



**CLEARSTONE
ENERGY**

DARTFORD ENERGY HUB NOISE IMPACT ASSESSMENT

Prepared by Clearstone Energy & RSK Acoustics
| December 2024 | Document Reference: R016



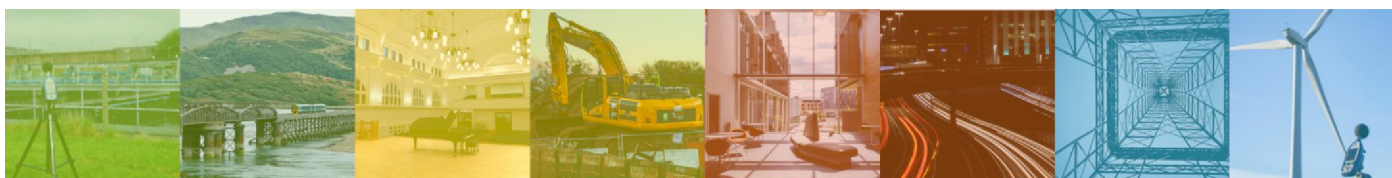
NOISE IMPACT ASSESSMENT

DARTFORD ENERGY HUB

Clearstone Energy

2061895-RSKA-RP-001-(02)





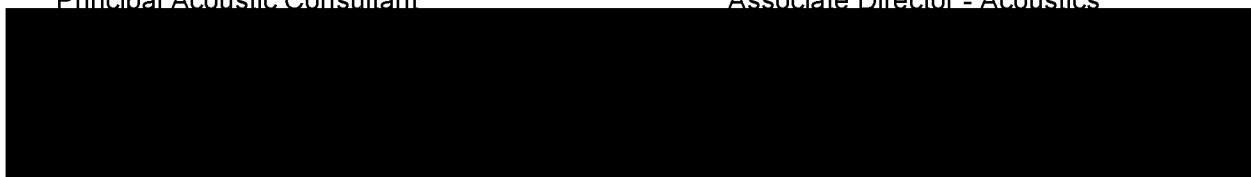
General notes

Project Name:	Dartford Energy Hub
Title:	Noise Impact Assessment
Client:	Clearstone Energy
Issue Date:	18 December 2024
Report No.	2061895-RSKA-RP-001-(02)

Revision:	Description:	Author(s):	Reviewer:	Date:
01	Issue	MT	MU	13/12/2024
02	Minor layout revisions	MT	MU	18/12/2024

Author(s): Matthew Thomson Technical reviewer: Mark Underhill
Principal Acoustic Consultant Associate Director - Acoustics

Signature:



Date: 18 December 2024

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Acoustics Ltd.



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1 Introduction

1.1 Overview

RSK Acoustics has been instructed by Clearstone Energy to undertake a noise impact assessment in support of the planning application for the proposed Dartford Energy Hub, a 300 MW Battery Energy Storage System (BESS) facility in Southfleet, Dartford.

The assessment has been informed by a baseline noise survey, undertaken at positions representative of the nearest noise sensitive receptors to the proposed development, to determine typical background sound levels during daytime and nighttime periods

This report describes the assessment methodology and the baseline acoustic conditions currently prevailing across the site and surrounding area, and evaluates the suitability of the proposed development in line with relevant policy, standards and guidance.

1.2 Site Location and Description

The development site is located off the B262 Station Road, Gravesend, DA13 9PA. The site is centred on approximate TQ 61696 72104, with the facility covering an approximate area of 6.3 hectares. The development site currently comprises predominantly open grassland.

The proposed site is split into two parcels, intersected by Station Road. A commercial area bounds the east of the northern parcel, containing a pet store and garden centre, beyond which is a recycling centre, HS1 railway line and the A2 Watling Street. A second branch of the HS1 railway line runs along the south boundary of the southern parcel, beyond which is agricultural land. The north of the site is also bounded by land used for agriculture.

The nearest dwelling to the site is located to the west of the northern parcel. This is adjacent to land used for commercial purposes as a logistics yard. Additional dwellings are located further from the site in all directions. Swanscombe Peninsula Site of Special Scientific Interest (SSSI) is located approximately 500m to the north of the site, beyond the A2.

The proposed development will contain an array of BESS units and associated equipment which can generate noise, including inverters, medium voltage (MV) skids and transformers. Two grid transformers will be located within a new substation in the east corner of the northern land parcel.

A site layout plan upon which this assessment has been based is provided in Appendix A.

1.3 Objectives

The objectives of the noise impact assessment are to:

- Identify noise sensitive receptors in the vicinity of the proposed development;
- Undertake a baseline survey to quantify and characterise existing sound levels in the area surrounding the proposed development;
- Calculate the noise levels likely to be generated by the proposed development at the nearest or most exposed noise sensitive receptors;
- Assess the potential noise impacts of the proposed development in accordance with relevant standards and guidance;
- Provide recommendations for acoustic mitigation measures, where necessary, and;
- Present the residual sound levels following the incorporation of acoustic mitigation measures.



2 Regulatory Framework

2.1 Planning Policy

2.1.1 National Planning Policy Framework (NPPF): December 2024

The National Planning Policy Framework (NPPF) is the means by which noise is considered within the planning regime. The NPPF does not contain assessment criteria, instead providing a series of policies, giving local authorities the flexibility in meeting the needs of local communities. The NPPF states:

“Planning policies and decisions should contribute to and enhance the natural and local environment by [...] preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.”

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the Site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

2.1.2 Noise Policy Statement for England: March 2010

The Noise Policy Statement for England (NPSE) is published by the Department for Environment, Food and Rural Affairs (Defra) and sets out the approach to noise within the Government's sustainable development strategy. NPSE states there are two established concepts from toxicology that are currently being applied to noise impacts (for example, by the World Health Organisation). They are:

- *“NOEL - No Observed Effect Level - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
- *LOAEL - Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.*

Extending these concepts for the purpose of this NPSE leads to the concept of a Significant Observed Adverse Effect Level.

- *SOAEL - Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur.”*

The three aims of the NPSE are stated as:



- Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development; and
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

2.1.3 Planning Practice Guidance (PPG)

The Department for Communities and Local Government 'Planning Practice Guidance' (PPG) expands upon the NPPF and NPSE. The guidance does not include any specific noise levels but sets out further principles that should underpin a noise assessment. The PPG states:

"Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

whether or not a significant adverse effect is occurring or likely to occur;

whether or not an adverse effect is occurring or likely to occur; and

whether or not a good standard of amenity can be achieved."

It then refers to the NPSE and states that the aim is to identify where the overall effect of the noise exposure falls in relation to SOAEL, LOAEL and NOEL and presents a table, reproduced below.

Response	Examples of outcomes	Increasing effect level	Action
NOAEL (No Observed Effect Level)			
Not present	No effect	No observed effect	No specific measures required
NOAEL (No Observed Adverse Effect Level)			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No observed adverse effect	No specific measures required
LOAEL (Lowest Observable Adverse Effect Level)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed adverse effect	Mitigate and reduce to a minimum



Response	Examples of outcomes	Increasing effect level	Action
SOAEL (<i>Significant Observed Adverse Effect Level</i>)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant observed adverse effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable adverse effect	Prevent

Table 1 Summary of noise exposure hierarchy

2.2 Standards and Guidance

2.2.1 British Standard (BS) 7445-1,-2,-3 'Description and measurement of environmental noise. Guide to quantities and procedures'

The three-part standard BS 7445 provides the framework within which environmental noise should be quantified. Part 1 (2003) provides a guide to quantities and procedures and Part 2 (1991) provides a guide to the acquisition of data pertinent to land use. Part 3 (1991) provides a guide to the application of noise limits.

