Preliminary Environmental Information Report
Volume I, Chapter 10: Noise and Vibration

Prosiect Maen Hir - September 2024

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Table of Contents

List of Tables

Appendices

10 Noise and Vibration

10.1 Introduction

10.1.1 This Chapter assesses the likely significant effects of the Project in respect of noise and vibration. It considers the potential effects of noise and vibration impacts associated with the construction, operation and decommissioning phases of the Project.

10.1.2 To assist the reader with understanding the chapter, which is necessarily technical in nature, a compilation of acoustic terminology is included in Appendix 10-1.

10.2 Baseline Conditions

10.2.1 Following a walkover undertaken in August 2023, it was observed that the noise climate within the PEIR Boundary (Figure 2-1) typically comprises natural and wildlife noise such as birdsong, and occasional operational noise from agricultural land and farm buildings. Distant road traffic noise from rural road networks was observed to be audible, but infrequent. Wind turbines were sporadically located in neighbouring fields and noise from them was noted to be just distinguishable during attendance.

Study Area

10.2.2 The assessment will focus on the Noise Sensitive Receptors (NSRs) to the Project, within a region of approximately 500m from the boundary of the Solar PV Site. This is because significant adverse effects from solar development noise emissions are unlikely beyond this distance based on experience of similar recent developments.

10.2.3 Similarly, construction traffic noise impacts will be localised and temporary in character. For construction traffic, the study area has been defined at 10m from the edge of the road. A notional receptor at 10m from the edge of the road is used, because the change in road traffic noise level adjacent to any given road will be the same at all distances where noise from that route is dominant.

10.2.4 A desktop review has been undertaken using available mapping and address data of the potential NSRs within the Study Area defined above. The locations of the identified NSRs are indicated in Appendix 10-3.

10.2.5 It is considered that the nearest existing NSRs consist of isolated dwellings, with more densely populated settlements along road networks within 500m of the PEIR Boundary.

10.2.6 There are statutory ecologically designated sites within 500m of the PEIR Boundary. Baseline conditions at these sites are established within this Chapter and considered further in Chapter 7: Ecology.

10.2.7 There is a network of Public Rights of Way (PRoW) within PEIR Boundary and the surrounding area (see Figure 6-5).

Baseline Surveys

10.2.8 A walkover was undertaken on 30th and 31st August 2023, during which it was observed that the existing noise climate typically comprised natural and wildlife noise such as birdsong, and operational noise from agricultural land and farm buildings. Distant road traffic from rural road networks was observed to be audible, but infrequent. Wind turbines were sporadically located in neighbouring fields and were noted to be just distinguishable against the ambient noise levels during attendance.

10.2.9 Following the site walkover, noise monitoring locations were selected to provide representative noise data for the identified sensitive receptors. Where receptors were likely to experience similar ambient noise conditions (e.g., they are approximately the same distance from a main highway), they were grouped together and represented by one noise measurement location.

10.2.10 A baseline noise survey has been undertaken at thirteen locations representative of the NSRs identified, to characterise the existing ambient and background noise levels at the identified NSRs. Details of the baseline noise survey including the location of noise measurement locations are provided in Appendix 10-3. Characterising the local noise environment in this way will allow the effect of any noise generating sources associated with the Project to be assessed against the existing baseline conditions. The survey included the installation of unattended continuous noise loggers at fixed locations for a period of approximately one week during November-December 2023.

10.2.11 Full details of the baseline survey and results fare presented in Appendix 10-3.

10.3 Assessment Methodology

Assessment Scope

Scoped In

10.3.1 The following items are scoped into the assessment of the construction phase of the Project.

- Noise and Vibration from onsite activities;
- Project generated road traffic noise; and
- Tranquillity Assessment.

10.3.2 The construction phase is considered to represent a worst-case scenario for the decommissioning phase which will generate lower levels of noise. As such, the decommissioning phase will not be assessed separately.

10.3.3 The following are scoped into the assessment of the operation phase of the Project.

- Noise from Operational Equipment (Power generators, transformers, fans, etc.);
- Low Frequency Noise (sound in the range of 10Hz to 200Hz, frequently perceived as a throb or low rumbling or referred to as a ‘hum’); and
- Tranquillity Assessment.

Scoped Out

10.3.4 Noise from building services plant and equipment during construction and decommissioning has been scoped out as agreed by PINS in the Scoping Opinion (Appendix 2-2).

