustic environment around the site.

The noise impact during the daytime is tabulated below:

Noise Impact

NSR	Rating Level, dB L _{Ar}	Difference, dBA	Impact
1	30	16	Low Impact
2	27	19	Low Impact

The noise impact during the night-time is tabulated below:

Noise Impact

NSR	Rating Level, dB L _{Ar}	Difference, dBA	Impact
2	27	11	Low Impact

The results of the noise assessment demonstrate that noise near sensitive receivers will be considered **low impact**.

1. Proposal

- 1.1 Noise Assessments Ltd have been contacted to undertake a noise impact assessment. The client has been requested by the Local Council to complete a noise assessment on Land at 322 Broomloan Rd, Glasgow G51 2JW.
- 1.2 A noise assessment is required to assess the likely noise impact from noise generated from the continuous operation of a Battery Storage Facility with 22 no. battery storage containers during the daytime and night-time.
- 1.3 The proposed permitted hours of operation are:
 - Monday – Sunday: 24hrs

Consultant

- 1.4 Jonathan has experience in environmental, noise and vibration monitoring, acoustic consultancy and impact assessment gained over a period of 19 years in the industry, across the UK, Australia, Brunei, Turkey and the Middle East. He has a Degree in Environmental Science, Postgraduate Diploma in Environmental Monitoring and is a member of the Institute of Acoustics (TechIOA). He has also completed the IOA Certificate in Environmental Noise, from the University of Liverpool.
- 1.5 Jonathan specialises in the measurement and assessment of noise and vibration for a wide range of planning applications, including those requiring EIA, across the industrial, commercial, residential, and mineral extraction sectors. Jonathan is also involved in undertaking various aspects of indoor occupational monitoring and reporting for projects relating to worker health.

2. Existing Context

- 2.1 The site is set in a commercial/industrial location, adjacent to a railway and Ibrox Stadium, and several busy main roads. There are residential properties to the northeast (460m) and school to the south (350m) of the site.
- 2.2 The environmental health department of the local planning authority raised concerns of noise emissions from the use of the Battery Storage Facility on neighbouring noise sensitive properties during the daytime and night-time.

3. Criteria

- 3.1 The following targets have been selected in accordance with 'BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound.' This will be achieved when the Rating Level is below the representative background sound level.

4. Noise Policy and Guidance

Planning Policy Scotland

- 4.1 PAN 1/2011 'Planning and Noise' is the current advice note dealing with noise in the Scottish planning system. For technical information regarding noise assessments, this document refers to the accompanying Technical Advice Note TAN 2011, which suggests that when a noise impact assessment is to be conducted, the first stage in the assessment process is:
- 4.2 "to identify all noise sensitive receptors which are likely to be adversely affected by the development... Generally, in the case of noise sensitive developments, the noise sensitive receptors will be those associated with the development. However, other noise sensitive receptors may be identified in cases where a noise sensitive development adversely affects existing noise sensitive receptors due, for example, to an increase in traffic associated with a planned large housing development.

Technical Guidance

BS 7445:2003 Parts 1 and 2 - Description and measurement of environmental noise

- 4.3 This Standard provides details of the instrumentation and measurement techniques to be used when assessing environmental noise and defines the basic noise quantity as the continuous A-weighted sound pressure level (LAeq).

BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound'

- 4.4 BS 4142:2014+A1:2019 provides methods for rating and assessing sound of an industrial and/or commercial nature, which includes:
- a) Sound from industrial and manufacturing processes;
 - b) Sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - c) Sound from loading and unloading of goods and materials at industrial and/or commercial premises; and
 - d) Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements in or around an industrial and/or commercial site.
- 4.5 The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The measured specific sound source is corrected for acoustic features (if present) of intermittency, impulsivity and tonality to give the rated noise level. The assessment considers the impact of the specific sound by subtracting the measured background sound level from the rating level, and considering the following;

- a) Typically, the greater this difference, the greater the magnitude of impact.
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5dB(A) is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact, or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

5. Nearest Sensitive Receptor Locations

- 5.1 The nearest noise sensitive receptors (NSRs) have been identified as residential properties northeast and school to the south of the site.