BS 7445 also refers to a further standard, BS EN 61672, which prescribes the equipment necessary for such measurements. Whilst BS 7445 does not prescribe the meteorological conditions under which noise measurements should or should not be taken, it does (part 2, paragraph 5.4.3.3) recommend that in order:

"...to facilitate the comparison of results (measurements of noise from different sources), it may be necessary to carry out measurements under selected meteorological conditions which are reproducible and correspond to quite stable propagation conditions."

These conditions include:

- Wind speed not exceeding 5 metres/second (m/s) (measured at a height of 3 to 11 metres (m) above the ground);
- No strong temperature inversions near the ground; and
- No heavy precipitation.

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

BS 4142:2014+A1:2019 describes the methods for rating and assessing noise from industrial or commercial sources, including energy projects. The standard is applicable to the assessment of sound affecting residential receptors, through the determination of a specific level of an industrial or commercial noise source.



Where certain acoustic features are present at the assessment location, a character correction should be applied to the specific sound level to give the rating level to be used in the assessment. Acoustic features can include tones, impulsivity, intermittency or a type of noise that is distinct from the existing noise environment.

The assessment of the impact from a commercial or industrial sound can be carried out as follows:

- A difference of around +10 dB or more, between the rating and background noise levels, is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB, between the rating and background noise levels, is likely to be an indication of adverse impact, depending on the context; and
- 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.

As indicated above, the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. BS 4142:2014+A1:2019 states that:

“an effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context”.

Where the initial estimate of the impact needs to be modified due to the context, the standard recognises that aspects, such as the absolute level of sound or the character and level of the residual sound compared to the character and level of the specific sound, shall be taken into account.

2.2.3 International Standard ISO 9613-2:2024 ‘Acoustics — Attenuation of sound during propagation outdoors — Part 2: Engineering method for the prediction of sound pressure levels outdoors’

International Standard: ISO 9613-2:2024 enables the prediction of noise levels in the community from sources of known sound emission.

The noise prediction method described in this part of the standard is general and is suitable for a wide range of engineering applications where the noise level outdoors is of interest. The noise source(s) may be moving or stationary and the method considers the following major mechanisms of noise attenuation:

- Geometrical divergence (also known as distance loss or geometric damping);
- Atmospheric absorption;
- Ground effect;
- Reflection from surfaces; and
- Screening by obstacles.

The method predicts noise levels under metrological conditions favourable to noise propagation from the sound source to the receptor, such as downwind propagation, or equivalently, propagation under a moderate ground-based temperature inversion as commonly occurs at night.



3 Baseline Conditions

3.1 Noise Sensitive Receptors

Based on review of aerial imagery and observations during site visits, the following noise sensitive receptors have been included in the assessment. Receptors have been selected based on their proximity to the proposed development and, where necessary, are representative of a wider number of properties.

ID	Receptor(s)	Easting	Northing
R1	1 Station Road	561429	172011
R2	Railway Cottages	561390	171948
R3	Dale Hill	561316	171749
R4	Dale Lodge Residential Home	561283	171691
R5	Dale Mount Residential Home	561276	171634
R6	Haydon Cross	561380	171642
R7	Millbrook Garden Centre	561812	172287
R8	Pepper Hill	562210	172332

Table 2 Assessment receptor locations

The location of the noise sensitive receptors considered are presented in Figure 1.

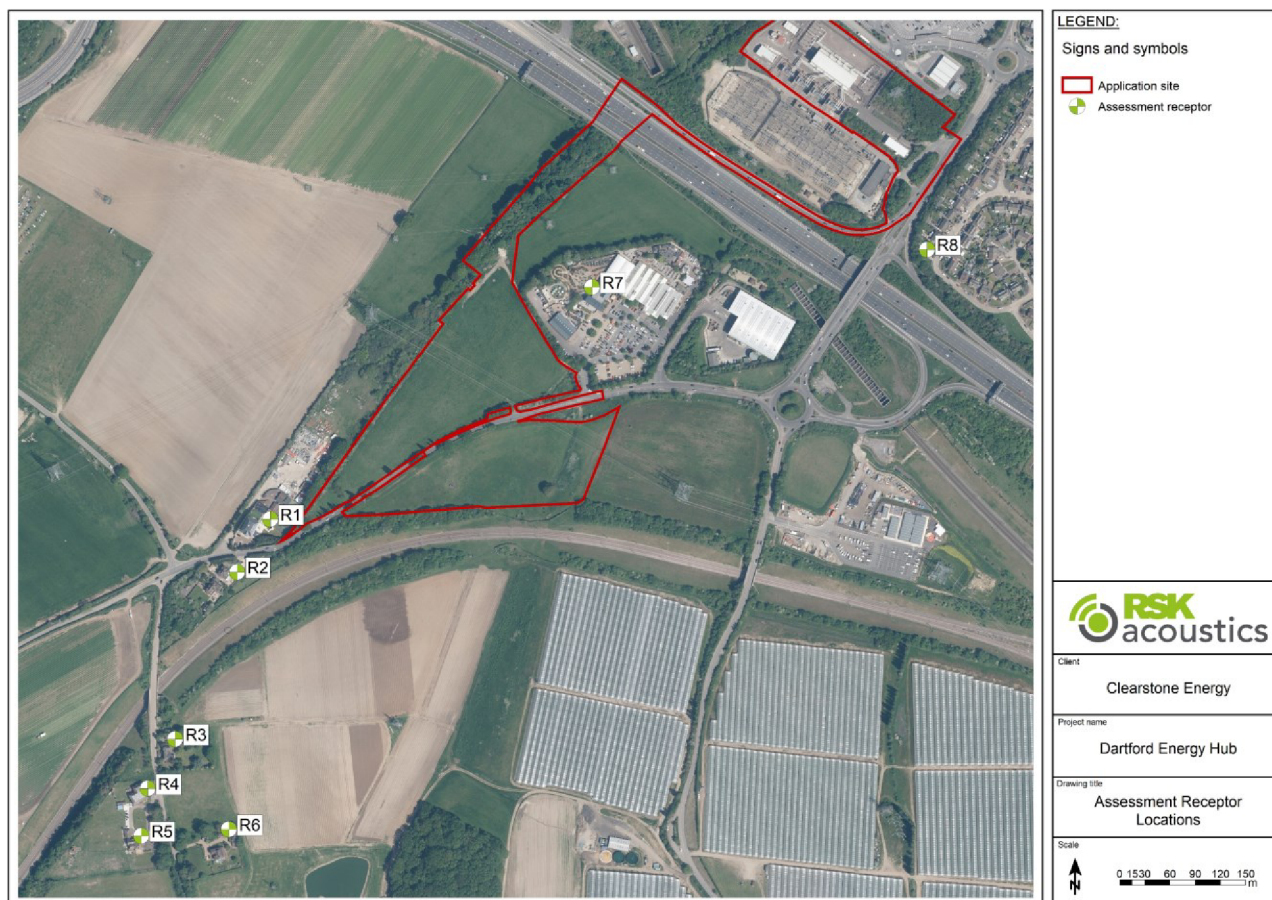


Figure 1 Assessment receptor locations



The proposed development site and the Swanscombe Peninsula SSSI are separated by a distance of approximately 500m, with road traffic noise from the A2 likely to be a prominent noise source at the SSSI location. As a result, this potential receptor has been scoped out of the assessment on the basis that adverse impacts from the proposed development are unlikely to occur.

