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MONA OFFSHORE WIND PROJECT

Environmental Statement

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Glossary

Term	Meaning
A-weighting	A frequency weighting devised to attempt to account for the fact that human response to sound is not equally sensitive to all frequencies. It consists of an electronic filter in a sound level meter which attempts to build this variability into the indicative sound level reading so that it will correlate, approximately, with the human response.
Ambient sound level, $L_{Aeq,T}$	The steady sound level which, over a period of time T, contains the same amount of A-weighted sound energy as the time varying sound over the same period. Also known as the equivalent continuous sound pressure level.
Attenuation	The reduction in magnitude of sound energy.
Basic Noise Level (BNL)	A measure of traffic source noise prior to development. It is calculated from traffic flows, road speed, and HGV percentage.
Decibel (dB)	A unit used to measure or compare the intensity of a sound by comparing it with a given reference level on a logarithmic scale.
Extrapolation	The extension of a graph, curve, or range of values by inferring unknown values from trends in the known data.
Fast Fourier Transform	A computational algorithm which allows for the conversion of a time signal to a representation in the frequency domain.
Geometric Divergence	The loss of energy from a wavefront as a consequence of geometrical spreading, observable as a decrease in wave amplitude. Spherical divergence decreases energy with the square of the distance. Cylindrical divergence decreases energy with the distance.
Ground factor, G	A dimensionless parameter which allows for the consideration of the acoustic properties of the ground surface between a sound source and the receptor.
Noise	An unwanted or unexpected sound.
Peak Particle Velocity	An indicator of the magnitude of ground vibration which refers to the movement of molecular particles within the ground.
Propagation	The transmission of acoustic energy through a medium via a sound wave.
Reflection	The phenomena of sound waves bouncing back off a surface or barrier.
Refraction (Atmospheric)	The deviation of a sound wave from a straight line as it passes through the atmosphere due to the variation in air density as a function of height.
Sound	Fluctuations of pressure within a medium (gas, solid or fluid) within the audible range of loudness and frequencies which excite the sensation of hearing.
Sound Power Level, L_w	The total sound energy emitted by a source per unit time.
Sound Pressure Level, L_p	The amount of force a sound wave exerts on a surface area perpendicular to the direction of travel. A measure of the variation of sound level over a distance.
Spectrum	The presentation of sound in terms of the amount of energy at different frequencies.
Transmission Loss	A measure of the reduction in sound level of a sound source as it propagates through a medium.
Wavenumber	The number of sound waves in a unit distance.

Acronyms

Acronym	Description
BNL	Base Noise Level
BS	British Standard
CoCP	Code of Construction Practice
CoPA	Control of Pollution Act
CRTN	Calculation of Road Traffic Noise
DMRB	Design Manual for Roads and Bridges
FFT	Fast Fourier Transform
GIS	Geographical Information Systems
IoA	Institute of Acoustics
ISO	International Organisation for Standardisation
LOAEL	Lowest Observed Adverse Effect Level
MDS	Maximum Design Scenario
NOEL	No Observed Effect Level
OS	Ordnance Survey
OSP	Offshore Substation Platform
PPV	Peak Particle Velocity

Units

Unit	Description
dB	Decibel
Hz	Hertz
kHz	Kilohertz
kJ	Kilojoules
kKm	Kilometres
m	Metres
mins	Minutes

1 CONSTRUCTION NOISE AND VIBRATION TECHNICAL REPORT

1.1 Introduction

1.1.1 Overview

1.1.1.1 This construction noise and vibration technical report provides the methodology and results of indicative calculations undertaken to assess the noise and vibration impacts on nearby receptors due to the construction of the Mona Offshore Wind Project. This report should be read in conjunction with Volume 3, Chapter 9: Noise and vibration of the Environmental Statement.

1.1.1.2 Baseline sound measurements, which inform the derivation of construction noise impact criteria, have only be undertaken within the Mona Onshore Development Area to characterise the baseline sound environment at the nearest noise-sensitive receptors within the construction noise and vibration study area.

1.1.1.3 No baseline vibration surveys were undertaken since vibration impacts are assessed against absolute criteria as opposed to criteria derived based on the existing environment which is the case for noise impacts.

1.1.2 Study area

1.1.2.1 The Mona Offshore Wind Project noise and vibration study area focuses on receptors (landward of Mean High Water Springs) where potential impacts are most likely to occur on receptors sensitive to noise and vibration.

1.1.2.2 A 1 km study area has been defined for the Mona Landfall due to the high noise emission levels and potential night-time works required for trenchless techniques at the Mona Landfall.

1.1.2.3 The study area along the Mona Onshore Cable Corridor has been defined as 300 m in line with the guidance in the Design Manual for Roads and Bridges (DMRB) – LA 111 – Noise and Vibration. This study area is greater than that presented in the Mona Offshore Wind Farm Environmental Impact Assessment Scoping Report (Mona Offshore Wind Ltd, 2022) and has been increased to better align with guidance.

1.1.2.4 The guidance in DMRB – LA 111 – Noise and Vibration has also been used to inform the 100 m study area adopted for the assessment of construction vibration impacts.

1.1.2.5 A study area of 50 km has been defined for the assessment of offshore piling noise to account for the potential for the long-range propagation of low frequency noise emissions which can travel large distances over water.

1.1.2.6 In summary, the noise and vibration study area relevant to this technical report is defined as:

- The area of land to be temporarily or permanently occupied during the construction of the Mona Offshore Wind project (hereafter referred to as the Mona Onshore Development Area)
- Noise sensitive receptors located within 1 km of the Mona Landfall (approximately 147 receptors) and Onshore Substation (approximately 40 receptors)

- Noise sensitive receptors located within 300 m of the Mona Onshore Development Area (excluding the Mona Landfall and Onshore Substation options) (approximately 932 receptors)
- Noise sensitive receptors located within 50 km of the Mona Array Area where construction piling is required (receptor count not available due to limited address data)
- Vibration sensitive receptors located within 100 m of construction activities (approximately 108 receptors).

1.1.2.7 The above descriptors are presented graphically in Figure 1.1 to Figure 1.5 below. All but two of the proposed study areas above are as set out in the Mona Offshore Wind Project Environmental Impact Assessment Scoping Report (Mona Offshore Wind Ltd, 2022). Full details of the amendments to the proposed noise and vibration study areas are provided in Volume 3, Chapter 9: Noise and vibration of the Environmental Statement.

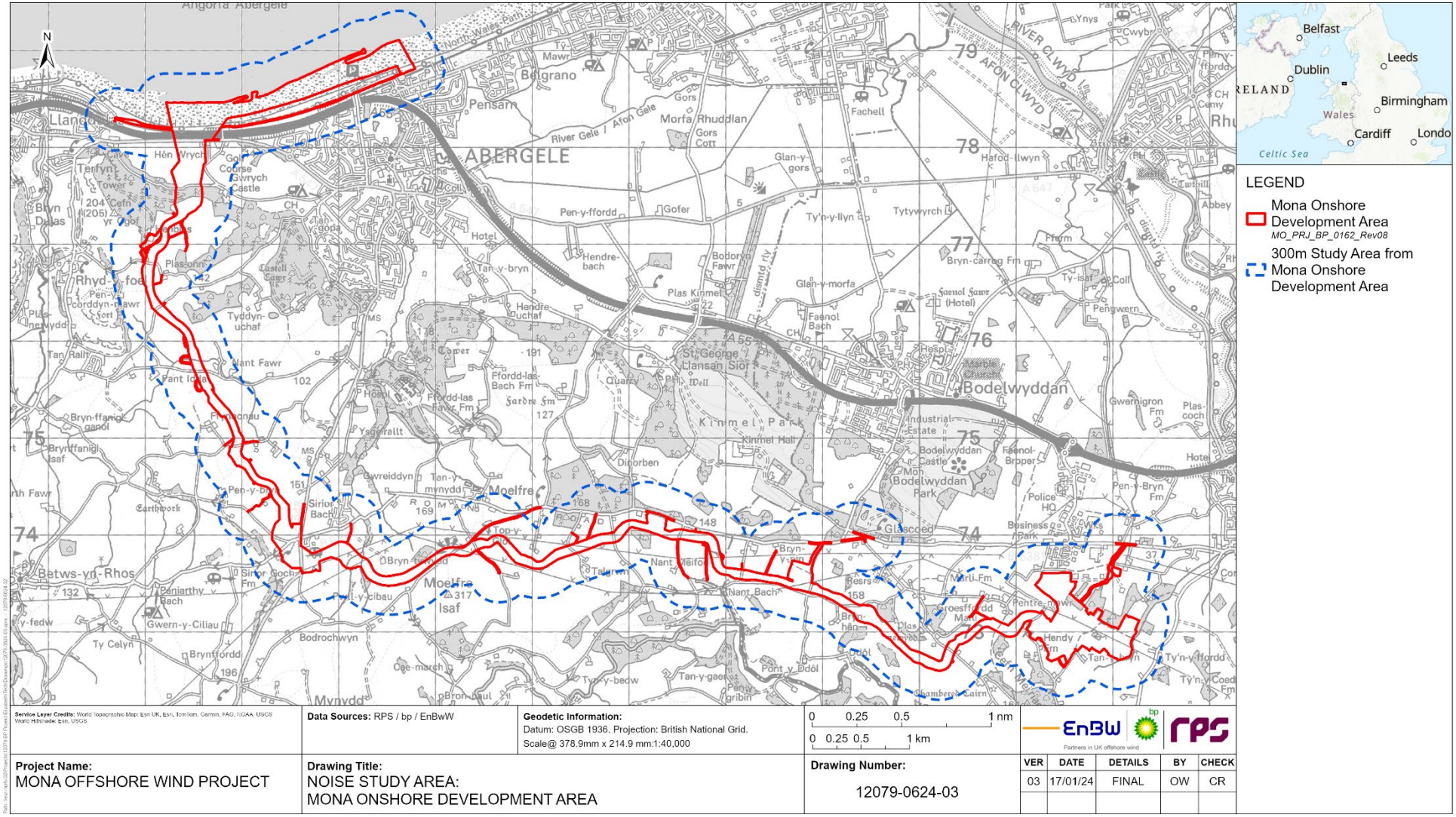


Figure 1.1: Noise study area –Mona Onshore Development Area

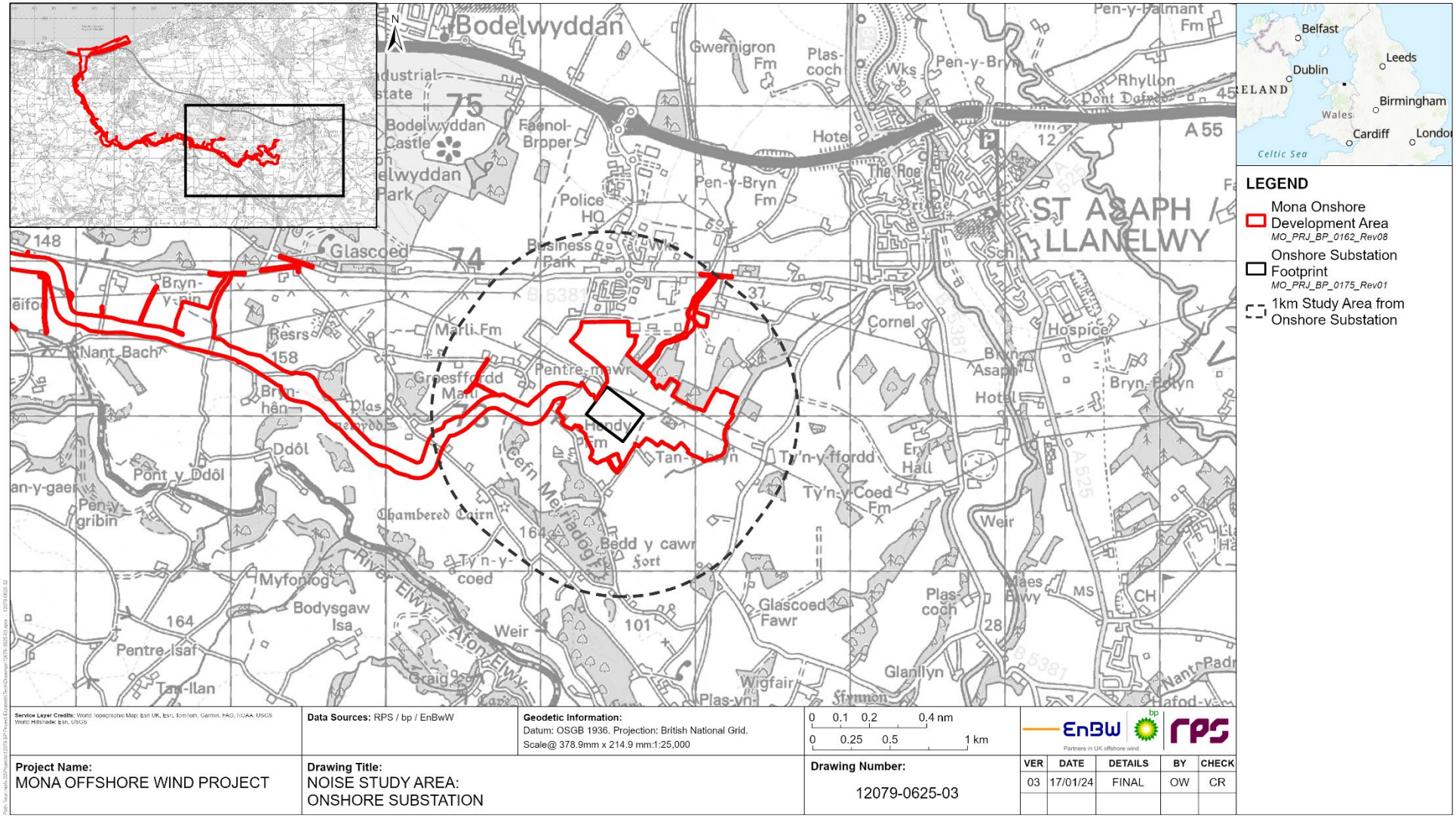


Figure 1.2: Noise study area –Onshore Substation.

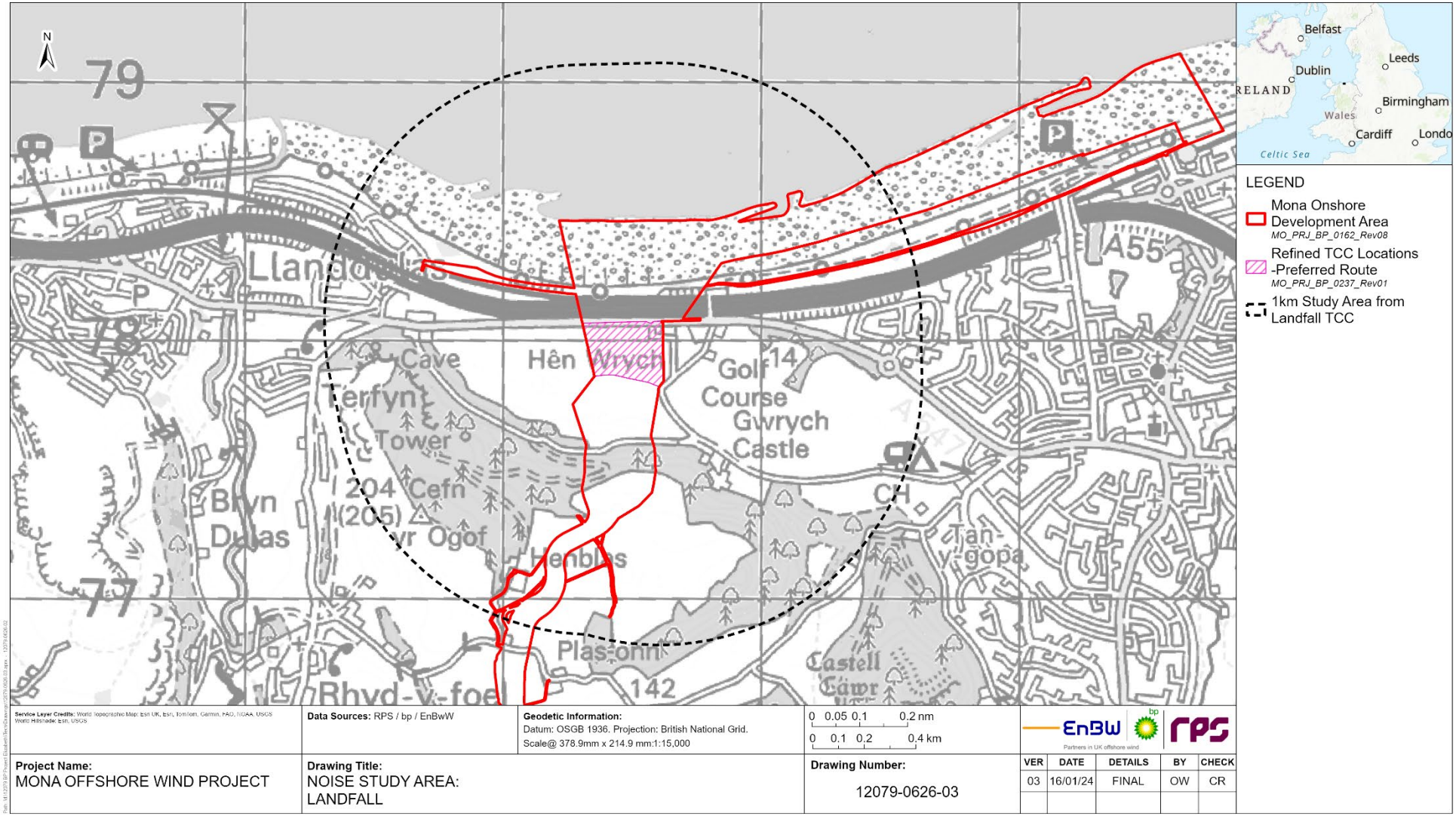


Figure 1.3: Noise study area – Landfall

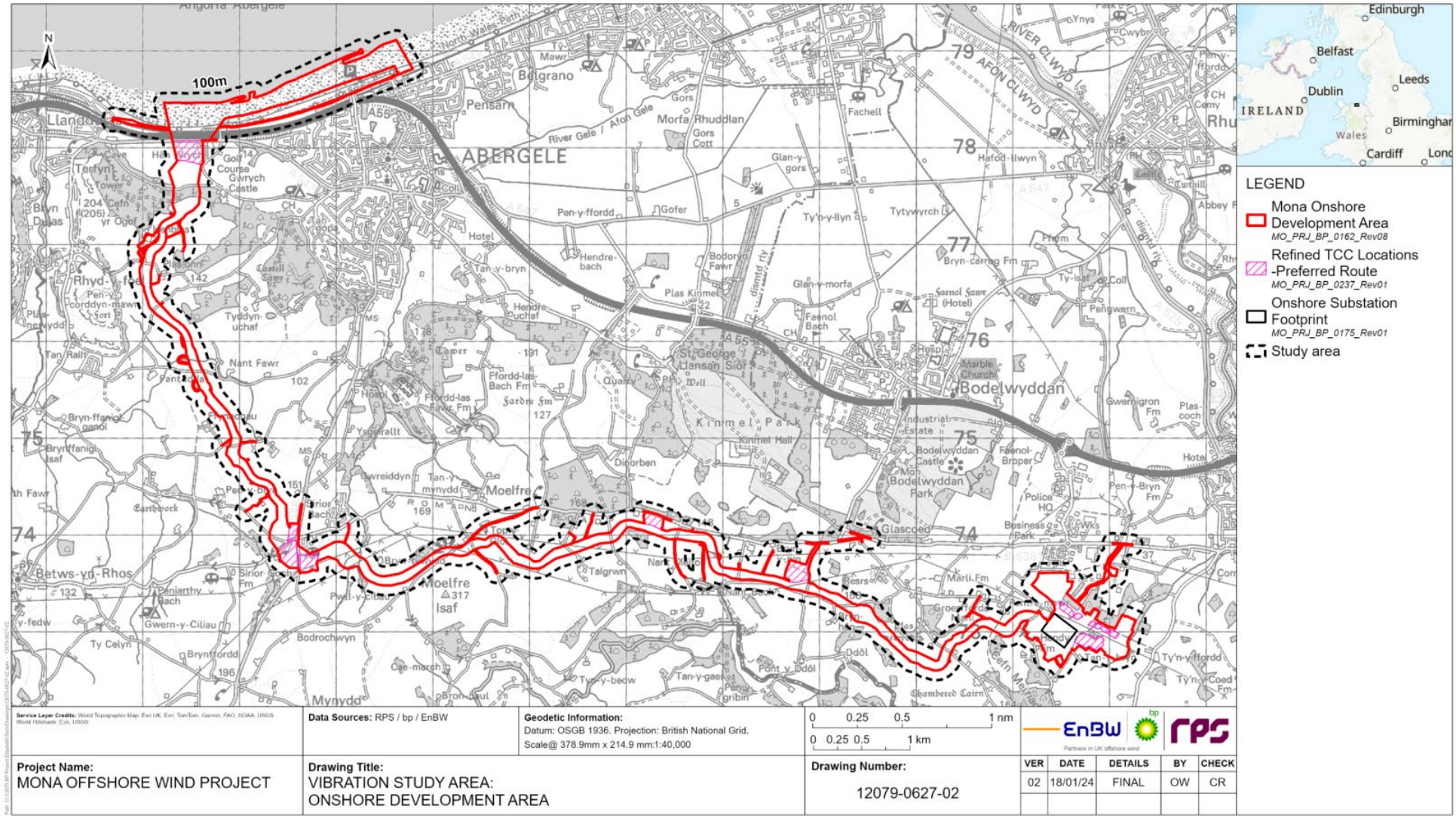


Figure 1.4: Vibration study area – piling at landfall

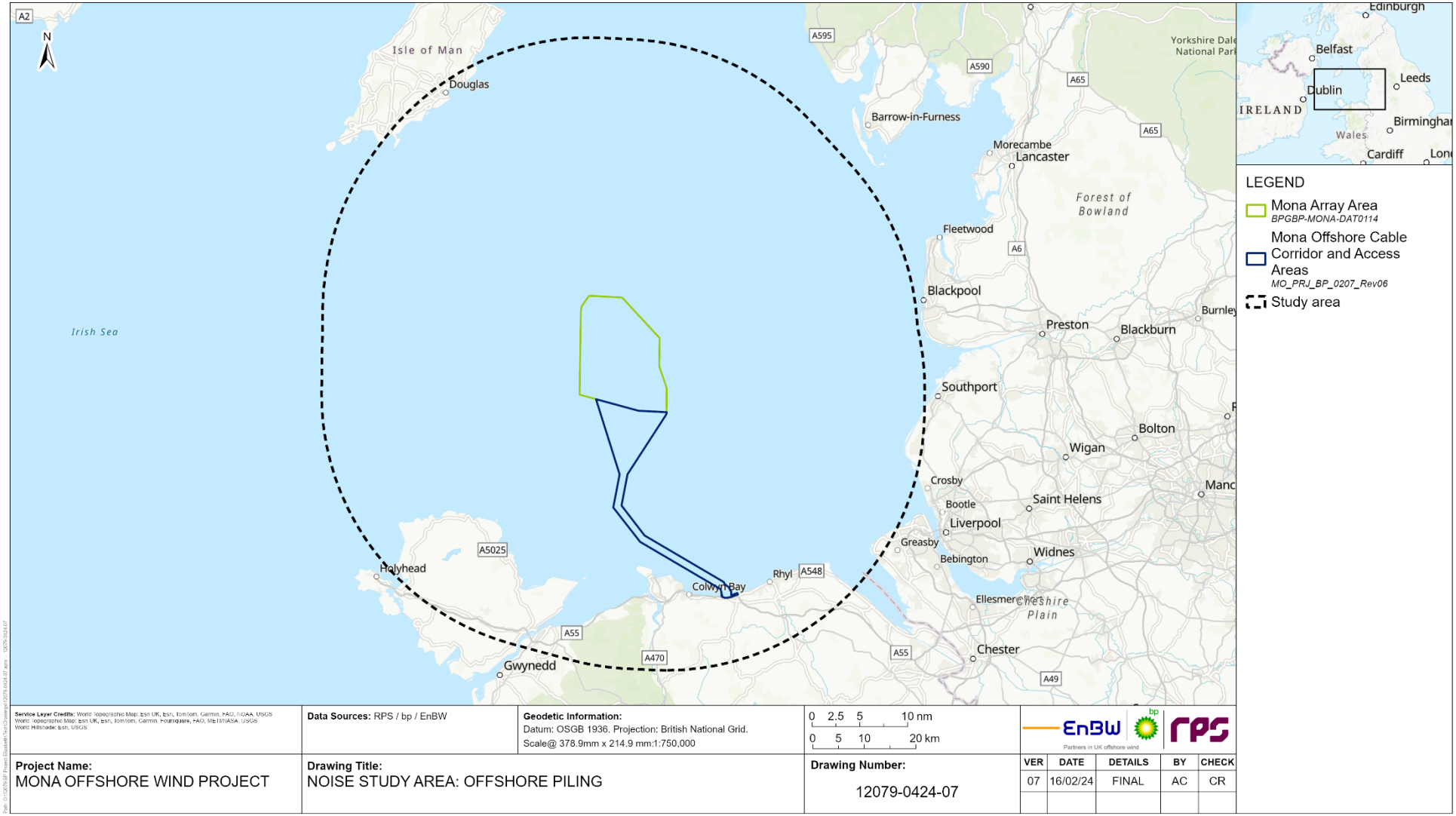


Figure 1.5: Noise study area – Offshore piling

1.2 Legislation and guidance

1.2.1 Overview

1.2.1.1 This section contains a summary of the relevant guidance and legislation for construction noise and vibration control.

