A specialist energy consultancy

Noise Impact Assessment

Coylton Greener Grid Park – S.36 Application

Statkraft UK Ltd.

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Statkraft

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1 Introduction

TNEI Services Ltd (TNEI) have been commissioned by Statkraft (henceforth referred to as 'the client') to undertake a Noise Impact Assessment to support the Section 36 application for an extension to increase the capacity by 100 MW of the consented Phase 1 of Coylton Greener Grid Park (GGP) development which was granted planning consent by East Ayrshire Council in February 2024 (ref: 23/0580/PP), for an original capacity up to 50MW.

In this report, the consented development is referred to as Phase 1 or Coylton GGP Consented whereas the extension is referred to as Phase 2 or Coylton GGP Extension. Phase 1 and Phase 2 together are referred as Coylton GGP Phase1&Phase2 and will have a capacity up to 150 MW.

Figure 1 (appended) illustrates:

- The location of Coylton GGP Consented (Phase 1) and Coylton GGP Extension (Phase 2);
- The Noise Assessment Locations (NALs), which are identical to the previous TNEI noise assessment for Coylton GGP consented; and,
- The Noise Monitoring Locations (NMLs) that were used in a baseline sound level survey undertaken by TNEI in June 2024.

TNEI had already undertaken a noise assessment in line with BS 4142:2014+A1-2019 *Methods for Rating and Assessing Industrial and Commercial Sound* (BS 4142) for the Coylton GGP Consented Noise Impact Assessment and this assessment now provides a full assessment considering a new noise survey and predictions for all plant from the consent and extension together.

All work undertaken to produce this report has been carried out by members of the TNEI Environment and Engineering Team, all of whom are affiliated with the Institute of Acoustics (IOA). Specifically, the following members of staff have been involved in the project:

- Will Conway, Technical Consultant, TECH IOA, BSc(Hons) Audio Technology. Roles in this project include site Survey, Noise Propagation Modelling and Reporting; and,
- Moise Coulon, Principal Consultant, AMIOA, BSc Information Technology, IOA Diploma in Acoustics and Noise Control. Roles in this project include Noise Propagation Modelling, Modelling and quality assurance.

1.1 Nomenclature

Please note the following terms and definitions, which are used throughout this report:

- **Emission** refers to the noise level emitted from a noise source, expressed as either a sound power level or a sound pressure level;
- **Immission** refers to the sound pressure level received at a specific location from a noise source;
- **SWL** indicates the sound power level in decibels (dB);
- **SPL** indicates the sound pressure level in decibels (dB);
- **NML** (Noise Monitoring Location) refers to any location where baseline noise levels have been measured;
- **NSRs** (Noise Sensitive Receptors) are all identified receptors that are sensitive to noise; and
- **NAL** (Noise Assessment Location) refers to any location where the noise immission levels are calculated and assessed.

A Glossary of Terms is also provided as Appendix A of this report.

All figures referenced within the report can be found in Appendix D.

Unless otherwise stated, all sound levels refer to free field levels i.e., sound levels without influence from any nearby reflective surfaces.

All grid coordinates refer to the Ordnance Survey grid using Eastings and Northings.

2 Project Description

The proposals constitute a 100MW uplift of an up tp 50MW BESS development which was granted permission by East Ayrshire Council on 29 February 2024 under the Town and Country Planning (Scotland) Act 1997 as amended (planning permission reference 23/0580/PP). The layout and design including general mitigation as consented by ref. 23/0580/PP is sufficient to accommodate the uplift and will remain unaffected by the increase in capacity.

The Coylton GGP Extension (Phase 2) principally comprises battery units and MV Transformer/Inverter Units (also called Power Conversion System – PCS Units) that will be included within the existing electrical infrastructure of Coylton GGP Consented (Phase 1). The full scheme Coylton GGP Phase1&Phase2 is contained in the same site behind fences already being built for Phase 1 and would operate as one scheme to charge and discharge electricity from the adjacent Coylton Substation.

The layout assessed here is for a BESS with a storage capacity up to 100 MW for Coylton GGP Extension (Phase 2) combined with 50MW for Coylton GGP Consented (Phase 1). The full layout is included in Appendix B and all existing plants within Phase 1 are included.

2.1 Study Area

Noise Sensitive Receptors (NSRs) are properties that are potentially sensitive to noise and, therefore, may require protection from proposed noise sources. The study area for the assessment of environmental noise is usually defined through the identification of the closest NSRs to the development.

The assessment of noise considers the nearest NSRs only, and those assessed have been labelled as Noise Assessment Locations (NALs). The selected NALs are the same as the previous noise assessment for Phase 1 and were also discussed in consultation as part of pre-application information submitted to the Energy Consents Unit and East Ayrshire Council for Phase 2. The NALs are existing residential properties located to the north, southwest, southeast, and south of the Coylton GGP Phase 1 & Phase 2 as shown in Figure 1 and 2 within Appendix D and Table 2-1 below.

Table 2-1: Noise Assessment Locations

NAL ID	NAL Descriptor	Eastings	Northings	Bearing from Coylton GGP Phase1&2	Distance to Coylton GGP Phase1&2 fixed plant (m)
NAL01	East Tarelgin Bungalow	246575	619827	North	340
NAL02	East Tarelgin Cottage	246418	619826	North	360
NAL03	Alwyn Cottage	246120	619715	North west	460
NAL04	MacQuittiston Farm House	246053	619266	West	540
NAL05	Clydenoch Cottage	247273	619273	Southeast	590
NAL06	Hugh Wallace & Son Farm	247216	619224	Southeast	640
NAL07	East Tarelgin	246635	619833	North	340

3 Assessment Methodology

3.1 Legislation and Policy Context

3.1.1 PAN 1/2011

At a national level, the relevant policy is PAN 1/2011 (PAN) *Planning and Noise* (1) and the associated Technical Advice Note (TAN) *Assessment of Noise* (2). With regards to the assessment of environmental noise, Appendix 1 of the TAN describes a number of standards and guidelines that may be referred to and details British Standards (BS) 4142 and 8233 as appropriate for use.

3.1.2 BS 4142:2014 +A1:2019 standard for Industrial Noise

The BS 4142:2014 '*Methods for Rating and Assessing Industrial and Commercial Sound*' (3) is based on a comparison of the predicted or measured levels of a sound source with the measured background sound levels to provide an initial estimate and then requires consideration of the context to conclude on the potential noise impact of an industrial source.

BS4142 uses the following definitions:

- **Ambient Sound**: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far. Described using the metric, $L_{Aeq(t)}$.
- **Specific Sound Level**: Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr. Described using the metric $L_{Aeq(t)}$. Also referred to in this report as the Immission Level.
- **Residual Sound Level**: Equivalent continuous A-weighted sound pressure level of the residual sound without the specific sound source(s) present at the assessment location over a given time interval, T. This is the same as background sound but using the metric $L_{Aeq(t)}$.
- **Background Sound Level**: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels. Described using the metric $L_{A90(t)}$.
- **Rating Level**: The Specific Sound Level adjusted for the characteristics of the sound. The Rating Level is calculated by adding a penalty or penalties (if required) to the Specific Sound Level when the sound source contains audible characteristics such as tonal, impulsive or intermittent components. Described using the metric, $L_{Aeq(t)}$.

The assessment is a two-stage process; Initially, an estimate of the impact is made by subtracting the measured background sound level from the calculated or measured 'Rating Level'. The second part of the assessment is to then consider the context in which the sound occurs, which may modify the findings of the initial estimate.

The standard states:

"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following…

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB 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."

For the second stage of the assessment there are many elements of context that can be considered. The following list, which is not exhaustive, gives some examples that could be relevant to the assessment:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound;
- Whether specific sound insulation and noise control measures have already been incorporated into a receptor (which would lower the sensitivity of the receptor);
- Former uses, at or close to the site;
- The legitimacy of the industrial use, e.g. planning permissions or environmental permits;
- Implementation of best practicable means for a given process or activity; and,
- Whether the Rating Level represents typical levels, realistic worst case, unlikely worst case etc.

Supplementary information regarding the application of BS 4142 is provided within the Association of Noise Consultants' (ANC) BS 4142 Technical Note (March 2020) (4). The technical note provides guidance on the appropriate interpretation and application of the standard and is "*designed to assist readers with a reasonable interpretation and application of BS 4142 as a whole"*, including clarifying the methodology for the derivation of representative background sound levels. The Technical note state:

'There is no theoretical limit to how the context can or should influence the impact assessment, but any alteration of the conclusions of an assessment due to the context should be sufficiently explained and justified for the specific circumstances in question.'

The additional information provided within the ANC technical note has informed TNEI's approach to the NIA assessment criteria with regards to the application of BS 4142. This is discussed further in below Sections 3.2 and 3.3.

3.2 Consultation and existing noise condition

A consultation letter specific for the noise assessment methodology and criteria to use for Coylton GGP Extension (Phase 2) was prepared by TNEI and addressed to an Environmental Health Officer at East Ayrshire Council. That noise consultation letter is dated 23rd October 2024 and enclosed in Appendix C, it was sent as part of information submitted by the Applicant to the council for pre-application advice (ref 23/0580/PP - Pre-application). A planning officer responded to the applicant on several points, and notably in regards to noise stated:

"I would agree with the assessment within the report that the principal for a Battery Energy Storage Site has been established at this location, under the previous approval granted (23/0580/PP). Therefore, in terms of planning policy and compliance with EAC LDP2 and NPF4, the general principal of the proposed development does not conflict with Policy SS1: Climate Change

and/or Policy RE1: Renewable Energy of LDP2. In terms of NPF4, it would comply with Policy 1: Tackling the Climate and Nature Crisis and Policy 11: Energy.

….

Provided any additional noise generated does not breach the parameters which were deemed to be acceptable in the original application (a night time background sound level of +4Db at the closest receptor – Crossbush house) and the visual impact of the additional batteries and associated infrastructure is considered acceptable, then it would be unlikely EAC would require to raise any objection in regards these issues to the ECU."

The references to '+4dB' and 'Crossbush house' seemed incorrect so were questioned by the Applicant by email and the Planning Officer responded that:

"*Apologies, this was an error on my part, please disregard this reference. As you correctly state, the condition refers to a +5Db noise limit (and obviously no reference to Crossbush house).*

16. When assessed in accordance with BS 4142:22014+A1:2019, the excess of the Rating Level above the Background Sound Level due to the Greener Grid Energy Park shall not reach or exceed 5 dB. The Background Sound Levels detailed in the 'Environmental Noise Impact Assessment – Coylton Greener Grid Park. Ref: 15416-003-R0' (dated October 2023), shall apply in carrying out such an assessment.

Reason: To ensure the low impact threshold in BS 4142 is not exceeded, to protect residential amenity".

The decision notice from February 2024 for Coylton GGP Consented includes planning conditions 16 and 17 relating to operational noise. Condition 17 details the process following a noise complaint to test compliance with the criteria found in Condition 16. Condition 16 as stated above in the planning officer response includes a noise limit criteria of "Background Sound Level +5 dB", already in place for Coylton GGP Consented alone. The combination of Coylton GGP Consented plus Extension together will ultimately be one single BESS site managed by the same developer / operator. As such, in the consultation letter TNEI had proposed that the same criteria remain applicable for the cumulative operation of Coylton GGP Consented and the Extension. In other words, adding the BESS extension plant to the Coylton GGP consented development should not cause an exceedance of the existing noise criteria. And consequently as the criteria is already in place for this scheme, there are no need to consider potential cumulative noise with other nearby developments, it would be for other developments to demonstrate that they are not using the already consented noise allowance of Coylton GGP.

The previous assessment for Coylton GGP Consented (Phase 1) relied on background noise data collected by a third party consultant (Arcus), which some limitations. As detailed in the consultation letter and in the baseline section below, TNEI undertook a more recent and robust survey in 2024 hence these were suggested in the consultation letter to be used as the background levels of reference instead of '*The Background Sound Levels detailed in the 'Environmental Noise Impact Assessment – Coylton Greener Grid Park. Ref: 15416-003-R0' (dated October 2023), shall apply in carrying out such an assessment*'.

The consultation letter also included a reminder that the BS 4142 standard in its latest iteration details a comprehensive assessment process. The comparison between background and operational noise is the initial estimate only, and to complete the assessment process, the initial estimate needs to be followed by a context assessment.

3.3 Noise assessment criteria

In light of the above section 3.2, the following noise assessment criteria have been applied:

- the criteria of "Background Sound Level +5dB" already in place for Coylton GGP Phase 1 alone was used for Coylton GGP Phase 1 and Phase 2 together.

- the background sound levels from the June 2024 noise survey have been used.
- the context has also been considered to comply with the BS 4142 standard.

3.4 Calculation Method

3.4.1 Noise Propagation Model (ISO 9613)

In order to predict the noise immission levels attributable to the development, a noise propagation model was created using the propriety noise modelling software, CadnaA (5). Within the software, complex models can be produced to simulate the propagation of noise according to a range of international calculation standards.