3.2 Noise Survey

3.2.1 Measurement Details

A baseline survey was undertaken between Thursday 04 January and Thursday 11 January 2024 to establish the prevailing acoustic conditions at the closest noise sensitive receptors in the vicinity of the site. Three unattended measurements were undertaken to record baseline sound levels over a typical midweek and weekend period.

A description of the measurement positions and rationale is provided in Table 3. A plan of the measurement locations is shown in Figure 2. Photographs of each location are presented in Appendix B.

Ref.	Location	Easting	Northing
MP1	Within the site on the east boundary, adjacent to the commercial area	561746	172249
MP2	Within the site boundary to the west corner of the site, adjacent to Station House	561514	172060
MP3	In a field to the south of Haydon Cross	561382	171591

Table 3 Noise monitoring locations

All measurements were undertaken in free-field conditions with the microphone positioned at least 3.5 m away from any significant reflecting surfaces and 1.5 m above local ground level.

3.2.2 Equipment

Noise monitoring was undertaken using the following equipment as provided in Table 4.

Equipment	Type	Serial number	Calibration date
Sound level meter	Rion NL-52	1054195	28 January 2022
Sound level meter	Rion NL-52	1054197	27 January 2022
Sound level meter	Rion NL-52	553877	12 October 2023
Acoustic calibrator	Calibrator NC-74	34557135	11 October 2023

Table 4 Baseline survey equipment

The sound level meters used conformed to the Class 1 requirements of BS EN 61672-1:2013. The calibrator used conformed to the Class 1 requirements of BS EN IEC 60942:2018. The equipment used had a calibration history that is traceable to a certified calibration institution within two years of the survey dates. Calibration certificates are available on request. The calibration of the sound level meters was field checked prior to commencing measurements and prior to removing the equipment from site upon completion. No significant calibration drift was observed, i.e. within a +/- 0.2 dB tolerance.



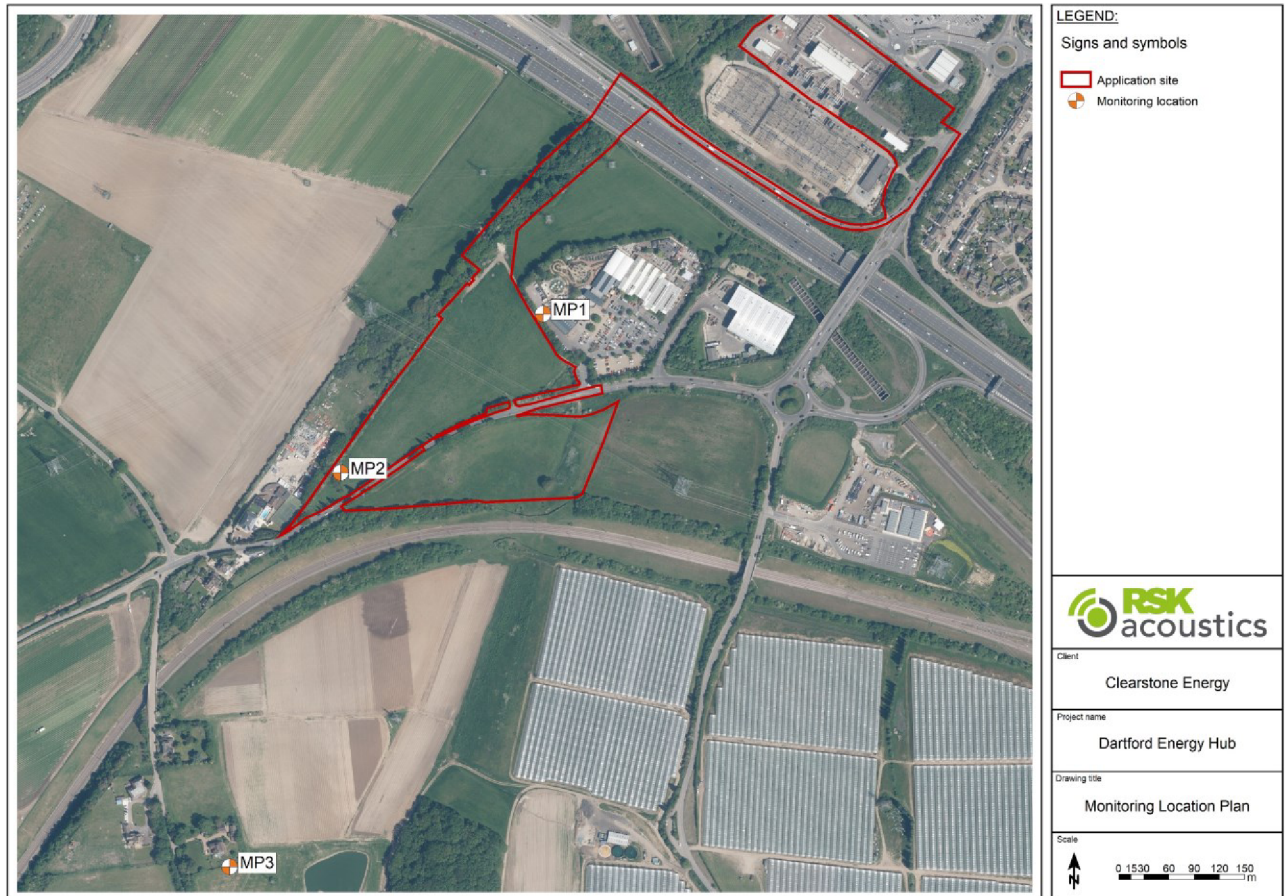


Figure 2 Monitoring location plan

3.2.3 Acoustic Environment

During the daytime deployment and collection of the monitoring equipment, subjective observations were recorded by the surveyor to assist in characterising the baseline acoustic environment.

At MP1, noise arising from road traffic on the A2 and Station Road was dominant. Vehicle movements in the adjacent commercial yard and car park were also audible.

At MP2, road traffic noise from the A2 and Station Road was continuously audible. Some birdsong was intermittently audible but was not dominant.

At MP3, birdsong was present alongside occasional vehicle movements on Dale Road. Distant road traffic noise was continuously audible at low level.

3.2.4 Weather Conditions

Weather conditions during the monitoring period were obtained from www.wunderground.com (Station ID: IGRAVE84, situated approximately 2 km southeast of the site) and are summarised in Table 5.

Date	Average temperature (°C)	Average wind speed (m/s)	Dominant wind direction	Precipitation total (mm)
04/01/2024	8	1	ENE	299
05/01/2024	5	2	NNW	37
06/01/2024	4	1	NNE	16
07/01/2024	2	2	NNE	0



Date	Average temperature (°C)	Average wind speed (m/s)	Dominant wind direction	Precipitation total (mm)
08/01/2024	1	2	NE	14
09/01/2024	2	3	ENE	4
10/01/2024	1	1	NE	0
11/01/2024	-1	1	NE	0

Table 5 Summary of weather data

The precipitation noted on 04 January 2024 was noted to coincide with a short-term increase in noise levels at each of the monitoring locations. This has been removed from further analysis as potentially weather-influenced data. Other periods of rainfall noted are considered to be minor and do not appear to have significantly affected the monitoring data.