1.2.2 Control of Pollution Act (CoPA) 1974

1.2.2.1 Section 60 of the CoPA refers to the control of noise on construction sites. It outlines legislation by which Local Authorities can control noise from construction sites and prevent noise disturbance.

1.2.2.2 British Standards (BS) 5228-1:2009+A1:2014 and BS 5228 2:2009+A1:2014 were approved within The Control of Noise (Code of Practice for Construction and Open Sites) Order 2015 as suitable guidance on appropriate methods for the control of noise from construction and open sites in exercise of the powers conferred on the Secretary of State by sections 71(1)(b), (2) and (3) of the CoPA.

1.2.2.3 The CoPA provides a Local Authority the power to serve a notice imposing requirements for the way in which construction works are to be carried out in their jurisdiction. This notice can specify the following:

- The plant or machinery permitted for use
- The hours during which construction work may be undertaken
- Limits for the emission levels of noise and vibration due to the works at any time or spatial position on site
- Any other change in circumstance.

1.2.2.4 Section 61 of the CoPA refers to prior consent for work on construction sites. It provides a method by which a contractor can apply for consent to undertake construction works in advance. Providing consent is granted, and compliance is maintained with the stated method and hours of work, no action may be taken by the Local Authority under Section 60.

1.2.2.5 Section 71 of the CoPA refers to the preparation and approval of codes of practice for minimising noise.

1.2.2.6 Section 72 of the CoPA refers to BPM, which is defined as:

'In that expression, 'practicable' means reasonably practicable, having regards among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications'. Whilst 'Means' includes 'the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structures.'

1.2.3 Environmental Protection Act (EPA) 1990

1.2.3.1 Section 79, Part of the EPA contains a list of matters that amount to statutory nuisances and places a duty on Local Authorities to regularly inspect areas in their jurisdiction to determine where statutory nuisances may exist.

1.2.3.2 The Local Authority must serve an abatement notice where it is satisfied that a statutory nuisance does not exist, or likely to occur/recur. Section 80 of the EPA

provides Local Authorities with the power to serve an abatement to prohibit or restrict its occurrence or recurrence; and to carry out works or other action necessary to abate the nuisance.

1.2.3.3 Section 82 of the EPA allows a Magistrates' court to act on a complaint made by any person on the grounds that they are aggrieved by a statutory nuisance, such as noise.

1.2.3.4 The procedures for appeals against abatement notices are detailed in the Statutory Nuisance (Appeals) Regulations 1995.

1.2.4 National Policy Statements (NPS)

1.2.4.1 There are currently six energy National Policy Statements (NPSs), three of which identify policy relevant to offshore wind development and the Mona Offshore Wind Project, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security & Net Zero, January 2024a)
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security & Net Zero, January 2024b)
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security & Net Zero, January 2024c).

1.2.4.2 NPS EN-1 NPS EN-3 include guidance on what matters are to be considered in the assessment including the determination of any mitigation measures required.

1.2.4.3 NPS EN-5 outlines matters to be considered as part of the onshore assessment of electrical networks.

1.2.4.4 A full breakdown of the relevant provisions of each NPS and how each is considered in the assessment of noise and vibration impacts due to the Mona Offshore Wind Project is provided in Table 9.1 of Volume 3, Chapter 9: Noise and vibration of the Environmental Statement.

1.2.5 Planning Policy Wales (Edition 11)

1.2.5.1 Planning Policy Wales (Edition 11) sets out the land use planning policies of the Welsh government to ensure the sustainable delivery of any new development and ensure positive impacts on the social, economic, and cultural well-being of Wales. Key provisions are summarised in Table 1.1 below along with details as to how these have been addressed within this assessment.

Table 1.1: Summary of Planning Policy Wales (Edition 11) policy relevant to noise and vibration.

Summary of Planning Policy Wales (Edition 11) provision	How and where considered in the Environmental Statement
Paragraph 5.9.20 highlights the need to minimise impacts of Renewable and Low Carbon infrastructure on local communities, such as noise and air pollution, to safeguard the quality of life for existing and future generations.	The construction phase of the Mona Offshore Wind Project have been assessed using the principles in: • BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014a) • BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (British Standards Institution, 2014b) • DMRB– LA111 – Noise and vibration (Highways England, Transport Scotland, Llwyodraeth Cymry, Department for Infrastructure, 2020). • Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988) The assessment of the construction and vibration impacts of the offshore and onshore elements of the Mona Offshore Wind Project is presented in section 1.4 and 1.5 of this technical report. The assessment of significant effects is presented in section 9.9 of Volume 3, Chapter 9: Noise and Vibration of the Environmental Statement.
Paragraph 6.7.18 states that early consideration is required to ascertain whether the location and design of proposed development is acceptable where air pollution or noise generating development is likely to affect a protected species or a tranquil urban green space.	Noise impacts on wildlife are assessed in Volume 3, Chapter 3: Onshore ecology of the Environmental Statement and Volume 3, Chapter 4: Onshore and intertidal ornithology of the Environmental Statement.
Paragraph 6.7.21 highlights the need to consider the existing soundscape as part of development strategies prior to determining planning applications.	A baseline sound survey has been undertaken at locations representative of the nearest and most exposed noise-sensitive receptors the Mona Landfall, the Mona Onshore Cable Corridor, and the Mona Onshore Substation. Details are provided in Volume 7, Annex 9.1: Baseline Sound Survey of the Environmental Statement. 1.2.5.2 A summary of the baseline sound levels relevant to the assessment of construction noise impacts is provided in Table 1.6 of this technical report.

1.2.6 Local planning policies

1.2.6.1 The assessment of potential changes to noise and vibration has also been made with consideration to the specific policies set out in:

- Adopted Local Development Plans (LDPs) of Conwy County Borough Council (CCBC) (adopted in October 2013)
- Denbighshire County Council (DCC) (adopted in June 2013).

1.2.6.2 Key provisions are set out in Table 1.2 along with details as to how these have been addressed within the assessment.

Table 1.2: Local Planning Policy of relevant to noise and vibration.

Policy	Key provisions	How and where considered in the Environmental Statement
Conwy County Borough Council: Adopted Local Development Plan (October 2013)		
DP/1	Development will only be permitted where the risks of noise pollution have been accounted for and addressed.	The construction phase of the Mona Offshore Wind Project has been assessed using the principles in: • BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014a) • BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (British Standards Institution, 2014b) • DMRB– LA111 – Noise and vibration (Highways England, Transport Scotland, Llwyodraeth Cymry, Department for Infrastructure, 2020). • Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988) The assessment of the construction and vibration impacts of the offshore and onshore elements of the Mona Offshore Wind Project is presented in section 1.4 and 1.5 of this technical report. The assessment of significant effects is presented in section 9.9 of Volume 3, Chapter 9: Noise and Vibration of the Environmental Statement.
NTE/1	Conservation of the natural environment by preventing, reducing, or remedying all forms of pollution including air, light, noise, soil, and water.	The construction phase of the Mona Offshore Wind Project has been assessed using the principles in: • BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014a) • BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (British Standards Institution, 2014b) • DMRB– LA111 – Noise and vibration (Highways England, Transport Scotland, Llwyodraeth Cymry, Department for Infrastructure, 2020). • Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988) The assessment of the construction and vibration impacts of the offshore and onshore elements of the Mona Offshore Wind Project is presented in section 1.4 and 1.5 of this technical report. This assessment accounts for the noise reduction achieved via the implementation of BPM for construction noise and vibration such as localised acoustic screening and acoustic enclosures. Consideration is also given to the percentage of the relevant construction period during which each plant item will be in operation. The impacts have been determined by assuming plant items will be in operation close to the boundary of the construction compounds adjacent to the nearest and most exposed noise and vibration receptors. The assessment of significant effects is presented in section 9.9 of Volume 3, Chapter 9: Noise and Vibration of the Environmental Statement.
Denbighshire County Council: Adopted Local Development Plan (June 2013)		

Policy	Key provisions	How and where considered in the Environmental Statement
RD 1	Development will only be permitted where the development does not unacceptably affect the amenity of local residents by virtue of noise.	The construction phase of the Mona Offshore Wind Project has been assessed using the principles in: • BS 5228-1:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014a) • BS 5228-2:2009+A1:2014 – 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration' (British Standards Institution, 2014b) • DMRB– LA111 – Noise and vibration (Highways England, Transport Scotland, Llwyodraeth Cymry, Department for Infrastructure, 2020). • Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988) The assessment of the construction and vibration impacts of the offshore and onshore elements of the Mona Offshore Wind Project is presented in section 1.4 and 1.5 of this technical report. The assessment of significant effects is presented in section 9.9 of Volume 3, Chapter 9: Noise and Vibration of the Environmental Statement.
VOE 10	Development proposals which promote the provision of renewable energy technologies may be supported providing they are located so as to minimise visual, noise and amenity impacts and demonstrate no unacceptable impact upon the interests of nature conservation, and wildlife.	The assessment of the construction and vibration impacts of the offshore and onshore elements of the Mona Offshore Wind Project is presented in section 1.4 and 1.5 of this technical report. This assessment accounts for the noise reduction achieved via the implementation of BPM for construction noise and vibration such as localised acoustic screening and acoustic enclosures. Consideration is also given to the percentage of the relevant construction period during which each plant item will be in operation. The impacts have been determined by assuming plant items will be in operation close to the boundary of the construction compounds adjacent to the nearest and most exposed noise and vibration receptors. The assessment of significant effects is presented in section 9.9 of Volume 3, Chapter 9: Noise and Vibration of the Environmental Statement. Noise impacts on wildlife have been assessed in: • Volume 3, Chapter 3: Onshore ecology of the Environmental Statement; and • Volume 3, Chapter 4: Onshore and intertidal ornithology of the Environmental Statement.

1.2.7 British Standard 5228

1.2.7.1 British Standard (BS) comprises two parts:

- BS 5228-1:2009+A1:2014 – '*Code of practice for noise and vibration control on construction and open sites'* – Part 1: Noise
- BS 5228-2:2009+A1:2014 – '*Code of practice for noise and vibration control on construction and open sites'* – Part 2: Vibration.

1.2.7.2 The Standard provides guidance, information, and procedures for the control of noise and vibration from demolition and construction sites. BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014 gained approval as guidance on appropriate methods for minimising noise from construction and open sites under the relevant sections of the CoPA 1974.

1.2.7.3 There are no set standards for the definition of the significance of construction noise effects. However, noise example criteria are provided in BS 5228-1:2009+A1:2014 Annex E and vibration example criteria are provided in BS 5228-2:2009+A1:2014 Annex B.

1.2.7.4 BS 5228-1:2009+A1:2014 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on:

- Community relations
- Noise and persons on site
- Neighbourhood nuisance
- Project supervision
- The control of noise.

1.2.7.5 The annexes include information on legislative background, noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data for on-site equipment and site activities; significance of noise effects; calculation procedures estimating sound emissions from sites and sound level monitoring; types of piling; and air overpressure.

1.2.7.6 BS 5228-2:2009+A1:2014 contains information and recommendations for basic methods of vibration control arising from construction and open sites where work activities/operations generate significant levels of vibration. It includes sections on community relations; vibration and persons on site; neighbourhood nuisance; project supervision; control of vibration and measurement. BS 5228-2:2009+A1:2014 refers to BS International Organisation for Standardisation (ISO) 4866:2010; BS 7385-2:1993; BS 6472-1:2008, and BS 6472-2:2008 for further advice on the significance of vibration.

1.2.8 Design Manual for Roads and Bridges (DMRB) – LA111 – Noise and vibration

1.2.8.1 The DMRB LA111 (Highways England, Transport Scotland, Llwyodraeth Cymru, Department for Infrastructure, 2020), provides on guidance on methods for assessing noise and vibration from construction traffic.

1.2.8.2 The magnitude of noise impacts is assessed using the predicted change in the Basic Noise Level (BNL) on the closest public roads to a receptor following the introduction of construction traffic.

1.2.8.3 The noise change is calculated using the methods outlined in the Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988) which considers the following:

- The change in traffic flow due to construction traffic
- Vehicle speed
- The percentage of Heavy Goods Vehicles (HGVs).

1.2.8.4 Paragraph 3.19 of DMRB LA111 states the following:

- ‘*Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:*

– *10 or more days or nights in any 15 consecutive days or nights*

– *A total number of days exceeding 40 in any 6 consecutive months*.'

1.2.8.5 Additional guidance is provided for the determination of construction noise impact criteria in terms of the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL).

1.2.8.6 Whilst not adopted in Wales, the Planning Practice Guidance – Noise (PPG-N) (Department for Levelling Up, Housing and Communities, 2019) provides a useful definition of these terms. For reference, a summary is provided in Table 1.3 below.

Table 1.3: Description of LOAEL and SOAEL from PPG-N

Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level (NOEL)			
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

1.2.8.7 Criteria for the impacts of construction noise have been derived based on the guidance detailed in DMRB LA111 in conjunction with BS 5228-1:2009+A1:2014. Full details are provided in section 1.2.9.

1.2.9 Institute of Acoustics (IoA) – A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise – Supplementary Guidance Note 6: Noise Propagation Over Water for On-Shore Wind Turbines

1.2.9.1 ETSU-R-97 (1996) is the UK government's preferred method of assessing the impacts of noise from wind farms for planning purposes. The IoA produced a Good Practice Guide (2013) to supplement the ETSU-R-97 guidance.

1.2.9.2 The assessment procedure in the IoA guidance relates primarily to operational noise from wind turbines and thus isn't directly applicable to this assessment.

1.2.9.3 However, Supplementary Guidance Note 6 (2014) highlights the lack of published research or guidance on wind turbine noise propagation over water.

1.2.9.4 Guidance is presented in the form of a summary of the available published research to aid practitioners in the assessment of noise propagation over water, particularly long distances. The important variables to consider include:

- The distance between source and receiver
- The losses due to geometric divergence of the sound waves including a correction for the tendency of the sound waves to deviate from spherical spreading (a decay in the amplitude with the inverse of the square of the source-receiver separation) to cylindrical spreading (a decay in the amplitude with the inverse of the source-receiver separation) at distances greater than 700 m
- The ground reflections from the water surface
- Atmospheric absorption.

1.2.9.5 The relevant equations and how they've been applied is discussed in more detail in section 1.4.3 below.

1.3 Assessment criteria

1.3.1 Overview

1.3.1.1 Based on the guidance above, the following impact criteria have been adopted.

1.3.2 Construction noise

1.3.2.1 Impact criteria for construction noise have been determined in accordance with DMRB LA111 and Annex E of BS 5228-1:2009+A1:2014. Table 3.12 of DMRB LA111 provides the following guidance (as summarised in Table 1.4 below) for determining the LOAEL and SOAEL for construction noise and in Table 1.5 for determining the magnitude of impacts.

Table 1.4: Construction time period – LOAEL and SOAEL.

Time Period	LOAEL	SOAEL
Weekdays (7am-7pm) and Saturdays (7am-1pm)	Baseline noise levels, $L_{Aeq,T}$	Threshold level determined as per BS 5228-1:2009+A1:2014.

Time Period	LOAEL	SOAEL
Evening (7pm-11pm) and Weekends (1pm-11pm on Saturdays and 7am-11pm on Sundays)		
Night (11pm-7am)		

Table 1.5: Magnitude of impact and construction noise descriptions.

Magnitude of impact	Construction noise level
High	$L_{Aeq,T} \geq$ SOAEL + 5 dB
Medium	SOAEL ≤ $L_{Aeq,T}$ < SOAEL +5 dB
Low	LOAEL ≤ $L_{Aeq,T}$ < SOAEL
Negligible	$L_{Aeq,T}$ < LOAEL

1.3.2.2 The threshold levels which quantify the LOAEL and SOAEL have been derived from Example Method 2 in Annex E 3.3 of BS 5228-1:2009+A1:2014 which states the following:

'Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB L_{Aeq}, from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.'

1.3.2.3 Section 3 of DMRB LA 111 states provides alternative durations when considering the significance of effect of transient construction works. Since many of the construction works undertaken are indeed likely to be transient in nature, the following durations are considered in the assessment of significant effects:

'Construction noise and construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

1) 10 or more days in any 15 consecutive days or nights;

2) a total number of days exceeding 40 in any 6 consecutive months'

1.3.2.4 Given the low ambient sound climate in the area surrounding the Mona Onshore Development Area, the lower cut-off values above provide the SOAEL against which construction noise impacts will be assessed.

1.3.2.5 The impact criteria for receptors near the Mona Landfall, along the Onshore Cable Corridor, and around the Onshore Substation are presented in

1.3.2.6 Table 1.6 below. Full details of the baseline sound survey positions and results can be found in Volume 7, Annex 9.1: Baseline Noise Survey of the Environmental Statement.

Table 1.6: Construction noise criteria

Measurement Position		LOAEL (dB)			SOAEL (dB)		
		Day $L_{Aeq,12h}$	Evening $L_{Aeq,4h}$	Night $L_{Aeq,8h}$	Day $L_{Aeq,12h}$	Evening $L_{Aeq,4h}$	Night $L_{Aeq,8h}$
Landfall	LT1	52	46	42	65	55	45
	LT2	53	50	46	65	55	45
Onshore Cable Corridor	LT9	44	36	35	65	55	45
	LT10	41	40	34	65	55	45
	LT11	48	40	38	65	55	45
	LT12	47	45	43	65	55	45
	LT13	39	37	36	65	55	45
	LT14	48	47	46	65	55	50
	LT15	40	39	37	65	55	45
	LT16	46	43	38	65	55	45
	LT17	48	38	37	65	55	45
	LT18	40	35	34	65	55	45
	LT19	47	39	38	65	55	45
Onshore Substation	LT20	43	42	37	65	55	45
	LT3	44	39	36	65	55	45
	LT4	45	41	40	65	55	45
	LT5	46	40	37	65	55	45
	LT6	45	41	38	65	55	45
	LT7	44	40	35	65	55	45
	LT8	43	39	36	65	55	45

1.3.3 Construction vibration

1.3.3.1 Impact criteria for vibration from construction have been identified based on guidance provided in DMRB LA111. The outline criteria (set out in Table 1.7) for peak particle velocity (PPV) can be used to identify potential significant impacts on nearby receptors.

Table 1.7: Construction vibration criteria.

(1) Vibration at these levels is unlikely to be tolerable for more than a very brief period and major effects could occur below these levels, particularly where impacts occur for longer periods.

Magnitude of impact	Vibration level, Peak Particle Velocity (PPV), mm/s
High	1 ≤ PPV < 10
Medium	0.3 ≤ PPV < 1
Low	PPV < 0.3
Negligible	1 ≤ PPV < 10

1.3.3.2 As with construction noise, the durations outlined in paragraph 1.3.2.3 above are considered in the assessment of significant effects as per in Section 3 of DMRB LA 111.

1.3.4 Construction traffic noise

1.3.4.1 Impact criteria for these changes have been obtained from the guidance in DMRB LA 111 and are presented in Table 1.8 below.

Table 1.8: Construction traffic criteria.

Magnitude of impact	Increase in Basic Noise Level (BNL) of closest public road used for construction traffic (dB)
High	BNL ≥ 5
Medium	3 ≤ BNL < 5
Low	1 ≤ BNL < 3
Negligible	BNL < 1

1.4 Offshore airborne noise assessment

1.4.1 Propagation model

1.4.1.1 Offshore construction activities include impact driven or drilled piled jacket foundations for the wind turbines and Offshore Substation Platforms (OSPs). The equipment required has high noise emission levels and the low frequency elements of the construction noise have the potential to travel long distances due to the acoustically reflective sea surface.

1.4.1.2 There are many outdoor sound propagation models available for the prediction of noise levels at receptors. Typically, these models account for losses due to physical effects such as geometrical divergence, atmospheric absorption, ground attenuation, reflections from surfaces, and barrier attenuation where each is appropriate.

1.4.1.3 However, long-range sound propagation from a noise source out at sea is likely to be influenced more greatly by meteorological effects such as the vertical temperature and velocity profiles which result in the downward refraction of sound waves. Prediction methods such as the Nord2000 and Harmonoise P2P model include meteorological corrections, however they can be limited in the approximation methods required to characterise these propagation effects. These standards are also primarily intended for use in sound propagation over land.

1.4.1.4 As an alternative, the parabolic wave equation is frequently adopted for long-range sound propagation since the surface impedance and roughness, sound speed profile, and atmospheric turbulence can all be accounted for in the calculations.

1.4.1.5 A numerical model has been developed which applies finite difference discretisation to the 2-Dimensional Crank-Nicholson Parabolic Equation (CNPE) shown below along with a brief definition for each term:

$$\frac{\partial \varphi}{\partial x} = i\left[\frac{1}{2k_0}\left(\frac{\partial^2}{\partial z^2} + (k^2 - k_0^2)\right)\right] \quad (1)$$

- k_0 and k are the reference wavenumber and wavenumber, respectively, defined as the number of wave cycles within a given distance
- $\varphi = \varphi(x, z)$ is the sound pressure level at a position (x, z) above the sea surface.

