CONSTRUCTION NOISE AND VIBRATION IMPACT ASSESSMENT

MARGAM SUBSTATION

Laing O'Rourke

2062990-RSKA-RP-002-(06)

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General notes

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Signature:		Signature:	
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1 Introduction

1.1 Instruction

RSK Acoustics (RSKA) has been instructed by Laing O'Rourke to undertake an assessment of the potential noise and vibration impacts associated with the construction activities involved with the construction of Margam Substation Extension in Port Talbot.

An assessment has been undertaken to determine the potential noise and vibration impacts associated with the construction works at the nearest sensitive receptors to the construction works. The outcome of this assessment will identify any potential noise impacts and, where necessary, recommend control measures to assist the design team in minimising disturbance to the surrounding community.

The assessment has been informed by baseline noise surveys carried out by RSKA in March 2025 and May 2024 comprising unattended measurements at locations representative of the nearest noise sensitive receptors and nearest ecological receptors respectively.

A glossary of acoustic terms used within this report is provided in **Appendix A**.

1.2 Objectives

This construction noise assessment details the procedures by which noise and vibration will be managed in relation to the proposed construction works at Margam Substation, and includes the following aspects:

- A detailed evaluation of the site and surrounding area, including identification of the closest sensitive receptors;
- Establishment of the baseline noise environment at nearby noise sensitive receptors;
- A description of the construction works to be undertaken, including plant requirements and construction phasing;
- A review of relevant legislation and guidance;
- Prediction of noise and vibration levels at nearby sensitive receptors, and assessment against relevant standards and guidance;
- Recommended mitigation measures to be implemented on site in accordance with Best Practicable Means (BPM); and
- Complaint management procedure.

2 Site Location

The site is located off Grange Road in Port Talbot (278520E, 186356N) and comprises an existing substation that includes a switchgear room, two transformers, two auxiliary transformers, a compressor, and associated ancillary equipment.

The site is bounded by the Tata Steel UK site and railway line to the west, green space with the A4241 and residential properties to the north, bioenergy facilities to the east, and Grange substation and green space to the south.

The nearest residential noise sensitive receptors have been identified as residential dwellings located:

- to the east on Heolcae'r-bont (R1) and Margam Road (R2); and
- to the north on Abbot Close (R3), Brynhyfryd Road (R4), Min-Y-Don (R5), and Byass Street (R6).

The closest of these receptors is approximately 450 metres from the boundary of the substation.

There are also two Sites of Special Scientific Interest (SSSI) located near to the south of the site:

- Margam Moors
- Eglwys Nunydd reservoir

Figure 2.1 depicts an overview of the substation site and the nearby identified sensitive receptors.

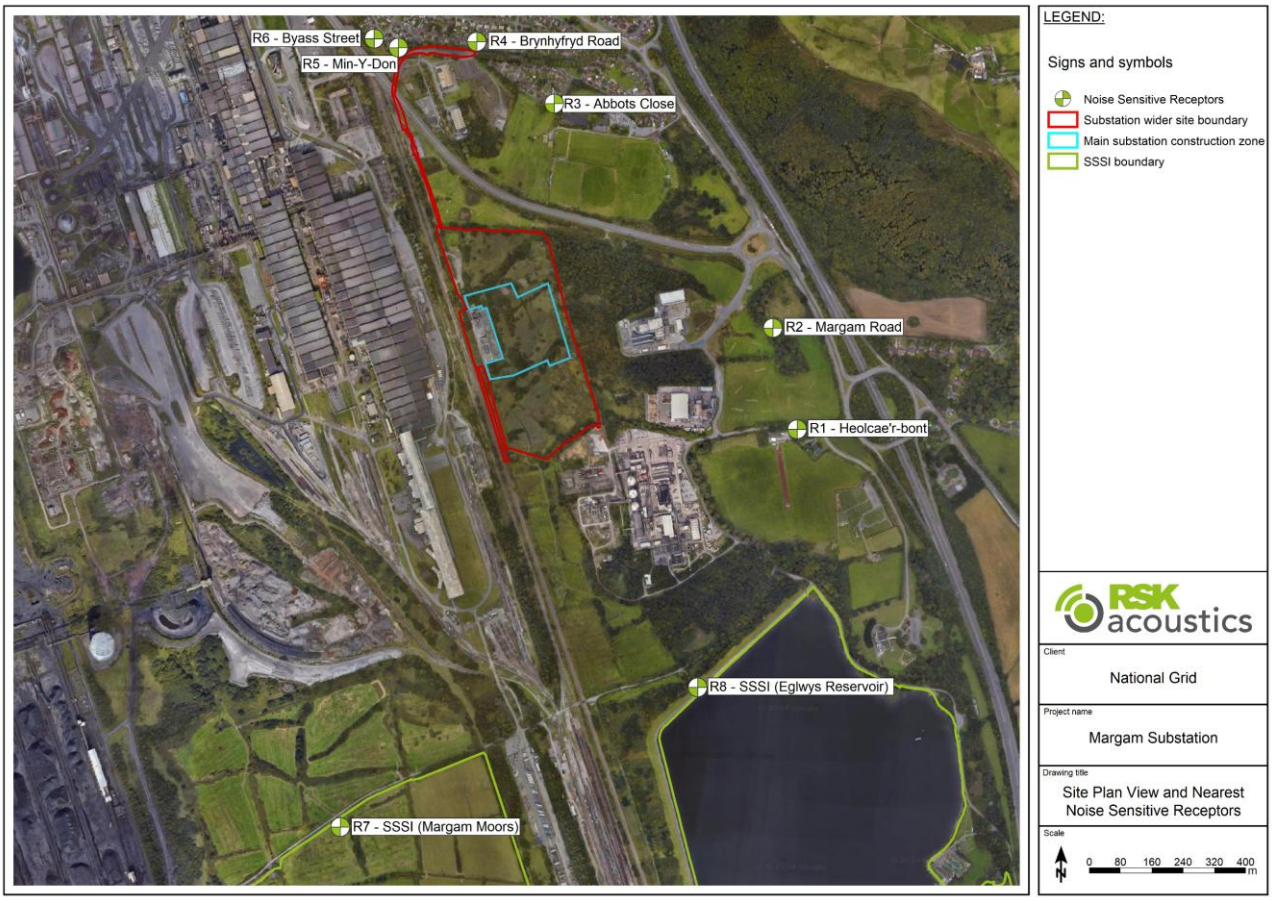

Figure 2.1 Plan view of Margam substation and nearby noise sensitive receptors

3 Regulatory Framework

This section provides a literature review of legislation and guidance relevant to proposed construction works.

3.1 BS 5228-1:2009+A1:2014

BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise' sets out techniques to predict and assess the likely noise effects from construction works, based on detailed information on the type and number of plant items being used, their location, and the length of time they are in operation. The standard provides example thresholds for the assessment of the significance of noise effects.

Annex E of BS 5228 provides guidance on how to assess the significance of construction noise. Section E.3.2 details the ABC Method, applicable to residential receptors, duplicated in Table 3.1 below:

Assessment Category and Threshold Value Period	Threshold Value, $L_{Aeq,T}$ (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23:00-07:00)	45	50	55
Evening and weekends [D]	55	60	65
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75

[A] Category A used when ambient noise levels (when rounded to the nearest 5dB(A)) are less than these values.

[B] Category B used when ambient noise levels (when rounded to the nearest 5 dB) are the same as the category A values.

[C] Category C used when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D] 19.00 – 23.00 weekdays, 13.00-23.00 Saturdays and 07.00 – 23.00 Sundays.

Notes

[Note 1] A significant effect has been deemed to occur if the L_{Aeq} noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

[Note 2] If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise levels is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due site noise.

[Note 3] Applied to residential receptors only.

Table 3-1 Threshold of significant effect at dwellings (BS 5228 Table E.1)

3.2 BS 5228-2:2009+A1:2014

Annex B of BS 5228-2:2009+A1:2015 *'Code of practice for noise and vibration control on construction and open sites. Vibration'* gives guidance on the significance of vibration effects in terms of human response to vibration and structural response to vibration.

Tables 3.2 and 3.3 summarise vibration levels in terms of Peak Particle Velocity (PPV), with Table 3.2 addressing thresholds related to human perception and potential disturbance, and Table 3.3 presenting transient vibration guide values for cosmetic damage to various building types, based on the frequency range of the vibration.

Vibration level (PPV)	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration
0.3 mm/s	Vibration might be just perceptible in residential environments

Vibration level (PPV)	Effect
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level

Table 3-2 Guidance on effects of vibration levels perceptible to humans

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Table 3-3 Transient vibration guide values for cosmetic damage in structures

3.3 BS 7385-2: 1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration'

BS 7385-2: 1993 provides a series of guide values for building vibration above which damage may occur. The standard provides a framework for the procedure of monitoring, recording and analysing of building vibration.