For this assessment noise propagation was calculated in accordance with ISO 9613-2 '*Acoustics – Attenuation of sound during propagation outdoors* (6) using the following input parameters:

- Temperature is assumed to be 10 °C and relative humidity as 70%;
- A ground attenuation factor of 1 (soft ground) has been used globally, with specific areas of 0 (hard ground) added to account for the BESS hardstanding area and;
- Receiver heights have been set to 4 m.

3.4.2 Uncertainties and Limitations

The noise propagation model is designed to give a good approximation of the specific sound level and the contribution of each individual sound source; however, it is expected that measured levels are unlikely to be matched exactly with modelled values. As such, the following limitations in the model should be considered:

- In accordance with ISO 9613-2, all assessment locations are modelled as downwind of all sound sources and propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night. These conditions are favourable to noise propagation;
- The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation will have been accounted for; and,
- The model assumes all sound sources are operating continuously and simultaneously, at expected operating capacity.

4 Baseline Sound Level Monitoring

The baseline details were provided to the Council in the consultation letter dated October 2024, precisely found in an Annex of that letter called 'Annex 1- *Details of Background Noise Survey from TNEI June 2024'*. This section reproduce a summary of the noise baseline information as was done in the core of the consultation letter and the Annex 1 of the consultation letter (in Appendix C of this report) should be read in conjunction with this section for more detail.

The previous assessment for Coylton GGP Consented (Phase 1) relied on baseline data collected by a third-party consultant (Arcus), which was collected in June 2021. At this time, Covid restrictions on social contact were in place and the survey was conducted at two locations only and for less than 2 full days. The two NMLs were used to represent seven NALs.

In June 2024 TNEI undertook a new survey, prior to construction commencing on Coylton GGP Consented (Phase 1), to try to address the shortcomings of Survey 1. As well as being undertaken during a more representative period i.e. outside of Covid lockdown, Survey 2 was longer in duration (11 days) and at more monitoring locations. Four locations in total were used; two nearly identical to June 2021, a more representative location was added near to NALs 5&6 (to the southeast), and an additional 4th location was added further north.

The 2024 NMLs and survey details are presented in detail in Appendix C (consultation letter). Based on the June 2024 survey, representative residual sound levels and background sound levels (definitions of these terms are provided in the Glossary) have been derived for each NAL, and these are shown in Table 4-1.

Table 4-1: Residual and Background sound levels for each of the NALs

Noise Assessment Location	Representative Residual Sound Level, June 2024		Representative Background Noise Levels, June 2024		NML from June 2024*
	Day (dB $L_{Aeq,15min}$)	Night (dB $L_{Aeq,15min}$)	Day (dB $L_{A90,15min}$)	Night (dB $L_{A90,15min}$)	
NAL01 -East Tarelgin Bungalow	66	57	45	36	2
NAL02 -East Tarelgin Cottage	66	57	45	36	2
NAL03- Alwyn Cottage	66	57	45	36	2
NAL04- MacQuittiston Farm House	43	38	37	30	1
NAL05 - Clydenoch Cottage	42	36	34	28	3
NAL06 - Hugh Wallace & Son Farm	42	36	34	28	3
NAL07 - East Tarelgin	66	57	45	36	2

* Note that NML4 is not used as it was further away and found irrelevant for the NALs specifically selected in this assessment of Coylton GGP Phase1&Phase 2.

The background sound levels from the June 2024 survey are judged to be the most recent and robust and include an additional survey location, so that all nearby NALs are appropriately represented. As such, they were used for this assessment and this approach was set out in the pre-application noise consultation letter to East Ayrshire Council.

5 Operational Noise Impacts

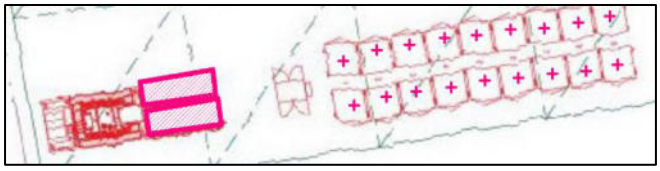
5.1 Overview

The following section describes the sound sources which have been assumed in the noise model. All items of plant have been modelled assuming they are operating continually, at expected operating capacities and with a constant sound level output.

It should be noted that due to Phase 1 being already in construction, the same units are assumed for Phase 2. In regards to noise, Phase 2 is only an increase in the number of Battery Units and PCS Units being operated. As such plant selected for noise modelling are considered to be very representative of the plant that will actually be installed.

The main plant assumed are CATL EnerOne Battery Units and NHOA C-BESS PCS Units at full power. No differences are assumed between day and night as a worst-case assumption. The Graphic 1 below is an illustration detailing a Power Island (PI) which is composed of 2 x NHOA C-BESS PCS Units and a block of several associated CATL EnerOne Battery Units (number can vary per PI).

Graphic 1 – Illustration of a Power Island, pink items denotating noise sources modelled:



5.1.1 Battery Units

The battery units will be liquid-cooled and in TNEI's experience with various systems and technology, the main noise source from each battery unit will be from the cooling system and no specific noise character is expected. When the battery cells are charging or discharging, the cooling unit noise is often dependent on ambient temperature and power load. When the batteries are on idle (neither charging nor discharging), there would still be a need to continuously cool the battery cells and in this situation the noise would mostly be dependent on ambient temperature. Most battery unit products are designed to operate in high ambient temperatures, typically of 40°C and above, however, for a site in Scotland this situation will occur rarely (if ever) and the typical cooling requirements are often less than the maximum capabilities of the cooling system design. Not many products have detailed sound power levels associated with ambient temperature and load and very often sound power data is provided for laboratory simulated maximum operating conditions only.

A liquid-cooled modular CATL EnerOne Battery Unit has been assumed. The chiller unit affixed to the side is assumed to be the main noise source from this unit. The noise source data cannot be published due to confidentiality reasons, however TNEI would be happy to discuss this aspect in more detail if required.

5.1.2 Power Conversion Systems (PCS Units)

The battery units will be connected to Power Conversion Systems (PCS) units composed of Inverters and Medium Voltage (MV) Transformers, also called PCS Units. In most instances, a single PCS can service a small group or row of smaller capacity battery units. The main noise source from these PCS units will be cooling noise and, to a lesser degree, transformer noise. Similar to the battery units, the noise from these units will usually vary depending on the ambient temperatures and the power load. The transformer noise is from small MV transformers units that form part of the PCS and in TNEI's

experience a low-level tone may be emitted (typically in the 100 Hz frequency band). However, as the relative output from these MV transformers is low, they tend to be masked by the cooling noise from the cooling of both PCS and surrounding battery units and, as such, the tone tends not to be audible at distances more than 100m.

A NHOA C-BESS PCS unit has been assumed. This bi-directional PCS can operate up to 50 °C and is cooled by forced air, the datasheet state noise is provided for rated power and rated power is at 40 °C on that same datasheet. The noise source data cannot be published due to confidentiality reasons, however TNEI would be happy to discuss this aspect in more detail if required.

5.1.3 HV Transformer

There will be a large High-Voltage (HV) transformer located in the northeast of the main compound and installed as part of Phase 1. No additional HV transformers will be required for Phase 2. This represents a very small amount (one only) of HV Transformer in comparison to the whole system which will include hundreds of Battery Units & PCS Units and therefore the HV Transformer noise will only be a marginal contributor to overall noise.

An assumption of a Ganz HV Transformer was used, with an 82dB (A) sound power level.

5.2 Summary of plant assumptions

The below Table 5-1 provides a summary of the plant count assumed fore noise modelling.

Table 5-1: Plant count assumed for noise modelling

Plant	Phase 1 count	Phase 2 count	Phase 1+ Phase 2 Total Count
Battery Units	280	730	1010
PCS Units	42	62	104
HV Transformers	1	0	1

5.3 Additional Mitigation Measures

The model assumes that there will be 'L shaped' noise attenuation fences 4.5m high installed close to the battery units and a perimeter acoustic fence 3.5m high (with an additional +0.5m security wiring on top) to help mitigate noise. These fences are assumed as per the latest design of Phase 1 being constructed and are shown in green in Graphic 2 below depicting a plan view of the layout modelled in the CadnaA noise modelling software. That Graphic 2 also shows in pink the noise sources of Phase 1 and Phase 2.

Graphic 2 – Illustration of fences (Green) and noise sources (Pink) of Phase 1 + Phase 2

5.4 Calculated Specific Sound Levels

Predicted Specific Sound levels have been calculated at seven Noise Assessment Locations (NALs), which have been selected to represent the closest receptors to the development as detailed in Table 2-1 and on Figure 1 and 2 in Appendix D.

The Specific Sound Levels were calculated assuming all plant is operating continuously and concurrently at anticipated operating capacities. The Specific Sound Levels at the NALs for the daytime and night-time periods are detailed in Table 5-2 below and also illustrated as noise contour plots shown in Figure 2 of Appendix D.

Table 5-2: Predicted Specific Sound Levels

Noise Assessment Location		Specific Sound Level, dB $L_{Aeq(t)}$ assumed for both day and night	
NAL ID	**NAL Descriptor**	**Phase 1**	**Phase 1 + 2**
NAL01	East Tarelgin Bungalow	37	41
NAL02	East Tarelgin Cottage	35	39
NAL03	Alwyn Cottage	30	35
NAL04	MacQuittiston Farm House	31	35
NAL05	Clydenoch Cottage	29	32
NAL06	Hugh Wallace & Son Farm	29	33
NAL07	East Tarelgin	36	41

6 Noise Impact Assessment - BS 4142

6.1 Calculating the Rating Level

In order to assess the immission levels in accordance with BS 4142, the Specific Sound Level must be converted into a Rating Level. The Rating Level allows for character corrections to be added to account for particular characteristics of the sound that may be perceived as more annoying. In particular the Rating Level considers tonality, impulsivity and intermittency of the sound, as well other sound characteristics that are neither tonal, impulsive, or intermittent, but are otherwise readily distinctive against the residual acoustic environment.

6.1.1 Tonality

With regards to tonality, BS 4142 states:

"For sound ranging from not tonal to prominently 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."

Electrical plant such as power transformers are often inherently tonal at source, typically in the 100 Hz frequency band. BS 4142 corrections, however, are only applied if the noise characteristics are present at the receptor location, not at the source location. TNEI have used professional judgement and considerable experience of BESS developments of similar nature and scale to subjectively determine that a character correction of 0 dB is appropriate for application within the assessment at all receptors, given the distance from source to receiver is at least 340m. Within the noise model, as per the description of each item of plant included earlier in this report, the cooling noise from the battery and PCS units is anticipated to be the dominant noise source and will likely mask any noise emissions from the low-level MV transformer units and the single HV transformer.

6.1.2 Impulsivity

With regards to impulsivity, BS 4142 states:

"A correction of up to +9dB 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 3dB for impulsivity which is just perceptible the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible".

Impulsivity is not considered to be a relevant sound characteristic of BESS; once operational, the noise level will be predictable and constant.

6.1.3 Intermittency

The intermittency of the sound source needs to be considered when it has identifiable on/off conditions with regards to intermittency, BS 4142 states:

"If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

As with impulsivity, intermittency is not considered to be a relevant sound characteristic in this case. Once operational, noise levels may fluctuate by a small amount over long periods of time, but no step changes in noise level are anticipated.

6.1.4 Other Characteristics

With regards to other sound characteristics, BS 4142 states:

"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 can be applied."

Based on TNEI's understanding and experience of this type of plant, we do not anticipate any additional sound characteristics that would be considered readily distinctive against the residual acoustic environment.

6.1.5 BS 4142 Rating Level

With due regard to the above, no character corrections are required. Therefore, the BS 4142 Rating Levels are equal to the Specific Sound Level presented in Table 5-2.

6.2 Stage 1 - Initial Estimates

Stage 1 of the assessment is the initial estimate which compares the Rating Level to the Background Sound Level, and this is detailed in Table 6-1 and Table 6-2 below.