1.4.1.6 The numerical model developed has the benefit of increased computational efficiency by not requiring the discretisation of the sea surface and instead, defining the surface as a flat, totally reflective layer. Other key parameters accounted for include:

- A vertical sound speed profile which allows for the inclusion of downward sound refraction which bends the sound waves toward the receiver thereby presenting the maximum design scenario
- An effective sound speed which varies with temperature which is influential out at sea
- Atmospheric turbulence due to random fluctuations in wind speed which can result in higher sound pressure levels than expected.

1.4.1.7 Equation 1 has been solved numerically using finite difference methods to derive the transmission loss at terrestrial receptors at a height of 4.5 m, equivalent to the height of a first-floor window.

1.4.2 Source Levels

1.4.2.1 Appendix A of Volume 5, Annex 3.1: Underwater sound technical report of the Environmental Statement contains details of numerical modelling undertaken to estimate the excitation force of the hammer, the pile, and sound propagation in the water column. This detailed modelling was necessary since at the time the study was undertaken, the Maximum Design Scenario (MDS) was represented by an impact hammer with an energy of around 5,500 kJ. The MDS is now represented by the following hammer energies:

- OSPs and 16 wind turbine locations: 4,400 kJ
- 48 wind turbine locations: 3,000 kJ.

1.4.2.2 Due to the differences in the ways in which sound propagates in water compared to air, there is no direct relationship between the source noise levels determined for underwater sound propagation and the airborne source noise levels due to the impact hammer.

1.4.2.3 An estimation of the sound source levels has been using the radial velocity impulse response output by the numerical modelling undertaken by Seiche Ltd.

1.4.2.4 A Fast Fourier Transform (FFT) has been computed of the radial velocity response to obtain a frequency spectrum for the airborne sound power levels of the impact hammer. Extrapolation of the results provided by Seiche Ltd. show each strike to have an impulse response length of around 180 milliseconds (ms). Assuming up to 80 strikes per minute, the results of the analysis yield an airborne sound power level of for each impact hammer energy as presented in Table 1.9 below.

Table 1.9: Estimated sound power spectrum for the offshore piling activities.

Source	Sound power level (dB) at 1/1-octave band centre frequency (Hz)									dB(A)
	31.5	63	125	250	500	1k	2k	4k	8k	
Impact Piling Hammer (4,400 kJ)	122	133	146	138	127	124	120	114	111	**134**
Impact Piling Hammer (3,000 kJ)	121	131	144	136	125	122	118	112	109	**132**

1.4.3 Methodology

1.4.3.1 The MDS is represented by impact piling for the foundations of the Mona Offshore Wind Turbines and OPS. The following scenarios have been considered:

- Piled Jacket foundations for the wind turbines and OSP foundations using an impact hammer with a maximum energy of 4,400 kJ for up to 6 hrs 21 minutes
- Pile Jacket foundations for the wind turbine foundations using an impact hammer with maximum hammer energy of 3,000 kJ for up to 6 hrs and 21 minutes at two concurrent locations up to 15 km apart.

1.4.3.2 The parameters forming the basis of the maximum design scenario are presented in Table 1.10 below.

Table 1.10: Maximum design scenario for impact piling.

Parameter	Maximum design scenario
Pile diameter (m)	5
Penetration depth (m)	75
Hammer energy (kJ) (OSPs and 16x wind turbine locations)/(48x wind turbine locations)	4,400/3,000
Number of strikes	26,690
Total duration (mins)/(hours)	381/6.35
Number of concurrent events	2
Minimum spacing between turbines/concurrent events (m)	15,000

1.4.3.3 The piling process involves the following:

- **Initiation:** The initial strikes of the pile starting at as low a strike-rate as possible
- **Soft start:** Increasing the strike rate to approximately 10% of the maximum hammer energy
- **Standard operation:** The strike rate is increased to the standard operational value.

1.4.3.4 The maximum design scenarios for the impact piling schedule is presented in Table 1.11 and Table 1.12 below.

Table 1.11: Maximum design scenario for impact piling schedule (OSPs and 16 wind turbine locations).

Stage	Duration (mins)	Hammer energy (kJ)	Strike rate (per minute)	Number of strikes	Description
Initiation	10	320	1	10	Preparing the piles (alignment etc.) with 1 strike every 90 seconds.
Soft start	20	440	10	200	Soft start at low hammer energy
Ramp up	20	440-4,400	15	300	Increase in hammer energy after soft start
Maximum power	331	4,400	80	26,480	Driving piles at maximum hammer energy

Table 1.12: Maximum design scenario for impact piling schedule (48 wind turbine locations).

Stage	Duration (mins)	Hammer energy (kJ)	Strike rate (per minute)	Number of strikes	Description
Initiation	10	320	1	10	Preparing the piles (alignment etc.) with 1 strike every 90 seconds.
Soft start	20	320	10	200	Soft start at low hammer energy
Ramp up	20	320-3,000	15	300	Increase in hammer energy after soft start
Maximum power	331	3,000	80	26,480	Driving piles at maximum hammer energy

1.4.3.5 Numerical modelling has been used to predict noise impacts in the frequency range of 31.5 Hz and 250 Hz. Beyond 250 Hz, the number of points per element required to undertake the calculations, and thereby the computational time, increases significantly. In the frequency range defined, the attenuation effects due to air absorption are less. Moreover, the CNPE method shows that the attenuation rate is slower under downward refraction and the sound propagates cylindrically and reduces at a rate proportional to inverse of the distance. This is slower than the rate of attenuation for a point source which reduces at a rate proportional to the inverse of the square of the distance.

1.4.3.6 Indicative calculations of the noise impacts in the frequency range between 500 Hz and 8 kHz have been undertaken in line with the guidance in the IoA's Supplementary Guidance Note 6, as discussed in section 1.2.9 above. This equation does not fully account for the effects of cylindrical propagation due to downward refraction but does account for air absorption which is the more prevalent propagation losses associated with this frequency range.

1.4.3.7 The guidance provides the following equation to calculate the variation in noise level L_s from wind turbines with distance r from the source, also accounting for the frequency dependent absorption coefficient ΔL_a as defined in ISO 9613-2:1996.

$$L = L_s - 20\log_{10}(r) - 11 + 3 - \Delta L_a + 10\log_{10}\left(\frac{r}{700}\right) \quad (2)$$

1.4.3.8 Indicative calculations of the noise impacts have been undertaken in line with the guidance in ISO 9613-2:1996 in downwind conditions at various distances to assess where the impacts change. A temperature of 15°C and relative humidity of 15% have been assumed to calculate the atmospheric attenuation coefficients. The -11 dB term in equation 2 above relates to the losses associated with a wave spreading spherically away from the source with no influence from any reflecting surfaces. The +3 dB term in equation 2 accounts for the increase in sound level due to constructive interference between the direct and reflected waves off a totally reflecting surface.

1.4.4 Results

1.4.4.1 The results show that no high impacts are predicted at distances greater than 4 km from the boundary of the Mona Array Area, with no medium impacts beyond 9 km.

1.4.4.2 The nearest onshore receptors along the North Wales coast are approximately 30 km from the boundary of the Mona Array Area and thus impacts due to offshore construction are predicted to be negligible overall.

1.5 Onshore construction noise and vibration assessment

1.5.1 Methodology

Construction noise

1.5.1.1 The construction noise impacts have been predicted based upon a construction plant list for each of the various activities required within the Mona Onshore Development Area. The full list of plant for each scenario is presented in Appendix A. The source data presented in Appendix A has been corrected for the 'on-time' which has been defined as the proportion of the day, evening, or night-time period for which the plant is likely to be in operation.

1.5.1.2 The construction working hours proposed are 7am to 7pm from Monday to Saturday. As such, the assessment has been undertaken with reference to the Saturday criteria for daytime only activities since receptors are likely to be more sensitive on weekends. Construction noise impacts due to trenchless techniques have been assessed against the night-time criteria due to the potential for night-time working.

1.5.1.3 Mitigation measures will be adopted via the implementation of a construction noise and vibration plan (see the Outline Construction Nosie and Vibration Plan (Document

reference J 26.3)). Table B.1 in Annex B of BS 5228-1:2009+A1:2014 outlines typical losses associated with construction noise mitigation measures. A summary is provided in Table 1.13 below.

Table 1.13: Noise reduction levels for typical construction plant mitigation.

Mitigation measure	Indicative reduction in noise level	Justification/source
Localised acoustic screening.	Up to 10 dB	The effectiveness of an acoustic barrier is dependent upon the difference in path length between the sound travelling the shortest path between source and receiver and the increased path over the top of a barrier. Section F.2.2.2 of BS 5228:2009+A1:2014 states: '*if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier and of 10 dB when the noise screen completely hides the sources from the receiver.*'
Enhanced sound reduction equipment on diesel or petrol engines.	Between 5 and 10 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014
Ventilated enclosures around breakers and rock drills.	Up to 20 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014
Ventilated acoustic shed for the use of rotary drills and boring plant.	Up to 15 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014
Electric or hybrid construction plant.	Variable.	The use of electrically powered construction equipment would reduce the noise emitted from engines and exhausts. However, the actual noise reduction is dependent upon the equipment used.

1.5.1.4 Other effective mitigation measures which may be used as alternative measures or in conjunction with the measures outlined in Table 1.13 above include:

- Limiting the use of loud equipment during the night-time
- Increasing the distance between concurrent construction works
- Positioning plant items away from noise-sensitive receptors
- Avoiding the simultaneous operation of loud plant items, where possible.

1.5.1.5 Two methodologies have been adopted to determine the potential noise impacts depending on whether the activity is likely to be concentrated within a single area or spread along sections of the Onshore Cable Corridor, as detailed below.

Construction activities concentrated within one area

1.5.1.6 Construction activities likely to be concentrated within one area have been modelled using 3D acoustic modelling software (SoundPLAN v8.2). The construction plant has been assumed to be situated within the temporary construction compounds and the

sources have been modelled along the boundary closest to receptors to represent the maximum design scenario with an average height of 2 m above local ground level.

1.5.1.7 An acoustic barrier of height 2.4 m has been included in the model around the perimeter of the construction compounds. This barrier is likely to take the form of a spoil bund constructed of the material removed during construction. The works assessed using this method include:

- Establishing access and temporary construction compounds
- Transition Joint Bay (TJB) and joint bay excavation
- TJB and joint bay base construction
- Jointing of cables in TJBs and joint bays
- Backfill over TJB and joint bays
- Trenchless technique compounds entry/exit pits
- Onshore Substation construction:
  - Groundworks
  - Building foundation works
  - Building fabrication and plant installation.

Transient construction activities along the Mona Onshore Cable Corridor

1.5.1.8 There are some construction activities which are likely to be more transient in nature than those listed above and thus spread along sections of the Onshore Cable Corridor. It is not known exactly where these works will occur at any given time and, as such, there would be a high degree of uncertainty in the output of any 3D acoustic model of the construction noise impacts.

1.5.1.9 An alternative method has been adopted whereby any construction activities which are likely to be transient and spread along the sections of the Onshore Cable Corridor have been predicted at various distances to determine where the impact magnitudes change within the proposed noise and vibration study areas.

1.5.1.10 Subsequent analysis of the number of residential receptors where a significant impact is predicted has been undertaken using Ordnance Survey (OS) Address Base Plus data and Geographic Information System (GIS) software. The impact magnitude bands are inserted as spatial buffers around the Mona Onshore Development Area at the distance at which the impact magnitude changes. The number of receptors within each band is then calculated to determine where effects may occur.

1.5.1.11 The works assessed using this method include:

- Site preparation
  - Fencing
  - Topsoil strip.
- Haul road construction
- Trench excavation and duct installation
- Trench backfill
- Trench route and topsoil reinstatement

- Haul road removal.

Construction vibration

1.5.1.12 The use of vibratory rollers for the dynamic compaction during the construction of the haul road, construction compounds, and Onshore Substation platform has been assessed to determine the likelihood of adverse impacts on nearby receptors.

1.5.1.13 The assessment has been undertaken with reference to the guidance in Table E.1 of BS 5228-2:2009+A1:2014. This guidance provides empirically derived formula for the prediction of vibration impacts arising from mechanised construction works. During start up and run down, the resultant PPV v_{res} may be calculated using the following equation:

$$v_{res} = k_t\sqrt{n_d}\left[\frac{A}{x + L_d}\right]^{1.5} \quad (3)$$

1.5.1.14 The impacts with distance during steady state vibratory compaction works may be predicted using the following:

$$v_{res} = k_s\sqrt{n_d}\left[\frac{A^{1.5}}{(x + L_d)^{1.3}}\right] \quad (4)$$

- v_{res}: PPV (mm/s)
- k_t and k_s: scaling factors associated with the probability of exceedance
- n_d: number of vibrating drums
- A: maximum amplitude of drum vibration (mm)
- x: source-receiver separation distance along the ground surface (m)
- L_d: vibrating roller drum width (m).

1.5.1.15 It is understood that vibratory piling may be required for the installation of the trenchless technique entry and exit pits, as well as for the construction of the Mona Onshore Substation platform. The potential vibration impacts have been predicted based on the guidance in Table E.1 of BS 5228-2:2009+A1:2014 which provides the following equation for the prediction of vibration impacts with distance due to vibratory piling:

$$v_{res} = \frac{k_v}{x^{\delta}} \quad (4)$$

- v_{res}: PPV (mm/s)
- k_v: scaling factors associated with the probability of exceedance
- x: source-receiver separation distance along the ground surface (m)
- δ: dimensionless empirical constant
  - Start up and run down: δ = 1.2
  - All operations: δ = 1.3

- Steady state operations: δ = 1.4.

Construction traffic

1.5.1.16 Indicative baseline traffic flows on key highway links within the traffic and transport study area are presented in Volume 3, Chapter 8: Traffic and Transport of the Environmental Statement.

1.5.1.17 These initial figures have been predicted using a mixture of site-specific surveys, comprising traffic counts over a two-week period, and detailed desktop reviews of existing studies and datasets.

1.5.1.18 The change in the BNL due to the introduction of addition vehicles onto local highways as part of the construction of the Mona Offshore Wind Project has been calculated using the method outlined in CRTN, as detailed in paragraph 1.2.8.3.

1.5.1.19 The 18-hour BNL $L_{10.18h}$ is calculated using the linear equation for Chart 3 of CRTN reproduced in equation 2 below. This equation is empirically and depends upon the traffic flow Q at a mean speed of V = 75 km/h assuming no HGVs.

$$L_{10,18hr} = 29.1 + 10\log_{10} Q \quad (5)$$

1.5.1.20 This BNL is corrected adjusted by a correction C to account for variations in mean traffic speed V and the percentage of HGVs p using the empirically derived equation in Chart 4 of CRTN, as given by equation 6 below.

$$C = 33\log_{10}\left(V + 40 + \frac{500}{V}\right) + 10\log_{10}\left(1 + \frac{5p}{V}\right) - 68.8 \quad (6)$$

1.5.2 Results

Construction noise

1.5.2.1 The results of the 3D acoustic modelling are presented in Figure 1.6 to Figure 1.26 below, with full results tabulated in Appendix B. The relevant construction periods are as follows:

- Day:
  - 7am to 7pm on weekdays
  - 7am to 1pm on Saturdays
- Evening and weekends:
  - 7pm to 11pm on weekdays
  - 1pm to 11pm on Saturdays
  - 7am to 11pm on Sundays
- Night:
  - 11pm to 7am every day

1.5.2.2 It is understood that only trenchless techniques have the potential to require night-time working. However, it is further understood that generators and dewatering pumps may be required to operate 24/7 and thus an assessment has been undertaken of these two items in operation during the night-time period.

1.5.2.3 The results of the assessment show that low impacts are predicted when the measures outlined in Table 1.13 are adopted when undertaking the works.

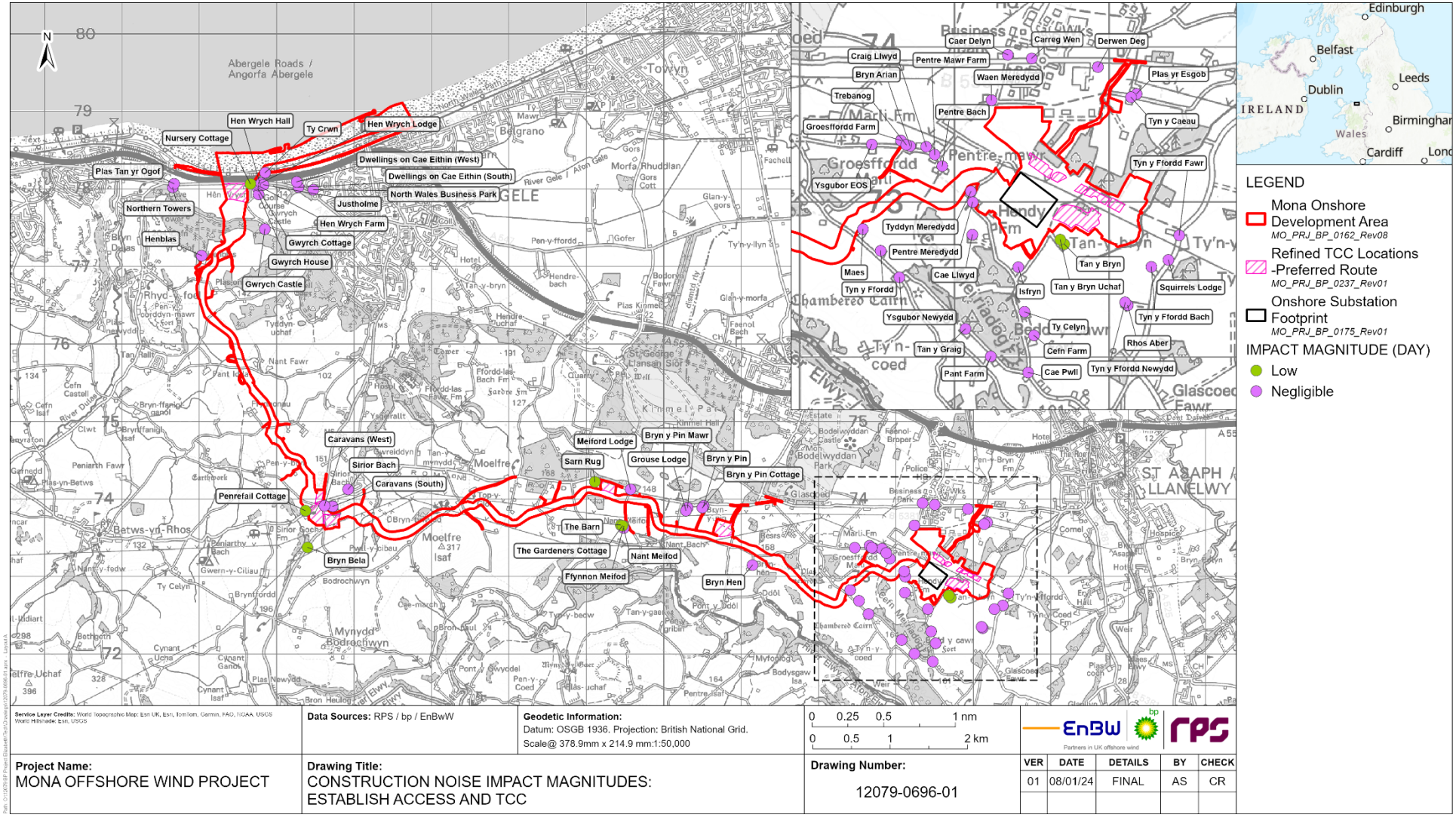


Figure 1.6: Daytime construction noise impact magnitudes: Establish access and TCC

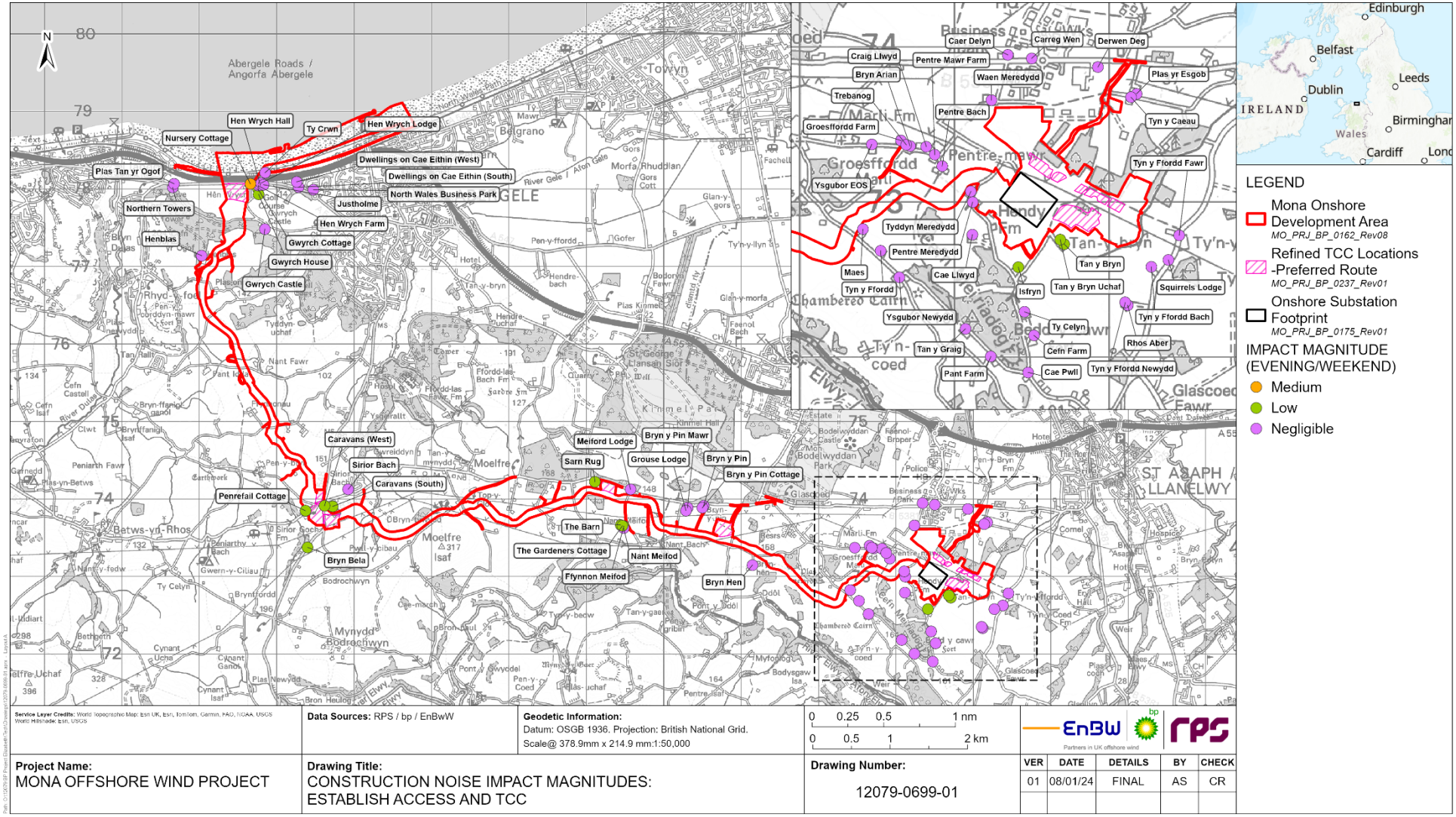


Figure 1.7: Evening/weekend construction noise impact magnitudes: Establish access and TCC