BS 7385-2 deals mostly with over ground structures and provides guide values to prevent cosmetic damage to property. Between 4 Hz and 15 Hz, a guide value of 15 - 20 mms^{-1} is recommended for unreinforced and residential property, whist above 40 Hz the guide value is 50 mms^{-1}. In the lower frequency region strains associated with a given vibration are higher and therefore result in a lowering of the threshold criteria.

According to BS 7385-2: "*Minor damage is possible at vibration magnitudes which are greater than twice those given for cosmetic damage, and major damage to a building structure may occur at values greater than four times the tabulated values*".

Published damage criteria will not necessarily differentiate between these damage types, instead the guidance values will be at such a level which precludes the onset of cosmetic damage and therefore automatically prevent any higher grade of damage.

BS 7385-2 '*Evaluation for Vibration in Buildings*' states that the risk of vibration-induced damage should be evaluated taking into account the magnitude, frequency and duration of recorded vibration together with consideration of the type of building which is exposed. Figure 3.1 overleaf presents the transient vibration guide values for cosmetic damage recommended in BS 7385-2.

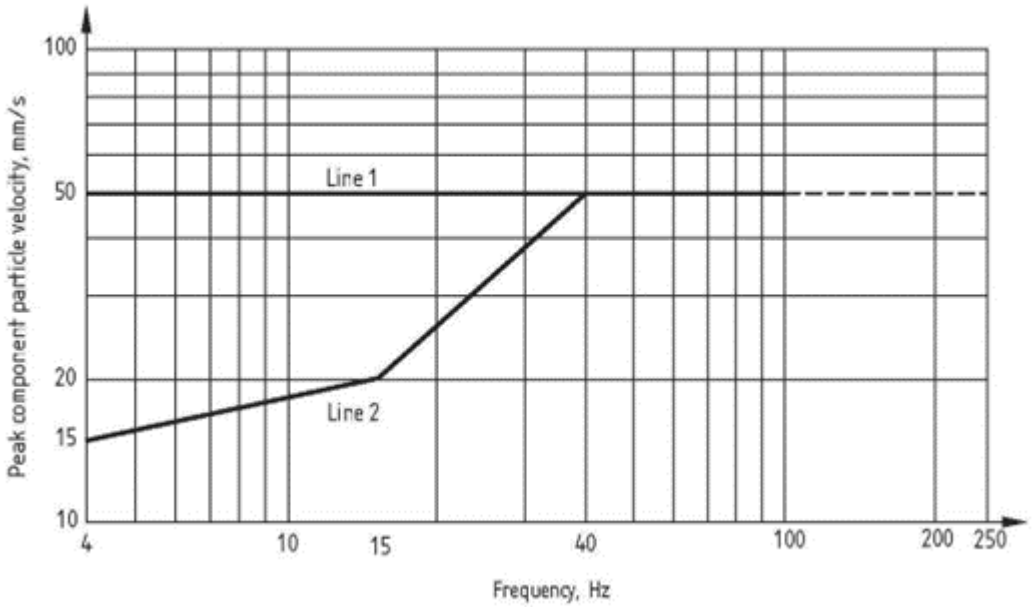

Figure 3.1 Transient vibration guide values for cosmetic damage (BS 7385-2)

3.4 Institute of Estuarine and Coastal Studies 'Construction and Waterflow: Defining Sensitivity, Response, Impacts and Guidance' 2009

The IECS 2009 report (Cutts et al., 2009) defines disturbance in the general context as discrete events that disrupt ecosystem, community or population structures or in some way alter resource levels i.e. food and space. It may also influence the survival of individual birds and reduce the function of the site either for roosting or feeding. The report states that disturbance varies in its magnitude, frequency, predictability, spatial distribution and duration, and species vary greatly in their susceptibility to disturbance and this susceptibility is likely to vary with age, season, weather and the degree of previous exposure. The links between visual and audible stimuli are evident throughout the report and it is clear that noise by itself is not necessarily a cause for disturbance if not accompanied by a perceived visual threat.

In its literature review the IECS report cites a Dutch study (Smit and Visser, 1993) that found that reactions to noise from shooting ranges are stronger if sounds are combined with visual disturbance.

The IECS report reviews a 1999 study (Cutts and Allen 1999) into the disturbance of birds in response to flood defence works at Saltend on the Humber estuary.

In a separate series of reports by IECS to the Saltend Cogeneration Company into the effects of piling noise on estuarine birds, the monitoring of noise related disturbance was carried out. Noise levels were predicted across the site and ranged between 55 – 84 dB(A) (no indication is given initially in the report of the noise index used but, in subsequent paragraphs, use is made of the L_{Amax} parameter, with the time response factor not identified – but it is presumed that the Fast time response is inferred).

Effects on the bird population were observed via observations of flight responses and or behavioural changes. With respect to specific noise levels the following response descriptors are given:

- Noise below 50 dB(A) – low;
- Regular noise 50 – 70 dB – low to moderate;
- Irregular noise 50 – 70 dB – moderate;
- Regular piling noise below 70 dB – moderate; and
- Irregular piling noise above 70 dB – moderate to high.

Cutts et al. 2013 using a combination of literature review and field observations linked the likely behavioural responses of waterbirds to typical noise levels that may arise during construction works. They categorised disturbance effects into high, moderate or low and linked these to a range of noise levels, as follows:

High Noise Level Effects

Noise disturbance is typified by regular responses to stimuli with birds moving away from the works to areas which are less disturbed (within noise tolerances). Most birds will show a degree of response to noise stimuli. Birds that remain in the affect area may not forage efficiently and if there are additional pressures on the birds (cold weather, extreme heat etc.) then this may impact upon the survival of individual birds or their ability to breed. For auditory disturbances to qualify as a high level, it must constitute a sudden noise event of over 60 dB (at the bird, not at source) or a more prolonged noise of over 72 dB.

Moderate Noise Level Effects

Moderate noise disturbance is typified as high level noise which has occurred over long periods so that birds become habituated to it or lower level noise which causes some disturbance to birds. This encompasses occasional noise events above 55 dB, regular noise 60 - 72dB and long-term regular noise above 72 dB, where birds have become habituated. There is cross-over in moderate and high level noise thresholds although the lower band can be assumed unless the species is particularly sensitive. Those species that are particularly sensitive are Brent Goose, Curlew and Redshank. Birds that may be more sensitive than average include Shelduck and Bar-tailed Godwit (Smit & Visser, 1993)

Low Noise Level Effects

Low level noise is classed as that which is unlikely to cause response in birds using a fronting intertidal area. As such noises of less than 55 dB at the bird are included in this category. These effects are likely to be masked by background inputs in all but the least disturbed areas and thus would not disturb the birds close by. Noise between 55 – 72 dB in some highly disturbed areas e.g., industrial or urban areas and adjacent to roads, may feature a low level of disturbance provided the noise level was regular as birds will to often habituate to a constant noise level.

A summary of the impact thresholds for bird populations is provided below:

Level	Impact	Effect Level	Noise Level / dB(A)	Type of Noise
1	No impact	Low	Below 50	Regular construction noise
2	Behavioral changes (alarm calls, heads up, change in feeding/roosting activity)	Moderate	Equal to or below 70	Piling noise
3	Movement within zone	Moderate to high	Above 70	Piling noise
4	Movement out of zone but remaining on site	High	Above 85	Piling noise
5	Movement off site	High	Not defined	N/A

Table 3-4 IECS noise impact criteria

The noise unit in Table 3-4 IECS noise impact criteria is not defined in the 2009 IECS Report but is likely to refer to the L_{AFmax} which is referenced throughout. The A-weighting network has therefore been adopted to inform the impact thresholds for those ecological receptors.

3.5 Natural England, 'A Review of the Effects of Noise on Birds – Version 1' 2018

This guidance note describes the nature of the effects of noise on birds and provides a literature review of present studies and broad measures of mitigation. This includes the application of generic thresholds for potentially harmful noise levels (or increases in noise levels), and measures to help mitigate noise effects on birds.

The document does not prescribe specific noise limits, rather a list of published thresholds for a range of activities, including construction piling, general construction, sporadic events such as shooting ranges and transportation sources. The document references the previously discussed Cutts et al, 2009 document, plus a number of others, all of which present noise thresholds for construction activity of between 55 dB(A) and 84 dB(A) as an indication of behavioural changes from anxiety displays to moderate responses (birds moving away).

Although this document refers to English guidance, in the absence of specific Welsh Guidance, this is considered to be most appropriate to identify impacts.