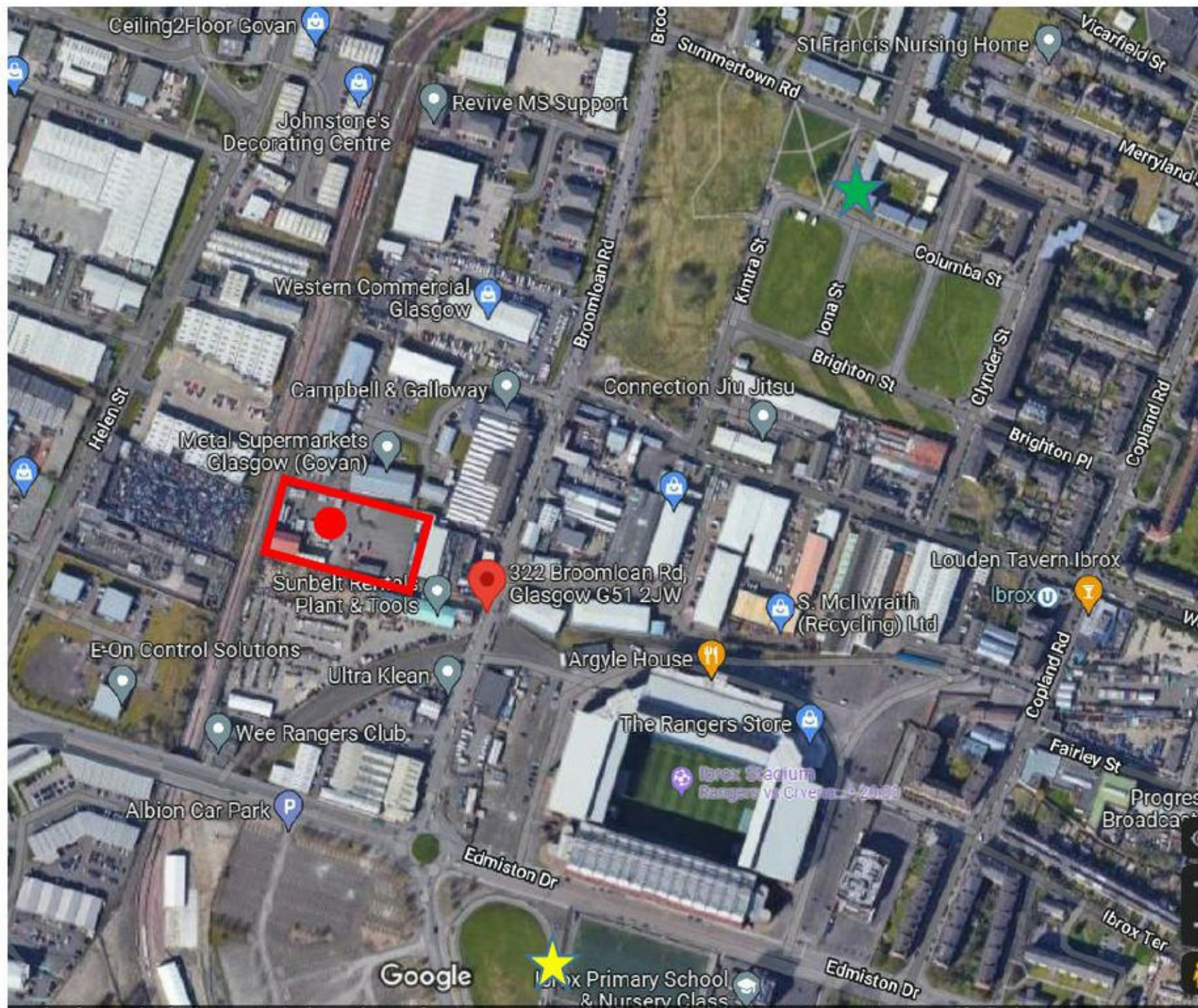
6. Subjective Impressions

- 6.1 The noise climate at the rear of the site is dominated by road traffic throughout the day including cars, buses and HGVs / LGVs where tyre / road interaction noise. Secondary noise included bird song.

7. Measurement Locations

- 7.1 Various background noise measurements were undertaken outside the nearest sensitive receptors (NSR1/NSR2) and at the proposed site boundary. The data collected during this period has been used to characterise the existing acoustic environment around the site.
- 7.2 Measurement and NSR locations are shown in figure 1 below:

Figure 1: Site & Measurement Location



8. Measurement Procedure

8.1 Noise levels were measured on Thursday 24th to Friday 25th February 2022. Full measurement times and durations can be found in **Appendix B**.