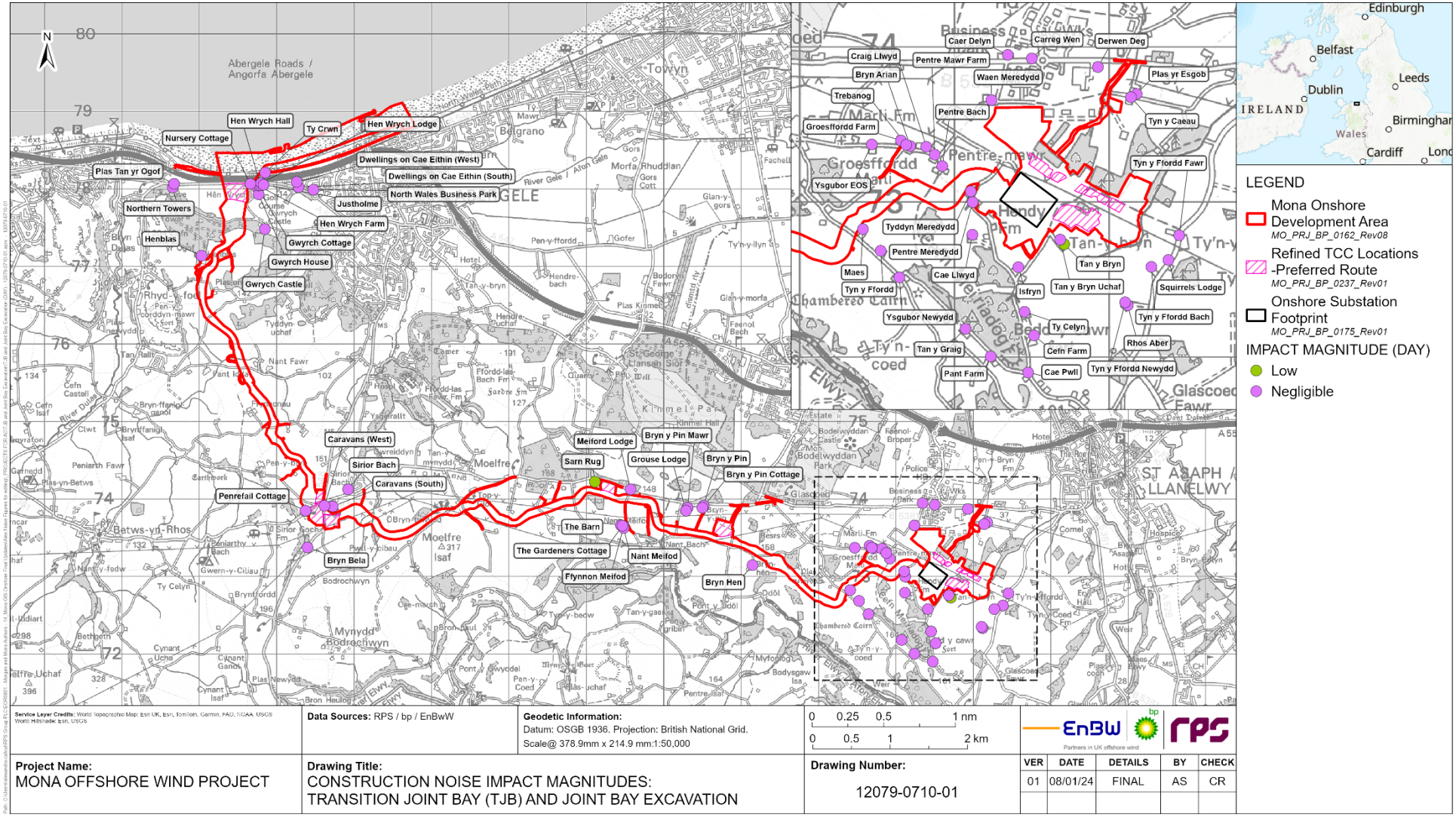


Figure 1.8: Daytime construction noise impact magnitudes: TJB and joint bay excavation

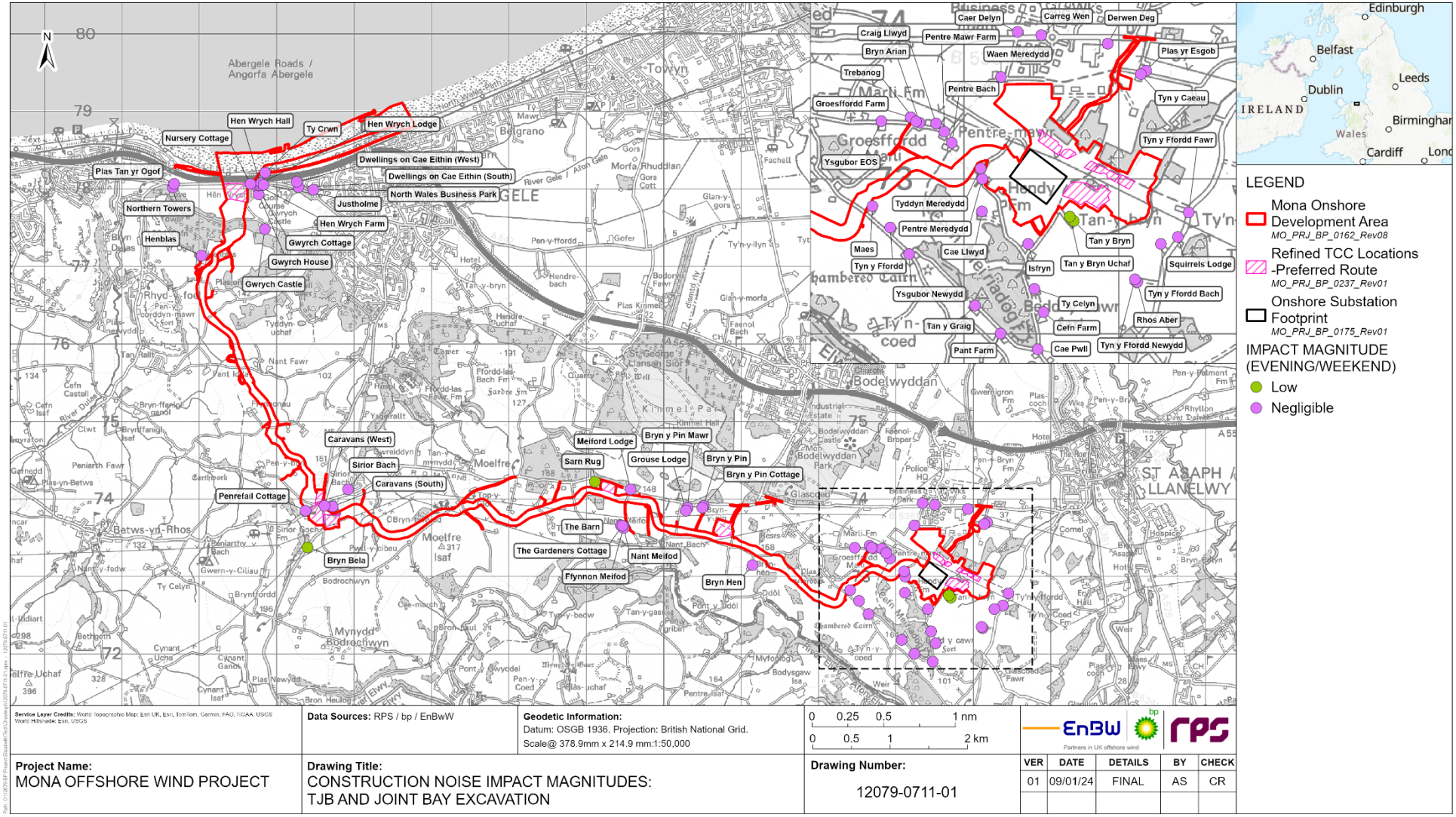


Figure 1.9: Evening/weekend construction noise impact magnitudes: TJB and joint bay excavation

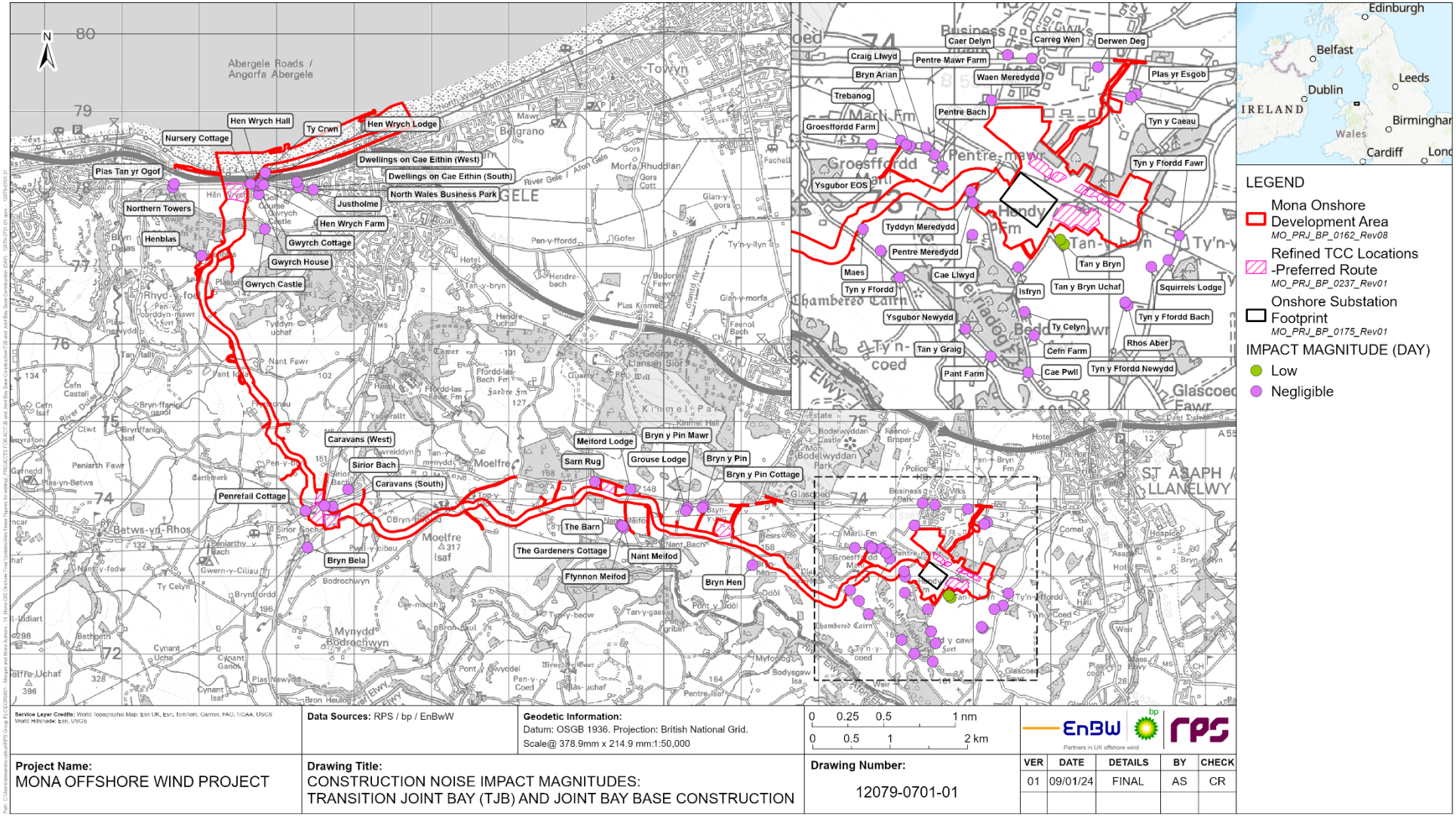


Figure 1.10: Daytime construction noise impact magnitudes: TJB and joint bay base construction

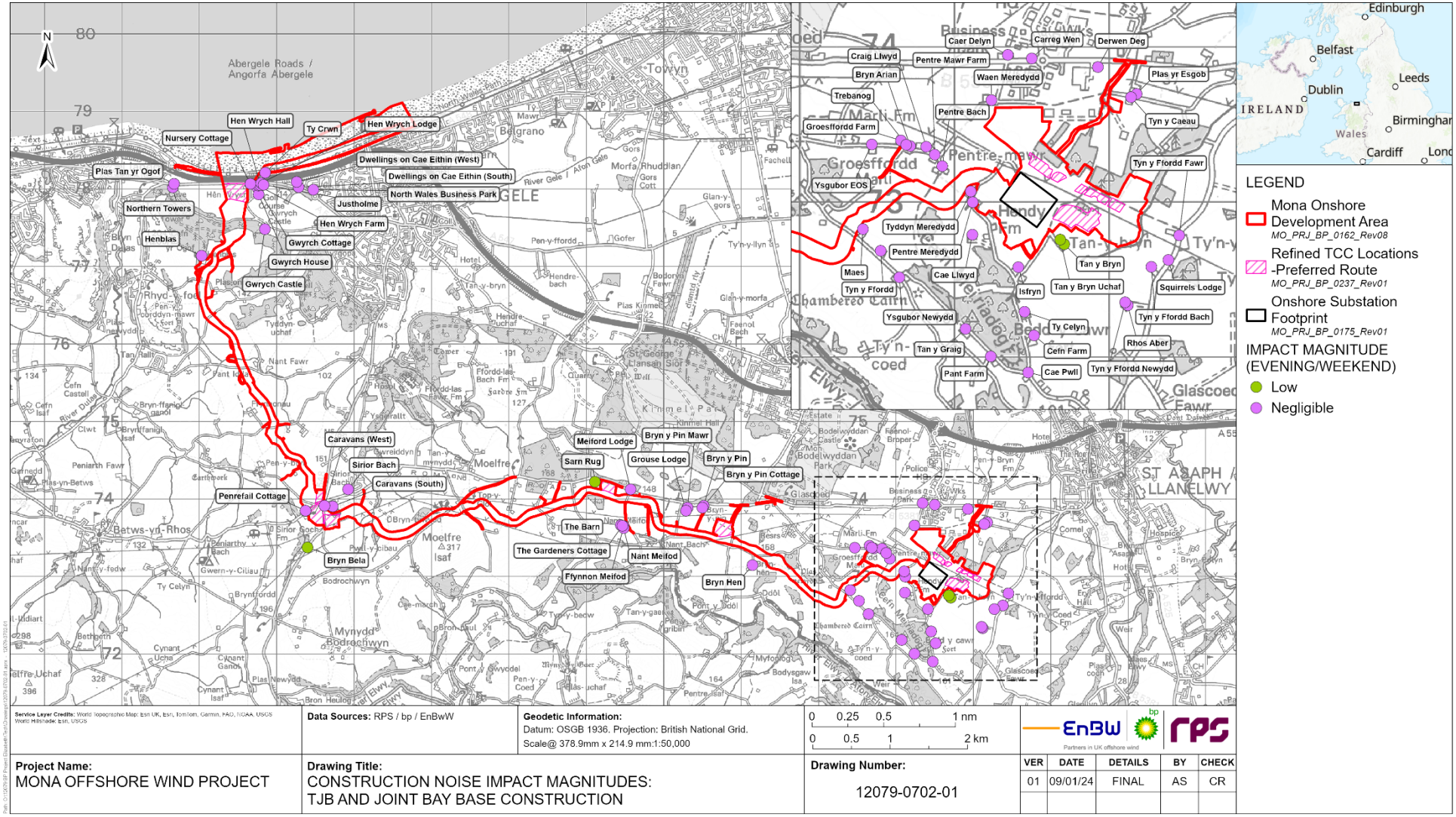


Figure 1.11: Evening/weekend construction noise impact magnitudes: TJB and joint bay base construction

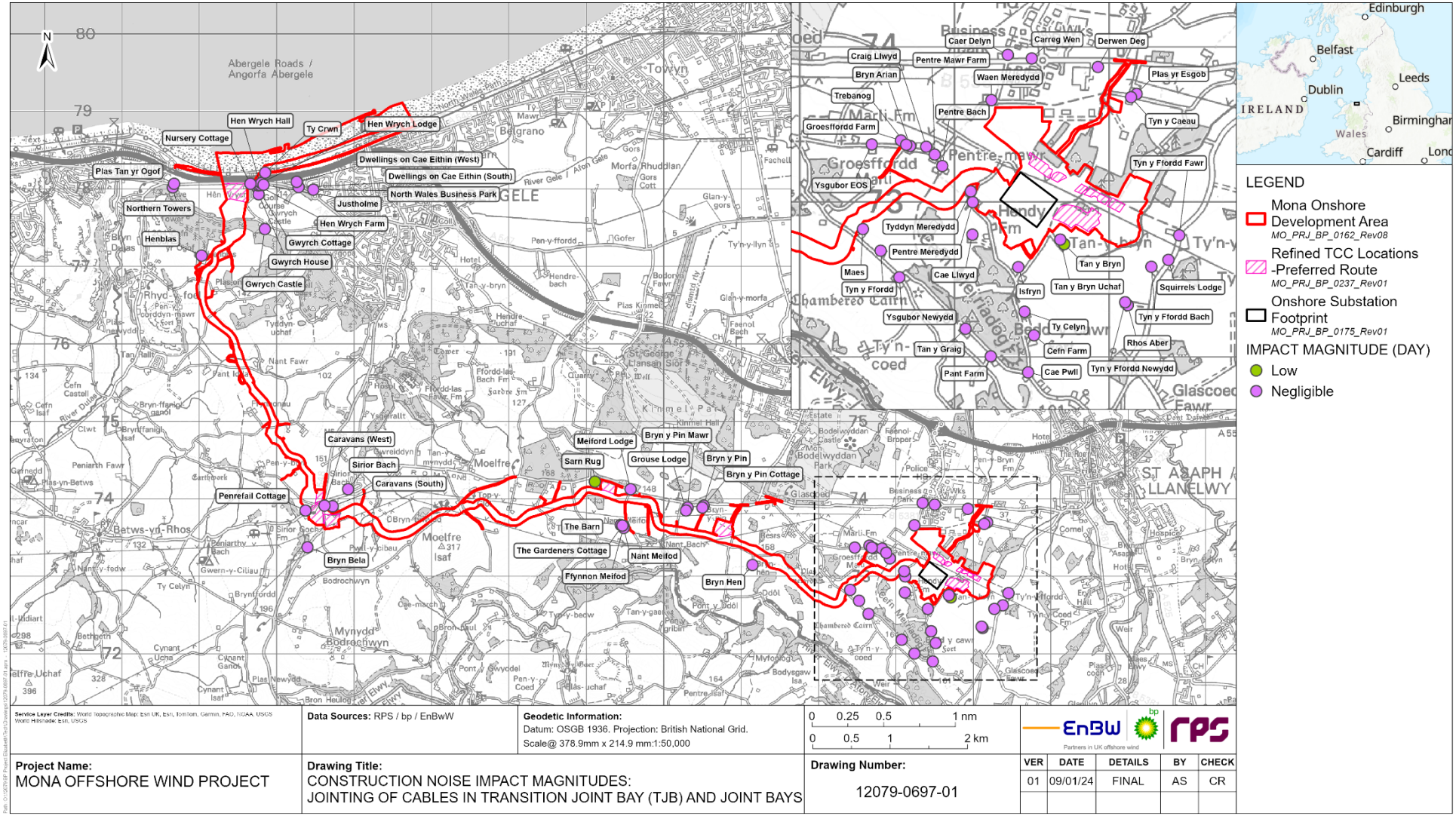


Figure 1.12: Daytime construction noise impact magnitudes: Jointing of cables in TJB and joint bays

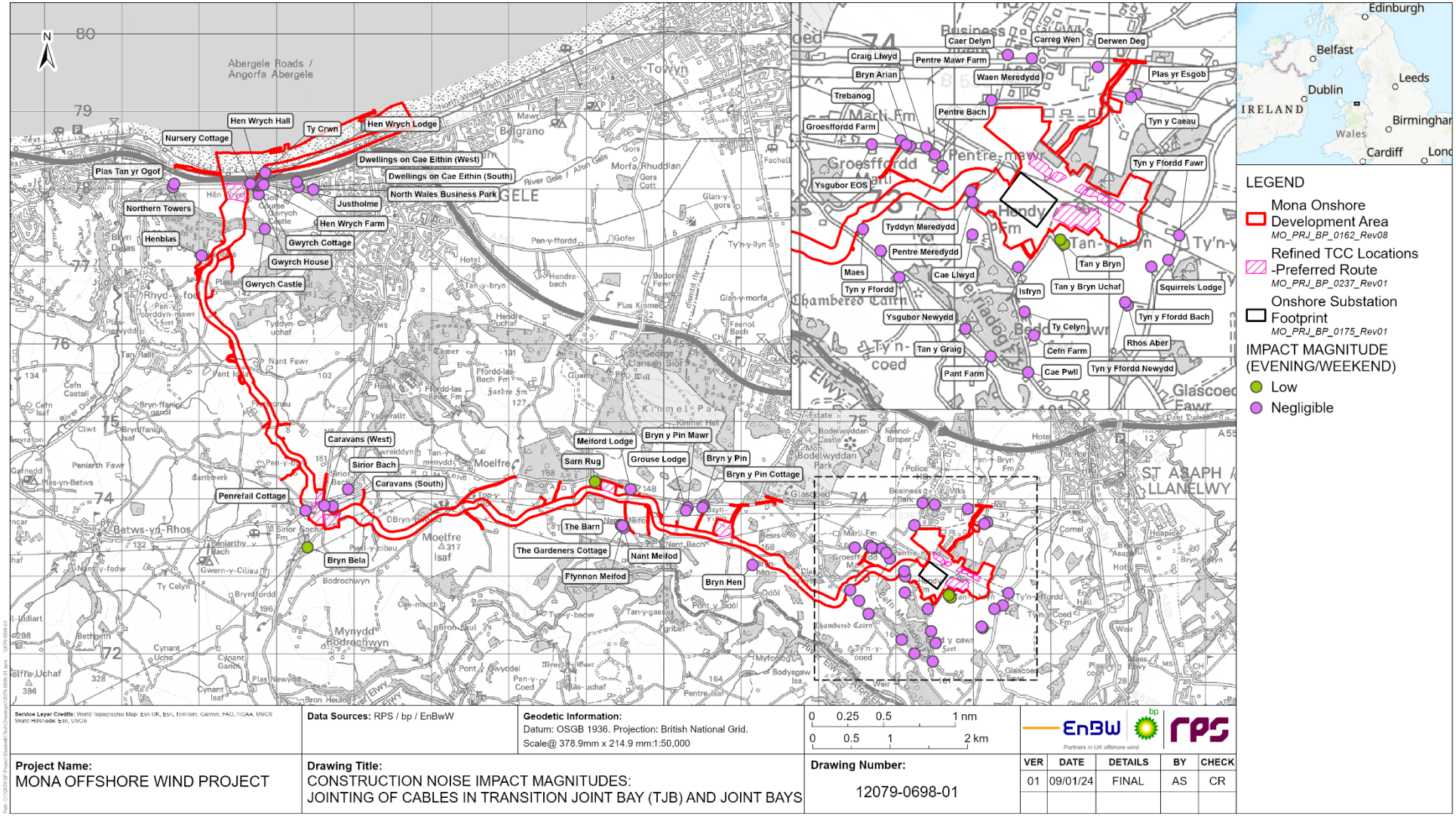


Figure 1.13: Evening/weekend construction noise impact magnitudes: Jointing of cables in TJB and joint bays