3.6 Neath Port Talbot County Borough Council Local Development Plan (2011-2026) (Adopted January 2016)

Neath Port Talbot County Borough Council (NPTCDC) prepared a Local Development Plan (LDP) for the period 2011 to 2026, as required under the Planning and Compulsory Purchase Act 2004. This document *'(…) guides the future development of an area, providing a clear vision for the County Borough setting out where, when and how much new development can take place over the next 15 years (2011-2026). The aim is to provide developers and the public with certainty about the planning framework for Neath Port Talbot.'*

Policy EN8 '*Pollution and Land Stability'* includes considerations on noise pollution as follows:

'In relation to noise, potentially noisy proposals should not be located close to sensitive uses (such as hospitals, schools and housing) and new noise-sensitive developments should not be located near to existing noisy uses (including industry and existing or proposed transport infrastructure) unless it can be shown that adverse effects can be dealt with through mitigation measures incorporated into the design. Where noise levels are likely to be a significant issue, developers may be required to provide information to show that no nuisance is likely to be caused through increased noise levels at sensitive locations if the development proceeds. Policy EN10 sets out policy relating to designated Quiet Areas.'

4 Construction Details

4.1 Construction Methodology

Laing O'Rourke are proposing to conduct a number of general construction activities at Margam Substation.

Based on the indicative construction programme provided by the Client, construction at Margam Substation is understood to be undertaken between 01 September 2025 and 24 April 2026.

It should be noted that, at the time of this report, a detailed programme and plant schedules were not available. Therefore, plant requirements have been estimated based on similar project types and site conditions.

Standard construction working hours are assumed to be Monday to Friday from 08:00 to 18:00, and Saturday from 08:00 to 13:00. All tasks are expected to be carried out within these core hours At this stage it is assumed that bank holidays will be non-working.

Any works required outside of daytime working hours will not commence until approval has been received from the local authority.

Table 4-1 provides an overview of the construction tasks to be undertaken, along with the corresponding time periods.

Works	Description	Construction Time Periods
Task 1: Vegetation Clearance	Chain saws, a chipper, excavators and various hand tools will be used to remove Hedges and other vegetated areas to enable the subsequent tasks to be undertaken within the working areas of the site.	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00
Task 2: Site Establishment	The relevant construction teams will take possession of the site. Prior to the initial site setup, suitable work facilities will be installed in the form of welfare cabins delivered to site on appropriate HGVs or low loaders in line with an agreed traffic management plan and route. The site establishment works will include any necessary activities that are required along the diversion route and prior to the arrival of the HDD equipment. The vehicle access, drilling pad, working area, and water supply to the entry site will be prepared using excavators to remove topsoil. The task will utilise plant items including mini-excavators, saws, generators, compressors and various hand tools as and where required.	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00
Task 3: Earthworks and Dewatering	Once the site is established, it will be cleared, and earthworks will be carried out to establish the correct site levels. Topsoil will be stripped, and then general earthworks will be undertaken to cut and fill as required. This will involve excavators to load spoil into dumpers and lorries, which will transport it to the designated locations, along with the use of compaction/stabilisation equipment. Dewatering will be undertaken ahead of excavation works, where required, in order to provide dry conditions.	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00

Works	Description	Construction Time Periods
Task 4: Piling Works	Use of rotary piling rig, concrete pumps during the installation of piled foundations.	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00
Task 5: Installation of load transfer platform	Use of general earthworks plant, and power tools for the installation of the load transfer platform. Will include surface and foundation works, delivery vehicles and hand tools for final structural installation.	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00
Task 6: Foundation Construction (Concreting works)	Construction of foundations in preparation for infrastructure installation. Use of concrete mixing truck and concrete pumps.	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00
Task 7: Installation of Structural Steel, Cladding and HV Equipment	Installation of superstructure (steel works) with telescoping handler/crane, and power tools	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00
Task 8: Soft & Hard Landscaping	Use of excavator and compaction plant to resurface finished areas	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00
Task 9: commission and Site Demobilisation	The trackway used for the temporary haul road will be lifted, and the ground will be backfilled. The temporary welfare cabins and plant will be removed from the site, along with all associated warning signs.	Core Hours: Monday to Friday from 07:00 to 18:00, and Saturday 07:00 to 13:00

Table 4-1 Construction methodology

4.2 Plant Sound Level Data

The estimated plant requirements have been assumed based on the indicative construction programme provided by the Client, dated 21st February 2025. Table 4-2 below outlines the construction tasks included in the assessment, along with their associated noise levels for each task.

Task ref	Description	Sound Power Level (dBA)
1	Vegetation Clearance	108
2	Site Establishment and Deliveries	109
3	Earthworks and Dewatering	115
4	Piling Works	112
5	Installation of load transfer platform	115
6	Foundation Construction (Concreting works)	112
7	Installation of Structural Steel, Cladding and HV Equipment	109
8	Soft & Hard Landscaping	104
9	Decommission and Site Demobilisation	98

Table 4-2 Summary of noise levels for activities within the construction programme

The full list of plant assumed within each task and further detail of the plant requirements and assumed percentage on times is provided in **Appendix D**. Where the make and model of the plant items, or if

manufacturer noise levels are not available, representative noise levels have been used based on the guidelines and reference noise levels within BS5228 of similar plant.

4.3 Working Extents

It is assumed that the Margam Substation extension works will be conducted within the Margam Substation construction zone boundary, while vegetation clearance will also be undertaken along the main access route. The work's extents are shown within Figure 4.1 below.

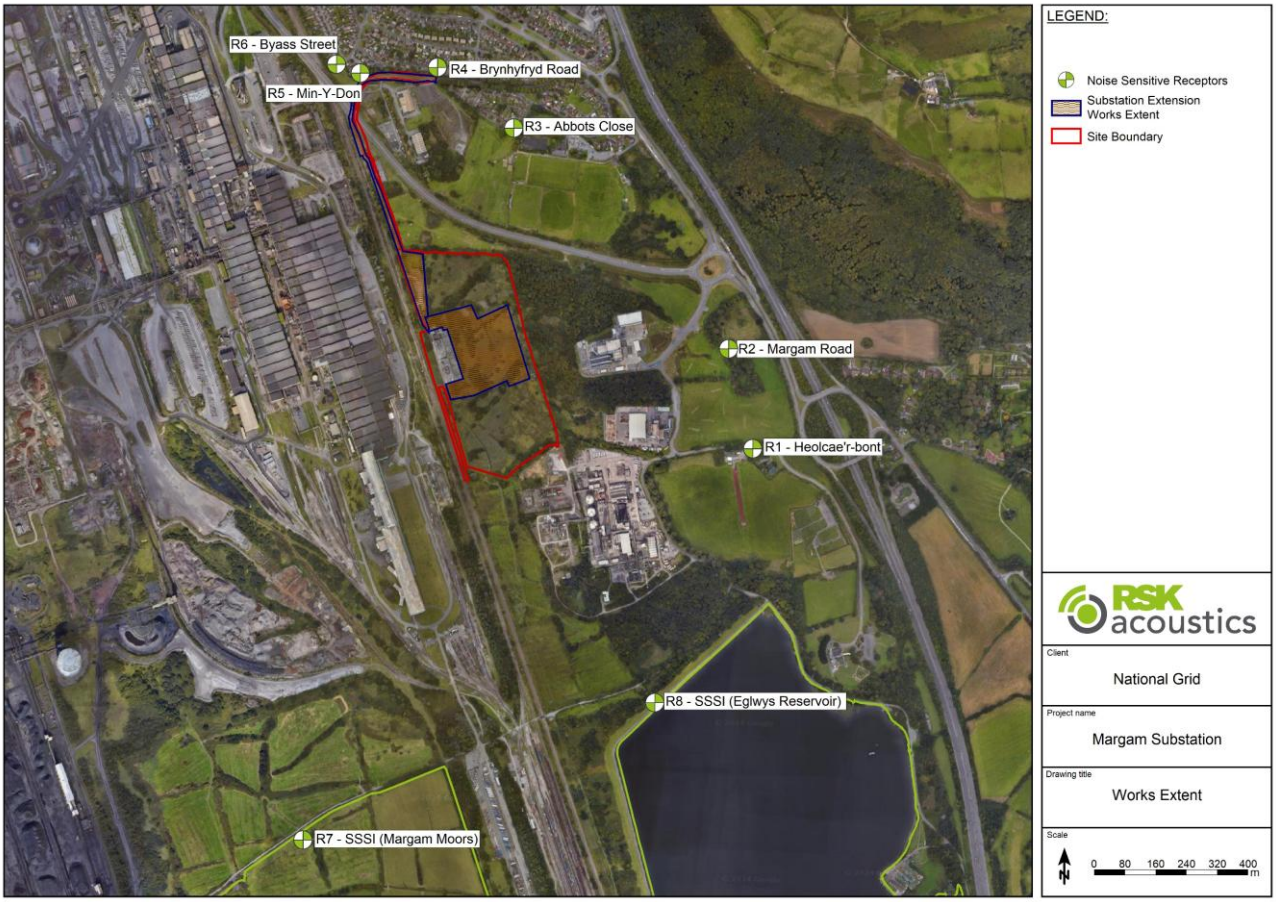

Figure 4.1 Construction works extent

5 Survey Methodology

A baseline noise survey was undertaken between 07 March 2025 and 19 March 2025 to obtain ambient and background noise levels representative of the existing surrounding residential receptors.