Table 6-1: BS4142 Initial Estimate- Day

Name	Residual Sound (dB LAeq)	Background Sound (dB LA90)	Noise Predictions (Rating Levels in dB LAeq)		BS4142 Initial Estimate, numerical comparison predictions and Background Sound		BS4142 Initial Estimate, potential impact (low / adverse / significant adverse), **depending on the context**	
			Phase 1	Phase1+2	Phase 1	Phase1+2	Phase 1	Phase1+2
NAL01 - East Tarelgin Bungalow	66	45	37	41	-8	-4	Low	Low
NAL02 - East Tarelgin Cottage	66	45	35	39	-10	-6	Low	Low
NAL03 - Alwyn Cottage	66	45	30	35	-15	-10	Low	Low
NAL04 - MacQuittiston Farm House	43	37	31	35	-6	-2	Low	Low
NAL05 - Clydenoch Cottage	42	34	29	32	-5	-2	Low	Low
NAL06 - Hugh Wallace & Son Farm	42	34	29	33	-5	-1	Low	Low
NAL07 - East Tarelgin	66	45	36	41	-9	-4	Low	Low

Table 6-2: BS4142 Initial Estimate- Night

Name	Residual Sound (dB LAeq)	Background Sound (dB LA90)	Noise Predictions (Rating Levels in dB LAeq)		BS4142 Initial Estimate, numerical comparison predictions and background		BS4142 Initial Estimate, potential impact (low / adverse / significant adverse), **depending on the context**	
			Phase 1	Phase1+2	Phase 1	Phase1+2	Phase 1	Phase1+2
NAL01 - East Tarelgin Bungalow	57	36	37	41	1	5	Low	Low
NAL02 - East Tarelgin Cottage	57	36	35	39	-1	3	Low	Low
NAL03 - Alwyn Cottage	57	36	30	35	-6	-1	Low	Low
NAL04 - MacQuittiston Farm House	38	30	31	35	1	5	Low	Low
NAL05 - Clydenoch Cottage	36	28	29	32	1	4	Low	Low
NAL06 - Hugh Wallace & Son Farm	36	28	29	33	1	5	Low	Low
NAL07 - East Tarelgin	57	36	36	41	0	5	Low	Low

The initial estimate shows that, without consideration of the context:

- Phase 1 alone: A low impact is predicted at all NALs for both day and night.
- Phase 1 + 2 : A low impact is predicted at all NALs for both day and night. In the night though, it is noted that the rating levels are around +5dB above background levels (the cut-off for an adverse impact) at NAL1 and NAL4-7 therefore the initial estimate indicate a potential impact between low and adverse at night at these receptors.

As the initial estimate results are depending on the context, the context must be assessed before making a conclusion and this is detailed in the below paragraphs.

6.3 Stage 2 – Assessment of Context

BS 4142 requires the following contextual elements to be considered:

- the absolute level of the sound;
- the character and level of the residual sound compared to the character and the level of the specific sound;
- the sensitivity of the receptor; and
- any other pertinent factors;

Each of these is considered in turn below alongside other relevant contextual elements.

6.3.1 Context: Absolute Level of the Sound

BS 4142 suggests that in instances where the existing sound environment is considered either particularly low or particularly high then absolute levels may be more relevant than the initial estimate. The standard states:

"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.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse".

Furthermore, the ANC 2020 BS 4142 Guidance Note makes reference to the old version of BS4142 to provide indicative values that could be used for very low (i.e. below low) background sound levels and low rating levels. The suggested values are found in page 42 of the ANC note, which states:

"BS 4142 does not define 'low' in the context of background sound levels nor rating levels. The note to the Scope of the 1997 version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90}, and low rating levels as being less than about 35 dB $L_{Ar,Tr}$".

In the area surrounding the Coylton GGP (Phase 1+2), which can be described as rural in nature, the measured existing residual levels are not *"very high*". However, the background sound levels may be defined as *"low"* during the daytime at NALs 5-6 and *"not low"* at the others NALs. During the night-time the levels are *"very low"* at NALs 4-6 and "low" at the other NALs. During the night-time, the absolute levels could be considered as an important factor which may reduce the initial estimate findings.

Consideration of the absolute level of the sound suggests that the initial estimate potential impact could be reduced, especially at night.

6.3.2 Context: Character and Level of Residual Sound

The character of the residual sound is fairly consistent at all NALs, and sound levels are influenced mostly by road traffic noise and wind induced noise with small contribution from intermittent sound sources. However it should be noted NALs4-6 are slightly further from the road and have lower levels. The Coylton GGP (Phase 1+2) predicted sound is not anticipated to have distinguishing character features and is considered a fairly continuous and relatively low-level sound source. As such, it is not anticipated that the Coylton GGP Extension (Phase 2) will be readily distinctive against the residual acoustic environment at the NALs.

In daytime, the mean residual sound level value is around 66 dB LAeq,t at NALs 1-3 and NAL7 (close to the road) which is way above the maximum of 41dB LAeq rating levels for these receptors. And at NALs4-6 (further from the road), residual levels are around 42-43 dB LAeq,t hence way above the maximum of 35dB LAeq rating levels for these receptors.

In night-time, the mean residual sound level value is around 57 dB LAeq,t at NALs 1-3 and NAL7 (close to the road) which is way above the maximum of 41dB LAeq rating levels for these receptors. And at NALs4-6 (further from the road), residual levels are around 36-38 dB LAeq,t hence above the maximum of 35dB LAeq rating levels for these receptors (at least by +3dB according to all values in Table 6-2).

To put this into context, it is generally considered that an overall increase in noise level of 3 dB is the threshold of perceptibility.

Consideration of the Character and Level of Residual Sound indicate that the initial estimate potential impact would not need to be modified due this factor alone.

6.3.3 Context: Sensitivity of the Receptor

BS 4142 suggests that:

'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, such as: i) facade insulation treatment; ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and iii) acoustic screening.'

It could be relevant to consider in more detail the indoor levels at night when residents will be inside bedrooms but this has not been explored in this assessment.

Consideration of the Sensitivity of receptor suggest that the impact may be equal or less than the initial estimate.

6.3.4 Context: Other Pertinent Factors

The assessment considers relatively accurate sound level output for the type of plant that will actually be installed and some plant are modelled with an assumption of cooling required in 40 °C ambient temperatures. Also, the noise model assumes all plant was operating concurrently; however not all cooling units will necessarily be required to operate at the same time and as such, overall noise levels are likely to be worst-case and lower than predicted. As set out in Section 5.1.1, for a site in Scotland this situation will occur rarely (if ever) and for much of the time cooling equipment may be operating at lower capacities and overall sound output will be reduced.

Consideration of other pertinent factor suggest that the impact may be less than the initial estimate.

6.4 BS 4142 Assessment Conclusion

The Stage 1- Initial estimate predicted that depending on the context there could be a low impact at most receptors in both daytime in night-time and that there could be an impact between low and adverse at night at NAL1 and NALs 4-7. Detailed considerations of the context in sections 6.3.1 to 6.3.4 clearly indicate that the impacts would be less than that found in the initial estimate.

Accordingly, the full BS 4142 assessment process concludes that there would be a low impact at all residential receptors for day and night. This conclusion assumes the acoustic fences of Phase 1 are in place as mitigation measures.

6.5 Noise condition criteria conclusion

The existing Condition 16 attached to permission ref. 23/0580/PP will also be applicable for the operation of Phase 1+ Phase 2 together and it is however limited to the initial estimate numerical comparison of background noise levels with rating levels (i.e. does not consider the context). The initial estimate is shown in Table 6-1 and Table 6-2 above and indicate that the criteria asking to not exceed 5dB above background is met, albeit some receptors in night-time are just reaching this threshold. It is concluded that the condition is complied with when both Phases are operated together, and that the context as detailed above (especially night-time receptors and the cooling assumptions modelled) should also be considered when reviewing these numerical results.

7 Summary

To assess the impact of operational noise emissions from the Coylton GGP Extension (Phase 2), TNEI has undertaken a noise survey in June 2024 and produced a noise propagation model to predict the noise immission levels at the nearest identified residential receptors. Noise modelling is based on some specific plant for that will very likely be installed at both the existing Coylton GGP Consent (Phase 1) and the Extension (Phase 2). The acoustic fences of Phase 1 are assumed as mitigation measures already in place.

The noise model also assumes that all plant will be operating continuously and concurrently, however, this is unlikely to occur for the majority of the time. Also, some plant are modelled with an assumption of cooling required in 40 °C ambient temperature. Accordingly, the noise predictions are inherently conservative.

A noise survey was undertaken in June 2024 to establish the existing baseline sound levels at four locations in the area. The assessment was undertaken in accordance with the full process of BS 4142 using baseline survey data and predictions. The initial estimate of BS4142 predict that depending on the context there could be a low impact at all receptors in daytime and there could be an impact between low and adverse at night-time for some receptors. Detailed considerations of the context clearly indicate that the impacts could be less than that found in the initial estimate and as such the full BS 4142 assessment process concludes that there would be a low impact from the combined operation of Phase 1 + Phase 2 at all residential receptors for daytime and night-time. This assumes the acoustic fences of Phase 1 are in place as mitigation measures.

The existing condition 16 criteria asking not to exceed 5dB above background would be relevant for the operation of both Phase 1 + Phase 2 together and that criteria is predicted to be met.

Appendix A – Glossary of Terms

Attenuation: the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.

Background Sound Level: the sound level rarely fallen below in any given location over any given time period, often classed according to daytime, evening or night-time periods. The LA90 indices (see below) are typically used to represent the background sound level.

Residual Sound Level : the sound level at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound. This is the same as background sound but with an LAeq indices.

Broadband Noise: noise with components over a wide range of frequencies.

Decibel (dB): the ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. A logarithmic scale is used in sound level measurements because of this wide range. The scale used is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound level.

dB(A): the ear has the ability to recognise a particular sound depending on its pitch or frequency. Microphones cannot differentiate sound in the same way as the ear, and to counter this weakness the sound measuring instrument applies a correction to correspond more closely to the frequency response of the human ear. The correction factor is called 'A Weighting' and the resulting measurements are written as dB(A). The dB(A) weighting is internationally accepted and has been found to correspond well with people's subjective reaction to sound levels and noise. Some typical subjective changes in sound levels are:

- a change of 3dB(A) is just perceptible;
- a change of 5dB(A) is clearly perceptible; and
- a change of 10dB(A) is twice (or half) as loud.

Directivity: the property of a sound source that causes more sound to be radiated in one direction than another.

Emission: the sound energy emitted by a sound source (e.g. a wind turbine).

Frequency: the pitch of a sound in Hz or kHz. See Hertz.

Ground Effects: the modification of sound at a receiver location due to the interaction of the sound waves with the ground along its propagation path from source to receiver. Described using the term 'G', and ranges between 0 (hard ground), 0.5 (mixed ground) and 1 (soft ground).

Hertz (Hz): sound frequency refers to how quickly the air vibrates, or how close the sound waves are to each other (in cycles per second, or Hertz (Hz)).

Immission: the sound pressure level detected at a given location (e.g. the nearest dwelling).

Isopleth: a line on a map connecting points of equal value, for example air pressure, noise level etc.

Noise: unwanted sound.

L_w: is the sound power level. It is a measure of the total sound energy radiated by a sound source and is used to calculate sound levels at a distant location. The *LWA* is the A-weighted sound power level.

L_{eq}: is the equivalent continuous sound level, and is the sound level of a steady sound with the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. The LAeq, T is the A-weighted equivalent continuous sound level over a given time period (T).

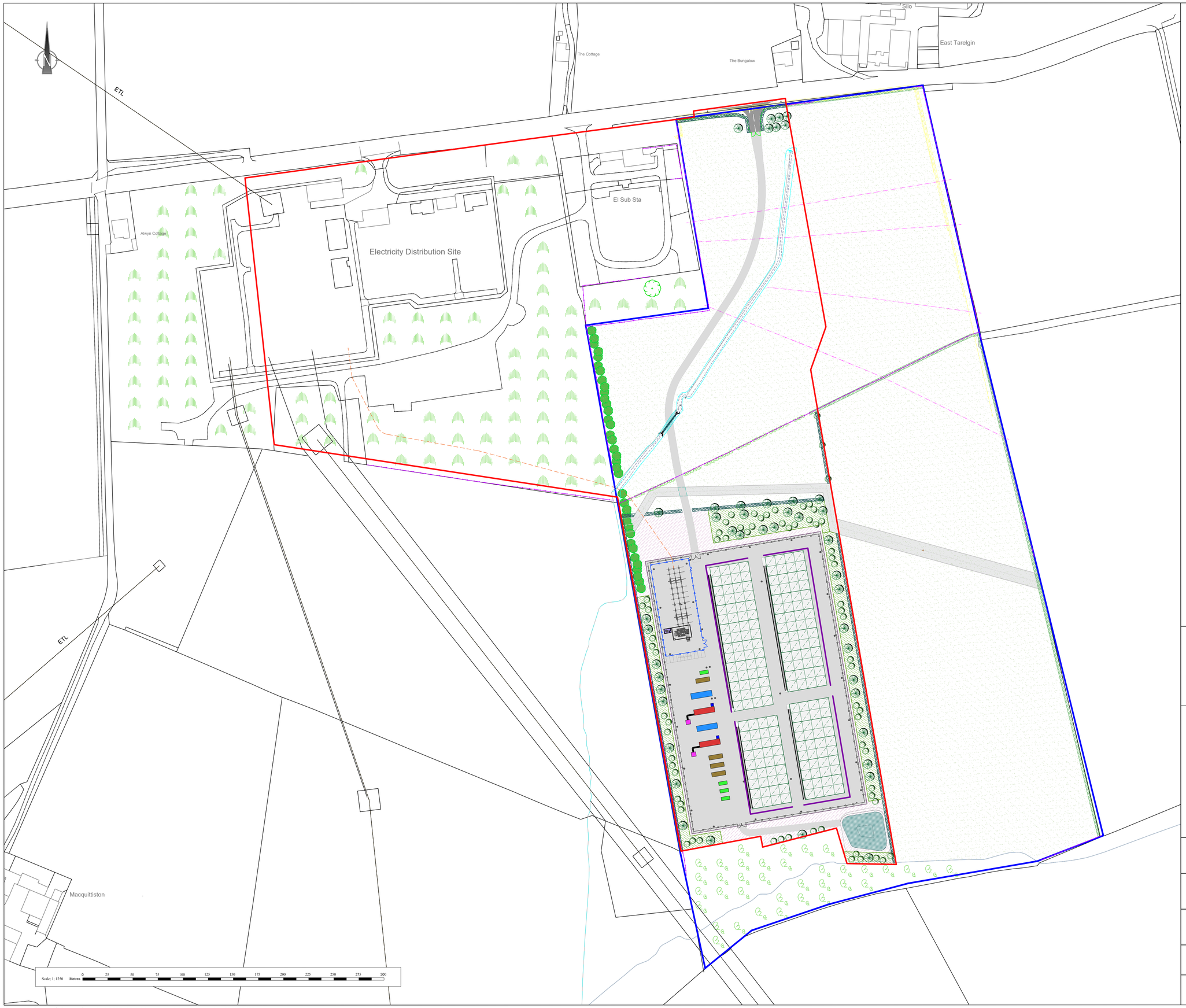
L_{90}: index represents the sound level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background sound level. The LA90,10min is the A-weighted background sound level over a ten-minute measurement sample.