10.3.5 The following items are scoped out of the assessment of the operation phase of the Project:

- Noise and vibration from Project generated road traffic, as agreed in the Scoping Opinion. As stated in the Scoping Report, vehicular movements during the operational phase of the Proposed Development, related to routine servicing and maintenance, would be very limited and unlikely to be associated with any significant noise effects; and

- Operational Vibration, as agreed in the Scoping Opinion. As stated in the Scoping Report, the plant likely to be used at the Proposed Development, when operational, would generate negligible levels of vibration at the boundary of the Proposed Development.

10.3.6 Note that the scope of this Chapter considers noise and vibration effects on human receptors and excludes the consideration of noise and vibration on ecological or heritage receptors, which will be considered in Chapter 7: Ecology and Chapter 8: Cultural Heritage, where appropriate.

Policy, Legislation and Guidance

10.3.7 The assessment methodology is based on the following policy, standards and guidance:

Legislation

- Control of Pollution Act 1974
- Environmental Protection Act 1990

National Policy

- Overarching National Policy Statement for Energy (EN-1), 2023 (Ref 10-1)
- National Policy Statement for Renewable Energy Infrastructure (EN-3), 2023 (Ref 10-2)
- National Policy Statement for Electricity Networks Infrastructure (EN-5), 2023 (Ref 10-3)
- Planning Policy Wales (PPW), February 2024 (Ref 10-4)
- Planning Guidance (Wales), Technical Advice Note 11: Noise 1997 (Ref 10-5)
- CL-01-15 Updates to TAN 11 Noise - Noise Action Plan (2013-18) Commitments (Ref 10-6)
- Noise and Soundscape Action Plan 2018 - 2023 (2018) (Ref 10-7)
- Future Wales: The National Plan 2040 (Ref 10-8)

Local Policy

- Anglesey and Gwynedd Joint Local Development Plan (Ref 10-9)

Standards and Guidance

- British Standard 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures (BS7445-1) (Ref 10-10)
- ISO 9613-2: Acoustic Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation
- British Standard 5228: 2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2 (BS5228) (Ref 10-11)
- Highways England (2019) Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration Revision 2 (including the Wales National Application Annex to LA 111) 2022 (Ref 10-12)
- Calculation of Road Traffic Noise,1988 (CRTN) (Ref 10-13)
- British Standard 4142: 2014+A1:2019 Method for rating and assessing industrial and commercial sound (BS4142) (Ref 10-14)
- British Standard 8233: 2014 Guidance on sound insulation and noise reduction for buildings (BS8233) (Ref 10-15)
- World Health Organization Guidelines for Community Noise (WHO 1999) (Ref 10-16)
- World Health Organization Environmental Noise Guidelines for the European Region (WHO 2018) (Ref 10-17)
- Moorhouse, A T, Waddington, D C and ADAMS, M. (2011) NANR45: Procedure for the Assessment of Low Frequency Noise Complaints. London: Department for Environment, Food and Rural Affairs (Ref 10-18)
- Sharps Redmore ‘Tranquil Spaces – Measuring the tranquillity of public spaces’ 2019 (Ref 10.19)

10.3.8 A full review all each of the above documents is provided in Appendix 10-3.

Approach

Construction

Noise and Vibration from Onsite Construction Activities

10.3.9 The effects of construction noise and vibration on existing NSRs, including decommissioning phase, have been assessed based on guidance contained within BS5228-1 and BS5228-2.

10.3.10 Construction noise levels have been predicted at nearby existing NSRs to determine the magnitude of impact based on a typical construction plant list for a development of this size and nature, and following the methodology set out in Annex F of BS5228-1.

10.3.11 The assessment of construction noise has been undertaken in accordance with the ABC method detailed in BS 5228-1:2009+A1:2014, set out in full in Appendix 10-2.

10.3.12 Based upon the BS 5228 ABC method, the criterion which will be adopted in this assessment for the onset of potentially significant effects is the exceedance of the LAeq,T threshold level for the category appropriate to the ambient noise level at NSRs.