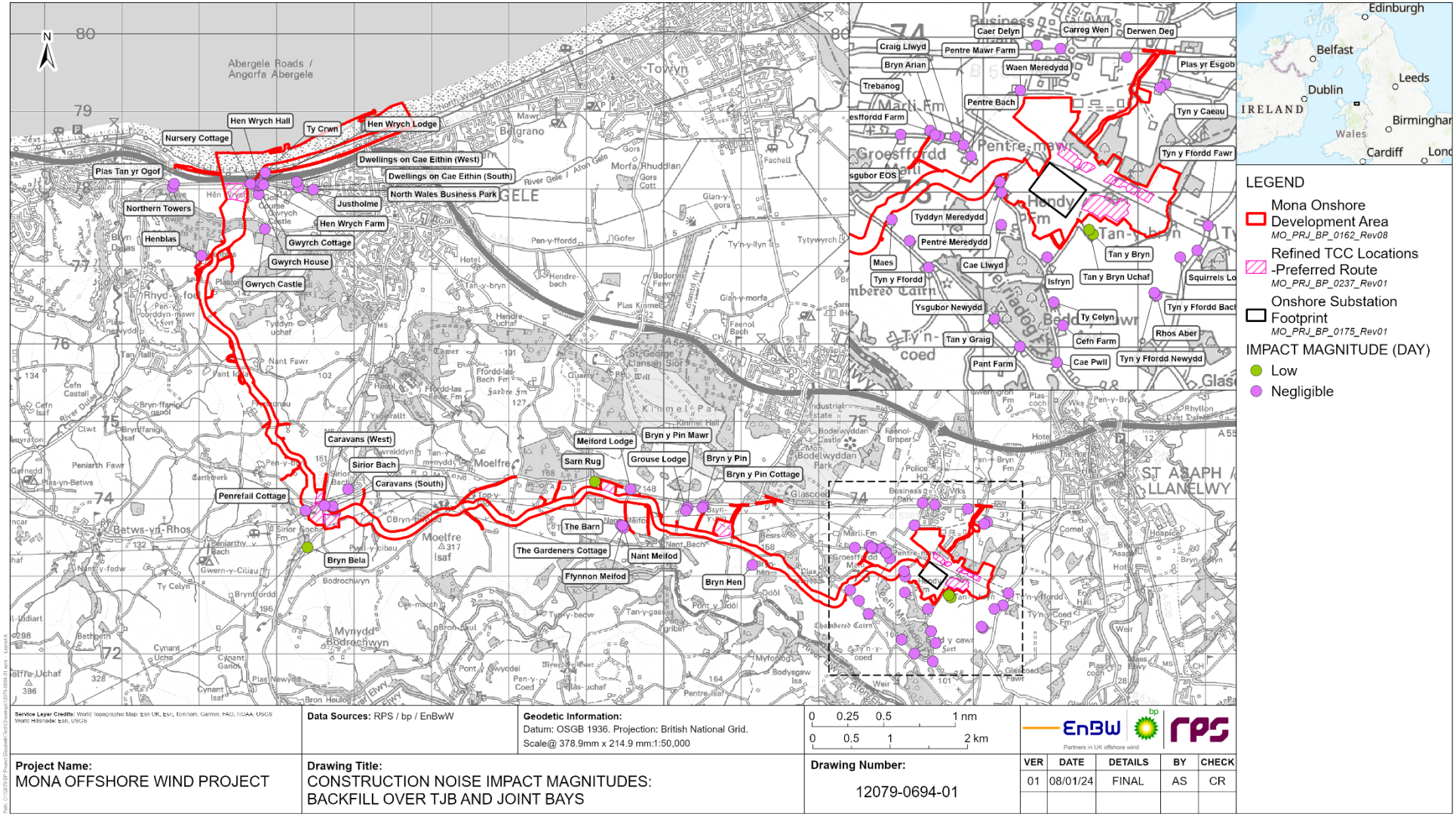


Figure 1.14: Daytime construction noise impact magnitudes: Backfill over TJB and joint bays

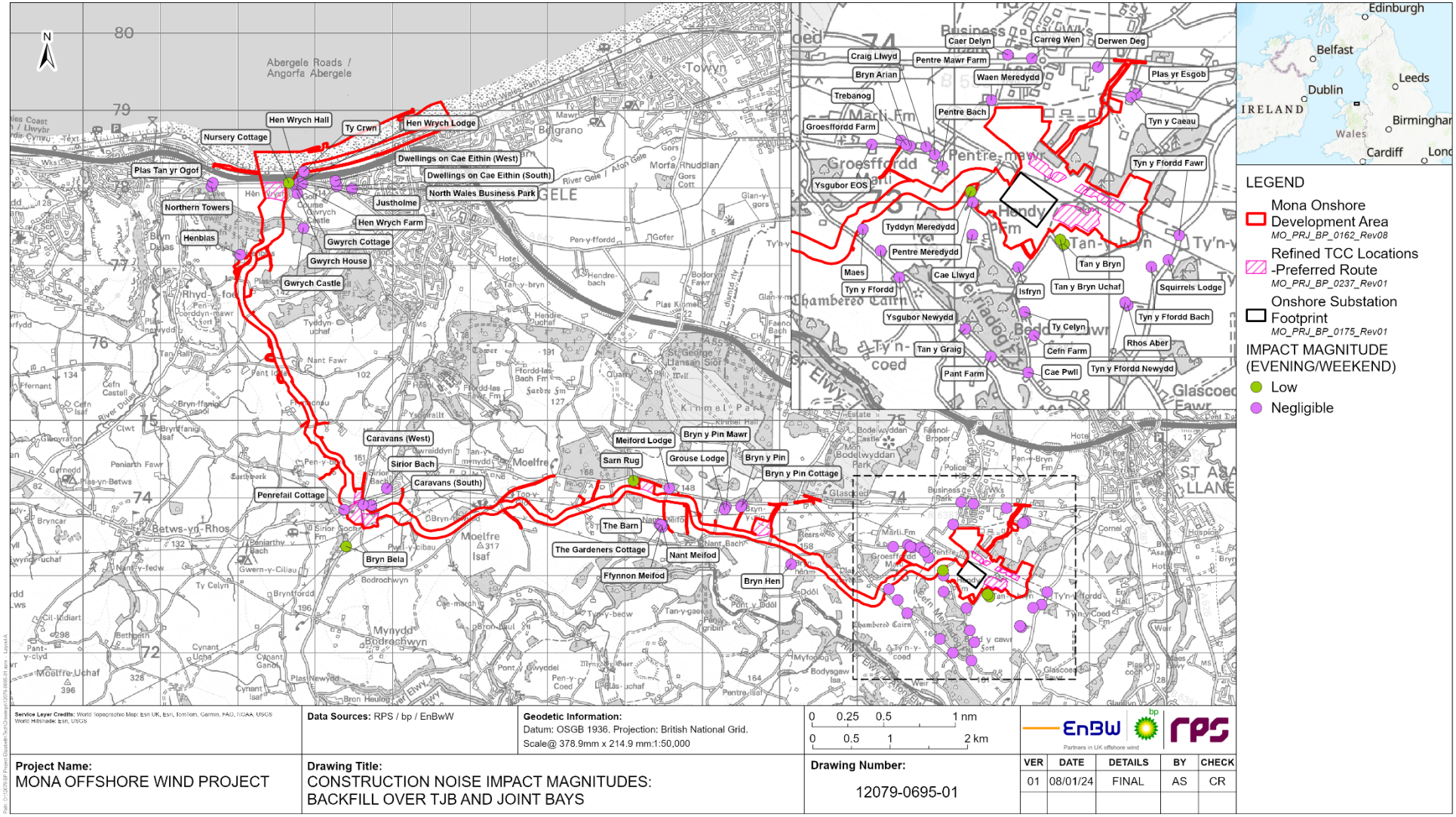


Figure 1.15: Evening/weekend construction noise impact magnitudes: Backfill over TJB and joint bays

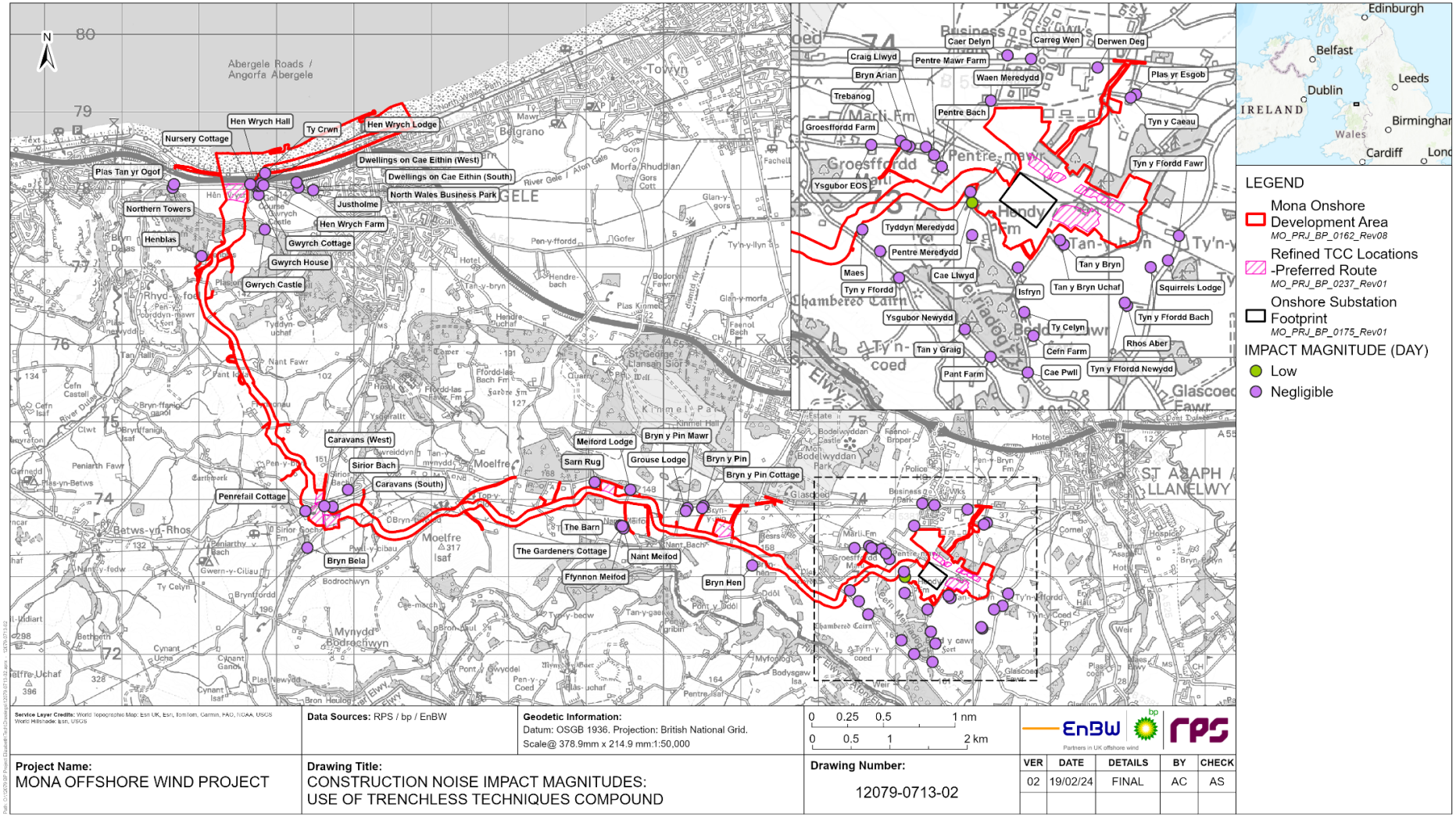


Figure 1.16: Daytime construction noise impact magnitudes: Use of trenchless techniques compound

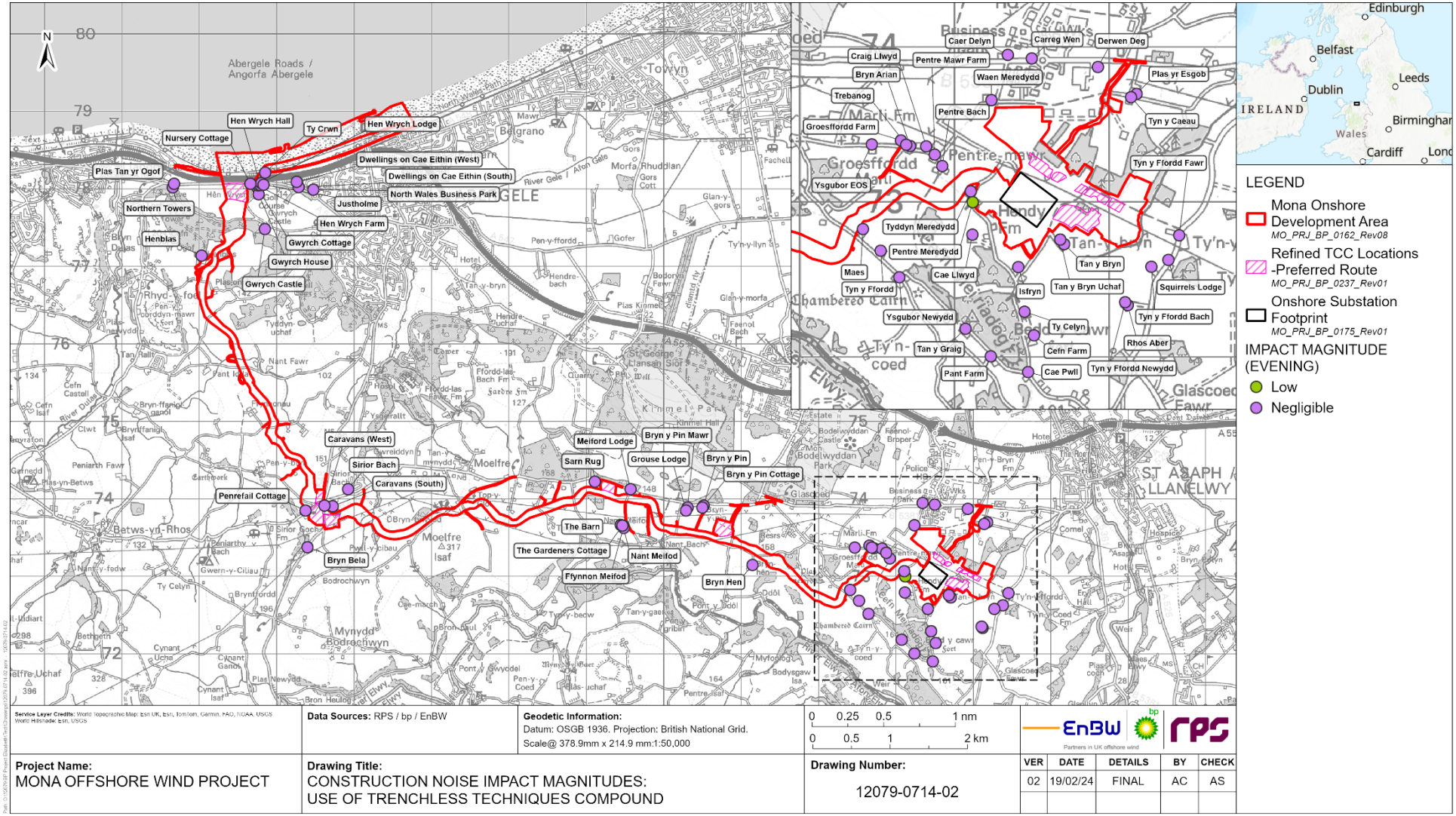


Figure 1.17: Evening/weekend construction noise impact magnitudes: Use of trenchless techniques compound

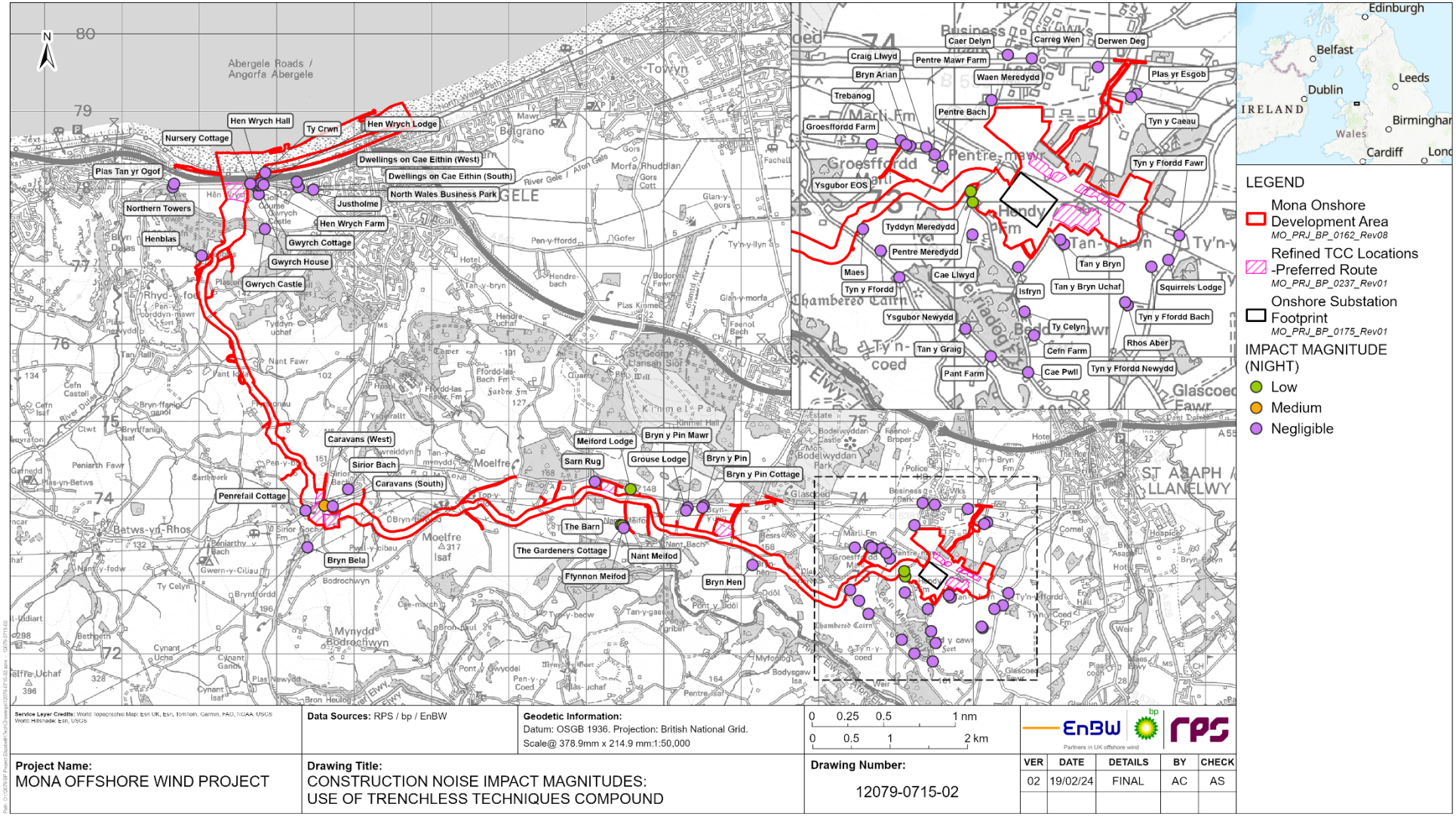


Figure 1.18: Night-time construction noise impact magnitudes: Use of trenchless techniques compound

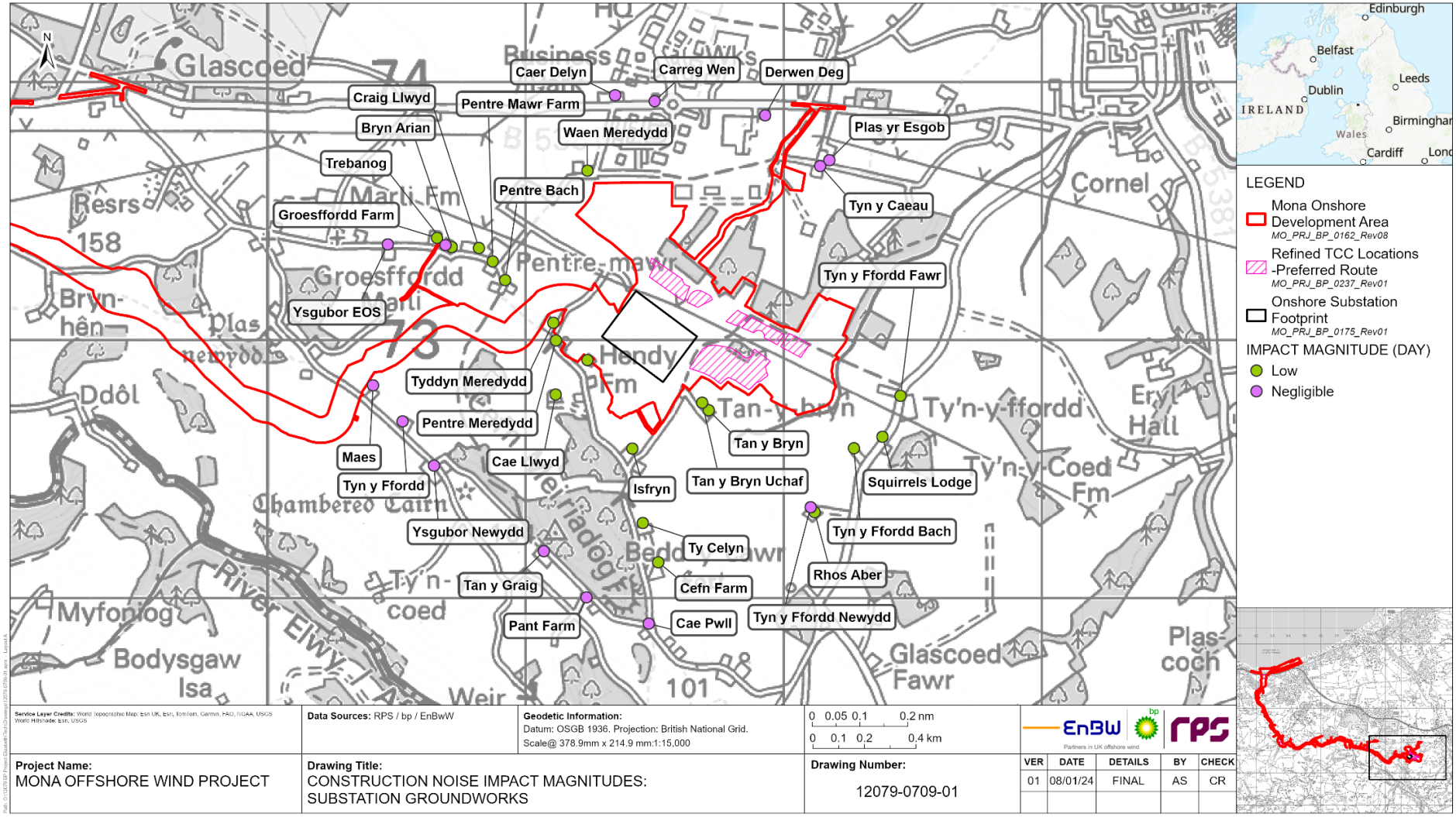


Figure 1.19: Daytime construction noise impact magnitudes: Substation groundworks