Sound Level Meter: an instrument for measuring sound pressure level.

Sound Pressure Level: a measure of the sound pressure at a point, in decibels.

Tonal Noise: noise which covers a very restricted range of frequencies (e.g. a range of ≤20 Hz). This noise is subjectively more annoying than broadband noise.

Appendix B – Development Information



LEGEND:

- APPLICATION SITE BOUNDARY
- LAND WITHIN THE CONTROL OF THE APPLICANT
- INDICATIVE GRID CABLE ROUTE 0.32 km
- EXISTING OVERHEAD LINE (33 kV)
- UNDERGROUNDING OF 33 kV CABLE
- EXISTING DITCH
- EXISTING INDICATIVE DITCH ALIGNMENT
- NOISE ATTENUATION FENCE 4.5m H
- PERIMETER and NOISE ATTENUATION FENCE 4.0m H (3.5m H CLOSE BOARDED FENCE WITH 0.5m SECURITY TOPPER)
- HV YARD INTERNAL SECURITY FENCE AT 3.4m H
- POST & RAIL FENCING 1.1m H
- EXISTING POST & WIRE FENCING
- SCOTTISH WATER FOUL DRAINAGE PIPE & 5m BUFFER
- PROPOSED REINFORCEMENT OF SURFACING TO PROTECT PIPE
- COMMS HOUSE/ LVAC CONTROL ROOM 5.63 m (H) x 14.7 m (L) x 3.9m (W)
- COMMS HOUSE / SWITCHROOM 5.63 m (H) x 14.7 m (L) x 3.9 m (W)
- AUX TRANSFORMER 2.50 (H) x 3.2 m (L) x 3.1m (W)
- STORES 2.60 m (H) x 6.10 m (L) X 2.40 m (W)
- OFFICES 3.60 m (H) x 9.80 m (L) x 3.1 m (W)
- EARTHING TRANSFORMER 4.0 m (H) x 5.05 m (L) x 3.35 m (W)
- LV SUPPLY CABINET 2.05 m (H) x 2.0 m (L) x 2.0 m (W)
- POROUS CRUSHED AGGREGATE HARD SURFACING
- GATE (CLOSE BOARDED) 4.5 m H
- PALISADE GATE 3.4 m H
- FIELD GATE 1.1 m H
- CCTV / LIGHTING POLE (6m H)
- EMERGENCY WALKWAY (1.5m W)
- CABLE TRENCHES (1.25m W)
- PROPOSED SuDS ATTENUATION FEATURE (DETENTION BASIN / SOAKAWAY)
- PROPOSED CULVERT
- EXISTING TREES - TO BE RETAINED
- EXISTING SCRUB VEGETATION - TO BE RETAINED
- EXISTING HEDGEROW - RETAINED
- EXISTING AGRICULTURAL LANDUSE - RETAINED / REINSTATED
- PROPOSED NATIVE TREE (SELECT STANDARD)
- PROPOSED NATIVE TREE (FEATHER)
- PROPOSED NATIVE WOODLAND EDGE MIX
- PROPOSED NATIVE MIXED HEDGEROW
- PROPOSED NATIVE WILDFLOWER MEADOW
- PROPOSED WET WILDFLOWER MIX (SuDS AREA)

BATTERY CONTAINER AND HV YARD KEY:

- INDICATIVE BATTERY BLOCK 4m (H) x 28m (L) x 15m (W)
- HV EQUIPMENT 8 m (H) x 46 m (L) x 14.4 m (W)

Notes:

Layout and template are not to be changed in any way.
All dimensions are in meters, unless specified otherwise.

Statkraft

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Project Name: Coylton GGP

Drawing Title: Proposed Site Layout - parameters

Drawing No: COYL1-DM-XX-00-DP-XX-02

Scale:	Page size:	Revision no.
1:1250	A1	05
Drawn by:	Check by:	Date:
RC	ST, GH	27/03/2025

Appendix C – Consultation letter inclusive of baseline survey details

Coylton Greener Grid Park Phase 2: Noise Impact Assessment

To:	Alice Ramsey, Environmental Health Officer	Planning Authority:	East Ayrshire Council
Address:	Civic Centre South Building 16 John Dickie Street KILMARNOCK, KA1 1HW	TNEI Ref.:	16523-003 R0
Date:	23 October, 2024		

Dear Alice,

Introduction

TNEI Services Ltd (TNEI) have been commissioned by Statkraft to undertake a Noise Impact Assessment to support the Section 36 application for increased capacity of the battery energy storage system (BESS) development that was granted planning consent by East Ayrshire Council in February 2024 (ref: 23/0580/PP). The consented development is currently under construction and referred to as Coylton Greener Grid Park (GGP) Phase 1. The increased capacity will be referred to as Coylton GGP Phase 2.

Figure 1 (appended) illustrates:

- The location of Coylton GGP Phase 1 and Phase 2;
- Suggested Noise Assessment Locations (NALs), which are identical to the previous TNEI noise assessment for Coylton GGP Phase 1; and,
- the Noise Monitoring Locations (NMLs) that were used in a baseline sound level survey undertaken by TNEI in June 2024.

TNEI propose to undertake the assessment in line with BS 4142:2014+A1-2019 *Methods for Rating and Assessing Industrial and Commercial Sound* (BS 4142) as per the Coylton GGP Phase 1 Noise Impact Assessment, which TNEI prepared. The below letter outlines some of the specific parameters that we would like to agree at the earliest opportunity to complete the noise assessment of Phase 2.

Existing Coylton GGP Phase 1 Criteria and proposed criteria for Coylton GGP Phase 1&2:

The decision notice from February 2024 for Coylton GGP Phase 1 includes planning conditions 16 and 17 relating to operational noise. Condition 17 details the process following a noise complaint to test compliance with the criteria found in Condition 16. Condition 16 states:

'16 . When assessed in accordance with BS 4142:22014+A1:2019, the excess of the Rating Level above the Background Sound Level due to the Greener Grid Energy Park shall not reach or exceed 5 dB. The Background Sound Levels detailed in the 'Environmental Noise Impact Assessment - Coylton Greener Grid Park. Ref: 15416-003-R0' (dated October 2023), shall apply in carrying out such an assessment.'

This noise limit criteria of "Background Sound Level +5 dB" is already in place for Coylton GGP Phase 1 alone. Phase 2 is considered to be an extension with increased operational capacity on the same footprint as previously consented, and the combination of Coylton GGP Phase 1 and 2 together will ultimately be one single BESS site managed by the same developer / operator. As such, TNEI propose that the same criteria remain applicable for the cumulative operation of Phase 1 and Phase 2. In other words, adding the Phase 2 BESS plant to Phase 1 should not cause an exceedance of the existing noise criteria.

Background Noise Levels Assumptions

The previous assessment for GGP Phase 1 relied on baseline data collected by a third party consultant (Arcus), which was collected in June 2021. At this time, Covid restrictions on social contact were in place and the survey was conducted at two locations only and for less than 2 full days. The two NMLs were used to represent seven NALs.

In June 2024 TNEI undertook a new survey, prior to construction commencing on GGP Phase 1, to try and address the shortcomings of Survey 1. As well as being undertaken during a more representative period i.e. outside of Covid lockdown, Survey 2 was longer in duration (11 days) and at more monitoring locations. Four locations in total were used; two nearly identical to June 2021, a more representative location was added near to NALs 5&6 (to the south east), and an additional 4th location was added further north.

The 2024 NMLs and survey details are presented in Annex 1 at the end of this letter. Based on the June 2024 survey, representative background levels have been derived for each NAL and these are shown in Table 1 alongside the previously used background sound levels.

Table 1 – Comparison of possible background sound levels for the NALs

NAL	Survey 1 : 2021 Arcus Short Duration Survey		Survey 2 : 2024 TNEI Long Duration Survey		NML from June 2024
	Day (dB $L_{A90,15min}$)	Night (dB $L_{A90,15min}$)	Day (dB $L_{A90,15min}$)	Night (dB $L_{A90,15min}$)	
NAL01 -East Tarelgin Bungalow	47	31	45	36	2
NAL02 -East Tarelgin Cottage	47	31	45	36	2
NAL03- Alwyn Cottage	47	31	45	36	2
NAL04- MacQuittiston Farm House	40	28	36	30	1
NAL05 - Clydenoch Cottage	40	28	34	27	3
NAL06 - Hugh Wallace & Son Farm	40	28	34	27	3
NAL07 - East Tarelgin	47	31	45	36	2

For the assessment of Phase 2 of the GGP we would like to propose the use of background sound levels from the June 2024 survey, as these are the most recent and robust and include an additional survey location, so that all nearby NALs are appropriately represented.

BS4142 Context Assessment

As a reminder, the BS 4142 standard in its latest iteration details a comprehensive assessment process, which does not stop at a comparison of Background Sound Levels versus operational noise levels from a development. The comparison between background and operational noise is the initial estimate only, and to complete the assessment, the initial estimate needs to be followed by a context assessment. There are some situations where the findings from the initial estimate is not the most relevant, for example, in a low background environment. In this regard, Section 11 of BS4142 states:

'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.'

In 2020, the Association of Noise Consultants (ANC) produced a Technical note on BS4142 to provide further guidance on the use of BS 4142. The Technical note state:

'There is no theoretical limit to how the context can or should influence the impact assessment, but any alteration of the conclusions of an assessment due to the context should be sufficiently explained and justified for the specific circumstances in question.'

Alongside the sound level limit, the context will also be considered in the final noise assessment to fully comply with the BS4142 standard.

Summary

We would like to agree that:

- the criteria of "Background Sound Level +5dB" already in place for Coylton GGP Phase 1 alone can be used for Coylton GGP Phase 1 and Phase 2 together.
- the background sound levels from the June 2024 noise survey should be used.
- the context will need to be considered in the final noise assessment to comply with the BS 4142 standard.

I would be very grateful if you could confirm your acceptance of this approach, or otherwise. If there is any aspect you would like to discuss in more detail, please do not hesitate to get in touch.

Yours sincerely,

Moise Coulon

Principal Consultant

TNEI Services Ltd

Appended: Figure 1 - Noise Monitoring and Assessment Locations

Annex 1 – Details of Background Noise Survey from TNEI June 2024

Figure

N

Track

Drain

FB

Drain

NML 04

Drain

Drain

Drain

Conveyor

Drain

Drain

lss

Killochside

166m

Track

A70

150m

West Tarelgin

153m

A70

Track

NAL02 - East Tarelgin Cottage

NAL01 - East Tarelgin Bungalow

East Tarelgin

151m

NML02

lss

NAL07 - East Tarelgin

A70

147m

141m

Alwyn Cottage

ESS

Pipeline

Path

El Dist Sta

Track

Track

NAL03 - Alwyn Cottage

Phase 2

Phase 1

NML01

NML 03

FB

Macquittiston

NAL04 - MacQuittiston Farm House

NAL05 - Clydenoch Cottage

Clydenoch Cottage

lss

Track

NAL06 - Hugh Wallace & Son Farm

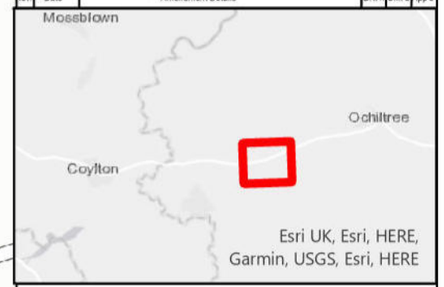
0 0.25 0.5 Kilometres

NOTES

Legend

- Coylton GGP P1 & P2 Plant Locations
- Noise Assessment Locations (NALs)
- Noise Monitoring Locations (NMLs) - TNEI June 2024

Rev.	Date	Amendment Details	Drw'n	Chk'd	App'd
0	01/10/2024	FIRST ISSUE	EH	MC	MC



tnei

Client: Statkraft

Drawing Status: FOR PLANNING

Project Title: Coylton Greener Grid Park Phase 2

Drawing Title: Figure 1 - Noise Monitoring and Assessment Locations

Scale	Designed	Drawn	Checked	Approved
1:5,000	EH	EH	MC	MC

Original Size	Date
A3	01/10/2024

Drawing Number: 16523-003

Revision: 1

Annex 1 - Background Noise Survey from TNEI June 2024

The purpose of the survey was to determine a representative daytime and night-time existing sound levels, characterising the noise environment at the nearest receptors.