10.3.13 The magnitude of the impact of construction noise is classified in accordance with the descriptors in Table 10-1

Table 10-1 Construction Noise Magnitude of Impact

Criteria	Magnitude of Impact
Exceedance of ABC Threshold Value by more than 5 dB	High
Exceedance of ABC Threshold Value up to 5 dB	Medium
Equal to or below the ABC Threshold Value by up to 5 dB	Low
Below the ABC Threshold Value by more than 5 dB	Very Low

10.3.14 Predictions have been carried out to determine noise levels likely to be generated during the construction stage at increasing distances from the effective noise source (i.e. 50m from source, 100m from source, 150m from source and 200m from source) during the core daytime period.

10.3.15 For noise levels in the range of 65-70 dB LAeq,T, this would indicate a medium impact, with levels above this indicating a high impact. Levels in the range of 60-65 dB LAeq,T would indicate a low impact, with levels below this indicating a very low impact.

10.3.16 A more focussed study across specific phases and buffers that will be completed at the ES Stage.

Vibration

Effects on Humans

10.3.17 Construction vibration has the potential to impact upon occupants of existing buildings within the vicinity of the works. BS 5228-2 provides guidance on the perception of vibration within occupied buildings and provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with vibration.

10.3.18 In order to determine the potential impact from vibration during the construction phase, groundborne vibration calculations have been performed for typical site preparation/construction activities/machinery based on the empirical prediction procedures presented within BS 5228-2 and RR 246 Traffic induced vibrations in buildings (TRL RR 246)[1] (applicable to HGV induced vibration).

Such predictions have been performed in order to determine the possible distances at which the adopted magnitude of impact criteria may be registered.

The following criteria set out in Table 10-2, has been adopted and is based upon the guidance on effects of vibration levels applicable to human perception as presented within BS 5228. The corresponding vibration ranges and associated magnitude of effect ratings adopted for the purpose of this assessment have also been included within Table 10-2.

[1] Transport and Road Research Laboratory (1990) RR 246 Traffic induced vibrations in buildings

Table 10-2 Magnitude of Effect Applicable to Construction Vibration - Applicable to Human Perception

Vibration Level	Effect	Magnitude of Effect
X >10.0 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level	High
1.0 X < 10.0 mm/s	Onset of complaints in residential environments	Medium
0.3 ≤ X < 1.0 mm/s	Onset of perceptibility in residential	Low
X < 0.3 mm/s	Unlikely to be perceptible in residential environments	Very Low

Effects on Buildings

10.3.19 In addition to human annoyance, building structures may be damaged by high levels of vibration. BS 6472-1:2008: Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting[2] states that "the likelihood of building damage is very low even when vibration levels are well above perception thresholds". Consequently, if vibration levels are controlled to those relating to annoyance then it is highly unlikely that buildings will be damaged by demolition and construction vibration levels.

Project Generated Road Traffic Noise

10.3.20 The Design and Manual for Roads and Bridges (DMRB) LA111 states that the magnitude of impact at noise sensitive receptors for construction traffic is assessed against a change in the Basic Noise Level (BNL). An increase equal to or greater than 3dB in the BNL would be an indication of a moderate to major adverse impact for a duration exceeding 10 or more days or nights in any 15 consecutive days or nights, or a total number of days exceeding 40 in any 6 consecutive months.

10.3.21 The magnitude of the impact of construction traffic is classified in accordance with the descriptors in Table 10-3.

2 British Standards Institute (2008) BS 6472-1:2008: Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting

Table 10-3 Construction Traffic Noise Magnitude of Impact

Criteria	Magnitude of Impact
Greater than or equal to 5.0	High
Greater than or equal to 3.0 and less than 5.0	Medium
Greater than or equal to 1.0 and less than 3.0	Low
Less than 1.0	Very Low

10.3.22 Where significant effects are likely to occur due to road traffic noise associated with the construction phase, these will be assessed within the ES. These will be assessed following the principles of DMRB LA111 by comparing the existing baseline with and without the Project to determine the change in noise levels.

10.3.23 The focus of the construction phase assessment at this PEIR stage has been on the identification of any likely significant effects, and consequently of any relevant additional mitigation measures that will need to be included in the oCEMP.

Operation

Noise from Operational Equipment

10.3.24 It is anticipated that there may be equipment associated with the Project that may have the potential to generate noise. Operational noise associated with the Project has been assessed in accordance with BS4142. Preliminary Noise Rating Levels have been determined based on the details of proposed operations and have been compared with the typical background sound levels established through the noise surveys. BS4142 requires a consideration be made to the existing noise context at the location of the NSRs before determining likely significant effects from proposed operational noise. Where relevant this has been undertaken by drawing on other standards and guidance such as BS8233.