Additionally, an unattended survey was undertaken at ecological receptors between Tuesday 7 May to Wednesday 22 May 2024, and between Tuesday 7 May to Tuesday 28 May 2024[1]. Further details regarding the baseline survey (including full measurement results and equipment details) at these locations can be found in the noise impact assessment for Tata Steel UK (planning application ref. P2024/0711).

5.1 Noise Sensitive Receptors

Two unattended monitoring positions were selected to be representative of the site and nearest receptors, respectively. As such, a baseline noise survey was undertaken at these positions, covering both midweek and weekend periods.

As the monitoring was unattended, the security and accessibility of the equipment were key considerations for the survey. These positions are considered to be representative of the acoustic climate at the nearest receptors, taking into account surrounding noise sources such as distant road traffic and agricultural activity.

A description of the installation and geo-referenced locations of each measurement position is provided in Table 5-1 below:

Ref.	Approx. Coordinates	Measurement Duration	Description
MP1	278782E, 186970N	07/03/25–17/03/25	Noise logger installed in free-field conditions approximately 1.5m above local ground level. Installed at this location to quantify noise levels at the residential receptors along Abbots Close.
MP2	278357E, 187086N	07/03/25–19/03/25	Noise logger installed in free-field conditions approximately 1.5m above local ground level. Installed at this location to quantify noise levels at the residential receptors in the vicinity of Byass Street and Brynhyfryd Road.
MP3	278256E, 185312N	07/05/24–28/05/24	Noise logger installed in free-field conditions approximately 1.5m above local ground level. Installed at this location quantify noise levels at Margam Moors SSSI.
MP4	279769E, 185040N	07/05/24–22/05/25	Noise logger installed in free-field conditions approximately 1.5m above local ground level. Installed at this location quantify noise levels at Eglwys Nunydd reservoir SSSI.

Table 5-1 Unattended measurement location details

The noise sensitive receptors, depicted in Figure 2.1, have been identified to be the nearest existing receptors to the site and therefore considered the most likely to be affected by changes to the local noise environment.

Table 5-2 below lists the chosen representative measurement position for each noise sensitive receptor, and Figure 5.1 illustrates their position in relation to the surrounding properties and the substation.

It is noted that the survey location at UL4 was impacted by its proximity to the nearby (within 150m of the M4). Although results are representative of areas of the reservoir a similar distance from the motorway, care should be taken in using the data as representative of the Eglwys Nunydd reservoir as a whole. On this basis, for the

[1] We do not consider the acoustic environment to have changed significantly since these surveys at these locations therefore the data presented below is considered to be representative of the current acoustic environment.

purpose of this assessment, noise levels measured at MP3 are considered applicable to both Margam Moors and Eglwys Nunydd reservoir.

Reference	Receptor Name	Representative Measurement Position
R1	Heolcae'r-bont	MP1
R2	Margam Road	
R3	Abbots Close	
R4	Brynhyfryd Road	MP2
R5	Min-Y-Don	
R6	Byass Street	
R7	Margam Moors SSSI	MP3
R8	Eglwys Nunydd reservoir SSSI	

Table 5-2 Representative measurement location for each noise sensitive receptor

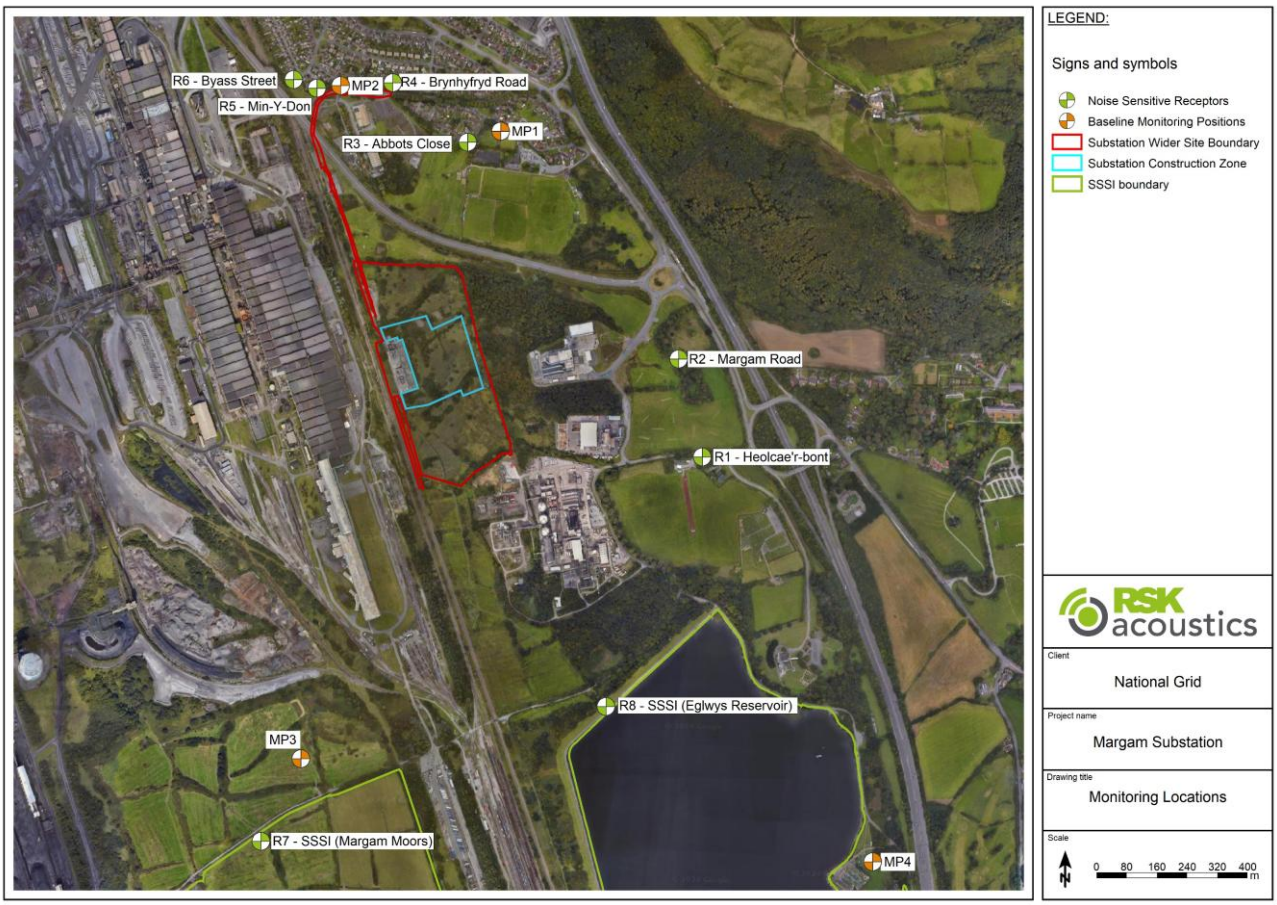

Figure 5.1 Plan view of the site showing the monitoring locations

5.2 Instrumentation

The equipment used and calibration information for the March 2025 survey are presented in Table 5-3. Calibration certificates for all equipment used can be provided on request.

Position	Equipment	Type	Serial Number	Calibration Date
MP1	Sound level meter	01dB Fusion	14023	28/06/2023

Position	Equipment	Type	Serial Number	Calibration Date
MP2	Sound level meter	01dB Fusion	15187	01/06/2023
MP1/MP2	Acoustic calibrator	Rion NC-74	34625616	16/07/2024

Table 5-3 Monitoring equipment

The calibration of the sound level meters was checked before and after the measurements, using the acoustic calibrator at 94 dB at 1 kHz; no significant calibration drift was noted i.e. within a +/- 0.5 dB tolerance.

The sound level meters used conformed to the Class 1 requirements of BS EN 61672-1: 2013 Electroacoustics. Sound level meter, Specifications. The calibrator used conformed to the Class 1 requirements of BS EN IEC 60942: 2018 Electroacoustics, Sound calibrators.

Photographs of the equipment in situ can be found in **Appendix B**.

5.3 Weather Conditions

Weather information was obtained from a nearby third-party weather station (Wunderground ref. IPORTT16) to determine conditions throughout the unattended survey duration. A summary of the weather conditions is provided below, while detailed hourly data can be provided upon request.