The baseline noise survey lasted 11 days between 13th June 2024 and 24th June 2024. The locations and on-site observations are detailed in Table A1.1 and the location is show in Figure 1.

Table A1.1: Noise Monitoring Location (NML) details

NML		Coordinates		Description / Observations at commission and decommission of equipment
ID	Name / Location	Eastings	Northings	
NML01	In a landowner field to be representative of the nearest receptors / houses to the south west.	246532	619342	Light rain, moderate breeze on installation. Wind induced noise is dominant. Traffic inaudible. Occasional livestock calls. Approx 100m to the east there are work on power cables audible and on decommission this was much further away in the northern field. After analysis of the measured data, it was found that work on power cables did not significantly contribute to noise levels.
NML02	South of the A70, to be representative of the nearest receptors / houses along the A70.	246557	619802	Light rain, moderate breeze on installation. Road traffic is dominant with relatively frequent vehicles. Birds are audible as well as wind induced foliage noise. Noise from work on power cables is quite distant (around 400 meters) and only occasional reversing alarms clearly audible. During decommission, the soundscape was the same as installation with the exception of the work on power cables being closer (around 50 - 70 meters). After analysis of the measured data, it was found that work on power cables did not significantly contribute to noise levels. This location has higher levels than all others due to proximity to the road.
NML03	In a landowner field to be representative of the nearest receptors / houses to the south east.	247132	619455	Light rain, moderate breeze on installation. Wind induced noise is dominant, livestock audible in adjacent fields. Noise from work on power cables is quite distant and only occasional reversing alarms were clearly audible. During decommission the soundscape was the same as installation.
NML04	In a landowner field to be estimate background in a far location to the north at a fair distance from the A70.	246755	620436	Light rain, moderate breeze on installation. Birds audible and traffic from local roads barely audible. Wind induced foliage rustle from bushes and grass was the dominant source. During decommission the soundscape was the same as installation.

The noise monitoring equipment consisted of four Rion NL-52 Sound Level Meter (SLM) fitted with appropriate environmental wind shield. All noise monitoring equipment (calibrator, SLM and microphones) used for the study are categorised as Class 1, as specified in IEC 61672-1 *'Electroacoustics. Sound level meters. Specifications'* (3). The equipment was calibrated onsite at the beginning and end of the measurement period with no significant deviations noted. The microphone was mounted approximately 1.2 m above the ground and away from nearby reflective surfaces i.e., building façades, fences etc.

Meteorological data was also collected, with a Kestrel portable weather station and a tipping bucket rain gauge installed near the noise monitoring equipment. In regard to weather conditions, BS4142 states:

'Record the weather conditions that could affect measurements. Monitor wind speed at the measurement location, using an anemometer, and record the wind speed together with the wind direction. Exercise caution when making measurements in poor weather conditions such as wind speeds greater than 5 m/s.'

As part of the post-survey data analysis, all noise data recorded during periods of high wind above 5 m/s or periods of precipitation have been removed from the datasets. A series of charts, including time series graphs statistical and distribution analysis charts, is included below which detail the measured meteorological data, measured background sound levels and data points excluded.

BS4142 suggest that representative background levels are selected for an assessment, notably section 8.2 states:

'In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.'

Table A1.2 presents the representative background sound level selected for daytime and night-time after reviewing all of the data detailed within the series of charts. The residual sound levels are also included as these are also required for the context based assessment.

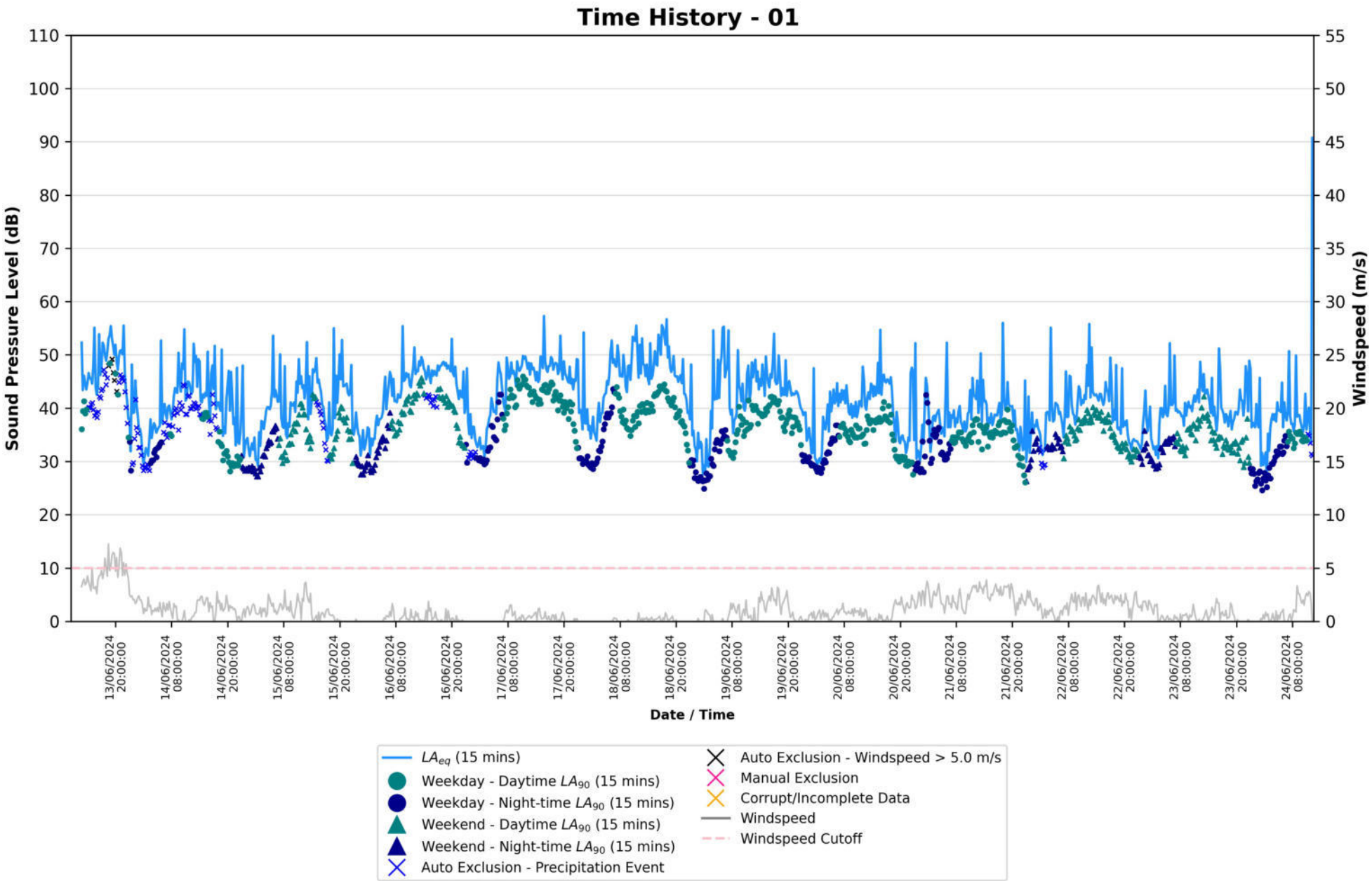
Table A1.2 - Representative Background and Residual Sound Levels, dB $L_{A90(15mins)}$

NML	Item	Daytime	Night-time
NML1	Range of Background Sound Levels (dB $L_{A90,t}$)	26 - 48	25 - 44
	Representative Background Sound Levels (dB $L_{A90,t}$)	37	30
	Range of Residual Sound Levels (dB $L_{Aeq,t}$)	32 - 57	26 - 55
	Representative Residual Sound Levels (dB $L_{Aeq,t}$)	43	38
NML2	Range of Background Sound Levels (dB $L_{A90,t}$)	34 - 57	27 - 50
	Representative Background Sound Levels (dB $L_{A90,t}$)	45	36
	Range of Residual Sound Levels (dB $L_{Aeq,t}$)	58 - 70	32 - 68
	Representative Residual Sound Levels (dB $L_{Aeq,t}$)	66	57
NML3	Range of Background Sound Levels (dB $L_{A90,t}$)	24 - 48	18 - 43
	Representative Background Sound Levels (dB $L_{A90,t}$)	34	28

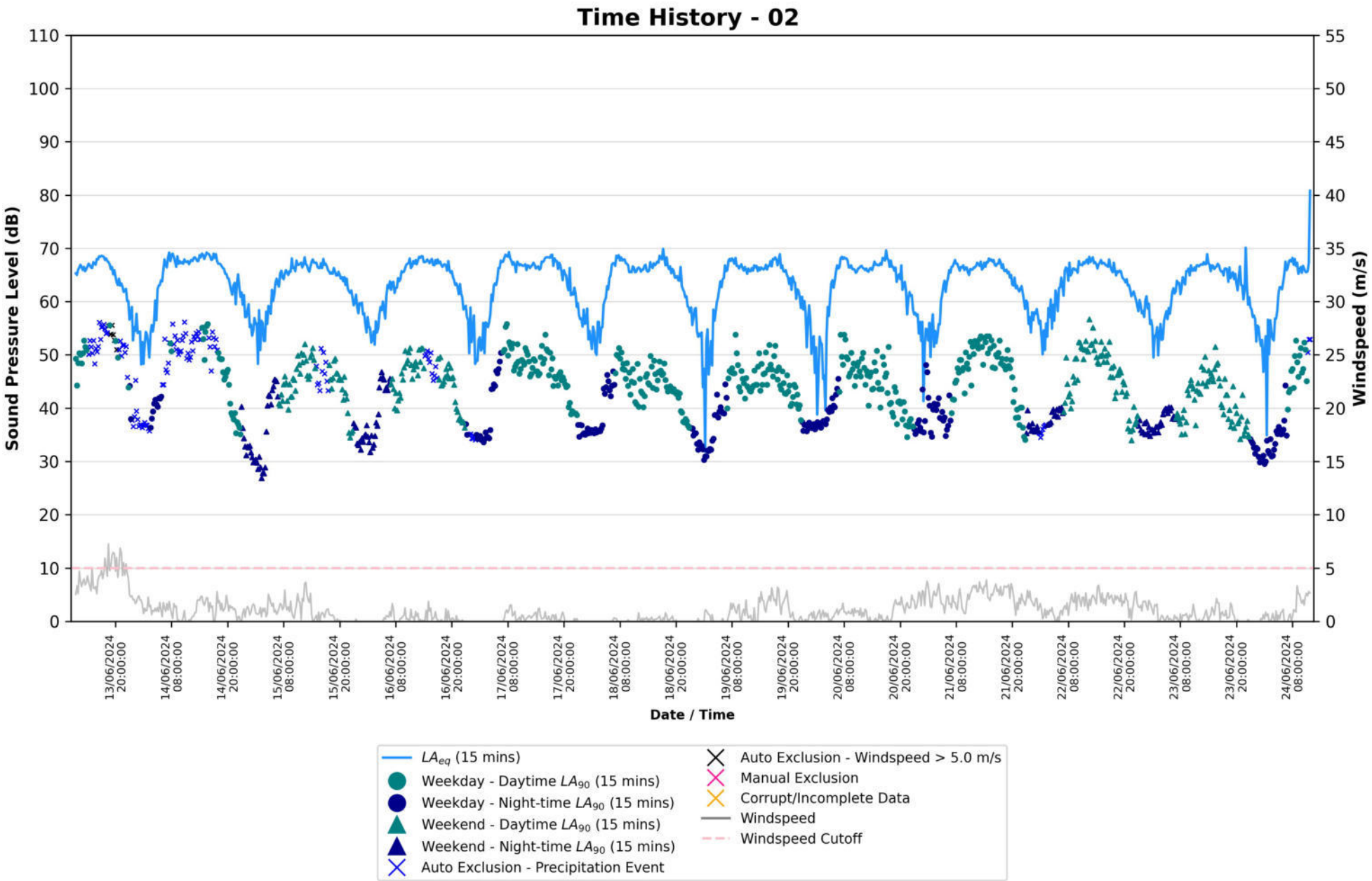
NML	Item	Daytime	Night-time
	Range of Residual Sound Levels (dB $L_{Aeq,t}$)	30 - 59	18 - 43
	Representative Residual Sound Levels (dB $L_{Aeq,t}$)	42	36
NML4	Range of Background Sound Levels (dB $L_{A90,t}$)	26 - 47	22 - 41
	Representative Background Sound Levels (dB $L_{A90,t}$)	36	31
	Range of Residual Sound Levels (dB $L_{Aeq,t}$)	33 - 67	24 - 63
	Representative Residual Sound Levels (dB $L_{Aeq,t}$)	45	41

The series of charts are included below.