3.2.5 Survey Results

Time history charts for each measurement location are provided in Appendix C. Measurements are presented with a 15-minute integration period and include indices L_{Aeq} , L_{A10} , L_{A90} and L_{AFmax} .

A summary of the background sound levels measured during the survey are provided in Table 6. Sound levels are provided for each period in which the proposed development is expected to be operational. This is based on the daytime and nighttime periods recommended by BS 4142:2014+A1:2019 and the garden centre opening hours.

Measurement location	Period	Background sound levels, dB L_{A90}			
		Minimum	Maximum	Mode	Representative value ^[1]
MP1	Daytime (07:00-23:00)	44	61	60	56
	Daytime (09:00-17:00) ^[2]	55	61	60	60
	Nighttime (23:00-07:00)	43	61	50	48
MP2	Daytime (07:00-23:00)	45	62	60	55
	Nighttime (23:00-07:00)	42	61	48	47
MP3	Daytime (07:00-23:00)	33	54	51	47
	Nighttime (23:00-07:00)	28	54	42/43	41

Notes

^[1] The representative value has been determined following the approach outlined within BS 4142:2014+A1:2019.

^[2] Represents garden centre opening hours.

Table 6 Derived background sound levels (dB $L_{A90,15min}$)

Graphical representations of the analysis to determine representative values following the methodology within BS 4142:2014+A1:2019 are provided in Appendix D.



4 Noise Modelling

4.1 Modelling Parameters

A computer noise model of the proposed development has been prepared using SoundPLAN v9.1, adopting the following parameters:

Item	Setting
Algorithm	Source noise - ISO 9613-2:2024 'Attenuation of sound during propagation outdoors – Engineering method for the prediction of sound pressure levels outdoors.
Façade Corrections	Results are presented as free-field levels located at 1m from each receptor façade.
Ground absorption	Acoustically soft (1.0 coefficient) – farmland and vegetation areas. Acoustically hard (0.0 coefficient) – industrial/commercial and paved areas
Meteorological conditions	10 degrees Celsius. 70% humidity. Wind from source to receiver.
Receptor height	Ground floor 1.5m and first floor 4m above ground.
Site layout	Digitised based on the proposed development layout included in Appendix A. Equipment dimensions derived from indicative elevation drawings.
Sources	See Section 4.2.
Terrain	Existing terrain imported from Defra LiDAR DTM data. Future site levels derived from proposed site plan.

Table 7 Modelling parameters

4.2 Source Noise Data

The noise levels associated with each noise producing element of the proposed development are provided in Table 8. This has been provided by Clearstone Energy based on similar schemes and is considered representative of the plant items which will be installed.

The PCSK inverters are anticipated to vary in load depending on the hours of operation. The assessment assumes that they may operate at up to 80% load during the daytime (07:00 to 23:00) and up to 60% load during the night (23:00 to 07:00). The stated sound power level for the inverters represents operation with an acoustic attenuation package installed. All other items of equipment are assumed to operate continuously during both day and night-time periods.

Item	Qty.	Dimensions (m)	Octave band centre frequency (Hz)							dB(A)
			63	125	250	500	1k	2k	4k	
Battery unit	204	2.3 x 2.3 x 2.6	70	69	69	75	64	61	54	74
PCSK Inverter (80%)	72	3.7 x 2.0 x 2.4	97	89	92	80	77	78	80	88
PCSK Inverter (60%)			86	93	85	78	75	74	75	84
MV Skid	38	5.4 x 2.2 x 2.0	87	85	72	61	55	51	49	71
Transformer	2	9.1 x 4.2 x 3.7	77	79	81	78	71	63	55	78

Table 8 Source sound power levels (per unit)



5 Assessment

5.1 Predicted Noise Levels

Predicted specific noise levels from the operational equipment at the noise sensitive receptors are presented in Table 9. The corresponding noise contour plots are presented in Appendix E.

ID	Receptor(s)	Specific noise level, $L_{Aeq,T}$	
		Daytime	Nighttime
R1	1 Station Road	47	44
R2	Railway Cottages	44	40
R3	Dale Hill	39	35
R4	Dale Lodge Residential Home	37	34
R5	Dale Mount Residential Home	40	36
R6	Haydon Cross	37	34
R7	Millbrook Garden Centre	49	46
R8	Pepper Hill	39	36

Table 9 Predicted specific noise levels

5.2 Acoustic Corrections

According to BS 4142:2014+A1:2019, where certain features of the specific noise level can increase the significance of impact of a sound level, a character correction is applied to provide a rating level. The characteristics of a sound that are likely to cause an increase in the significance of impact are tonality, impulsivity, intermittency or other characteristic features such as an identifiable 'hiss'.

BS 4142:2014+A1:2019 includes the addition of rating penalties (to the specific noise) as a factor of 'perceptibility', where the prominence of tonal or impulsive sound from a source can be readily distinguishable over the residual sound. For the purposes of the assessment, the addition of rating penalties quantifies perceptibility by comparing the specific noise from operational equipment against the baseline residual sound level at each receptor.

Transformers are known to be tonal in character. However, with the proposed development layout as presented in Appendix A, specific noise levels at receptor locations from this source are likely to be low in comparison to the more prominent PCSK inverters, reducing the potential for distinct tones to be perceptible. On this basis, no tonality correction has been applied.

Consideration of other acoustic features associated with the proposed equipment has also been undertaken as follows:

- Impulsivity - The character of the sound and the operational profile of the proposed equipment would generally be constant, with no rapid change in the level or character of noise. It is therefore considered unnecessary to apply an impulsive correction.
- Intermittency – Due to the nature of the proposed equipment it is considered that the equipment would not have identifiable on/off conditions, with items operating at varying loads relative to the air temperature. It is therefore considered unnecessary to apply a correction due to intermittency.
- Other sound characteristics - Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB should be applied. This has been adopted where it is



considered that site noise may be perceptible at the receptor locations, when the residual sound level from other local sources is reduced.

5.3 Assessment of Impacts

An assessment of predicted rating levels compared to the prevailing background sound levels is presented below. For dwellings, this is presented for daytime and nighttime periods. For Millbrook Garden Centre, only the hours of opening (09:00 to 17:00) are considered.

Results	Noise sensitive receptor location							
	R1	R2	R3	R4	R5	R6	R7	R8
Predicted specific sound level, $L_{Aeq,1hr}$ (dB)	47	44	39	37	40	37	49	39
Character corrections	+ 3	0	+ 3	+ 3	+ 3	+ 3	0	0
Predicted rating sound level, $L_{Ar,1hr}$ (dB)	50	44	42	40	43	40	49	39
Existing background sound level, $L_{A90,T}$ (dB)	55 (MP2)	55 (MP2)	47 (MP3)	47 (MP3)	47 (MP3)	47 (MP3)	60 (MP1)	56 (MP1)
Excess of rating over background level (dB)	- 5	- 11	- 5	- 7	- 4	- 7	- 11	- 17

Table 10 Operational phase assessment - daytime

Results	Noise sensitive receptor location							
	R1	R2	R3	R4	R5	R6	R7	R8
Predicted specific sound level, $L_{Aeq,15min}$ (dB)	44	40	35	34	36	34	N/A	36
Character corrections	+ 3	+ 3	+ 3	+ 3	+ 3	+ 3	N/A	0
Predicted rating sound level, $L_{Ar,15min}$ (dB)	47	43	38	37	39	37	N/A	36
Existing background sound level, $L_{A90,T}$ (dB)	47 (MP2)	47 (MP2)	41 (MP3)	41 (MP3)	41 (MP3)	41 (MP3)	N/A	48 (MP1)
Excess of rating over background level (dB)	0	- 4	- 3	- 4	- 2	- 4	N/A	- 12

Table 11 Operational phase assessment – nighttime

At the nearest receptors, the assessment shows that the noise levels arising from the proposed development are unlikely to exceed the existing background sound level. This indicates that the likelihood of adverse noise impacts during the operation of the proposed Dartford Energy Hub is **low** at any of the surrounding noise sensitive receptors. No additional mitigation measures are therefore proposed.