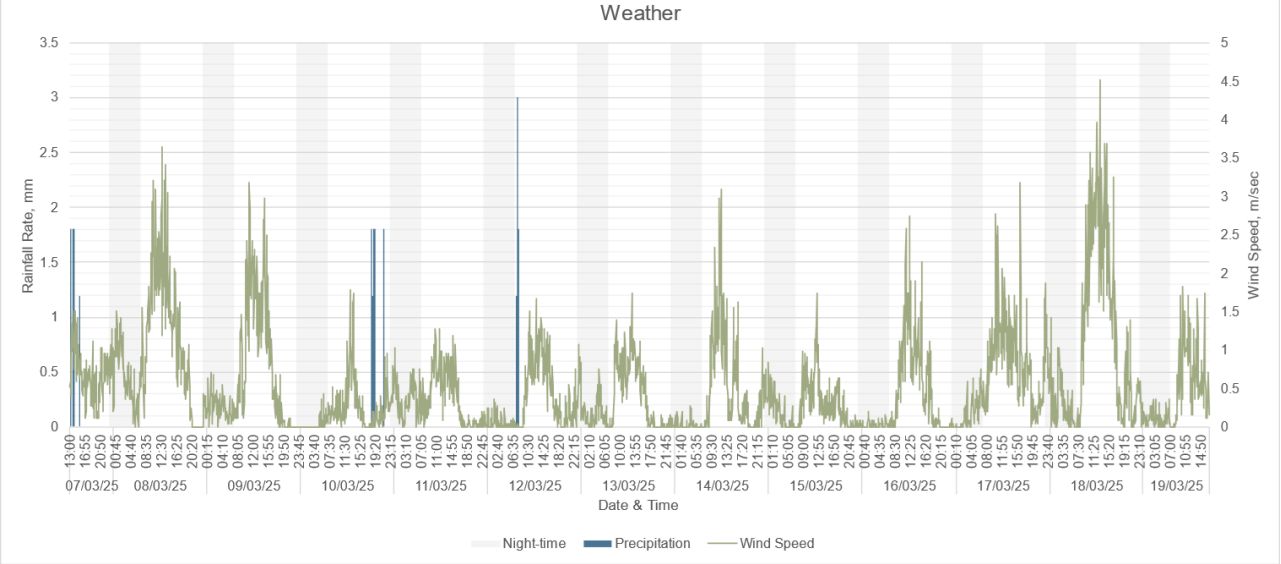

Table 5-4 Weather data (07/03/2025 to 19/03/2025)

Throughout the measurement period, wind speeds remained below 5 m/s, with a variable wind direction and minimal precipitation. Therefore, weather conditions were generally considered suitable for noise monitoring.

5.4 Survey Observations

Observations of the existing soundscape at the monitoring locations are presented in Table 5-5.

Location	Receptor	Type	Daytime Soundscape Observations	Night-time Soundscape Observations
MP1	Abbots Close	Residential	Urban location dominated by sounds generated through human activity, specifically road traffic noise from the A48 and M4, and occasional car passbys on local roads. Sounds from nature included noise from foliage moving in the wind.	Urban location dominated by sounds generated through human activity, specifically road traffic noise from the A48 and M4. Sounds from nature included noise from foliage moving in the wind.
MP2	Brynhyfryd Road	Residential	Urban location dominated by sounds generated through human activity, specifically noise from nearby industrial site and road traffic from the A4241 and A48. Sounds from nature include bird calls and some noise from foliage moving in the wind.	Urban location dominated by sounds generated by human activity, specifically noise from nearby industrial site. Occasional road traffic noise from A4241 and A48, however, this is infrequent. Sounds from nature include some noise from foliage moving in the wind.
MP3	Margam Moors SSSI	Ecological	Wilderness location adjacent to significant industrial site. Acoustic environment varies depending on adjacent industrial activities. Noise from	Wilderness location adjacent to significant industrial site. Acoustic environment dominated by sounds generated by human activity,

Location	Receptor	Type	Daytime Soundscape Observations	Night-time Soundscape Observations
			motorised traffic on the local road network is audible. Sounds from nature included birds calls and insects.	specifically from adjacent industrial activities. Occasional noise from the local road network (M4 motorway) and railway movements, however these were both infrequent. Sounds from nature included bird noise and insects.
MP4	Eglwys Nunydd reservoir SSSI	Ecological	Wilderness location dominated by sounds generated by human activity, specifically noise from the local road network (M4 motorway) as well as nearby industrial activity. Natural sounds include bird song and some noise from foliage moving in the wind.	Wilderness location dominated by sounds generated by human activity, specifically nearby industrial activity and occasional noise from the local road network (M4 motorway), however this was infrequent. Natural sounds include some noise from foliage moving in the wind.

Table 5-5 Survey observations

The RSKA surveyor confirmed that the noise from the existing Margam substation was not audible at the monitoring locations.

6 Baseline Survey Results

6.1 Monitoring Results

Analysis of the dataset obtained from the long term continuous survey has been conducted, accounting for the daytime, evening and weekends, and night-time periods as described in BS 5228 and shown in Table 3-1. From information provided by the client, construction works are understood to be undertaken during both daytime, however data for evening and weekends, and night-time periods are also presented for completeness.

Table 3.1 is applicable to residential receptors only as an absolute criterion of 55 dB L_{AFmax} has been adopted for the SSSI receptors.

A summary of measured noise levels at the long-term, at the measurement positions MP1 to MP2 for each time period is presented in Table 6-1. Graphical output of the full survey data is provided in **Appendix C**. All values have been rounded to the nearest whole number.

Measurement Position	Measured L_{Aeq} Noise Levels[1], dB(A)		
	Core Hours	Outside Core Hours	
	Daytime (07.00–19.00) and Saturdays (07.00–13.00)	Evenings and weekends[2]	Night-time (23.00–07.00)
MP1	55	53	50
MP2	53	51	48

Note:
[1] $L_{Aeq,T}$ values are the logarithmic average of $L_{Aeq,15min}$ samples
[2] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

Table 6-1 Noise monitoring data – MP1 and MP2

To inform the selection of appropriate assessment criteria, background noise levels have been analysed and a summary of the background levels at each receptor is summarised below.

Receptors	Representative Measurement Position	Background Noise Level during Daytime, $L_{eq,T}$ dB(A)	Background Noise Level during Evenings and Weekends, $L_{eq,T}$ dB(A)
R1	MP1	55	53
R2			
R3			
R4	MP2	53	51
R5			
R6			

Table 6-2 Representative background levels at each receptor

6.2 Derivation of Noise and Vibration Criteria for Receptors

6.2.1 Noise

BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise' sets out techniques to predict and assess the likely noise effects from construction works, based on detailed information on the type and number of plant items being used, their location, and the length of time they are in operation. The standard also provides example thresholds for assessing the significance of noise effects.

Annex E of BS 5228 provides guidance on evaluating the significance of construction noise impacts, and this has been provided in Table 3-1 above.

The construction programme for the proposed works in Margam Substation includes activities during core hours (i.e. midweek daytime periods between 07:00 and 18:00) as well as outside core hours, which may comprise weekday evenings, weekends and night-time periods.

As such, the following assessment criteria have been derived as per the BS 5228 ABC Method, in conjunction with the measured baseline noise levels and the assigned baseline monitoring positions listed in Table 6-2.

Receptors	Representative Measurement Location	Representative Baseline Noise Level Daytime (Core Hours), dB(A)	Representative Baseline Noise Level Daytime (Core Hours), dB(A)	Representative Baseline Noise Level Night-time (Outside Core hours), dB(A)
R1	MP1	65 (Category A)	60 (Category B)	55 (Category C)
R2				
R3				
R4	MP2	65 (Category A)	55 (Category A)	55 (Category C)
R5				
R6				

Table 6-3 Prescribed noise criteria for each Receptor based on BS 5228 ABC Method

As discussed in Section 6.1, 55 (L_{AFmax}) is taken to be the criterion for the SSSI receptors R7 and R8, above which impacts may occur.

6.2.2 Vibration

The piling works has been identified as the primary potential source of vibration within the construction programme.

Given that the nearest residential dwellings are located approximately 450 metres from the works, vibration levels at these receptors are expected to be minimal due to natural attenuation over distance. Therefore, a vibration criterion of 15–20 mm/s PPV (in the frequency range of 4 Hz to 15 Hz) has been adopted. This is consistent with the guide values provided in BS 5228 and is considered appropriate for receptors at this distance, while maintaining a precautionary approach to safeguard against potential building damage.

7 Construction Noise and Vibration Impacts

7.1 Noise Modelling Methodology

Construction generated noise has been predicted at the closest sensitive receptors to the proposed works. Receptors have been identified through a desktop study of the construction extent and the surrounding area. It should be noted that neighbouring receptors are likely to experience similar or lower magnitudes of noise to those included within the assessment.

Noise predictions have been made using acoustic modelling software 'SoundPlan v9.1'. The modelling parameters are presented in Table 7.1.