9. Measurement Equipment

9.1 Measurements were undertaken using a calibrated, Pulsar N45 class 1 sound level meters. Full equipment details can be found in **Appendix C**.

9.2 During all measurements the microphone was protected with an outdoor windshield.

9.3 The calibration level of the meters was checked before and after the survey with a Pulsar N45 sound calibrator with no variation in the levels observed.

9.4 The sound level meters were set to measure various noise parameters including LAeq and LAmax values using a 'fast' time weighting.

9.5 Full calibration details are available on request.

10. Weather Conditions

10.1 Weather conditions were deemed acceptable for background noise measurement. Full meteorological conditions are detailed in **Appendix D**.

11. Noise Source Levels

11.1 The noise level of the AC units (attached to containers) has been taken in situ at a similar site.

11.2 The measured noise level is tabulated below:

Table 2: Measured Noise Level

Equipment	LAeq (dB)	r, m
AC units (attached to containers)	75	6.0

BS4142:2014 Assessment

12. Specific Sound Levels

12.1 The specific sound level is denoted LAs and is the A-weighted, equivalent noise level at the NSR locations over the reference time period.

12.2 The NSRs are located northeast and south of the site, however there is no direct line of sight to the sensitive receptors. See Figure 1 for the location of sensitive receptors. Full calculations are shown in **Appendix F**:

12.3 The Specific Sound Level of the AC units (attached to containers) at the nearest NSR locations are summarised below:

Table 3: Specific Sound Levels

NSR	Specific Sound Level, dB LAs
1 (350m)	30
2 (460m)	27

13. Background Sound Level

13.1 Environmental noise levels were measured on Thursday 24th to Friday 25th February 2022.

13.2 The lowest daytime background sound level was measured between 14:45-15:00 on Thursday as 46 dB LA90,15min at NSR1.

13.3 The lowest daytime background sound level was measured between 10:00-10:15 on Thursday as 43 dB LA90,15min at NSR2.

13.4 The lowest night-time background sound level was measured between 02:15-02:30 on Friday as 38 dB LA90,15min at NSR2.

14. Rating Level

14.1 The specific sound level may be corrected for certain characteristics that make a sound more noticeable at the NSR locations. Corrections for tonality, impulsivity and intermittency may be applied.

14.2 The associated rating penalties and resultant sound rating levels, dB L_{Ar}, are tabulated below:

Table 4: Rating Penalties, dB, and Sound Rating Levels

NSR	dB L _{As}	Tonality	Impulsivity	Intermittency	dB L _{Ar}
1 [#]	30	0	0	0	30
2 [#]	27	0	0	0	27

14.3 #Based upon typical third octave spectrums previously sighted for this type of noise source we would consider that there is unlikely to be prominent, discrete tones in accordance with the objective method described within BS4142. In addition, due to the relative low level of the predicted Specific Sound Level in comparison with the Background Sound Level we would not consider that the noise generation from the site is likely to attract a feature correction that is distinctive above the background.

15. Rating Level Vs Background

15.1 The rating level is to be compared to the background sound level to determine the resultant noise impact in accordance with BS4142:

A Sound Rating Level at or below the background noise level is indicative of *Low Impact*;

A Sound Rating Level that exceeds the background noise level by around + 5dB is likely an indication of *Adverse Impact*, depending on the context;

A Sound Rating Level that exceeds the background noise level by around + 10dB is likely an indication of *Significant Adverse Impact*, depending on the context.

15.2 The noise impact during the daytime is tabulated below:

Table 5: Noise Impact

NSR	Rating Level, dB L _{Ar}	Difference, dBA	Impact
1	30	16	Low Impact
2	27	19	Low Impact

15.3 The noise impact during the night-time is tabulated below:

Table 6: Noise Impact

NSR	Rating Level, dB L _{Ar}	Difference, dBA	Impact
2	27	11	Low Impact

15.4 Low Impact has been identified at the NSR1 and NSR2 therefore no mitigation is required.

16. Summary

16.1 Noise Assessments Ltd have been contacted to undertake a noise impact assessment. The client has been requested by the Local Council to complete a noise assessment on Land at 322 Broomloan Rd, Glasgow G51 2JW.

16.2 A noise assessment is required to assess the likely noise impact from noise generated from the continuous operation of a Battery storage facility with 22 no. battery storage containers during the daytime and night-time.