5.4 Uncertainty

BS 4142:2014+A1:2019 requires that the assessment considers the level of uncertainty in the data and associated calculations. Consideration of the uncertainty can enable a more informed decision regarding the likely significance of impact, within the context of the assessment.

It is accepted that uncertainty may arise from all levels of measurement and assessment and reasonably practicable steps have been made at all stages with the aim of reducing uncertainty.

At this stage in the proposed development, equipment selection is subject to change upon procurement and installation. Based on experience with the type of equipment required and similar project designs, manufacturer's data has been selected that is representative of similar installations. Uncertainty regarding equipment specifications could be addressed by a suitably worded planning condition which would impose the requirements for an updated noise assessment once the final equipment selection has been made.

To determine applicable background and residual sound levels, a noise survey was conducted. Noise levels in the area are likely to fluctuate throughout different times of year and under varying weather conditions, however, the survey is considered to represent a typical week with no atypical events affecting the acoustic environment in the immediate area. The analysis of the data is in line with the guidance outlined within BS 4142:2014+A1:2019 and follows best practice in selecting an appropriate level for the assessment.

The following measures have been taken to reduce uncertainty:

- Background sound level measurements have been obtained at representative assessment locations over a duration of eight days to characterise the existing residual environment during the intended operational hours of the Proposed Development;
- Use of monitoring equipment in accordance with Section 5 of BS 4142:2014+A1:2019, using Class 1 instrumentation;
- Measurement procedures followed in accordance with section 6 of BS 4142:2014+A1:2019 with all precautions taken to minimise interference;
- Specific sound levels have been calculated to the requirements of ISO 9613-2:2024 which is the widely accepted procedure for the calculation of sound propagation (including favourable wind conditions from source to receiver); and
- The assessment has assumed inverters have the potential to operate at up to 80% load during the daytime and 60% load at night at all times. This is likely to overestimate the site emissions as some fluctuation would be expected based on load requirements and temperature fluctuations.



6 Summary

A noise impact assessment has been undertaken for a proposed 300 MW Battery Energy Storage System (BESS) facility at land off Station Road, Gravesend DA13 9PA. The assessment focuses on the operational impact of the proposed development at nearest receptor locations to the requirements of BS 4142:2014+A1:2019.

A baseline noise survey has been used to characterise the existing acoustic environment at noise sensitive receptors surrounding the proposed development site. The survey data has been analysed to determine representative background sound levels at the closest existing receptors to the site and provide context to the assessment.

A computer noise model has been developed which incorporates the proposed equipment and embedded mitigation measures to be adopted. The prediction of potential site noise levels at nearby sensitive receptors account for the combined operation of all equipment simultaneously during both daytime and night-time assessment periods.

The results of the assessment show that noise levels from the proposed development during all operational periods are unlikely to exceed the typical background sound level at any of the surrounding receptors. This is an indication that noise from the development would have a low likelihood of resulting in adverse impacts.

The assessment concludes that the proposed development is considered acceptable in accordance with the relevant standards and guidance for operational noise and therefore no further mitigation is proposed.