Table 10-4 Magnitude of Effect Applicable to Noise from Operational Equipment

Difference Between Rating Level (LAr,Tr) and Background Sound Level	Magnitude of Impact
≥+9	High
+4 to +8	Medium
0 to +3	Low
≤-1	Very Low
Subject to a lower cut-off of 35 dB as a rating level in accordance with BS 4142:1997 (See paragraph 9.94) + indicates rating level above background sound level - indicates rating level below background sound level	

Low Frequency Noise

10.3.25 NANR45 provides an assessment method to determine whether low frequency sound from proposed sources might be expected to cause disturbance to residents is present in a NSR's premises as a result of the Project.

10.3.26 The assessment method includes measurement and quantitative assessment of low frequency noise within NSRs. The assessment method compares field measurements of the noise against a given reference curve. Where the measured noise level exceeds the reference curve, it is considered that low frequency noise content from proposed sources may introduce a risk of significant effect at the affected NSR.

10.3.27 The assessment method does not include a method of determining the significance of the effect if low frequency noise is present.

10.3.28 While the guidance is not intended as a means of predicting the effects of low frequency noise, using this method on existing NSRs can provide a useful indication on whether these noise sources could contribute to the low frequency sound scape and ultimately lead to a significant effect, should they occur.

Tranquillity Assessment

10.3.29 There is no standard approach to assessing tranquillity (in the way there is a standard approach to assessing noise) and a case by case approach is generally

taken. Several existing methods which are commonly used are summarised in the following sections

10.3.30 BS8233 advises on the criteria to be achieved for external amenity space such as gardens and patios. It is stated that it is desirable that the noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, BS8233 does not provide guidance on external noise levels in areas other than outdoor amenity areas associated with dwellings. Notwithstanding this, the above thresholds are considered suitable in the absence of specific criteria.

10.3.31 Sharps Redmore have recently published literature detailing two methods for assessing tranquillity, the ‘University of Bradford Method’, ‘The Campaign to Protect Rural England Method’, and 'The Natural Tranquillity Method'.

10.3.32 The Bradford Method considers two factors: road traffic noise level and visual appearance. There are, however, limitations with the method, including the exclusion of noise sources other than road traffic.

10.3.33 The Campaign to Protect Rural England (CPRE) have previously produced a tranquillity map which has since been withdrawn. A tranquillity score was derived considering different features which can be heard and/or seen, with each one being weighted differently. Although this method is generally accepted as being more robust than the Bradford Method, it is not without limitations. The main limitation being that the coverage is limited to England, and that the tranquillity score is assigned to a 500m by 500m area, over which the noise levels can vary significantly.

10.3.34 The Natural Tranquillity Method is a new methodology proposed by Sharps Redmore. It is based on several parameters which are used to predict tranquillity, and although early results are promising, it is acknowledged within the text that further research is required to account for the character of man-made sounds, which can potentially skew the results due to the subjectivity of the method. Therefore, this method has not been relied upon.

10.3.35 As there is no accepted method to assess the impact on tranquillity from new noise sources, it is deemed that any assessment on tranquillity should consider

the existing and future ambient noise level, as well as the potential change in noise level as a result of the Project to determine the level of any impact, supplemented by a subjective assessment made at the area(s) of interest.

10.3.36 Therefore, it is proposed to develop a methodology drawing on multiple sources such as local open space policies, BS8233 and WHO Guidelines (1999). Areas such as open spaces, PRoW and local nature reserves (LNRs) will be considered within any assessment.

Determining Significance of Effect

Receptor Sensitivity

10.3.37 In accordance with the principles of Environmental Impact Assessment (EIA), the sensitivity of the existing NSRs to noise impacts during construction or operational phases have been defined in Table 10-5 below.