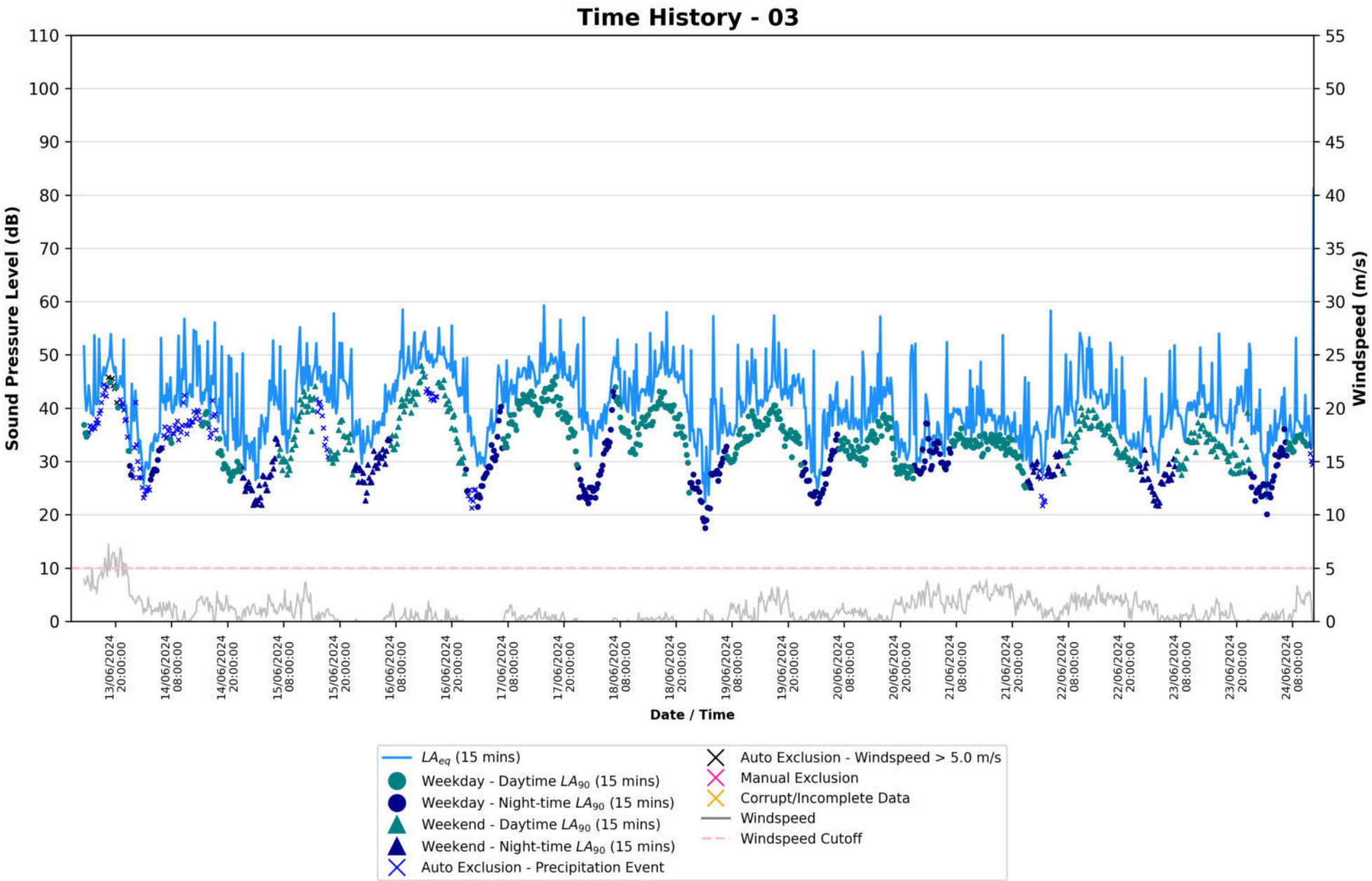
16523 - Coylton BESS - Measured Sound Levels:



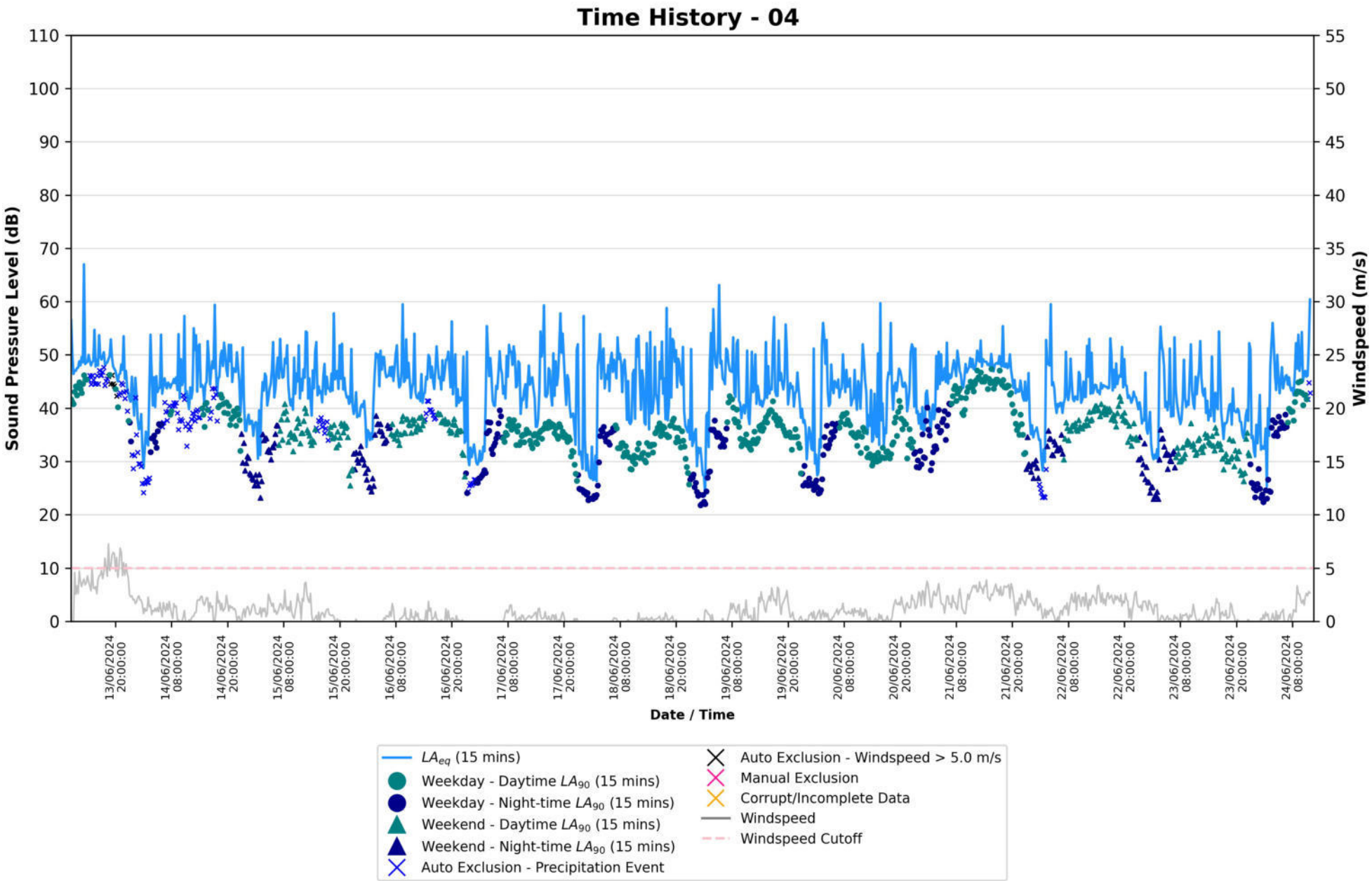
16523 - Coylton BESS - Measured Sound Levels:



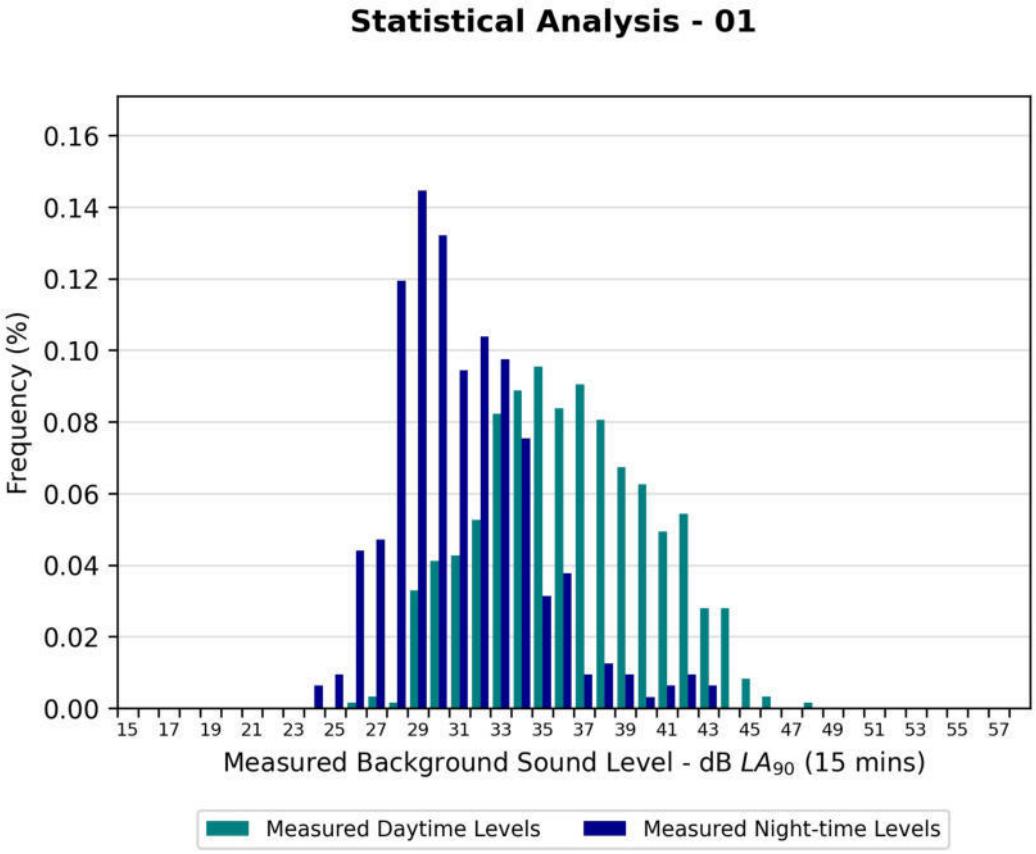
16523 - Coylton BESS - Measured Sound Levels:

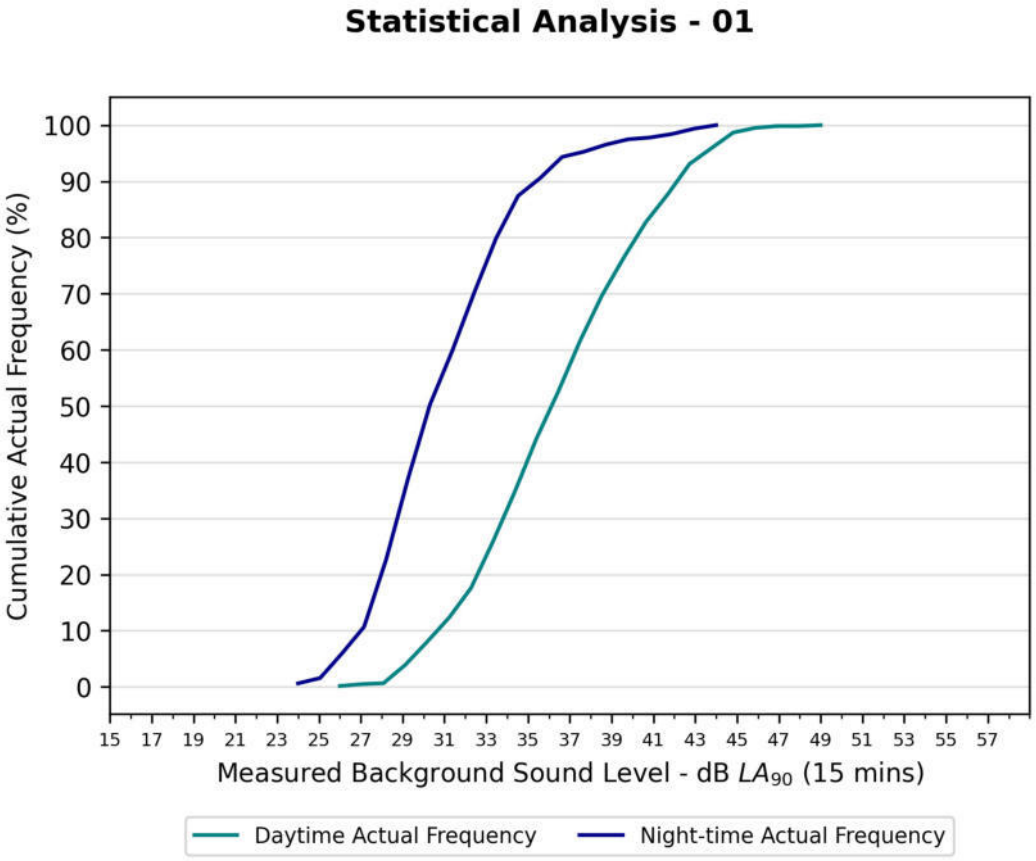


16523 - Coylton BESS - Measured Sound Levels:

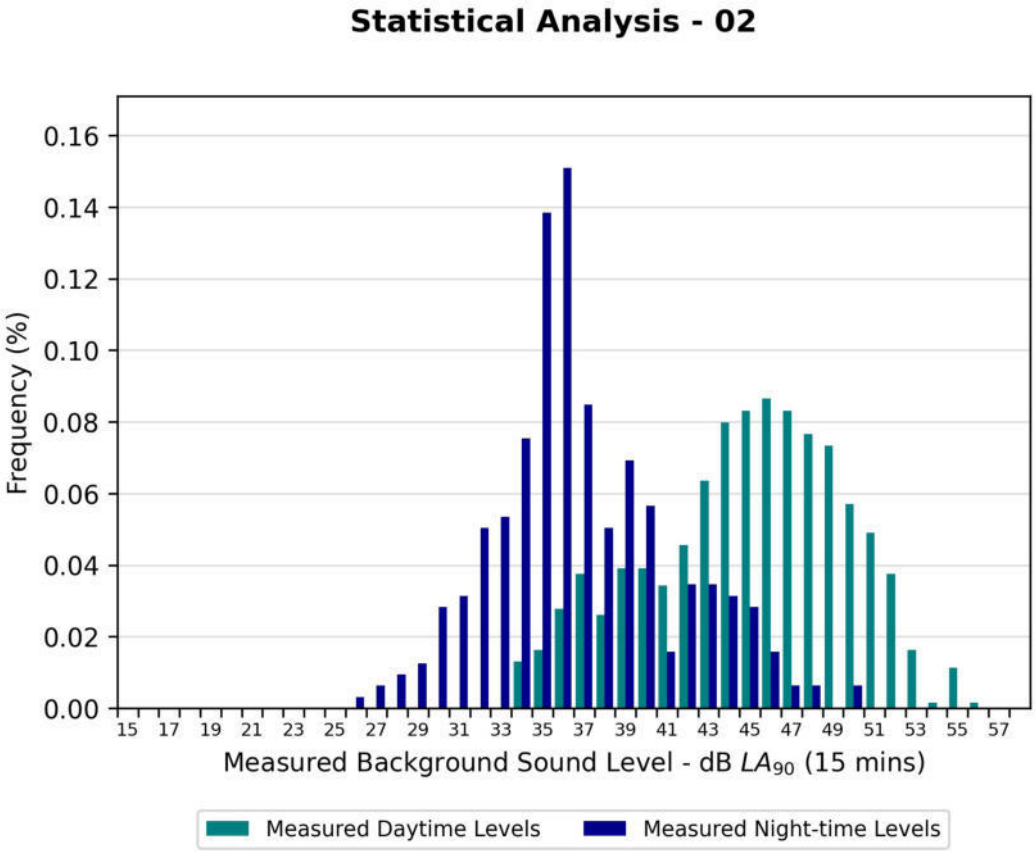


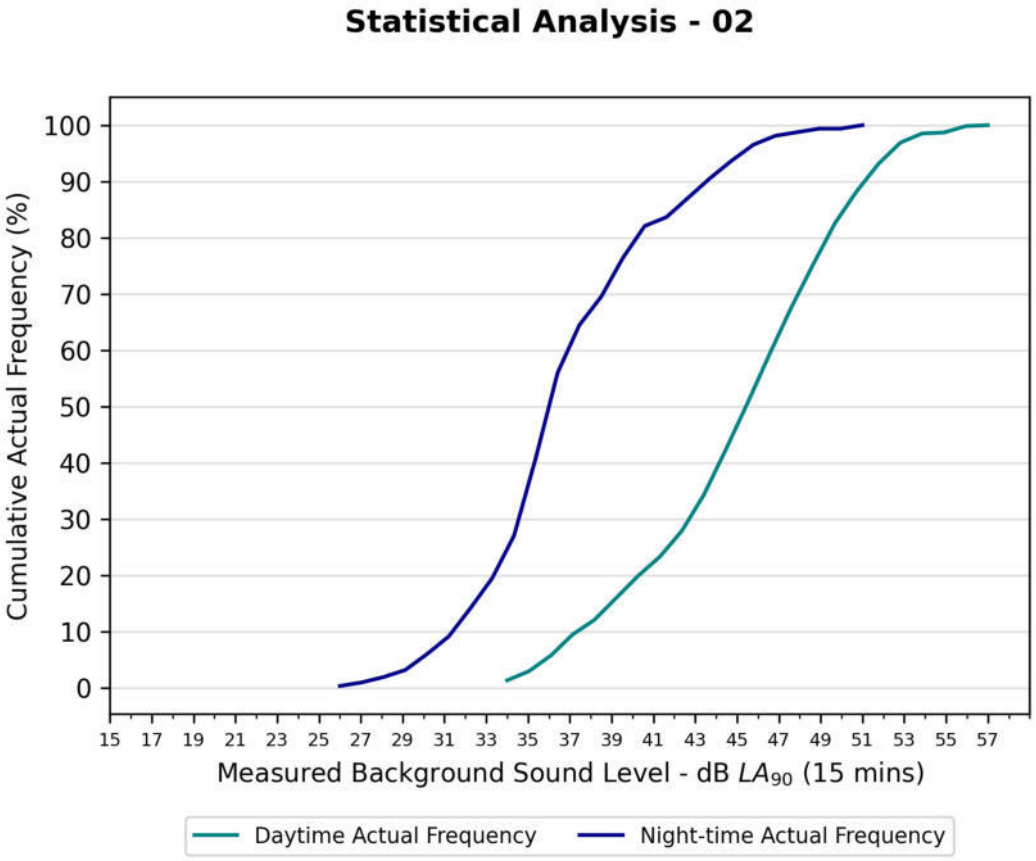
16523 - Coylton BESS - Measured Sound Levels:



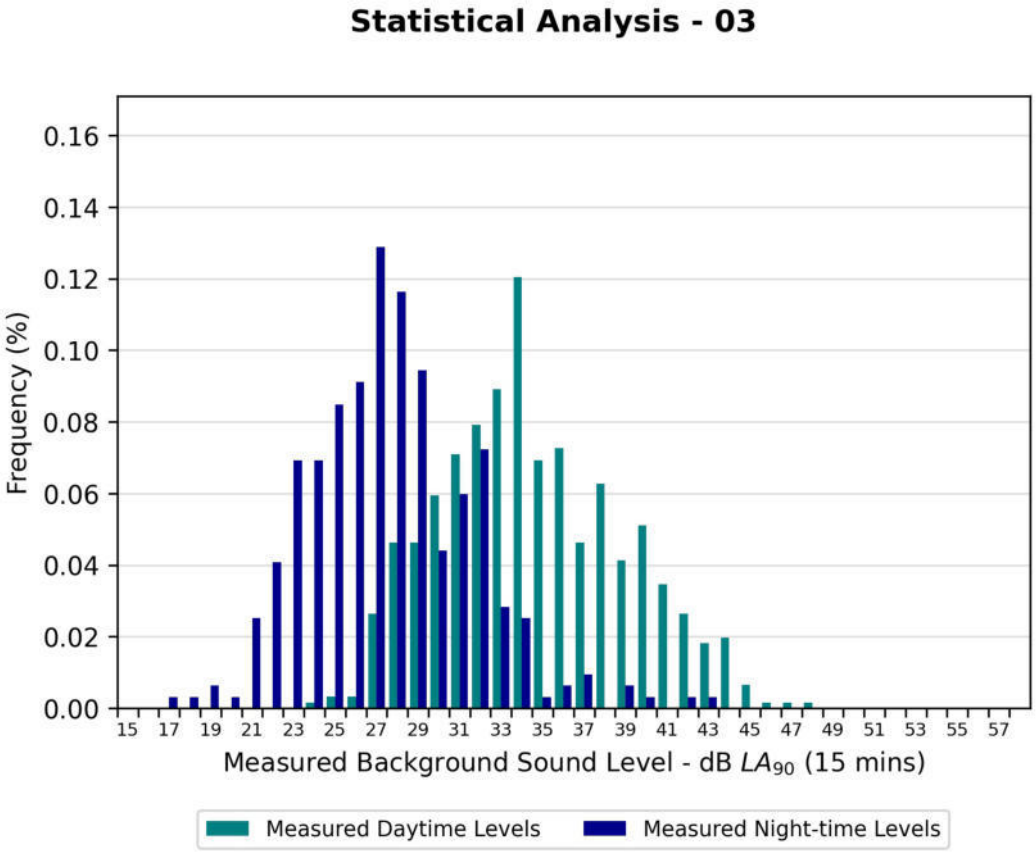


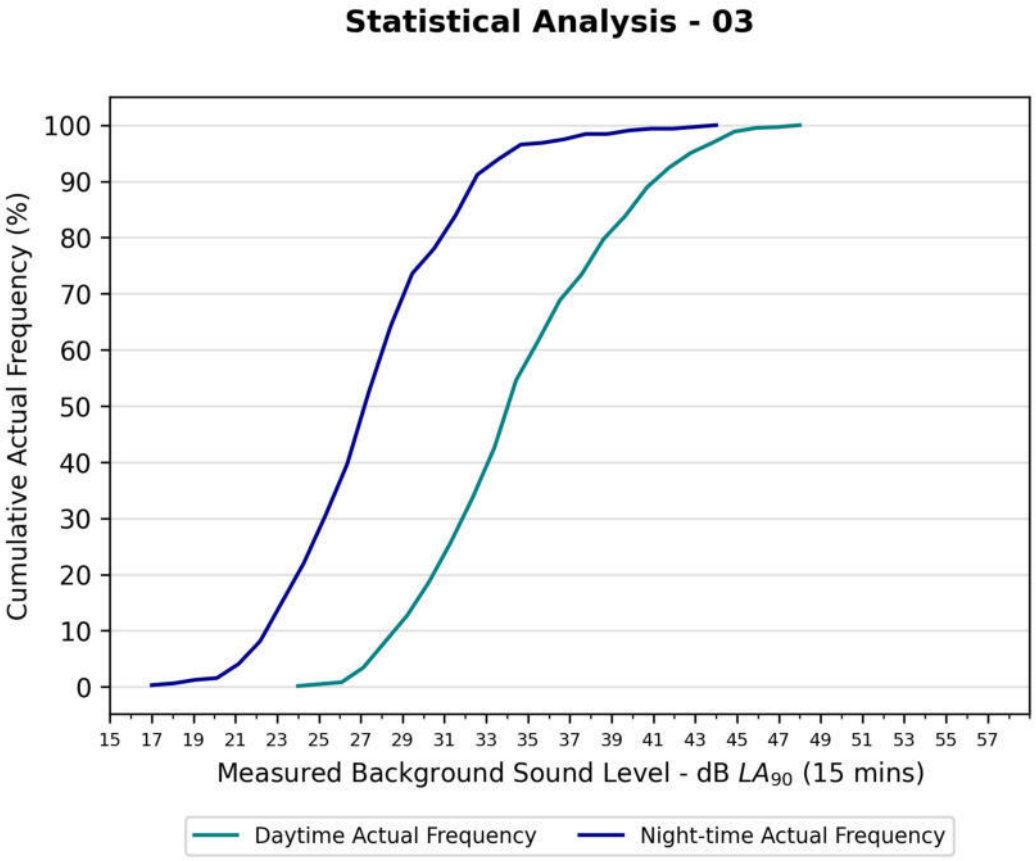
16523 - Coylton BESS - Measured Sound Levels:



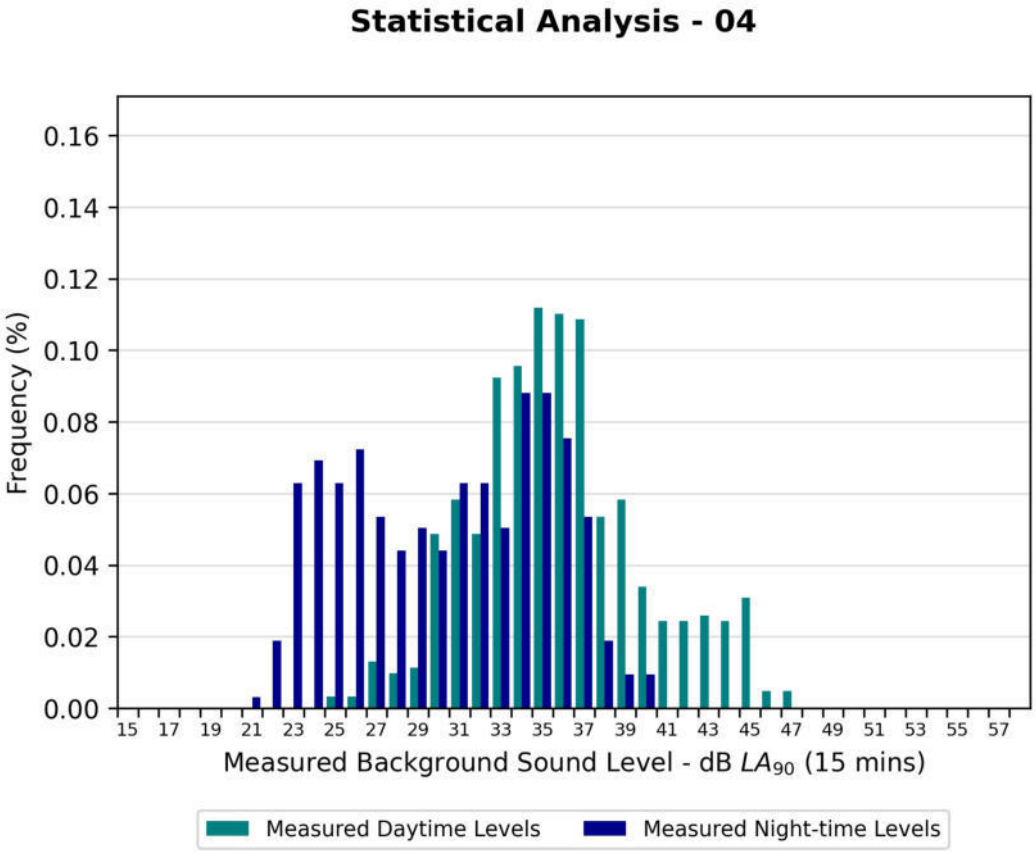


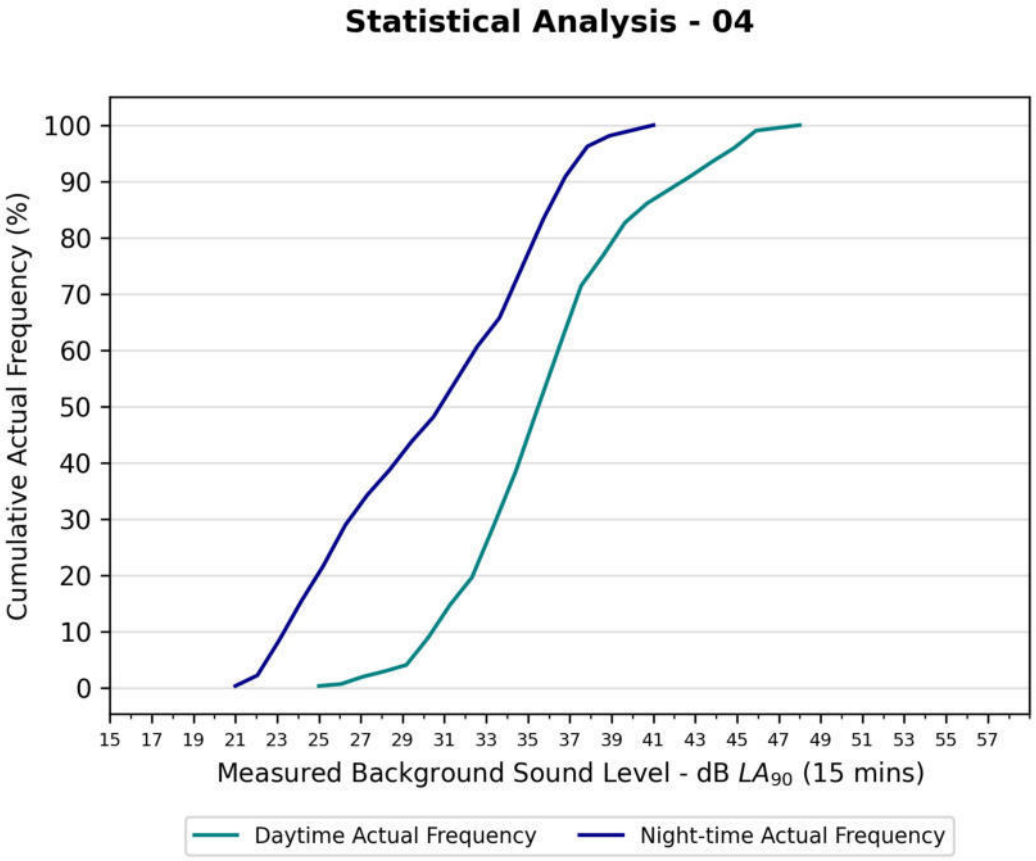
16523 - Coylton BESS - Measured Sound Levels:





16523 - Coylton BESS - Measured Sound Levels:





16523 - Coylton BESS - Measured Sound Levels:

Relevant Statistics

01

		COUNT	LOG_MEAN	MEAN	MEDIAN	MODE	RANGE
DAYTIME	LA90	608	38.61	36.79	37	38	26 - 48
	LAEQ	608	46.08	43.16	43	48	32 - 57
NIGHT-TIME	LA90	318	33.17	31.52	31	30	25 - 44
	LAEQ	318	42.75	38.01	38	39	26 - 55

02

		COUNT	LOG_MEAN	MEAN	MEDIAN	MODE	RANGE
DAYTIME	LA90	613	47.63	45.38	46	46	34 - 57
	LAEQ	613	66.19	65.74	66	66	58 - 70
NIGHT-TIME	LA90	318	39.73	37.27	36	36	27 - 50
	LAEQ	318	59.68	57.1	57	56	32 - 68

16523 - Coylton BESS - Measured Sound Levels:

Relevant Statistics

03

		COUNT	LOG_MEAN	MEAN	MEDIAN	MODE	RANGE
DAYTIME	LA90	606	37.39	35.06	35	34	24 - 48
	LAEQ	606	46.35	42.51	42	46	30 - 59
NIGHT-TIME	LA90	318	30.15	27.97	28	28	18 - 43
	LAEQ	318	42.35	36.5	36	36	22 - 58

04

		COUNT	LOG_MEAN	MEAN	MEDIAN	MODE	RANGE
DAYTIME	LA90	617	38.46	36.31	36	36	26 - 47
	LAEQ	617	48.3	45.03	45	44	33 - 67
NIGHT-TIME	LA90	318	33.16	30.82	31	36	22 - 41
	LAEQ	318	47.13	41.22	41	40	24 - 63

Appendix D – Figures

N

West Tarelgin

Track

Track

NAL02 - East Tarelgin Cottage

NAL01 - East Tarelgin Bungalow

East Tarelgin

NML02

lss

NAL07 - East Tarelgin

A70

141m

147m

151m

153m

150m

166m

Killochside

Pipeline

Alwyn Cottage

Path

El Dist Sta

ESS

NAL03 - Alwyn Cottage

Track

Track

Phase 2

Phase 1

NML01

NML 03

FB

Macquittiston

NAL04 - MacQuittiston Farm House

NAL05 - Clydenoch Cottage

Clydenoch Cottage

lss

Track

NAL06 - Hugh Wallace & Son Farm

Track

0

0.5

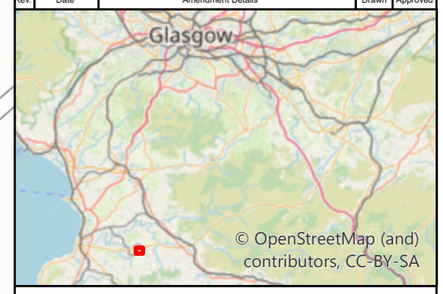
1

Kilometres

LEGEND

- Coylton GGP P1 & P2 Plant Locations
- Noise Assessment Locations (NALs)
- Noise Monitoring Locations (NMLs) - TNEI June 2024

Rev.	Date	Amendment Details	Drawn	Approved
0	24/03/2025	FOR INFORMATION	ST	MC



tnei

Client: Statkraft

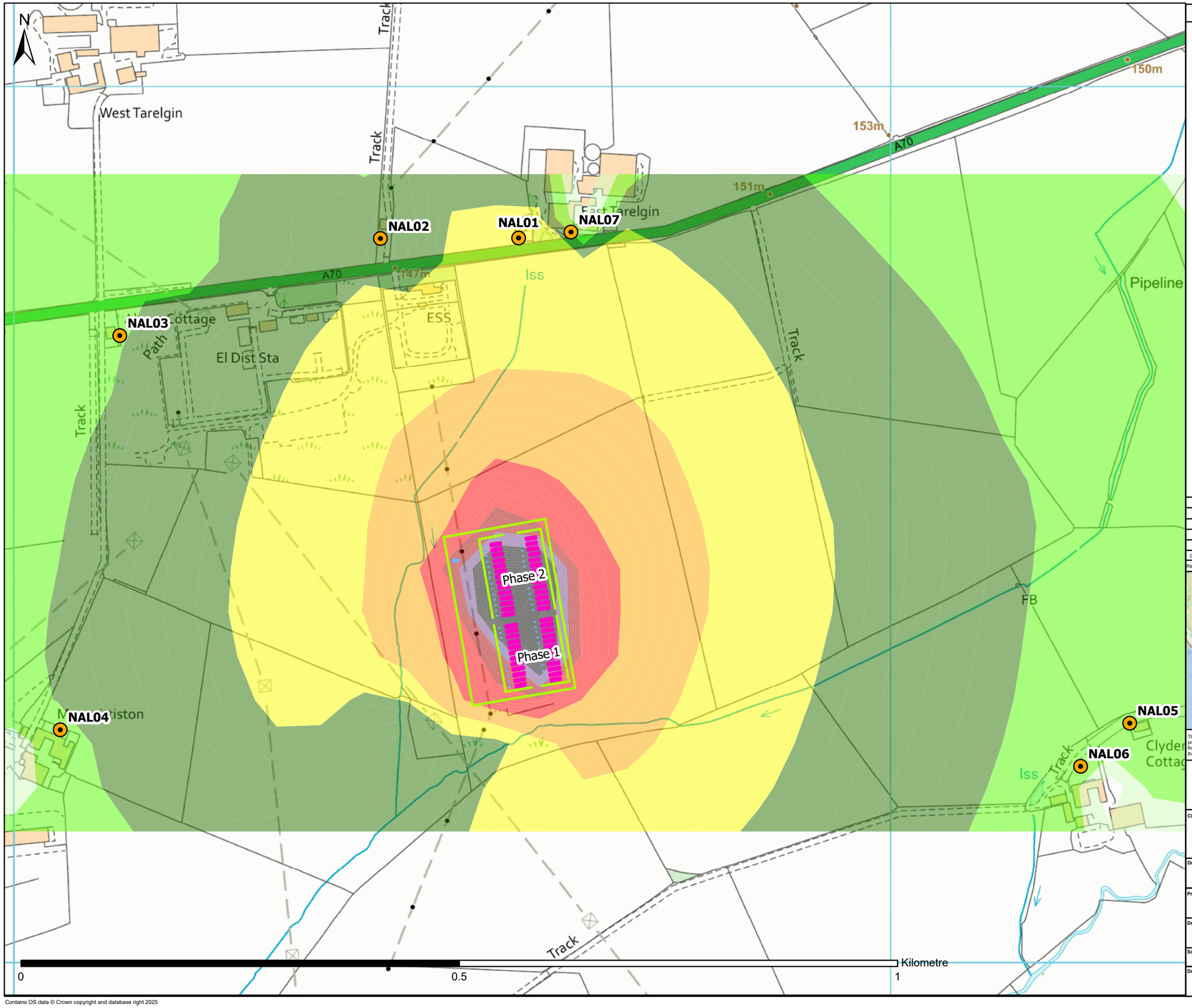
Drawing Status: FOR INFORMATION

Project Title: COYLTON BESS SECTION 36 APPLICATION

Drawing Title: FIGURE 1: NOISE STUDY AREA

Scale:	Original Size:	Spatial Reference:
1:4,500	A3	British National Grid

Drawing Number: 16523-006



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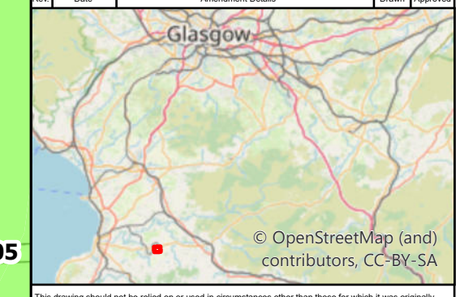
LEGEND

- Noise Assessment Locations (NALs)
- Acoustic Barriers
- Skid Transformer and HV Transformer
- Battery Unit

Specific Noise Level (dB LAeq,t)

- ≤ 30
- 30-35
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- ≥ 66

Rev.	Date	Amendment Details	Drawn	Approved
0	24/03/2025	FOR INFORMATION	ST	MC



tnei

Client: Statkraft

Drawing Status: FOR INFORMATION

Project Title: COYLTON BESS SECTION 36 APPLICATION

Drawing Title: FIGURE 2: NOISE CONTOUR PLOT

Scale:	Original Size:	Spatial Reference:
1:4,000	A3	British National Grid

Drawing Number: 16523-008