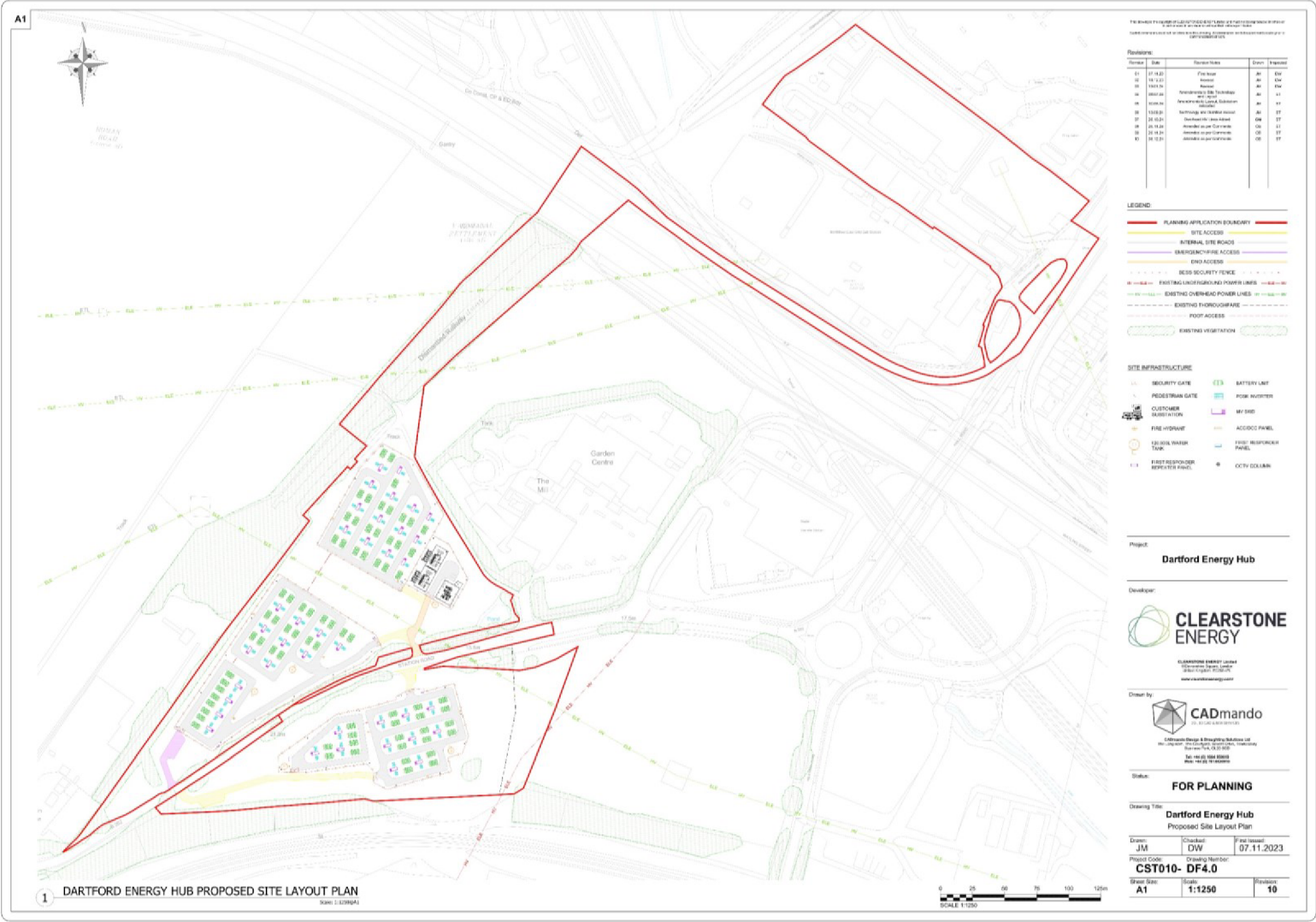


Glossary

Term	Definition
Ambient sound	The total sound at a given place, usually a composite of sounds from many sources near and far.
Background sound, $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval.
dB	Decibel. Scale for expressing sound pressure level. 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 i.e. 2×10^{-5} Pascal.
dB(A)	A-weighted decibel. This provides a measure of the overall level of sound across the audible spectrum with a frequency weighting to compensate for the varying sensitivity of the human ear to sound at different frequencies. Example sound levels include: 140 dB(A) Threshold of pain 120 dB(A) Threshold of feeling 100 dB(A) Loud nightclub 80 dB(A) Traffic at busy roadside 60 dB(A) Normal speech level at 1m 40 dB(A) Quiet office 20 dB(A) Broadcasting studio 0 dB(A) Median hearing threshold (1000 Hz)
Frequency	The repetition rate of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the Hertz (Hz), which is identical to cycles per second. A thousand hertz is often denoted as kHz, e.g. 2 kHz = 2000 Hz. Human hearing ranges approximately from 20 Hz to 20kHz.
$L_{Aeq,T}$	This is defined as the notional steady sound level over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.
Rating level	Specific sound level of a source plus any adjustment for the characteristic features of the sound.
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Specific sound	Sound pressure level produced by the source being assessed at the assessment location.