16.3 The noise level of the AC units (attached to containers) has been taken in situ at a similar site.

16.4 The measured noise level is tabulated below:

Measured Noise Level

Equipment	L _{Aeq} (dB)	r, m
AC units (attached to containers)	75	6.0

16.5 The nearest noise sensitive receptors (NSRs) have been identified as residential properties northeast and school to the south of the site.

16.6 Various unattended background noise measurements were undertaken outside the of the nearest sensitive receptor NSR1 during the daytime and NSR2 daytime and night-time. The data collected during this period has been used to characterise the existing acoustic environment around the site.

16.7 The noise impact during the daytime is tabulated below:

Noise Impact

NSR	Rating Level, dB L _{Ar}	Difference, dBA	Impact
1	30	16	Low Impact
2	27	19	Low Impact

16.8 The noise impact during the night-time is tabulated below:

Noise Impact

NSR	Rating Level, dB L _{Ar}	Difference, dBA	Impact
2	27	11	Low Impact

16.9 The results of the noise assessment demonstrate that noise near sensitive receivers will be considered low impact.

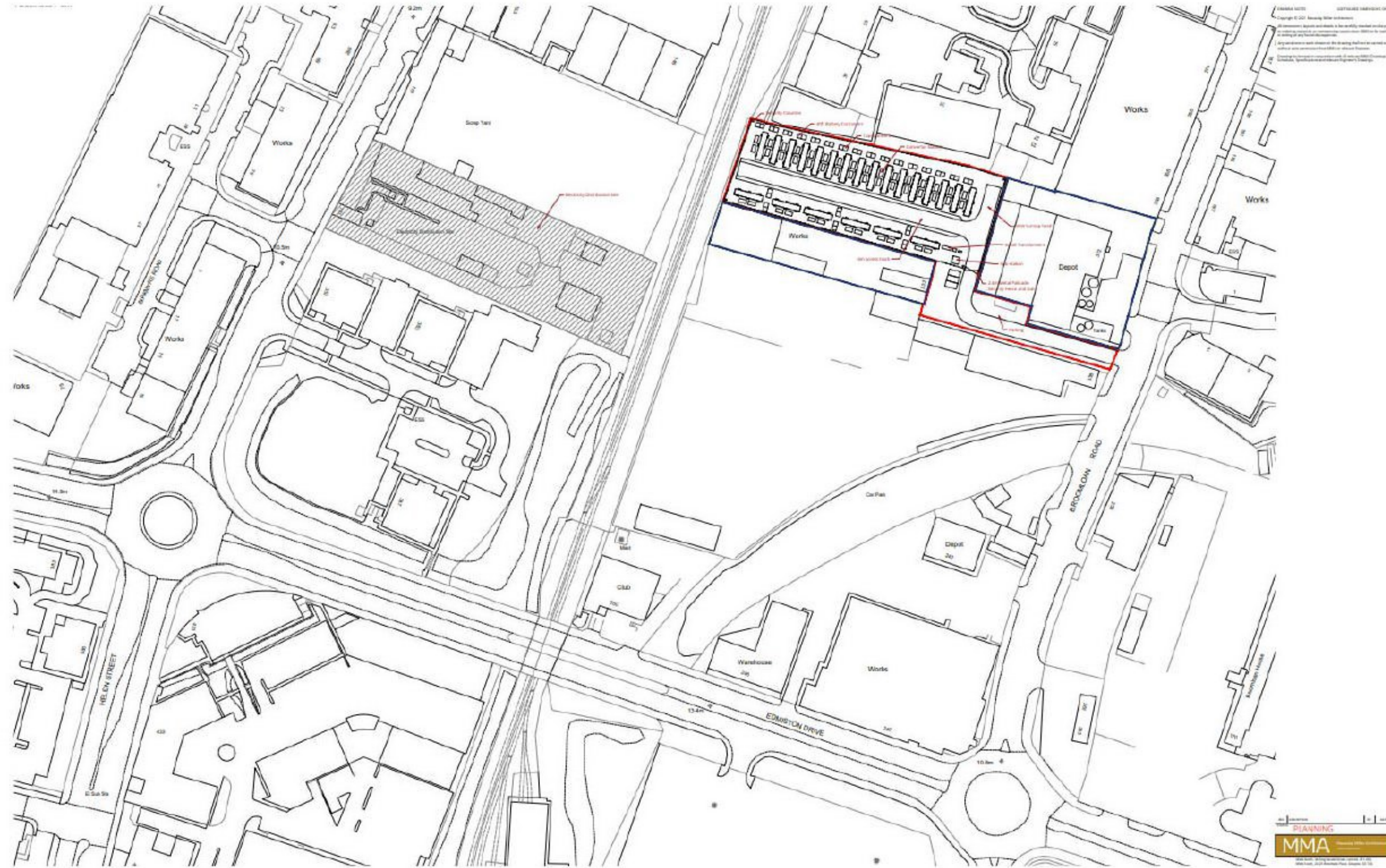
17. Uncertainties

17.1 Uncertainty can arise when a calculation method, such as distance correction, is used to determine an overall noise level at an NSR location; however, it is an accepted method when the noise sources are yet to be introduced to the site.

17.2 The monitoring equipment is subject to a 1dB error margin, however calibration before and after measurements allows the drift within the margin to be monitored and thus demonstrates that minimal drift occurred throughout the measurements.

Appendices

APPENDIX A – Proposed Location of Battery Storage Facility



APPENDIX B – Measurement Details

Measurement	Start Date	Start Time	End Date	End Time
M1	24/02/22	09:30	25/02/22	20:15
M2	24/02/22	09:45	25/02/22	20:20

APPENDIX C - Equipment Details

Equipment	Make	Model	Class	Serial Number
Sound Meter	Pulsar	N45	1	1365
Calibrator	Pulsar	PM1	1	011121C
Sound Meter	Pulsar	N45	1	1190
Calibrator	Pulsar	PM1	1	72429

APPENDIX D - Calibration Details

Measurement	Calibrator Ref Level (dB)	Level Before (dB)	Deviation Before (dB)	Level After (dB)	Deviation After (dB)
M1	94.0	94.0	0	94.0	0

APPENDIX E - Meteorology Details

Date	Temp C	Wind Speed m/s*	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
24-25/02/22	4-8	2.9	ssw	57	0.0	3/8

*Windspeeds measured on site using a Skywatch Xplorer 2 Anemo-Thermometer.

APPENDIX F - Noise Attenuation

Utilising Measured Levels

Equipment	measured data, dB $L_{Aeq,T}$	r_1 , m	r_2 , m	Barrier	Level at NSR ₂