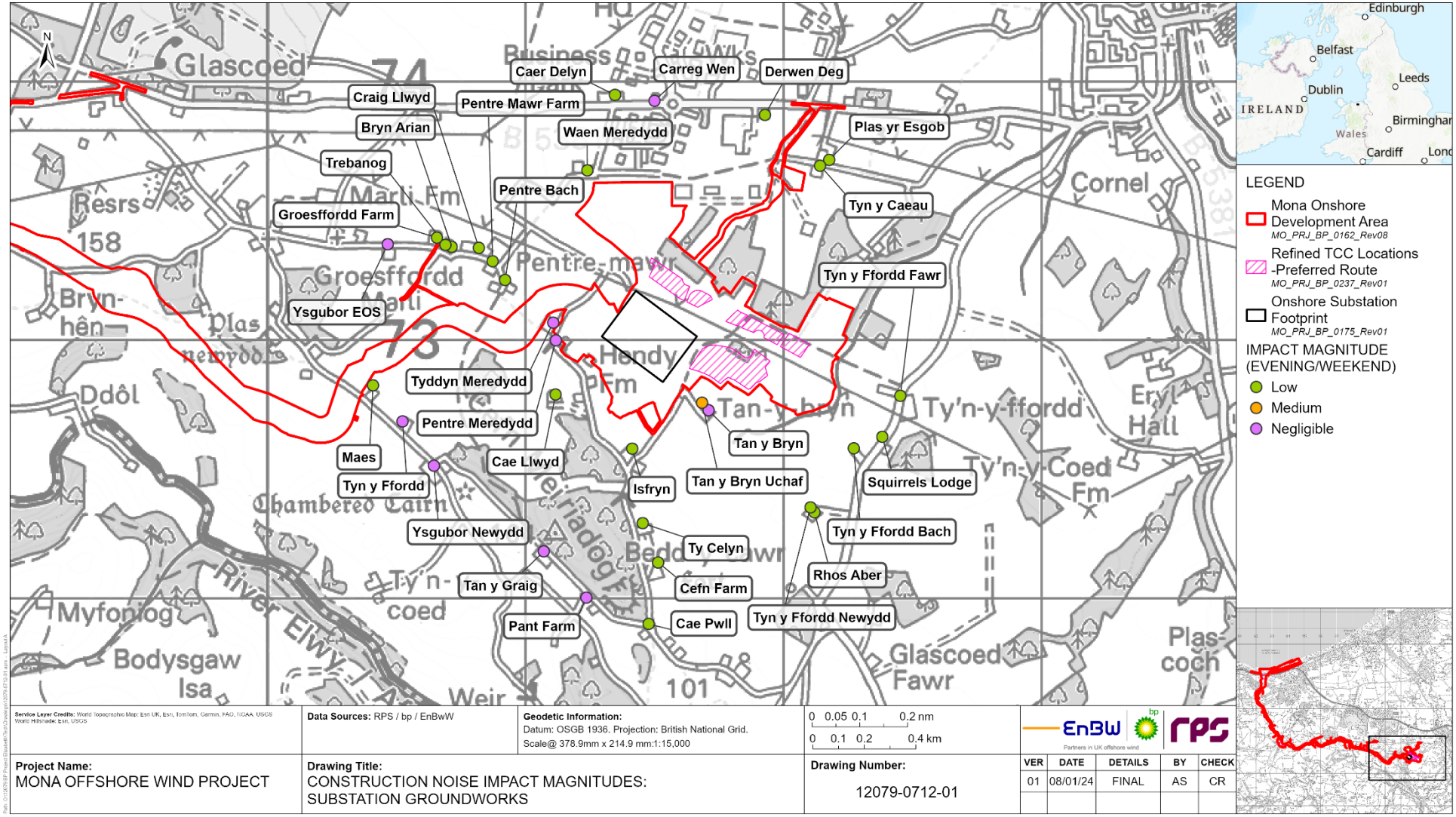


Figure 1.20: Evening/weekend construction noise impact magnitudes: Substation groundworks

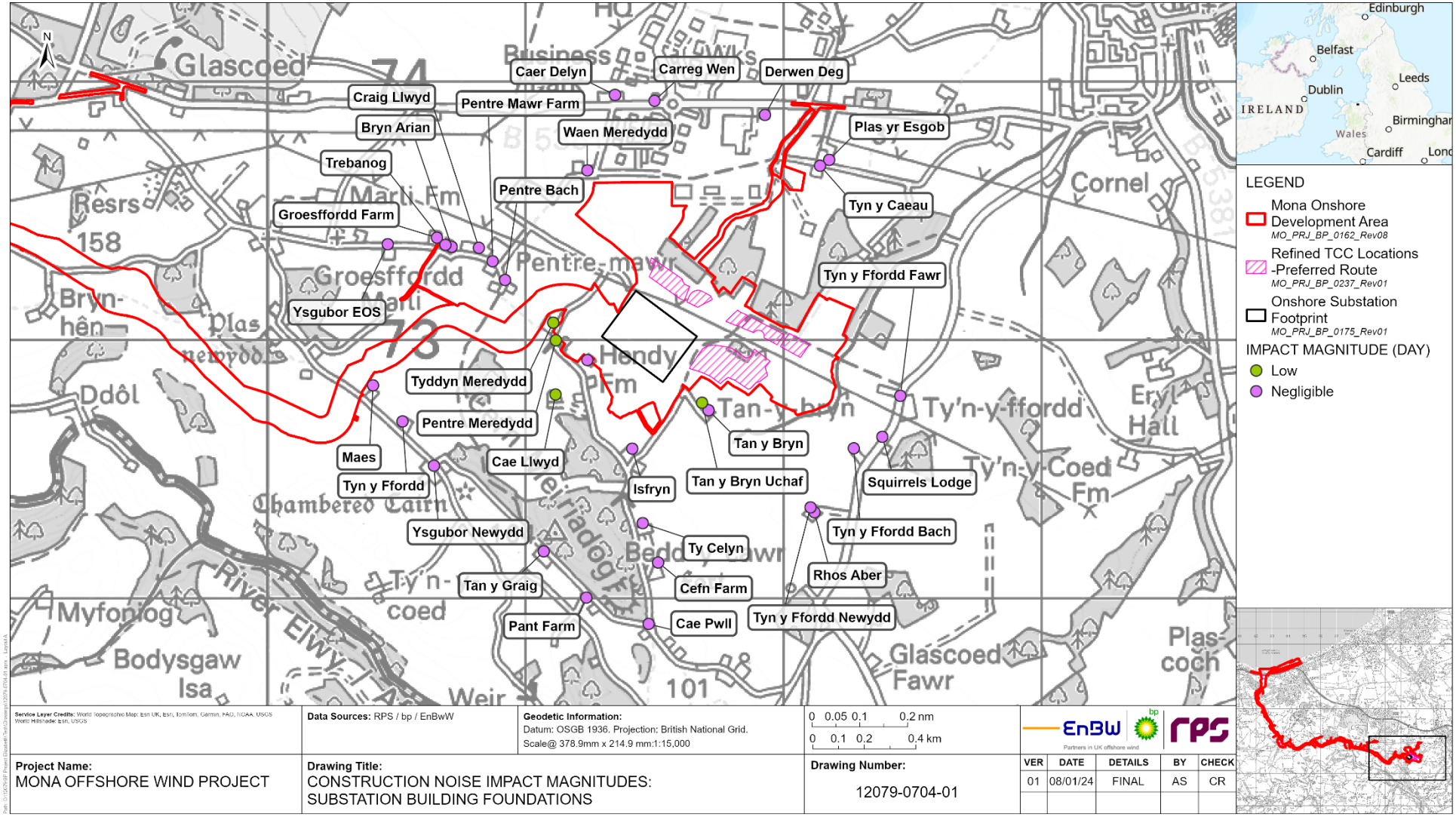


Figure 1.21: Daytime construction noise impact magnitudes: Substation building foundations

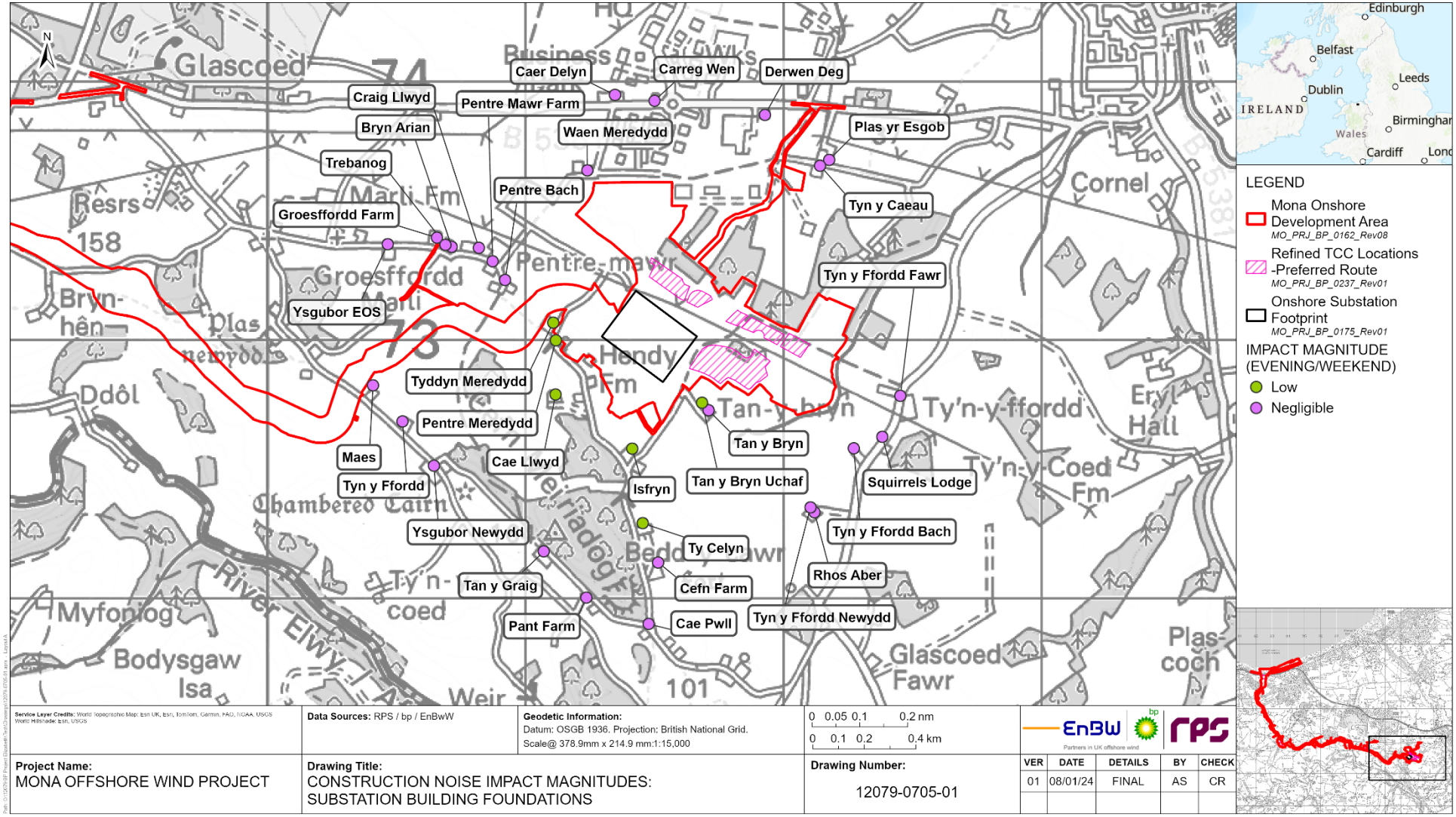


Figure 1.22: Evening/weekend construction noise impact magnitudes: Substation building foundations

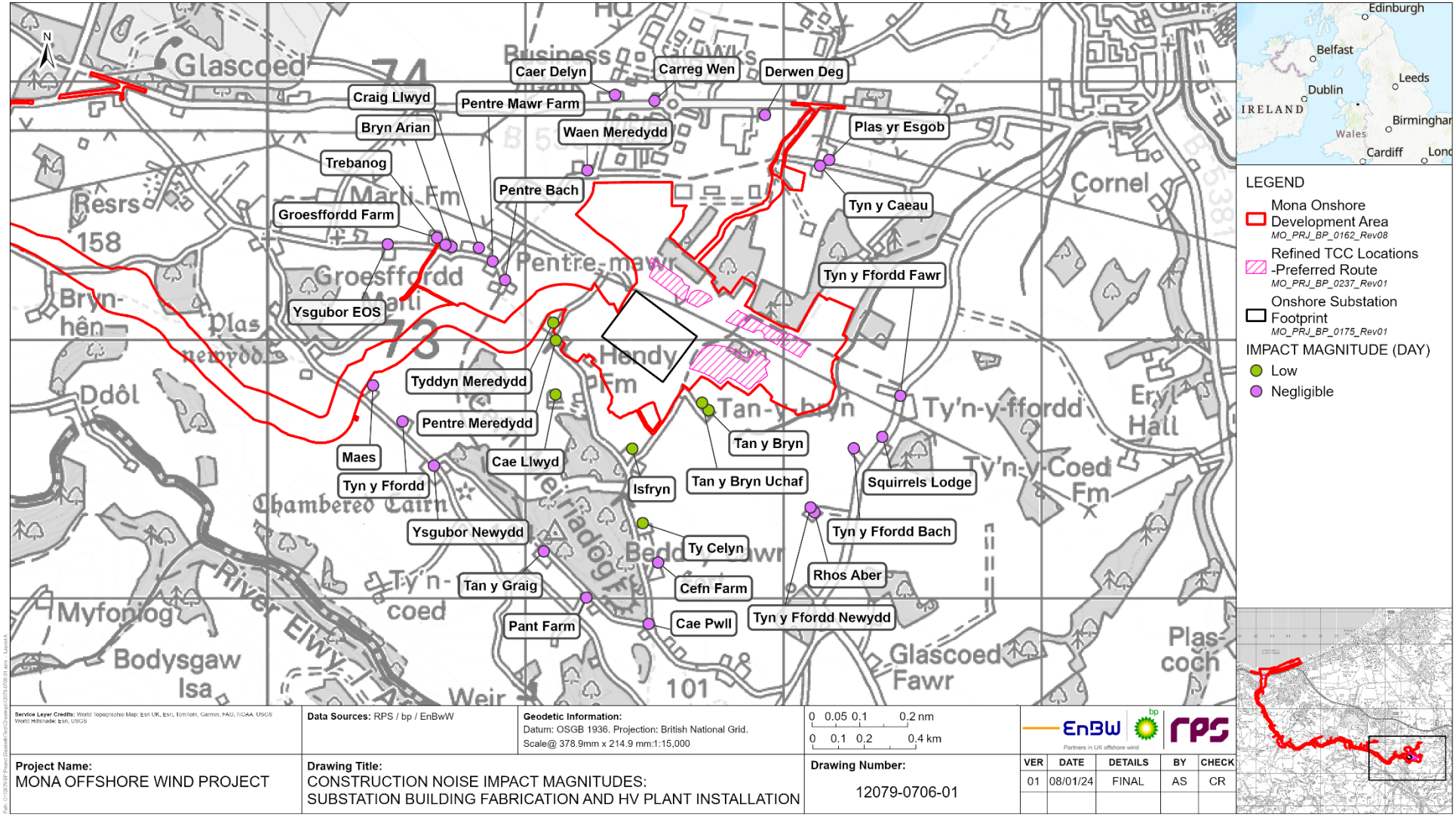


Figure 1.23: Daytime construction noise impact magnitudes: Substation building fabrication and plant installation

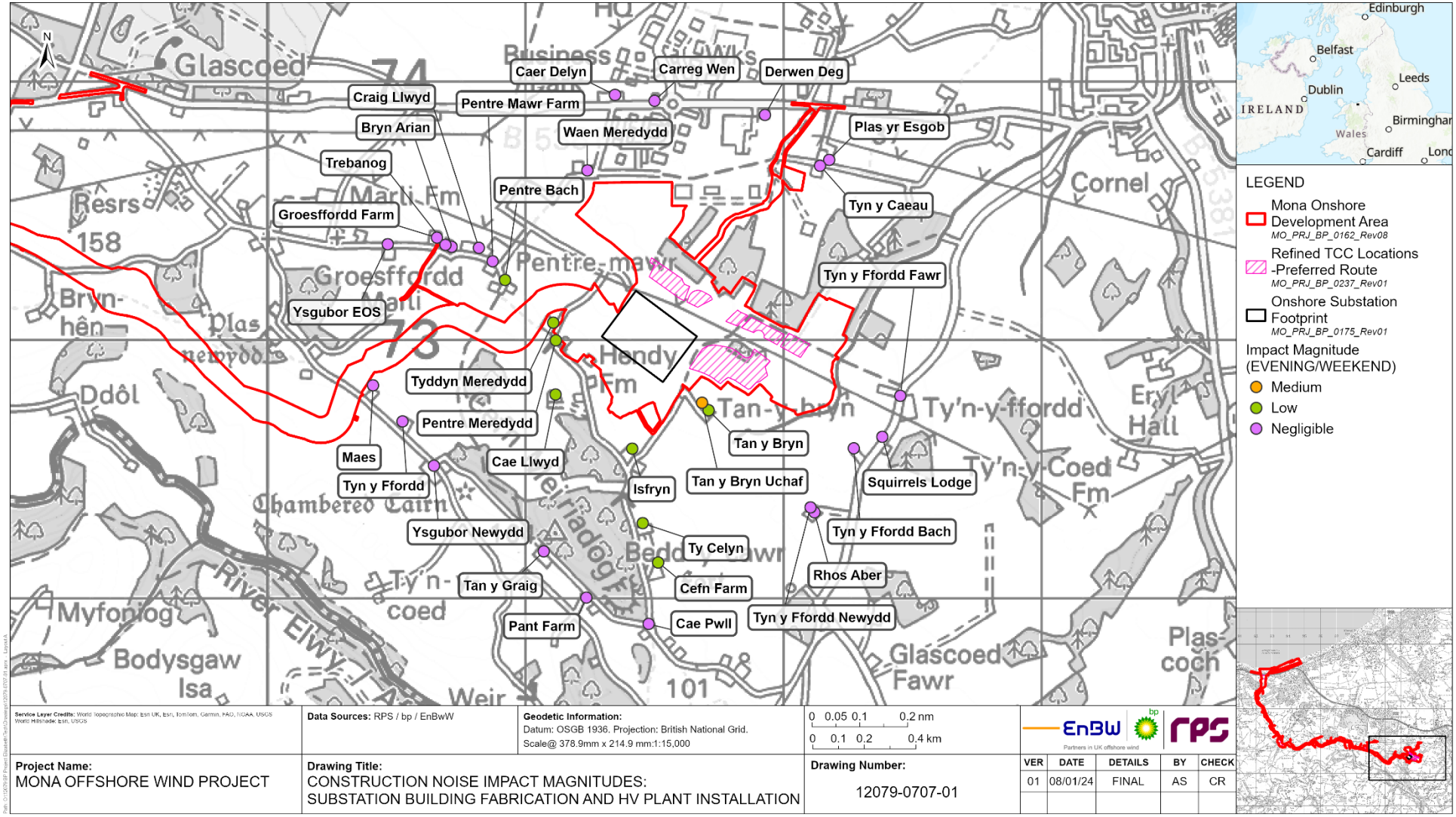


Figure 1.24: Evening/weekend construction noise impact magnitudes: Substation building fabrication and plant installation

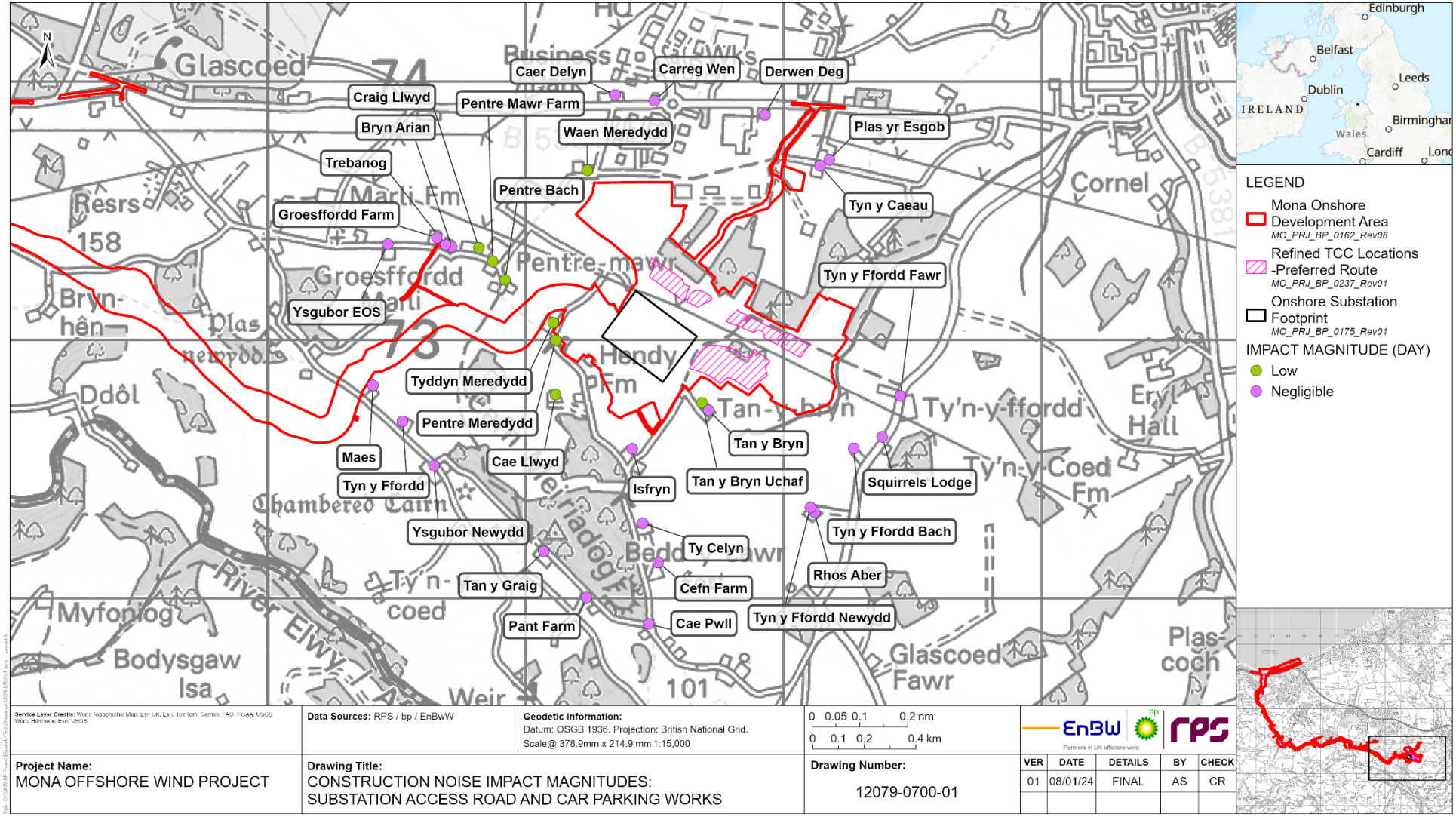


Figure 1.25: Daytime construction noise impact magnitudes: Substation access road and car parking works