Appendix A – Proposed Site Plan



Appendix B – Monitoring Location Photographs

Location MP1



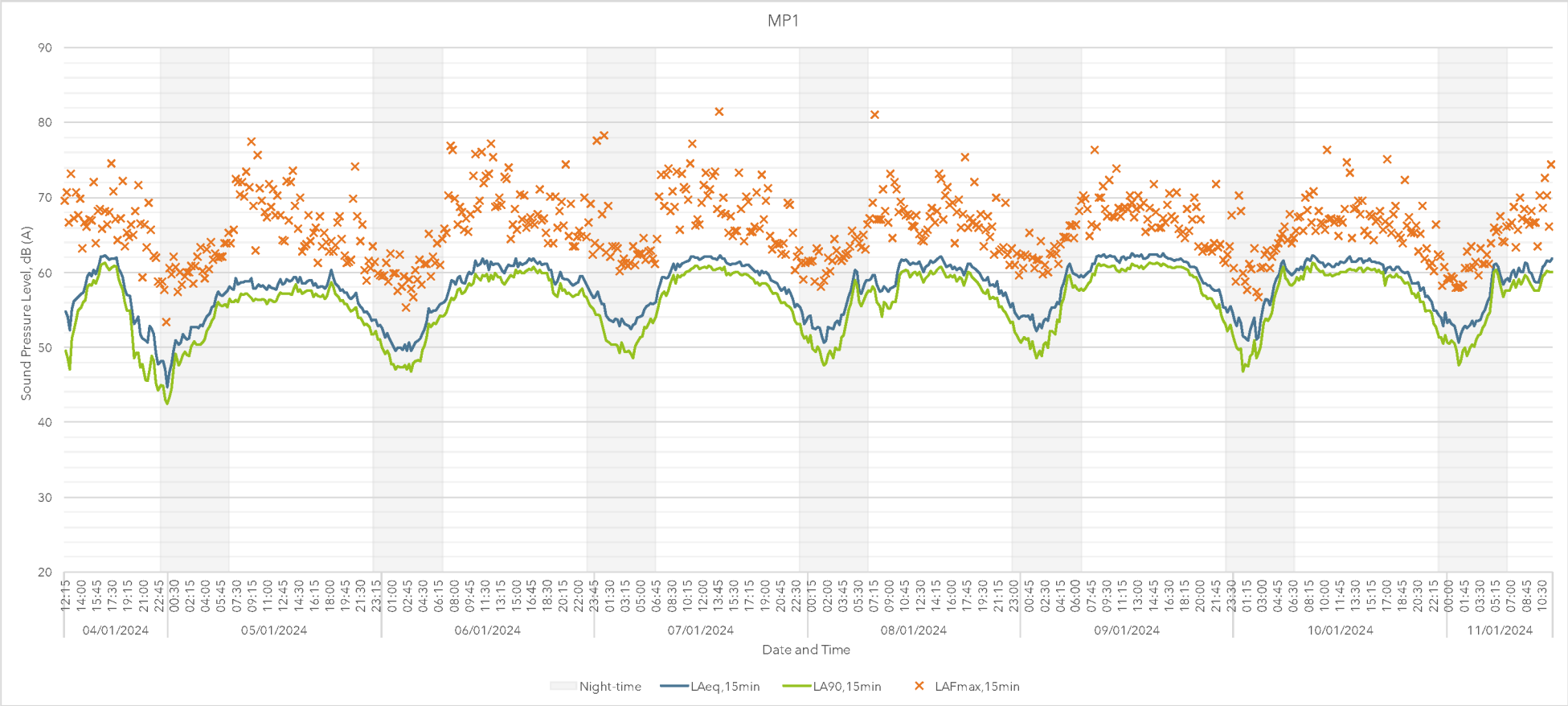
Location MP2

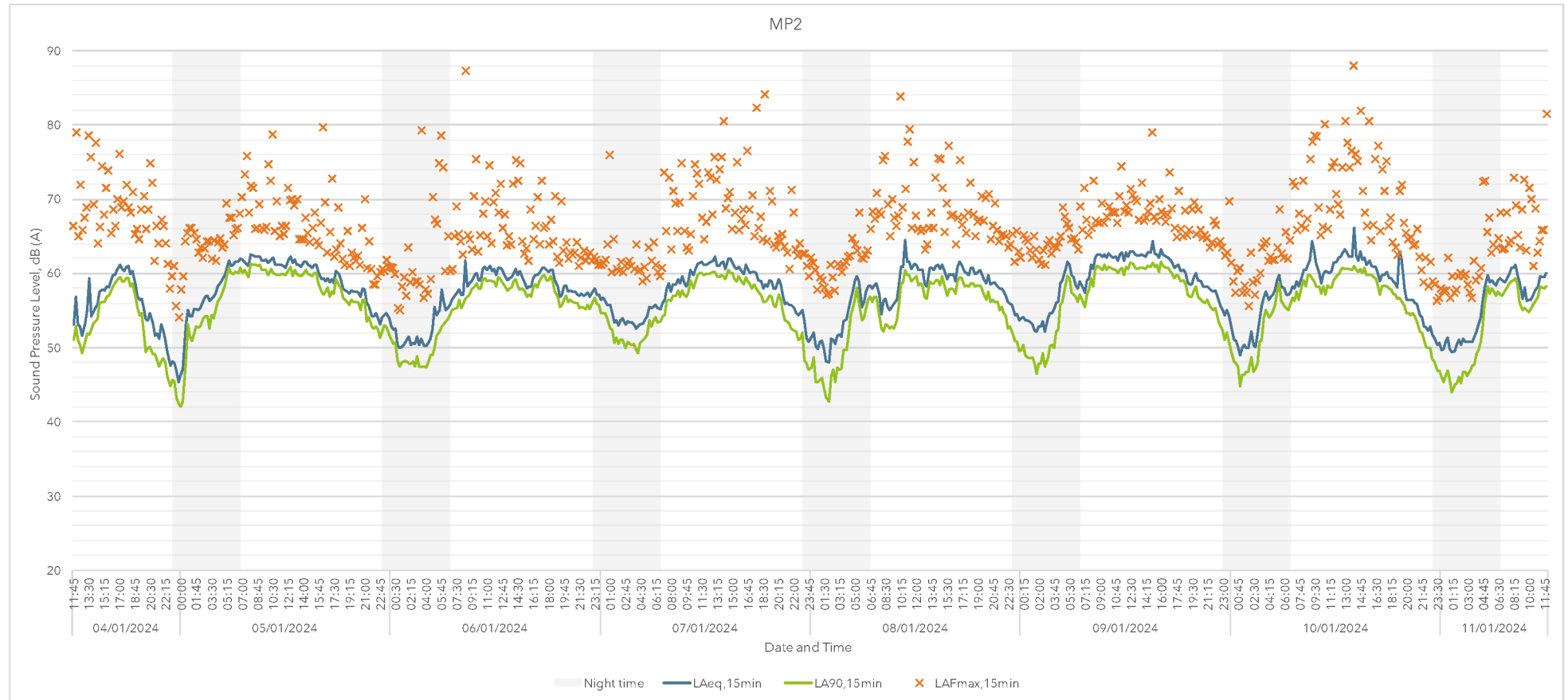


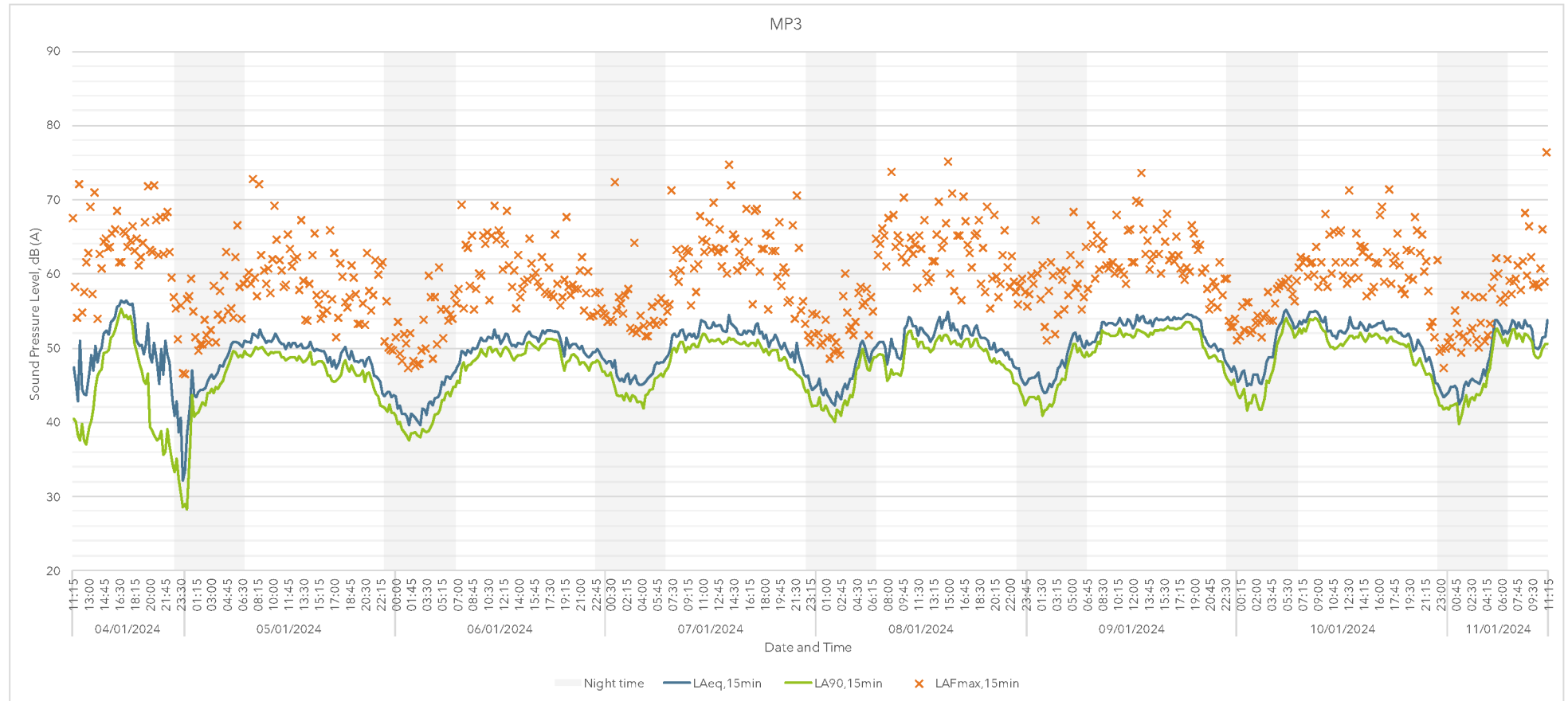
Location MP3



Appendix C – Time History Charts