Table 10-5 Sensitivity/Value of Receptor

Sensitivity/ Value of Receptor	Description	Examples of Receptor Usage
Very High	Receptors where noise or vibration will significantly affect the function of a receptor	Auditoria/studios Specialist medical/teaching centres, or laboratories with highly sensitive equipment
High	Receptors where people or operations are particularly susceptible to noise or vibration. Sensitive ecological receptors known to be vulnerable to the effects of noise or vibration.	Residential Quiet outdoor areas used for recreation Conference facilities Schools/educational facilities in the daytime Hospitals/residential care homes Libraries Ecologically sensitive areas for example Special Protection Areas (SPAs)
Medium	Receptors Moderately sensitive to or vibration where it may cause some distraction or disturbance	Offices Restaurants Sports grounds when spectator noise is not a normal part of the event and where

Sensitivity/ Value of Receptor	Description	Examples of Receptor Usage
		quiet conditions are necessary (e.g. tennis, golf)
Low	Receptors where distraction or disturbance of people from noise or vibration is minimal	Residences and other buildings not occupied during working hours Factories and working environments with existing high noise levels Sports grounds when spectator noise is a normal part of the event

Significance of Effect

10.3.38 The significance of effect resulting from each individual potential impact type below is derived from the magnitude of the impact and the sensitivity or value of the affected receptor using the matrix presented in Table 10-6.

Table 10-6 Classification of Effects

Sensitivity/Value of Resource/Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
Very High	Major	Major	Moderate	Minor
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

10.3.39 With respect to the Classification of Effects outcomes from Table 10-6, effects of Negligible and Minor are considered to be not significant, whereas effects of Moderate and Major are considered to be significant, however, this is tested with professional judgement.

Significance Criteria

10.3.40 The following terminology has been used in the assessment to define effects:

- adverse – detrimental or negative effects to an environmental resource or receptor;
- negligible – imperceptible effects to an environmental resource or receptor; or

- beneficial – advantageous or positive effect to an environmental resource or receptor.

10.3.41 Where adverse or beneficial effects are identified, these have been assessed against the following significance scale:

- minor – slight, very short or highly localised effect of no significant consequence;
- moderate – limited effect (by extent, duration or magnitude), which may be considered significant; or
- major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

10.3.42 Effects can also be characterised as temporary or permanent and either short-term, medium term or long-term depending on the duration of the effect. Short-term effects are defined as temporary effects related to a specific construction event of no more than a year's duration. Medium term effects are defined as temporary effects of a longer duration, such as those arising over an extended period of construction, ranging from one year to the full construction period. Long-term effects are defined as permanent effects arising from the operation of the Proposed Development.

Consultation

10.3.43 Consultation on the baseline noise monitoring strategy and assessment methodology was undertaken with IACC. On 7 November 2023, IACC confirmed it is satisfied with the methodology approach. The Public Protection department also recommended that working hours and specific noise and vibration limits are formalised through the adoption of the Control of Pollution Act 1974 Section 61 – 'Prior Consent for Work on Construction Sites' process.

10.3.44 At the time of writing, no further consultation has been undertaken.

Assumptions and Limitations

10.3.45 There are a number of assumptions and limitations to the study at the PEIR Stage that are highlighted below.

- Whilst noise monitoring locations have been selected to be representative of the nearest NSRs to the Project, there will always be some potential for fluctuation of noise levels from one receptor to the next.
- A number of land parcels within Maen Hir South A has not yet been captured by the baseline noise survey work carried out to date. There is therefore a limitation in the coverage of the noise monitoring in relation to potentially affected receptors at these locations. Further baseline noise monitoring will be undertaken in consultation with IoACC and will be reported in the ES.
- Due to the preliminary nature of the design at this stage, it has not been possible to undertake a noise modelling exercise to predict future construction and operational phase noise levels at every NSR within the Noise Study Area. In order to provide a preliminary appraisal of the potential range of effects at the PEIR Stage, calculations have been undertaken on a set of standard setback distances, as detailed in Appendix 10-4 and Appendix 10-5. Therefore, the calculations to not account for ground absorption, intervening topography etc. As more information becomes available and design proposals mature a noise model exercise will be carried out and reported within the ES.
- In order to predict future noise levels in the construction and operational phases, notional operational equipment selections have been used. For the construction phase, source noise data has been taken from BS5228 based on the known activities that are likely to occur. For the operational phase, manufacturers data has been used based on knowledge of what has been typically used for other similar solar developments. Whilst final equipment selection will be undertaken at a detailed design stage, it is considered that, for the purposes of the assessment work, these are realistic assumptions.
- As there is some certainty that noise generative operational equipment associated with the solar elements of the Project will be reasonably homogenous across the area of the PEIR Boundary, a preliminary assessment of these sources has been undertaken. However, there is less certainty over the BESS and Substation locations as the design/final layout

is subject to further iterations. Therefore, at the PEIR Stage, meaningful predictions of potential noise effects cannot be completed due to the final location being unknown, including assessments of low frequency noise and tranquillity. As such, this will instead be completed for the ES Chapter, along with likely mitigation measures as a result, where required.