AC units (attached to containers)	75	350	6.0	-10	30 (NSR1)
		460	6.0	-10	27 (NSR2)

Barrier attenuation assumed as 5 dB and 10 dB for the partial and complete blockage of the line of sight respectively between source and receiver as per 'BS5228-1:2009 – Noise and vibration control on construction and open sites' pg. 130.

Point source distance attenuation

$$L_y = 20 \times \log \frac{r_1}{r_2}$$

Where L_y is the distance attenuation factor and $r_{1,2}$ are the source -> measurement distance and source -> NSR distance in metres respectively

APPENDIX G – Terminology and Definitions

Noise

Sound only becomes noise (often defined as ‘unwanted sound’ or sound that is considered undesirable or disruptive) when it causes or contributes to some harmful or otherwise unwanted effect, like annoyance or sleep disturbance.

Acoustic Environment

Sound from all sound sources as modified by the environment.

Equivalent continuous A-weighted sound pressure level $L_{Aeq,T}$

Value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval T, has the same mean square sound pressure as a sound under consideration whose level varies with time.

A-weighting

The human ear is most sensitive to frequencies in the range 1 kHz to 5 kHz. On each side of this range the sensitivity falls off. A-weighting is used in sound level meters to replicate this sensitivity and respond in the same way as the human ear.

Octave Band

Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.

Maximum Sound Pressure Level $L_{Amax,T}$

Highest value of the A-weighted sound pressure level with a specified time weighting that occurs during a given event or measuring period.

The $L_{A10,T}$ Sound Level

The A-weighted sound pressure that is exceeded for 10% of a given time interval, T. It is often used to evaluate road traffic noise.

The $L_{A90,T}$ Sound Level

The A-weighted sound pressure that is exceeded for 90% of a given time interval, T, measured using time weighting F. It is often referred to as the background noise level and which might in part be an indication of relative quietness at a given location

Free-field Level

The sound pressure level away from reflecting surfaces.

NOTE Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the

measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

Façade Level

The sound pressure level 1 m in front of the façade.

NOTE Façade level measurements of LpA are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the façade.

Indoor Ambient Noise

Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants.



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