Item	Setting
Algorithm	British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites– Part 1: Noise'.
Ground absorption	Ground absorption has been set based on local conditions as derived from aerial imagery and noise survey. Acoustically hard (assumed 0 coefficient) – roads, water, pavements and hard standing areas; Acoustically soft (assumed 1 coefficient) – grassed areas, vegetation
Meteorological conditions	10 degrees Celsius; 70% humidity; and Wind from source to receiver.
Façade Corrections	Predictions are at 1m from a given facade
Receptor height	Ground Floor 1.5m above ground level and 2.5m intervals for higher floors. SSSI locations as per map data downloaded from DataMapWales for Sites of Special Scientific Interest (SSSI).
Site layout	Works extents as per drawing references: MARPT-BHK-01-ZZ-DG-A-130018_P03, MARPT-LOR-XX-XX-DR-R-090003_P03 and MARPT-BHK-01-ZZ-DG-A-130020_P04. In order to provide a robust assessment, modelling assumes that the plant for a given activity, for a given period of time is located at the closest separation distance to each receptor, thus providing worst case noise levels. In reality, this is unlikely to be the case, and the project will not constantly produce the predicted levels.
Source modelling	Data for plant noise emissions taken from RSKA file data, typical manufacturer noise data or BS5228 – See **Appendix D**. Where hand tools have been identified as the main plant within any particular activities, it has been assumed that the associated noise level and typical short duration would be such that it would not have a significant impact on noise predictions. Plant located at a relative height to ground of 1.5m.
Terrain	Lidar data from DataMapWales with a 5m resolution has been imported into the model.

Table 7-1 Modelling Parameters

It should be noted that modelling is widely accepted as being the preferred method for calculation as it can incorporate barriers, ground absorption and construction locations to a higher degree of accuracy than spreadsheets and can quickly predict resulting noise levels across a wider area or for a high number of receptors.

7.2 Construction Noise Assessment - Modelling Results

7.2.1 Residential receptors

Table 7.2 below presents the noise predictions during each construction time period due to the proposed construction works for the Margam Substation extension works.

The predicted noise levels represent construction noise in isolation, excluding contributions from existing ambient noise, in line with the methodology in BS5228-1:2009+A1 2014 presented in previous sections. The relevant assessment criteria are described in Section 6.2. Each construction task has been modelled individually, with the assumption that all associated plant items operate simultaneously during that task. The results presented reflect the worst affected floor/storey[2] at each receptor. This approach ensures that the predictions represent a robust and conservative assessment of potential noise impacts.

Receptor	Criteria	Task 1 - Vegetation Clearance	Task 2 - Site Establishment	Task 3 - Earthworks	Task 4 - Piling works	Task 5 - Installation of Load Transfer Platform	Task 6 - Foundation Construction (Concreting Works)	Task 7 - Installation of Structural Steel, Cladding and HV Equipment	Task 8 - Soft and Hard Landscaping	Task 9 - Commissioning and site demobilisation
R1 – Heolcae'r-bont	65	43	43	49	46	49	46	43	38	32
R2 – Margam Road		44	44	50	47	50	47	44	39	33
R3 – Abbots Close		46	44	50	47	50	47	44	39	33
R4 – Brynhyfryd Road		65	43	49	46	49	46	43	38	32
R5 – Min-Y-Don		62	43	49	46	49	46	43	38	32
R6 – Byass Street		53	42	48	45	48	45	42	37	31

Table 7-2 Predicted construction noise levels at each receptor during Daytime hours (weekdays 07.00−19.00 and Saturdays 07.00−13.00)

[2] The highest noise level predicted at either ground or upper floors per residential receptor.

The predictions above indicate that the noise from the proposed construction tasks are expected to remain within the significance threshold prescribed by BS 5228 at all residential receptors closest to the construction site, across all assessed time periods, therefore no unacceptable adverse effect on health or local amenity is predicted to occur as a result of construction noise relating to the substation.

7.2.2 SSSI receptors

Table 7-3 below presents the predicted L_{AFmax} at each SSSI receptor due to the Margam Substation extension works.

The predicted noise levels represent construction noise in isolation, excluding contributions from existing ambient noise, in line with the methodology in BS5228-1:2009+A1 2014 presented in previous sections. The relevant assessment criteria are described in Section 6.2.

As above, each construction task has been modelled individually, with the assumption that all associated plant items operate simultaneously during that task. This approach ensures that the predictions represent a robust and conservative assessment of potential noise impacts.

Construction Noise Predictions dB L_{AFmax}										
Receptor	Criteria	Task 1 - Vegetation Clearance	Task 2 - Site Establishment	Task 3 - Earthworks	Task 4 - Piling works	Task 5- Installation of Load Transfer Platform	Task 6 - Foundation Construction (Concreting Works)	Task 7 - Installation of Structural Steel, Cladding and HV Equipment	Task 8 - Soft and Hard Landscaping	Task 9 - Commissioning and site demobilisation
R7 - Margam Moors SSSI	55	35	36	42	39	42	39	36	31	25
R8 - Eglwys Nunydd reservoir SSSI		37	38	44	41	44	41	38	33	27

Table 7-3 Predicted construction max event noise levels at each SSSI receptor

At R7, Table 7-3 indicates that the noise from the proposed construction tasks are expected to remain within the significance criteria adopted for SSSIs. At R8, the predictions above indicate that the noise from all of the proposed construction tasks are expected to remain within the significance threshold adopted for SSSIs.

Based on Table 7.3, no unacceptable adverse effect on the SSSIs is predicted to occur as a result of construction noise related to the substation extension at either R7 or R8.

7.3 Construction Vibration Assessment

The primary source of vibration associated with the construction works at the nearest residential receptors has been identified as the proposed piling activities, undertaken as part of Task 4.

Annex E of BS5228-2 provides empirical formulae for predicting peak particle velocity (PPV) levels for various construction activities, including the prediction of ground-borne vibration from tunnelling operations.

The formula for the resultant peak particle velocity due to ground-borne tunnelling is reproduced below from Table E.1 of BS5228-2:

$$v_{res} \leq \frac{180}{x^{1.3}}$$

Where:

- v_{res} is the resultant peak particle velocity in mm/s; and
- x is the distance measured along the ground surface in metres (m).

Based on this equation, Table 7-4 below presents the minimum setback distances between the proposed piling activities and the predicted PPV levels at the identified sensitive receptors.

Existing Receptors	Approximate Setback Distance (m)	Vibration Criteria	Predicted Peak Particle Velocity, v_{res} (mm/s)
R1 – Heolcae'r-bont	605	15-20 mm/s (between 4 Hz and 15 Hz)	≤0.04
R2 – Margam Road	520		≤0.05
R3 – Abbots Close	470		≤0.06
R4 – Brynhyfryd Road	625		≤0.04
R5 – Min-Y-Don	660		≤0.04
R6 – Byass Street	705		≤0.04

Table 7-4 Minimum setback distance from HDD works to existing residential properties

The results presented above are significantly below the assessment criteria outlined in Section 6.2.2. Therefore, the vibration levels expected to be generated by the piling activities are not considered significant in terms of potential building damage.

8 Noise and Vibration Control Measures

8.1 Overview

As noted in Section 7, although the established noise criteria have not been breached, noise from the construction works may still have some impact on the identified receptors. While the predicted values represent a worst-case scenario, it is considered good practice to implement the following Best Practical Means (BPM) to further minimise potential disturbance:

8.2 Community Notification

A simple but highly effective method of reducing impacts in the surrounding community is through pro-active community engagement. Prior to the commencement of the project, a community engagement exercise should be undertaken. This will focus on the residential and commercial receptors identified within this document.

Community engagement can take many guises; however, typically this includes community newsletters (postal and email), posters and boundary notifications (contact details) and project websites. The following information will be made available to the surrounding community at the commencement of the project (overview of project) and prior to any high impact activity:

- Project overview;
- Start and duration of works;
- Proposed working hours;
- Steps being undertaken by the team to control noise and vibration;
- Any work which might be required out of specified working hours;
- A helpline for queries and complaints.

8.3 Best Practicable Means (BPM)

Best Practicable Means as defined in Section 72 of the Control of Pollution Act 1974 and BS 5228-1: 2009+A1: 2014 shall be employed at all times to reduce noise to a minimum.

The main contractor shall ensure that the following guidelines are applied where applicable:

- Whenever possible, noisy plant will be situated away from sensitive receptors;
- Whenever possible fabrication will be undertaken off site;
- Where reasonably practicable, fixed items of construction plant will be electrically powered in preference to diesel or petrol driven;
- As far as reasonably practicable, the noise from reversing alarms will be controlled or limited. This will be undertaken through following a hierarchy of techniques:
    - The site layout will be designed to minimise reversing;
    - Banksmen will be utilised to avoid so far as reasonably practicable the use of reversing alarms;
    - Reversing alarms will incorporate where reasonably practicable features such as broadband signals or ‘smart alarms’ to reduce the level of noise.
- Where an enclosure is available it should be used;
- Where reasonably practicable, vehicles and mechanical plant associated with the construction works will be fitted with effective exhaust silencers and will be maintained in good working order;

- Machines and vehicles in intermittent use will be shut down or throttled down to a minimum during periods between works;
- Screens such as reflective acoustic cladding and louvered screens are recommended to be placed around power units such as compressors, lighting rigs and generators;
- Mobile screens will be placed around noisy hand-held equipment i.e. breakers, stihl saws etc;
- Letter drops will be undertaken prior to any noisy works commencing that could affect local residents, this will be undertaken a minimum of two weeks in advance of the works;
- Where possible, all deliveries to support non-core works will be completed within core working hours;
- The movement of delivery materials outside of normal working hours will be kept to a minimum and handled in a manner that minimises noise (i.e. manual handling rather than mechanical);
- All plant, equipment and noise control measures applied to plant and equipment will be maintained in good working order and operated such that noise emissions are minimised as far as reasonably practicable;
- Where breaking out activities are necessary the continuous use of percussive or impact breaking equipment/ methods will be minimised;
- All employees shall be provided with an appropriate induction and ongoing briefings regarding the management of environmental issues. This will involve emphasising the need for employees to show consideration to the sensitive receptors, including residential neighbours. They will be briefed on not generating unnecessary noise when on site or when leaving and arriving;
    - Two-way radios to be used on site to avoid shouting; and
    - All works will comply with all plant/equipment to be used listed within this application.