10.4 Embedded Mitigation

Design

10.4.1 The layout of the Project has been developed to generally maximise where practicable the distance between areas where noise-generating plant may be located and NSRs. In particular, this is the case for the potential locations for the Project Substation, BESS and 33kV/132kV Substations.

Construction and Decommissioning

10.4.2 Working hours for all construction activities during the week (Monday – Friday) will be 07:00-19:00 and 08:00-13:00 on Saturdays. On Saturday afternoon/evenings (13:00 – 18:00), all activities may be undertaken except for HGV deliveries and works likely to generate substantial levels of noise. On Sundays and Bank holidays there will be no construction activities.

10.4.3 HDD drilling or Pipe Jacking is an exception to the above where it may be necessary to continue works for technical and safety reasons outside of these working hours. If other works are required outside of the construction working hours, this would be agreed with the local planning authority.

10.4.4 Commissioning works (see description below) may also need to take place outside the construction working hours.

10.4.5 The management of construction traffic is also described in Chapter 9: Highways and Access, including the measures implemented through the oCTMP (Appendix 9-7).

10.4.6 The only exception to the general working hours restrictions would be HDD and Pipe Jacking which could be required in some cases to continue outside of the assumed daytime construction hours (i.e. evening, Sundays, Bank Holidays or at night). Any other works required outside these construction hours would be agreed with the relevant planning authority.

10.4.7 The oCEMP will also include standard good practice measures such as use of Best Practical Means to reduce disturbance associated with noise and vibration during construction as far as reasonably practicable, with reference to relevant guidance in BS 5228. Mitigation measures may include the following provisions:

- Ensure all processes are in place to minimise noise and vibration before works begin and should ensure Best Practicable Means are being achieved throughout the construction and decommissioning programme;
- Ensure that modern plant is used, complying with the latest European Commission noise emission requirements;
- Selection of inherently quiet plant where practicable;
- Use of hoarding around the area where works are being undertaken, where practicable, to assist in the screening of noise generation from low-level sources;
- Use of rotary bored rather driven piling techniques, where appropriate;
- Off-site pre-fabrication to be used, where practical;
- All plant and equipment to be used for the works to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use;
- Plant to be certified to meet relevant current legislation as defined by BS 5228 standards;
- All Contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2), which should form a prerequisite of their appointment;
- Loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials around the PEIR Boundary to be conducted in such a manner as to minimise noise generation and where practical to be conducted away from NSRs;
- Careful consideration should be given to planning construction traffic haul routes within the PEIR Boundary and along local roads close to existing NSRs, so as to minimise reversing movements and to minimise the number of construction vehicles during peak traffic flows on local roads; and

- Noise complaints should be reported to the Contractor and immediately investigated.

10.4.8 Consultation with the local community during the construction phase is proposed to communicate the works schedule, giving warning to residents regarding periods when higher levels of noise may occur during specific periods, and provide them with lines of communication where complaints can be addressed. Dissemination of such information will help manage any potential for short-term disturbance.

10.5 Preliminary Assessment of Likely Significant Effects

Construction and Decommissioning

10.5.1 Noise and vibration from the construction of the Project will involve the use of plant that have the potential to generate noise and vibration effects at NSRs. Such activities will generally be limited both in intensity and/or duration.

10.5.2 For the purposes of assessing noise and vibration, the construction programme has been summarised into five main activity types that represent high Noise Generating Activities (NGA). These activities are most likely to generate likely significant effects and are as follows:

- Construction of Inverters and Transformers;
- Construction of ground mounted PV Arrays;
- Cable installation (general works);
- Horizontal Directional Drilling (HDD) activities at the Grid Connection Corridor and the Cable Route Corridor.

10.5.3 Some activities such as piling or horizontal drilling, which will be used if necessary, have the potential to cause significant effects.

10.5.4 To provide a robust assessment, the assessment has assumed a single 24-month construction period.

10.5.5 Any effects associated with the construction and decommissioning of the Project are likely to be short-term and temporary in nature.

Onsite Noise

10.5.6 Appendix 10-4 includes details of a preliminary exercise to determine likely effects at different setback distances from a range of noise generative activities prior to the consideration of any mitigation measures.