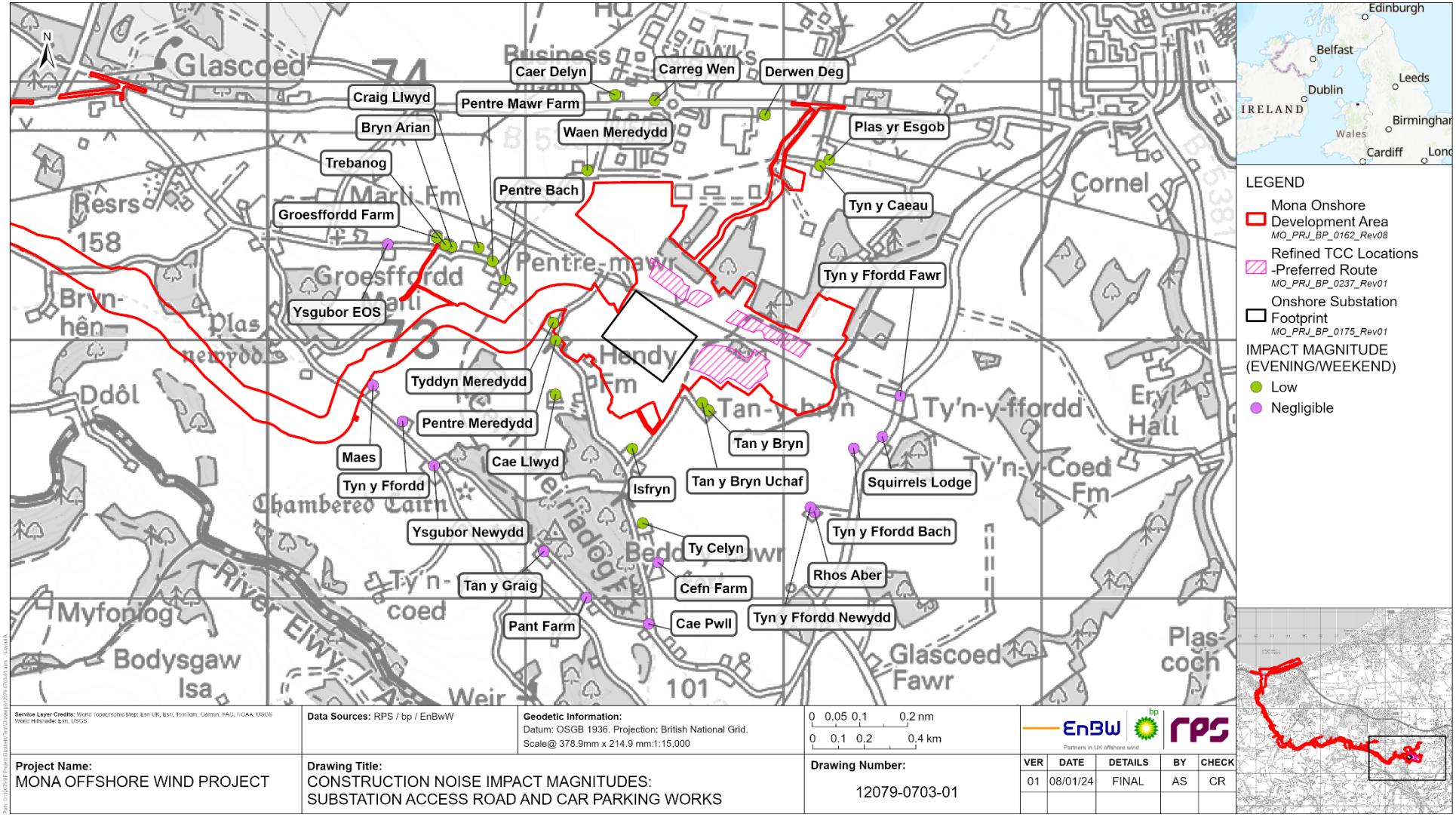


Figure 1.26: Evening/weekend construction noise impact magnitudes: Substation access road and car parking works

1.5.2.4 The results of the construction noise assessment for works spread along the Onshore Cable Corridor are presented in Table 1.14 below. The impacts have been predicted based upon the LOAEL at receptors where baseline sound levels were lowest to inform a robust assessment.

Table 1.14: Number of receptors per construction noise impact magnitude band (daytime).

Location	Impact Magnitude Band Distance (m)			Number of receptors per impact magnitude band		
	High	Medium	Low	High	Medium	Low
Haul Road Construction						
TCC1	6	9	12	0	0	4
TCC2	6	9	12	0	0	4
TCC4	4	6	18	0	0	4
TCC5	4	6	18	0	0	4
Site Preparation (including Fencing and Topsoil Strip)						
Landfall	43	75	335	6	1	82
Onshore cable corridor				16	10	143
Onshore substation				4	5	30
Trench Excavation and Duct Installation						
Landfall	33	59	266	6	1	82
Onshore cable corridor				16	10	143
Onshore substation				4	5	30
Trench Backfill						
Landfall	33	59	266	6	1	82
Onshore cable corridor				16	10	143
Onshore substation				4	5	30
Topsoil Reinstatement						
Landfall	42	74	334	16	10	63
Onshore cable corridor				4	2	163
Onshore substation				4	5	30
Haul Road Removal						
Landfall	47	84	375	16	15	85
Onshore cable corridor				6	2	163
Onshore substation				5	6	35

Table 1.15: Number of receptors per construction noise impact magnitude band (evening and weekends).

Location	Impact Magnitude Band Distance (m)			Number of receptors per impact magnitude band		
	High	Medium	Low	High	Medium	Low
Haul Road Construction						
TCC1	6	9	12	0	0	4
TCC2	6	9	12	0	0	4
TCC4	4	6	18	0	0	4
TCC5	4	6	18	0	0	4
Site Preparation (including Fencing and Topsoil Strip)						
Landfall	134	238	669	47	28	173
Onshore cable corridor				8	79	390
Onshore substation				20	14	49
Trench Excavation and Duct Installation						
Landfall	105	188	530	47	28	173
Onshore cable corridor				8	79	390
Onshore substation				20	14	49
Trench Backfill						
Landfall	105	188	530	47	28	173
Onshore cable corridor				8	79	390
Onshore substation				20	14	49
Topsoil Reinstatement						
Landfall	133	237	668	47	27	172
Onshore cable corridor				8	79	387
Onshore substation				20	14	49
Haul Road Removal						
Landfall	149	266	749	51	28	210
Onshore cable corridor				14	108	544
Onshore substation				20	16	61

1.5.2.5 The results are shown graphically in Figure 1.27 to Figure 1.34 below.

Construction vibration

1.5.2.6 Impact magnitude bands have been generated to count how many receptors will be impacted during the dynamic compaction of the haul road, construction of the temporary construction compounds, and the construction of the Mona Onshore Substation Platform. Consideration has also been given to the potential vibration impacts arising due to piling activities for the installation of the trenchless technique

entry/exit pits and construction of the Mona Onshore Substation Platform. The results are presented in Table 1.16 below.

Table 1.16: Number of receptors per construction vibration impact magnitude band.

Location	Impact Magnitude Band Distance (m)			Number of receptors per impact magnitude band		
	High	Medium	Low	High	Medium	Low
Dynamic Compaction						
Haul Road	10	26	60	1	16	20
Temporary construction compounds (onshore cable corridor).				0	1	2
Temporary construction compounds (onshore substation).				0	0	0
Onshore substation platform.				0	0	0
Vibratory Piling						
Trenchless technique entry/exit pits	10	23	58	0	1	2
Onshore substation platform.				0	0	0

1.5.2.7 It should be noted that the assessment has not accounted for any vibration control measures to be included as part of the Construction Noise and Vibration Management Plan (see the Outline Construction Noise and Vibration Plan (Document reference J 26.3)) and that the results of the assessment present the highest possible vibration levels within the parameters of the empirical formulae used for predictions.

Construction traffic

1.5.2.8 The full results of the construction traffic noise assessment are tabulated in Appendix C.

1.5.2.9 In summary, due to high existing baseline traffic flows on the main highway links, the change in the BNL is of ‘low’ to ‘negligible’ impact overall.

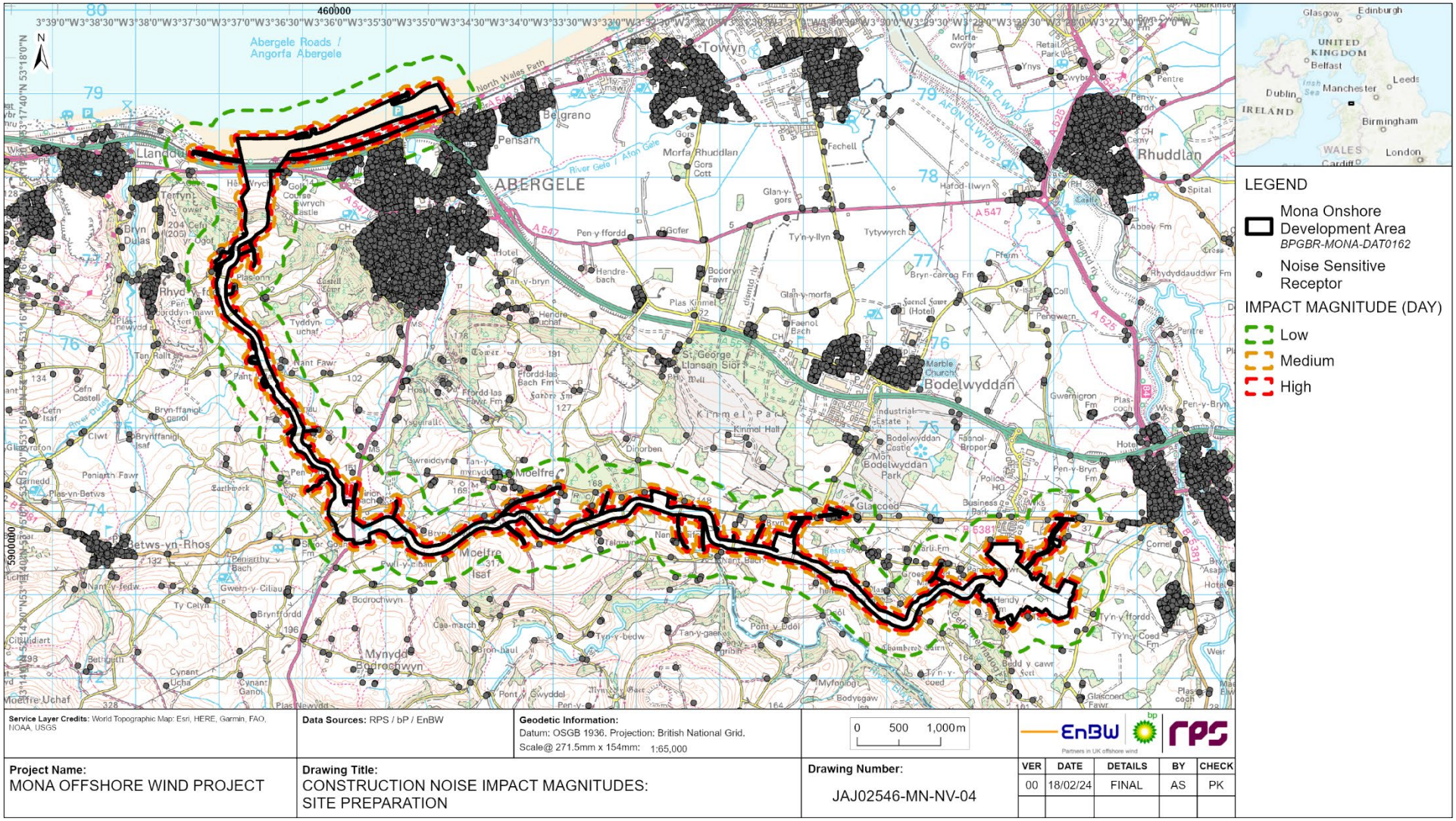
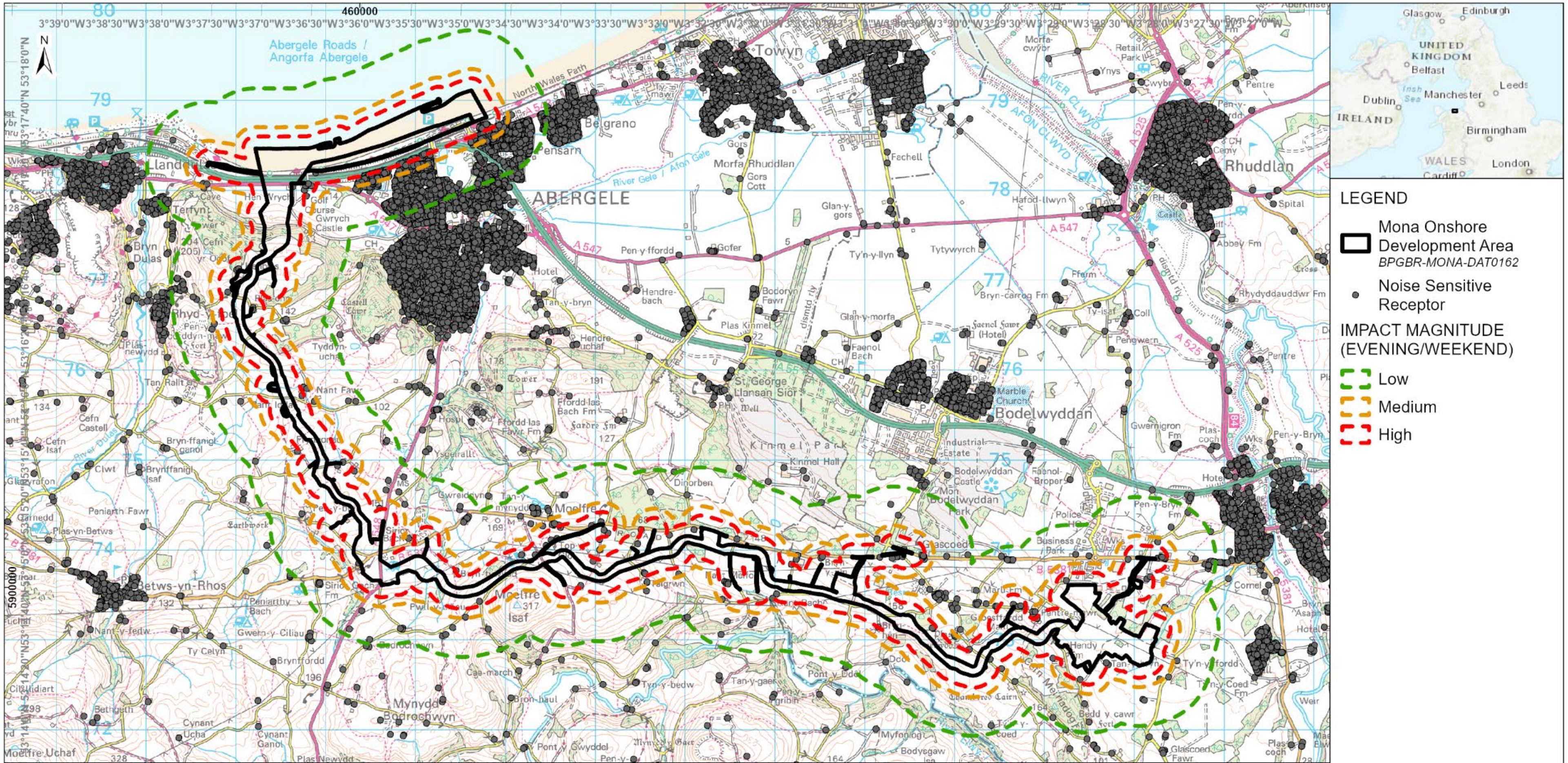


Figure 1.27: Daytime construction noise impact magnitudes: Site preparation



Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA	Data Sources: RPS / bP / EnBW	Geodetic Information: Datum: OSGB 1936. Projection: British National Grid. Scale@ 271.5mm x 154mm: 1:65,000	0 500 1,000 m					
Project Name: MONA OFFSHORE WIND PROJECT	**Drawing Title:** CONSTRUCTION NOISE IMPACT MAGNITUDES: SITE PREPARATION		**Drawing Number:** JAJ02546-MN-NV-05	VER	DATE	DETAILS	BY	CHECK
				00	18/02/24	FINAL	AS	PK

Figure 1.28: Evening/weekend construction noise impact magnitudes: Site preparation

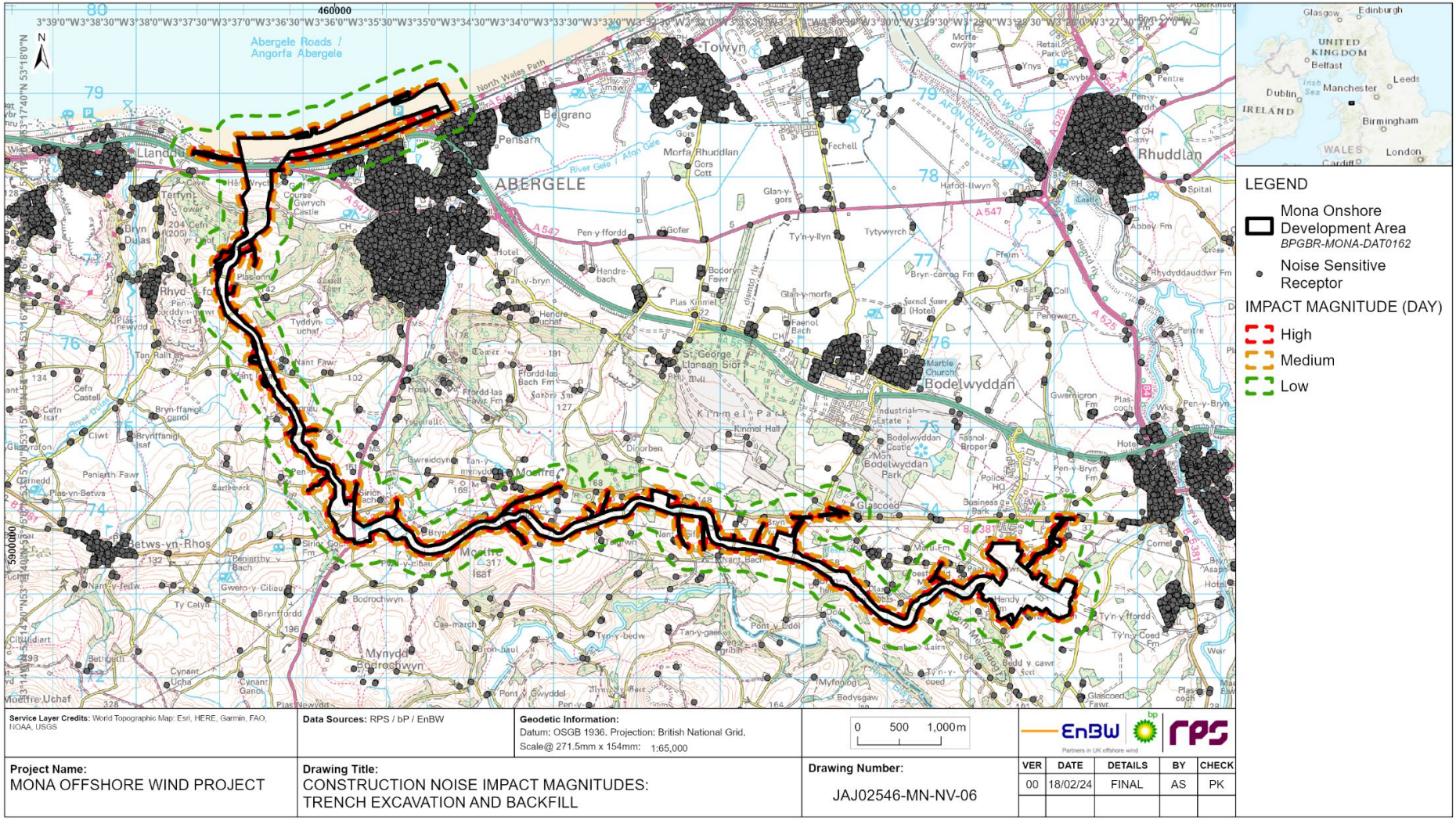


Figure 1.29: Daytime construction noise impact magnitudes: Trench excavation and backfill.

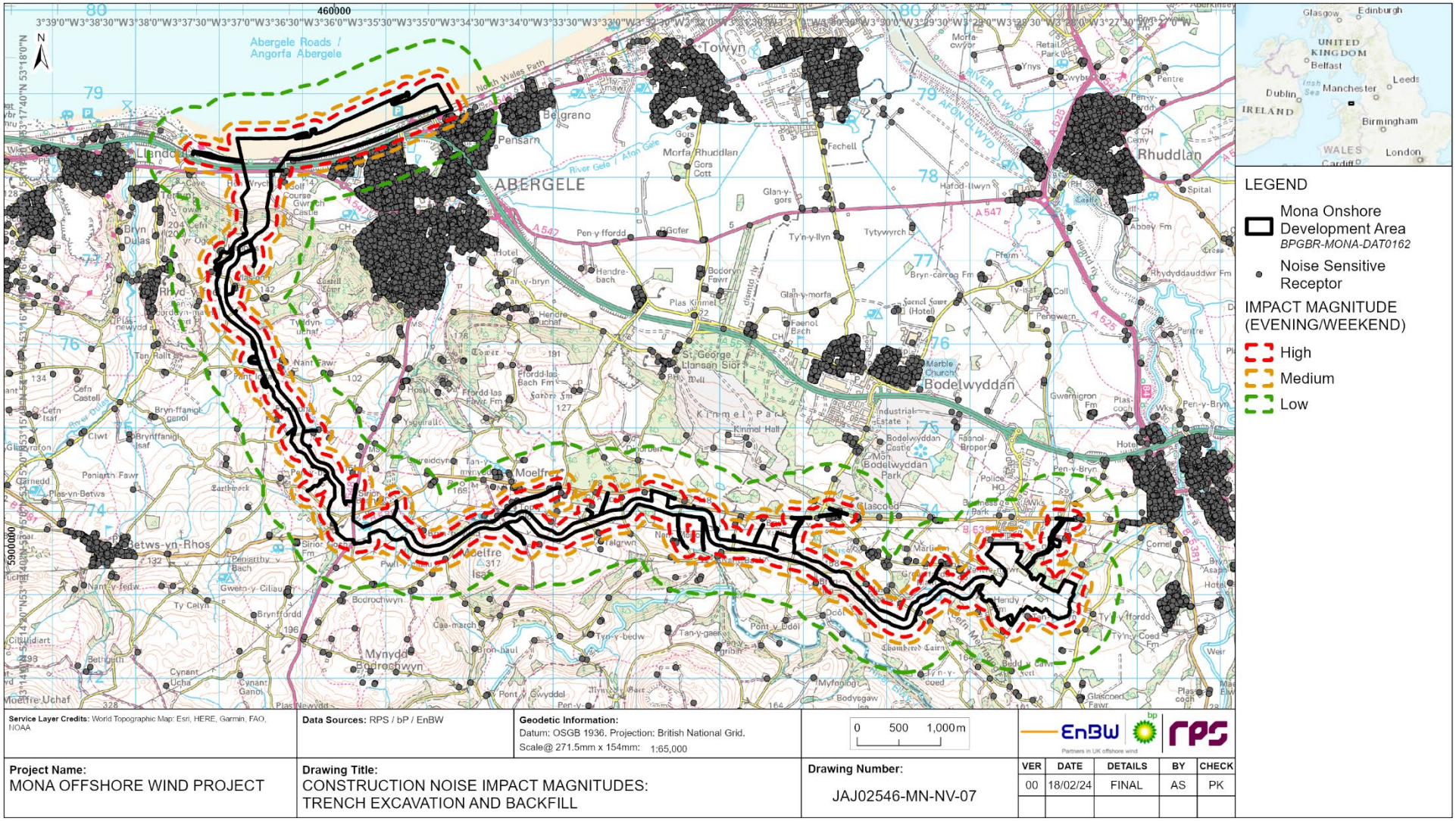


Figure 1.30: Evening/weekend construction noise impact magnitudes: Trench excavation and backfill.