  The above Best Practice will be briefed to all parties via:

- Site Induction;
- Toolbox talks;
- Start of Shift briefings; and
- Respite periods are provided for intensive works. This should take account of the temporal thresholds for noise insulation and temporary re-housing eligibility (i.e. 10 exceedances in 15 days, 40 exceedances in 6 months).

  Additional BPM measures are also to be implemented. BPM measures are only displayed below when not mentioned in the BPM above

- All compressors and generators will be ‘sound reduced’ models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use, and all pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers. (if possible)
- Noise emitting equipment which is required to run continuously will be housed in a suitable acoustic enclosure.
- No deliveries will arrive at the site before 0700 hours unless agreed with the local authority under exceptional circumstances.
- The engines of all parked vehicles or vehicles waiting to enter any work area will be switched off within two minutes of arrival.
- Work compounds will be laid out so that accesses and loading areas are located as far away from sensitive neighbours as practicably possible and so that temporary structures screen noisy areas where practicable.
- Stationary plant such as pumps, compressors and generators, will be situated as far as possible from residential property and acoustic screens erected if required. Other plant and machinery shall be screened if necessary;

- Plant known to emit noise strongly in one direction will be, where practicable, orientated so that noise is directed away from noise-sensitive areas;
- A speed limit of 10mph will be set and enforced on all Site traffic;
- Haul routes will be maintained in good condition to minimise 'body slap' of vehicles.

9 Complaints Handling

During any type of construction activity, there is always a potential for complaints to be received. Good practice and proactive community engagement will reduce the potential for complaints.

Broadly speaking, where complaints are received, these will be documented and dealt with in a timely and professional manner by the contractor. Prior to determining whether monitoring should be included as a response to a specific complaint, the complaint and the veracity of the complaint should be investigated.

Where appropriate, the main contractor or project manager would undertake an investigation of the complaint. After the investigation, an appropriate course of action and any corrective actions would be undertaken in response to this investigation. Notification of the complaint and actions taken will be provided to the local authority upon request. The actions which are recommended to be taken as soon as possible are as follows:

- Note the time, date, identity and contact details of the complainant. Note if the complaint has been referred from the local authority. Ask the complainant to describe the noise and vibration emission; is it constant or intermittent, how long has it been going on for, is it worse at any time of day, does it come from an identifiable source.
- The EHO at NPTC will be provided with the contact details of the site manger so that any complaints can be relayed efficiently
- As soon as possible after receipt of a complaint, undertake a site inspection. Note all noise and vibration-producing activities taking place and the mitigation methods that are being employed. If the complaint was related to an event in the recent past, note any noise and vibration-producing activities that were underway at that time, if possible. Implement any remedial action necessary.
- As soon as possible, visit the area from where the complaint originated to ascertain if noise and vibration are still a problem.
- Noise and vibration monitoring may be undertaken in the event of complaints being received. The methodology would be agreed with the local authority prior to the commencement of monitoring.
- If another source of noise or vibration, other than the construction work, is causing the nuisance, verify the source.
- As soon as possible after the initial investigations have been completed, contact the complainant to explain any problems found and remedial actions taken.
- If necessary, update any relevant method statements to prevent any recurrence of problems.
- File the noise and vibration complaint form on the complaint register.
- Notify the main contractor or project manager as soon as practicable that a complaint has been received, what the findings of the investigation were, and any remedial measures taken
- Where the specific activity responsible for the complaint cannot be identified, consideration should be given to the deployment of medium-term unattended monitoring equipment in discussion with the main contractor or project manager. Inform workers on site of the complaint and what the findings of the investigation were, and any remedial measures taken.

Appendix A – 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. $2x10^{-5}$ 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.
Peak particle velocity (PPV)	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position, typically expressed in mm/s.
Sound absorption	Process whereby sound energy is converted in to heat. Sound absorption properties is expressed as the sound absorption coefficient α or the sound absorption class (A-E).
Sound insulation	The reduction or attenuation of airborne sound by a solid element between source and receiver.