10.5.7 For NSRs within 50m of any noise generative works, there is likely to be a medium to high impact, leading to short-term, temporary, moderate to major adverse effects. In comparison, NSRs 150m or more away from noise generative works are generally likely to be exposed to a low or very low impact, leading to short-term, temporary, minor or negligible adverse effects.

Onsite Vibration

10.5.8 Some construction activities, such as piling operations, drilling or vibratory rolling techniques, can generate vibration levels in close proximity to their use (less than 50m typically); however, if used as part of the construction of the Project this would likely be for limited periods such that significant vibration levels are unlikely.

10.5.9 Appendix 10-3 also includes details of a preliminary exercise to determine likely effects at different setback distances from a range of vibration generative activities prior to the consideration of any mitigation measures.

10.5.10 Based on this, minor or negligible adverse effects of a short-term, temporary nature are anticipated from distances of more than 17m from the source before mitigation is considered. For properties at distances of between 2.5m and 17m there is likely to be a temporary, moderate adverse effect in the short-term, prior to the consideration of any mitigation measures. Given that it is highly unlikely that vibration generative activities will take place within 2.5m of a property, there are unlikely to be any major adverse effects.

10.5.11 A more focussed study across specific phases of construction (e.g. piling) and buffers will be completed for the ES.

Project Generated Road Traffic Noise

10.5.12 The increase in traffic on the road network due to construction traffic generated by the Project (see Chapter 9: Transport) is not considered to be acoustically significant and is therefore considered to lead to a negligible adverse magnitude

of change across the majority of the road links and a low/small magnitude of change on two links (Links 7 (Ty-Coch) and 23 (Bodewryd).

10.5.13 As such, it is considered unlikely that construction traffic will generate any significant adverse effects. However, construction traffic noise will be assessed within the ES based on further calculations using the methodology set out in DMRB LA111 once detailed traffic flow information is available to inform this.

Operation

Noise from Operational Equipment

10.5.14 The potential for operational noise effects would be from electrical and mechanical plant associated with the Project. Transformers, Batteries and Inverters can generate noise, some of which may contain distinguishable characteristics, making it potentially more noticeable. The Project Substation will include larger electrical plant, as well as ancillary cooling units.

10.5.15 Any effects associated with the operational phase of the Project would be long-term in nature. The effect of the Project is determined with regard to the change in existing noise levels at the nearest NSRs to the Project.

10.5.16 Appendix 10-5 provides a preliminary appraisal of operational noise from fixed plant and equipment at a range of distances from identified noise sources, based on three distinct operational periods:

- Daytime 07:00 - 23:00 - assumes all plant in operation;
- Night-time 23:00 - 05:00 - assumes plant in operation with the exception of the inverters; and
- Early morning 05:00 - 07:00 - assumes all plant in operation.

10.5.17 This approach is in response to the fact that, during hours of darkness, some noise generative plant will not operate through some of the 'night-time' period of 23:00 - 07:00 as defined in BS4142.

33kV Substations, String Inverters and 132kV Substations

10.5.18 For NSRs located beyond 200m the magnitude of impact is likely to be low during the daytime and early morning periods. This results in a permanent and long-term minor adverse effect, which is not significant. For NSRs located closer than 200m,

the magnitude of impact is between medium to high during the daytime and early morning periods. This results in a permanent and long-term moderate to major adverse effect, which is significant, before context and mitigation is taken in consideration.

10.5.19 For NSRs located up to beyond 100m from operational noise sources, the magnitude of impact is low during the core night-time period. This results in a permanent and long-term minor adverse effect, which is not significant. For NSRs located closer than 100m, the magnitude of impact is between medium to high during the core night-time period. This results in a permanent and long-term moderate to major adverse effect, which is significant, before context and mitigation is taken in consideration.

Project Substation and BESS

10.5.20 The candidate equipment for the BESS is Elementa and the test report shows that it can generate 63dB at 1m in some directions. The nearest residential receptor to the proposed location for the BESS in Maen Hir North is located approximately 470m away. The nearest residential receptor to the proposed location for the BESS in Maen Hir Central is located approximately 60m away. This could result in a major adverse effect, without mitigation in place. However, physical barriers and the topography of the area will provide self-screening and the final configuration of the equipment will likely reduce noise levels breaking out from the Solar PV Site. In addition to this, there is likely to be the opportunity to include boundary mitigation in the form of acoustic fencing. The final predicted noise output will be provided in the final ES chapter, but it is likely with these mitigation strategies, the residual effect could be minor adverse and not significant.