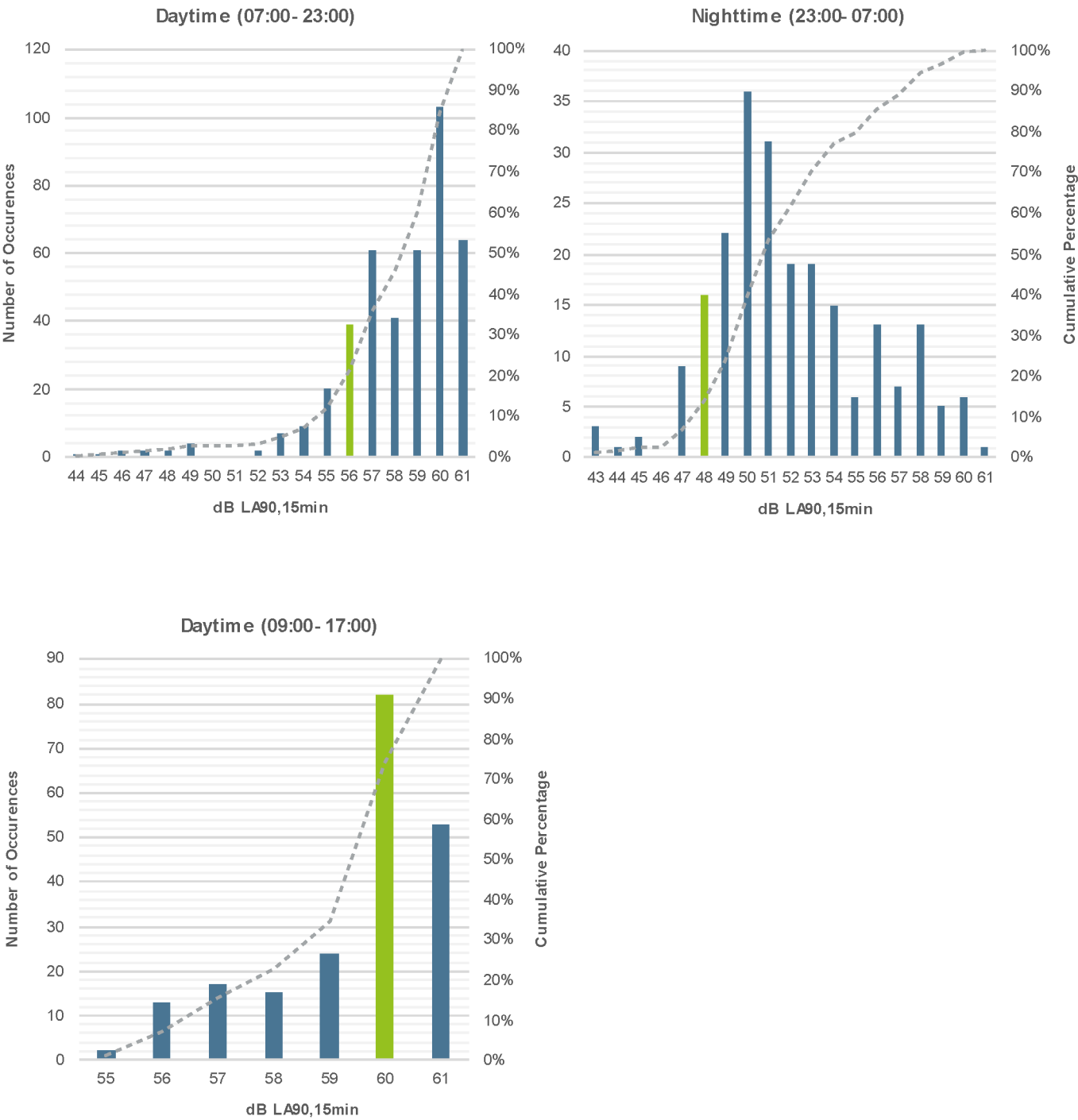




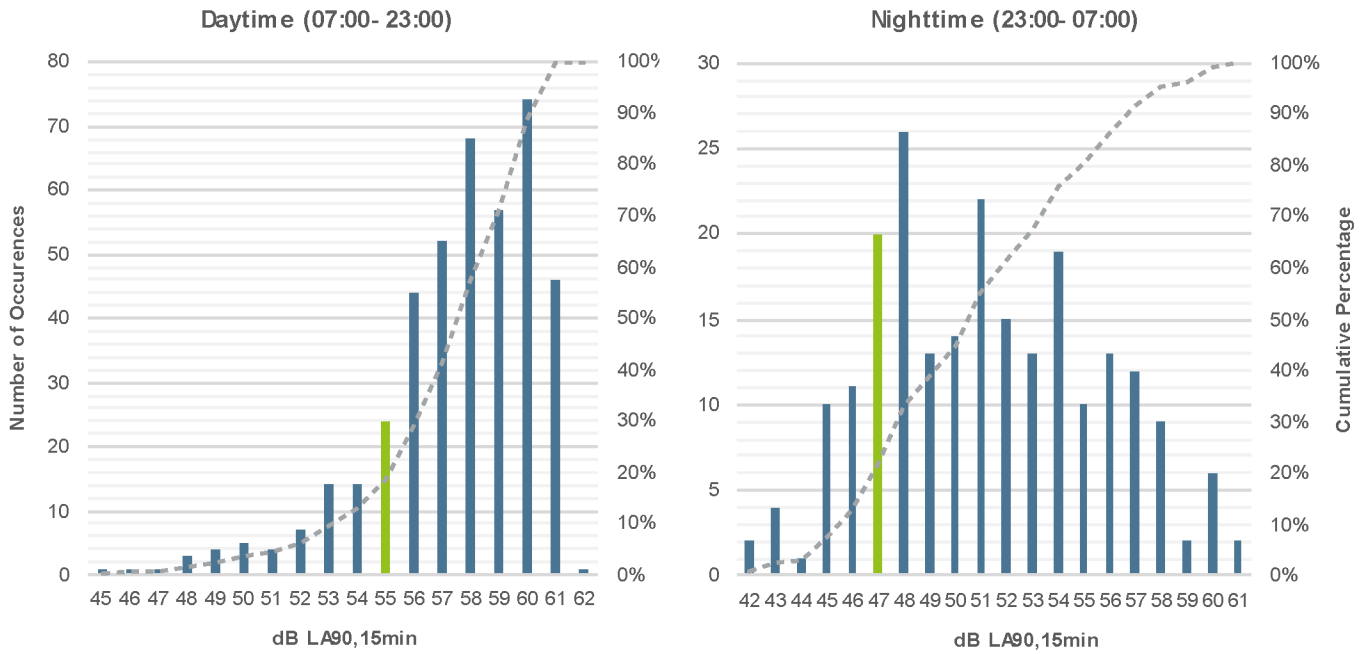


Appendix D – Background Data Analysis

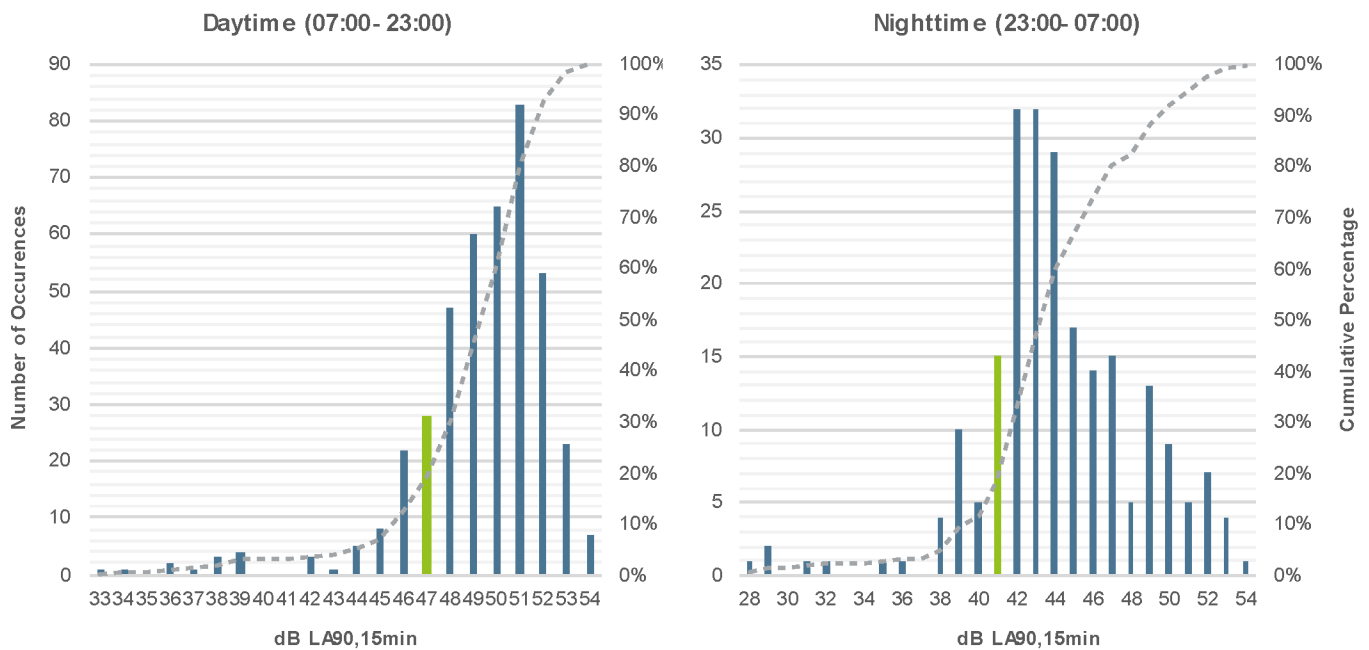
Location MP1



Location MP2



Location MP3



Appendix E – Predicted Noise Levels