Appendix B – Noise Survey Photographs

Figure B.1 MP1

Figure B.2 MP2

Appendix C – Noise Survey Time History

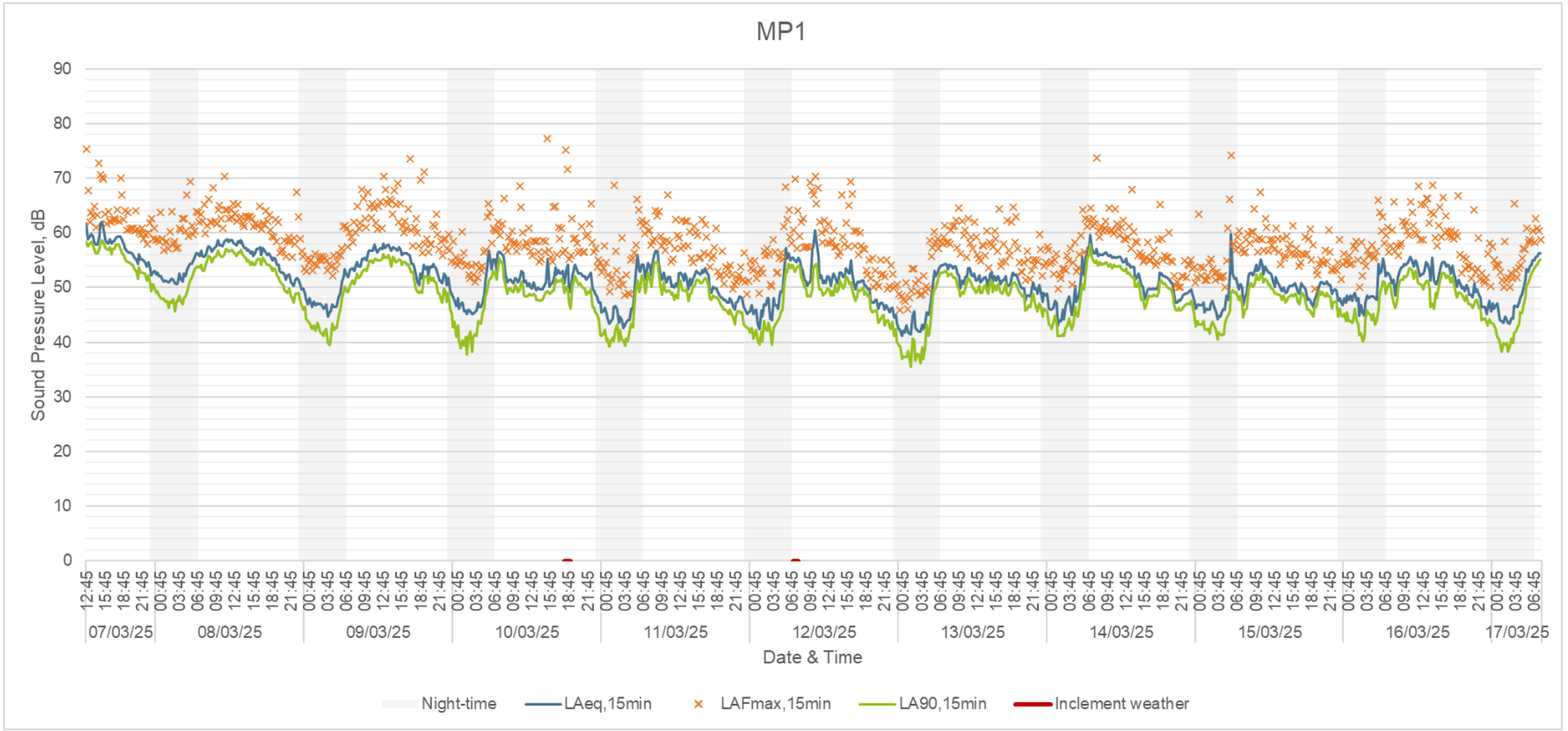

Figure C.1 Noise monitoring data – MP1

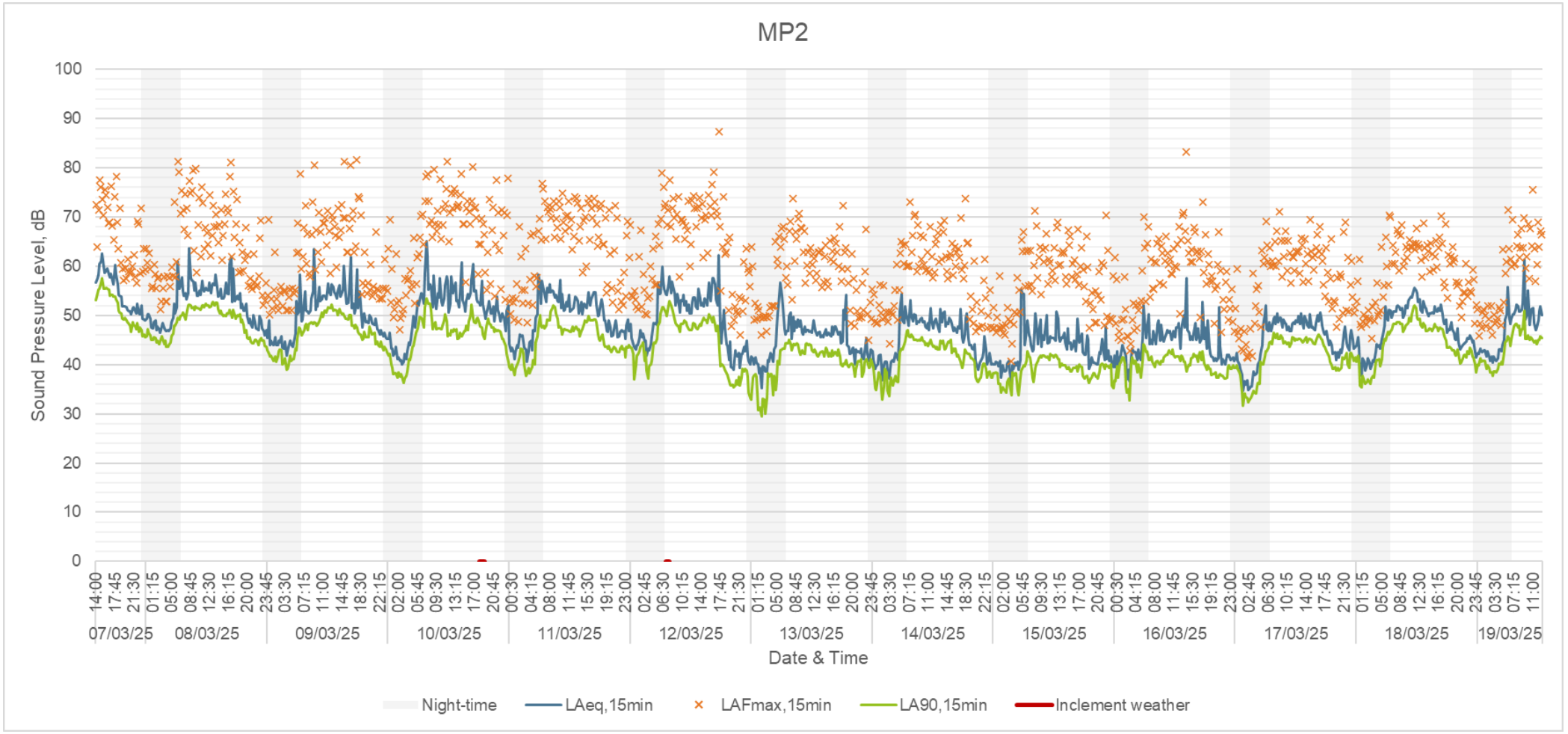

Table C.2 Noise monitoring data – MP2

Appendix D – Plant List and Noise Levels

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Chainsaw	C4.73	84	2	10	-5	-12	72
Powertools	C4.69	85	2	30	-5	-7	78
Woodchipper	SCHALL, emission data catalog 2023	86	1	5	0	-13	73
5T Excavator	C4.17	71	1	30	0	-5	66
Portable Generator	C4.86	65	2	100	-10	-7	58
						Total	**80**

Table D.1 Plant list for Task 1

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Powertools	C4.69	85	2	30	-5	-7	78
Mini tracked excavator	C3.20	68	1	20	0	-7	61
Tracked excavator	C6.12	74	2	15	0	-5	69
Dumper	C4.4	76	1	10	0	-10	66
JCB Telehandler 7 metre	C4.54	79	1	10	0	-10	69
Handheld Circular Saw	C5.36	87	1	5	0	-13	74
Diesel generator	C4.86	65	2	50	-10	-10	55
4 tool compressor	C5.5	65	1	50	-10	-13	52
Generator for welfare unit	C8.24	59	2	40	-10	-11	48
Tractor (towing trailer)	C4.75	79	1	15	0	-8	71
Concrete mixer truck (discharging) & concrete pump (pumping)	C4.28	75	1	10	0	-10	65
						Total	**81**

Table D.2 Plant list for Task 2

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Delivery lorries	C2.34	80	2	5	0	-10	70
Tracked excavator	C2.2	77	4	35	0	1	78
Vibratory plate (petrol)	C2.41	80	2	50	-5	-5	75
Vibratory roller	C2.40	73	2	50	0	0	73
Water pump	C2.46	62	2	80	0	2	64
Bulldozer	C5.15	83	1	50	0	-3	80
Grader	C6.31	86	2	30	0	-2	84
Articulated dump truck	C5.16	81	2	25	0	-3	78
Telescopic handler	C4.54	79	1	25	0	-6	73
						Total	**87**

Table D.3 Plant list for Task 3

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Large rotary bored piling rig	C3.14	83	2	40	0	-1	82
Compressor for mini piling	C3.19	75	2	20	-10	-14	61
Telescopic handler	C4.54	79	1	30	0	-5	74
Mobile telescopic crane (idling)	C4.47	61	2	50	0	0	61
Mobile telescopic crane	C4.41	71	2	50	0	0	71
Tracked excavator	C4.63	77	4	30	0	1	78
Concrete pump	C3.26	75	1	25	-5	-11	64
Cement mixer truck (discharging)	C4.18	75	1	25	0	-6	69
						Total	**84**

Table D.4 Plant list for Task 4

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Powertools	C4.69	85	2	30	-5	-7	78
Vibratory plate (petrol)	C2.41	80	2	50	-5	-5	75
Vibratory roller	C2.40	73	2	50	0	0	73
Bulldozer	C5.15	83	1	50	0	-3	80
Grader	C6.31	86	2	30	0	-2	84
Articulated dump truck	C5.16	81	2	25	0	-3	78
Delivery lorries	C2.34	80	2	5	0	-10	70
						Total	**87**

Table D.5 Plant list for Task 5

Task 8: Foundation Construction (Concreting works)							
Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Powertools	C4.69	85	2	30	-5	-7	78
Concrete pump	C3.26	75	1	25	-5	-11	64
Cement mixer truck (discharging)	C4.18	75	1	25	0	-6	69
Bulldozer	C5.15	83	1	50	0	-3	80
Mobile telescopic crane (idling)	C4.47	61	2	30	0	-2	59
Mobile telescopic crane	C4.41	71	2	50	0	0	71
Telescopic handler	C4.54	79	2	30	0	-2	77
Concrete placing boom	C4.37	65	1	25	0	-6	59
Delivery lorries	C2.34	80	2	5	0	-10	70
						Total	**84**

Table D.6 Plant list for Task 6

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Powertools	C4.69	85	2	30	-5	-7	78
Mobile telescopic crane (idling)	C4.47	61	1	30	0	-5	56
Mobile telescopic crane	C4.41	71	1	50	0	-3	68
Telescopic handler	C4.54	79	2	30	0	-2	77
Lorry with lifting boom	C4.53	77	3	50	-10	-8	69
Delivery lorries	C2.34	80	2	5	0	-10	70
						Total	**81**

Table D.7 Plant list for Task 7

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Tracked excavator	C4.17	71	3	60	0	3	74
Vibratory roller	C5.25	75	2	5	0	-10	65
Vibratory plate (petrol)	C2.41	80	1	5	0	-13	67
Concrete pump	C3.26	75	1	25	-5	-11	64
Cement mixer truck (discharging)	C4.18	75	1	25	0	-6	69
						Total	**76**

Table D.8 Plant list for Task 8

Plant	Plant Ref	L_p (at 10 m) dB(A)	No. of Plant Items	On-Time %	Screening (dB)	Total Correction (dB)	Total L_p (at 10 m) dB(A)
Tracked excavator	C6.12	74	1	20	0	-7	67
Dumper	C4.4	76	1	15	0	-8	68
						Total	**70**

Table D.9 Plant list for Task 9

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