Low Frequency Noise

10.5.21 Low frequency noise can be very difficult to predict with a high level of certainty and similarly hard to identify and resolve if present. This is because it can be generated by the unexpected interactions between system components and can be amplified by the geometry of the Project and receptor buildings. The issue of low frequency noise will therefore be considered once plans reach a more detailed

stage and noise minimised through design, or appropriately mitigated (isolation and attenuation measures) where appropriate at the ES Stage.

Tranquillity Assessment

10.5.22 At the time of writing, the approach to tranquillity is being considered in consultation with stakeholders but will necessarily draw on the results of the operational phase plant noise assessment, therefore at the PEIR Stage it is considered that information is not sufficiently developed to allow a meaningful tranquillity assessment, and this will be presented in the ES Chapter.

10.5.23 There is a range of additional mitigation measures that can be deployed to reduce effects to not significant.

10.6 Additional Mitigation

Design

10.6.1 Should there be a need to consider additional mitigation for close proximity construction noise and operational phase plant noise, there are a number of options available:

- Selection of quieter equipment, where this is available/practicable;
- Alternative siting of equipment, where appropriate;
- Specification of industrial noise control such as silencers, acoustically lined buildings, enclosures etc where this is achievable (subject to allowable pressure loss); and
- Specification of acoustic fencing, bunding, or a combination of the two to provide acoustic screening.

10.6.2 The need for, and extent of, any of the above mitigation measures will be considered in more detail in the ES Chapter.

10.7 Residual Effects

10.7.1 In absence of any additional mitigation, the residual effects are the same as the potential effects set out in Section 10.5. However, the aim of the design and additional mitigation for the Project will be for all residual effects to be insignificant.

10.8 Effect Interactions

10.8.1 Noise and vibration impacts can have synergistic effects on human health at both existing NSR locations within the Noise Study Area. Chapter 17: Human Health draws on the conclusions from both chapters to determine the significance of human health effects, taking into account health inequalities and vulnerable groups.

10.8.2 Noise and vibration can also have indirect ecological effects on designated sites and ancient woodland. The determination of the significance of noise and vibration effects on sensitive ecological receptors is considered in Chapter 7: Ecology.

10.8.3 No other interactions between significant effects from other disciplines and those from noise and vibration are predicted.

10.9 References

Ref 10-1 Overarching National Policy Statement for Energy (EN-1), 2023

Ref 10-2 National Policy Statement for Renewable Energy Infrastructure (EN-3), 2023

Ref 10-3 National Policy Statement for Electricity Networks Infrastructure (EN-5), 2023

Ref 10-4 Planning Policy Wales (PPW), February 2024

Ref 10-5 Planning Guidance (Wales), Technical Advice Note 11: Noise 1997

Ref 10-6 CL-01-15 Updates to TAN 11 Noise - Noise Action Plan (2013-18) Commitments

Ref 10-7 Noise and Soundscape Action Plan 2018 - 2023 (2018)

Ref 10-8 Future Wales: The National Plan 2040

Ref 10-9 Anglesey and Gwynedd Joint Local Development Plan – Written Statement

Ref 10-10 British Standard 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures (BS7445-1)

Ref 10-11 British Standard 5228: 2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2 (BS5228)

Ref 10-12 Highways England (2019) Design Manual for Roads and Bridges (DMRB) LA 111 Noise and Vibration Revision 2 (including the Wales National Application Annex to LA 111)

Ref 10-13 Calculation of Road Traffic Noise,1988 (CRTN)

Ref 10-14 British Standard 4142: 2014+A1:2019 Method for rating and assessing industrial and commercial sound (BS4142)

Ref 10-15 British Standard 8233: 2014 Guidance on sound insulation and noise reduction for buildings (BS8233)

Ref 10-16 World Health Organization Guidelines for Community Noise (WHO 1999)

Ref 10-17 World Health Organization Environmental Noise Guidelines for the European Region (WHO 2018)

Ref 10-18 Moorhouse, A T, Waddington, D C and ADAMS, M. (2011) NANR45: Procedure for the Assessment of Low Frequency Noise Complaints. London: Department for Environment, Food and Rural Affairs

Ref 10-19 Tranquil Spaces - Measuring the tranquillity of public spaces, Sharps Redmore Press, 2019


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