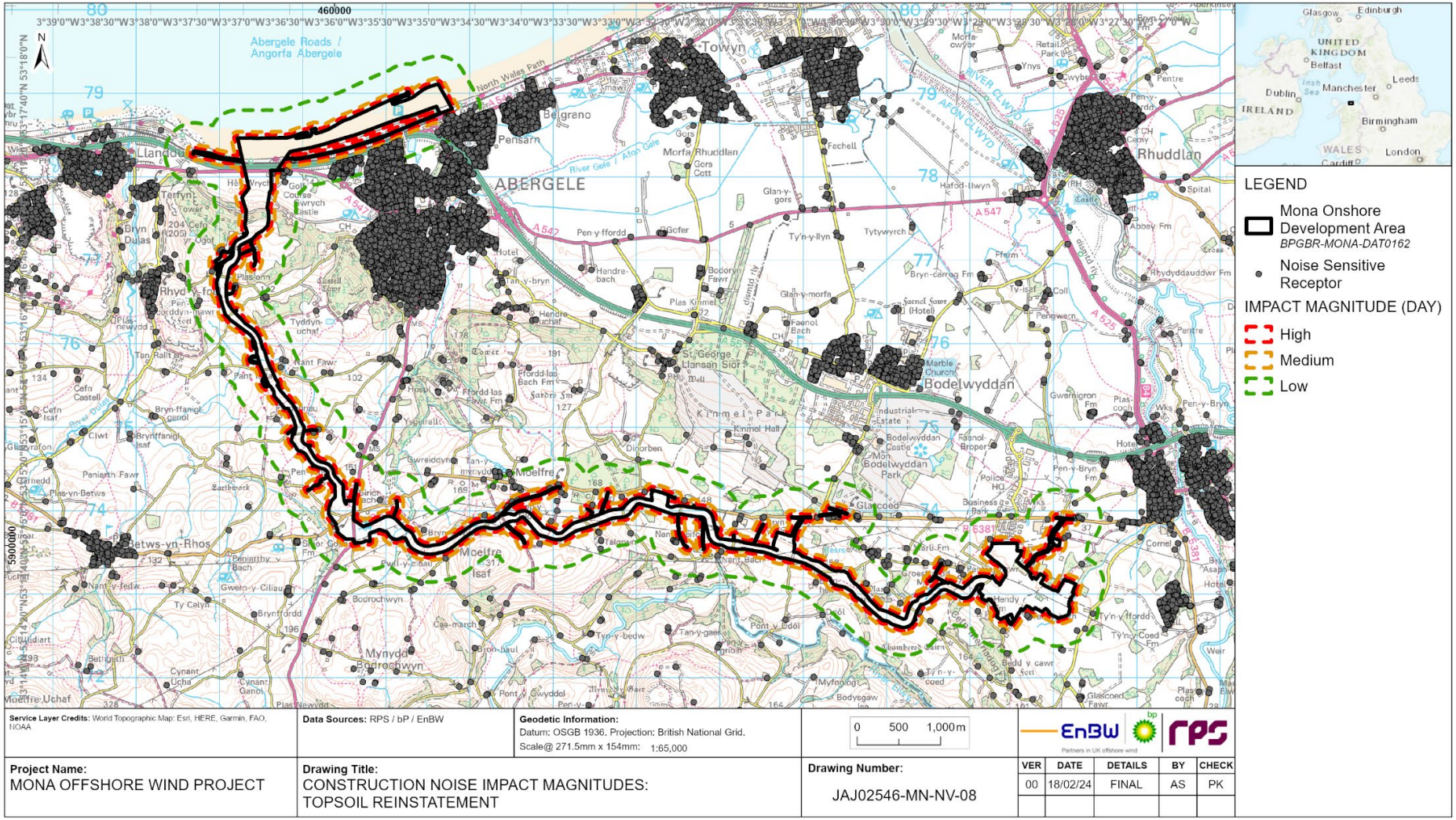


Figure 1.31: Daytime construction noise impact magnitudes: Topsoil reinstatement

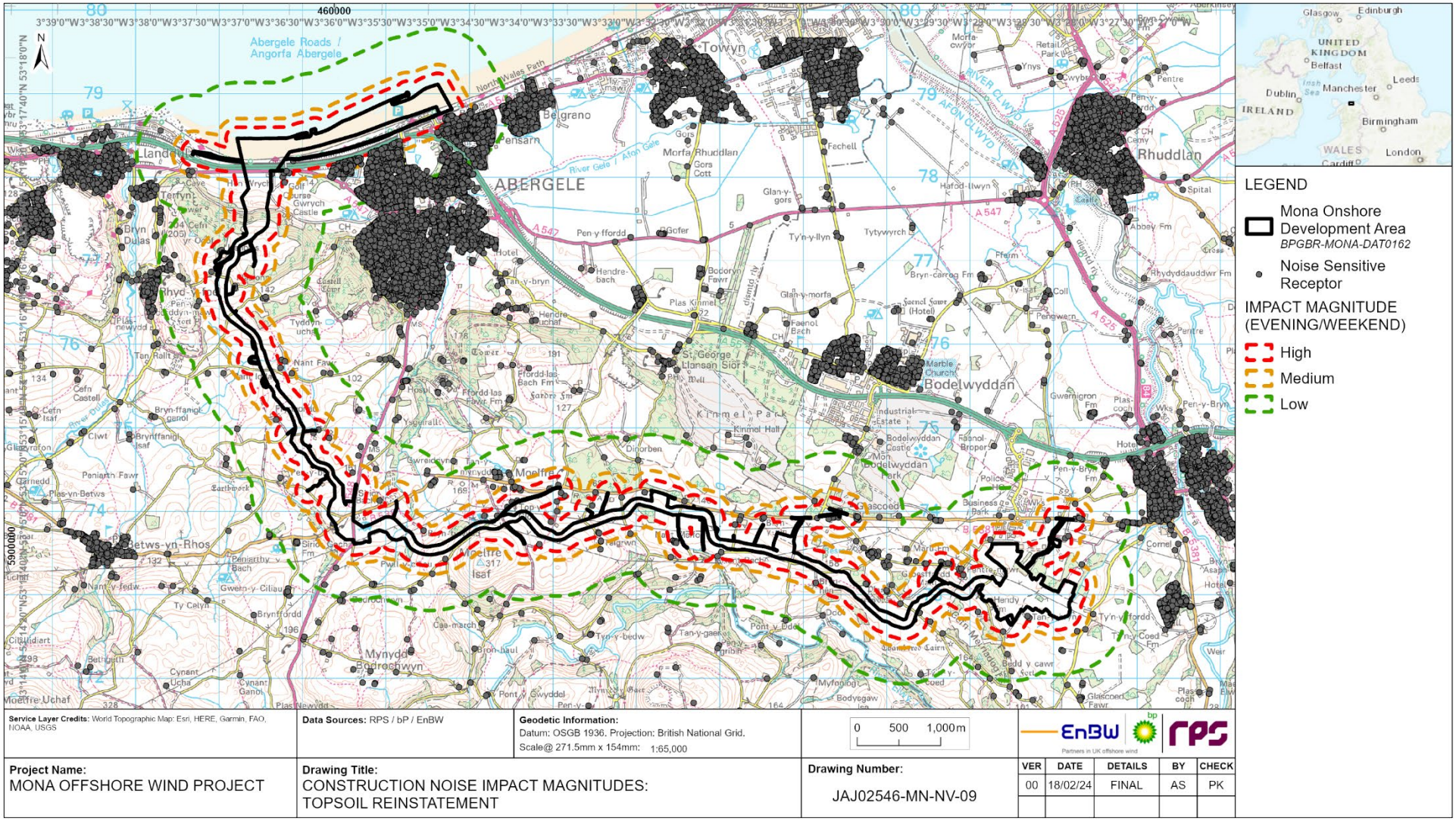


Figure 1.32: Evening/weekend construction noise impact magnitudes: Topsoil reinstatement

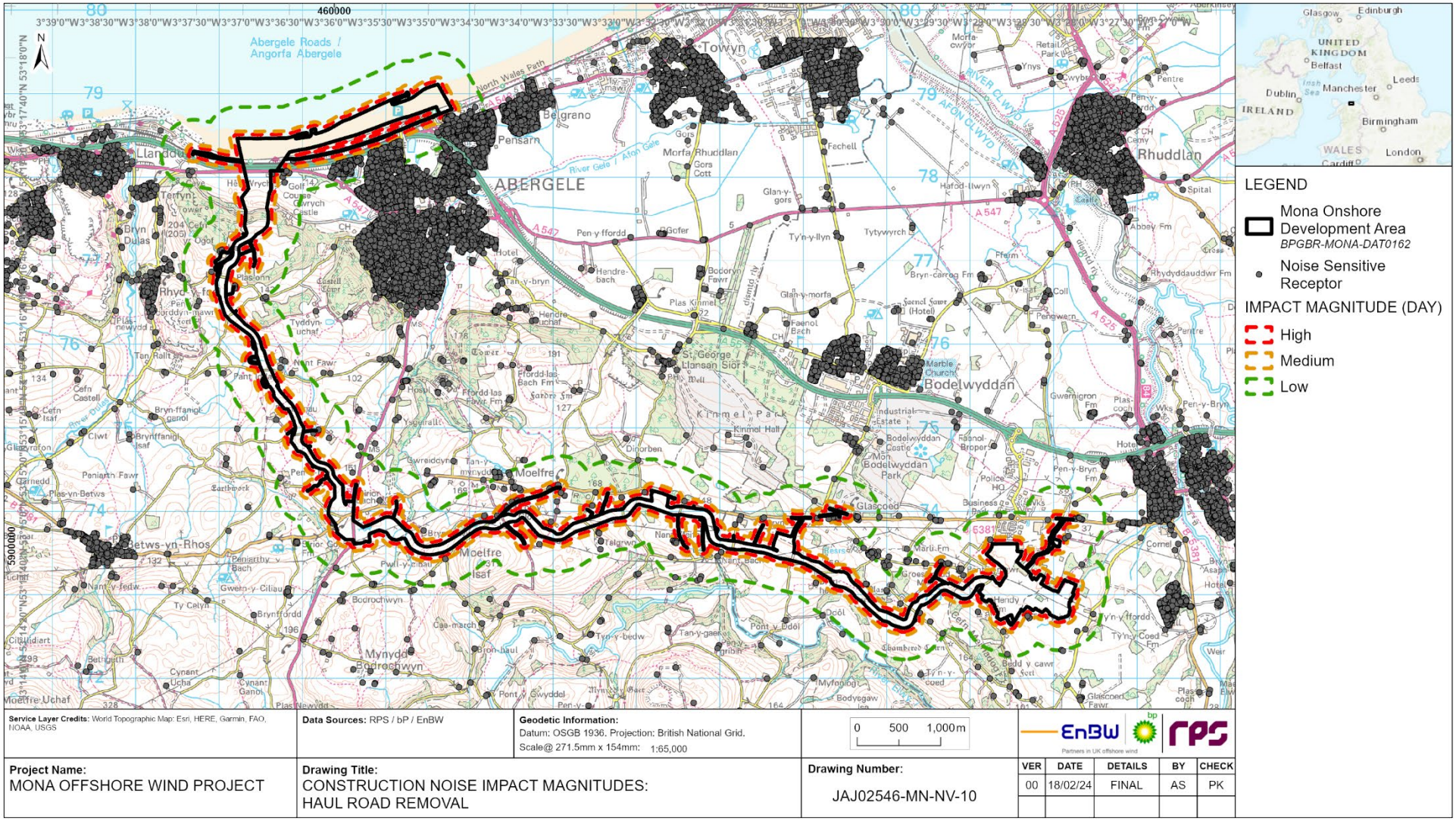


Figure 1.33: Daytime construction noise impact magnitudes: Haul road removal

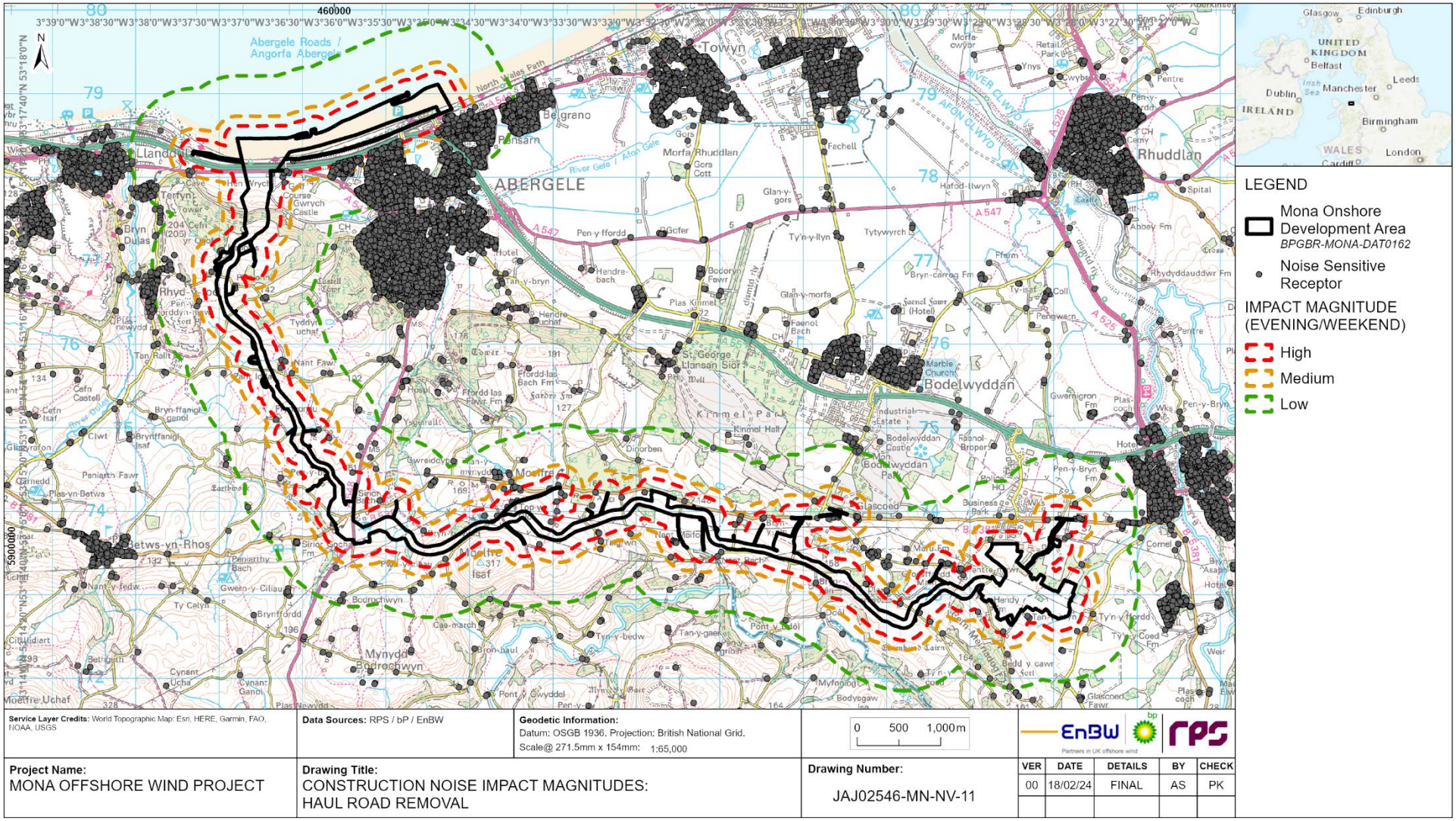


Figure 1.34: Evening/weekend construction noise impact magnitudes: Haul road removal

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Appendix A: Construction noise source spectra

Establish access and TCC (including trenchless technique compounds)											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 Dozer	1	100	113	102	104	101	100	106	90	84	**109**
30T excavator	2	100	103	102	105	104	100	97	94	89	**106**
20T dumper	3	100	113	106	106	106	106	111	96	87	**114**
Smooth drum vibro road roller	1	100	118	110	101	100	98	93	87	82	**103**
21T excavator	1	100	108	111	104	101	100	98	97	94	**106**
5T Forward Tipping Dumper	1	100	119	115	101	100	100	100	95	88	**106**
Loading shovel	1	100	113	111	104	103	103	100	100	89	**108**
Tractor and fencing kit	1	100	107	99	106	103	106	98	89	83	**108**
Tractor and trailer	1	70	119	112	102	102	99	98	90	85	**105**

Establish access and TCC (including trenchless technique compounds)											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**
Grader	1	100	116	115	111	107	112	106	102	93	**115**
Telehandler	1	70	106	100	93	92	105	93	81	74	**106**
Mobile crane	1	25	112	103	100	96	99	98	91	83	**104**
Mobile generator	2	25	100	97	101	95	94	90	81	72	**99**
Tipper Lorry	3	100	117	111	103	103	103	102	99	96	**108**
Vibratory Piling Rig	2	10	104	103	100	103	105	103	98	88	**109**
Temporary lighting	6	25	107	100	95	91	88	84	85	78	**95**
Road surface paver and roller (Not required for trenchless technique compounds)	1	25	109	106	103	102	101	98	96	87	**106**

Site preparation (inc. fencing, haul road construction and topsoil strip)											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 Dozer	1	100	113	102	104	101	100	106	90	84	**109**
30T excavator	2	100	103	102	105	104	100	97	94	89	**106**
20T dumper	3	100	113	106	106	106	106	111	96	87	**114**
Smooth drum vibro road roller	1	100	118	110	101	100	98	93	87	82	**103**
21T excavator	1	100	108	111	104	101	100	98	97	94	**106**
5T Forward Tipping Dumper	1	100	119	115	101	100	100	100	95	88	**106**
Loading shovel	1	100	113	111	104	103	103	100	100	89	**108**
Tractor and fencing kit	1	100	107	99	106	103	106	98	89	83	**108**
Tractor and trailer	1	70	119	112	102	102	99	98	90	85	**105**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**

Site preparation (inc. fencing, haul road construction and topsoil strip)											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**
Grader	1	100	116	115	111	107	112	106	102	93	**115**
Telehandler	1	70	106	100	93	92	105	93	81	74	**106**
Mobile self-contained welfare unit	1	25	86	92	93	90	83	79	74	67	**91**
Mobile generator	2	25	100	97	101	95	94	90	81	72	**99**
Tipper lorry	3	100	117	111	103	103	103	102	99	96	**108**
Temporary lighting	12	25	110	100	95	91	88	84	85	78	**95**

Transition joint bay and joint bay excavation											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	1	100	100	99	102	101	97	94	91	86	**103**

Transition joint bay and joint bay excavation											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
20T dumper	2	100	111	104	104	104	104	109	94	85	**112**
Smooth drum vibro road roller	1	10	123	115	106	105	103	98	92	87	**108**
21T excavator	1	50	108	111	104	101	100	98	97	94	**106**
5T Forward Tipping Dumper	1	50	119	115	101	100	100	100	95	88	**106**
9T forward tipping dumper	1	100	119	115	101	100	100	100	95	88	**106**
13T forward tipping dumper	1	100	119	115	101	100	100	100	95	88	**106**
Tractor and Fuel bowser (or self-propelled)	1	10	108	109	112	109	112	113	104	94	**117**
Tractor and Water bowser (for dust suppression)	1	25	106	114	112	106	106	105	98	97	**112**
Mobile self-contained welfare unit	1	25	93	96	97	94	87	83	78	71	**95**
Mobile generator	2	25	102	99	103	97	96	92	83	74	**101**

Transition joint bay and joint bay excavation											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Temporary lighting	4	25	96	89	84	80	77	73	74	67	**84**
Pump	2	100	105	98	92	95	96	94	87	80	**100**

Transition joint bay and joint bay wall and base construction											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
21T excavator	1	100	108	111	104	101	100	98	97	94	**106**
Concrete poker unit	1	50	106	104	104	97	93	96	94	89	**102**
Air compressor	1	100	125	114	105	100	98	96	99	88	**107**
Tractor and trailer	1	50	118	111	101	101	98	97	89	84	**104**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**

Transition joint bay and joint bay wall and base construction											
Plant item	Quantity	% On-time	Sound power level (dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile concrete pump/concrete mixer truck	1	50	108	99	91	94	95	103	85	80	**105**
5T Forward Tipping Dumper	1	50	119	115	101	100	100	100	95	88	**106**
Telehandler	1	50	104	98	91	90	103	91	79	72	**104**
Mobile self-contained welfare unit	1	25	86	89	90	87	80	76	71	64	**88**
Mobile generator	2	50	103	100	104	98	97	93	84	75	**102**
Temporary lighting	4	25	106	99	94	90	87	83	84	77	**94**
Pump	2	100	114	107	101	104	105	103	96	89	**109**

Jointing of cables in transition joint bay and joint bays											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor and trailer	1	50	118	111	101	101	98	97	89	84	**104**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**
Mobile crane	1	25	112	103	100	96	99	98	91	83	**104**
Telehandler	1	50	104	98	91	90	103	91	79	72	**104**
Mobile self-contained welfare unit	1	20	86	89	90	87	80	76	71	64	**88**
Mobile generator	2	100	106	103	107	101	100	96	87	78	**105**
Temporary lighting	4	50	109	102	97	93	90	86	87	80	**97**
Pump	2	100	114	107	101	104	105	103	96	89	**109**

Transition joint bay and joint bay and backfill											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	1	100	100	99	102	101	97	94	91	86	**103**
20T dumper	2	100	111	104	104	104	104	109	94	85	**112**
21T excavator	1	100	108	111	104	101	100	98	97	94	**106**
5T Forward Tipping Dumper	1	100	119	115	101	100	100	100	95	88	**106**
Loading shovel	1	100	113	111	104	103	103	100	100	89	**108**
Trench Roller	1	75	109	105	94	98	94	91	87	84	**100**
Tractor and trailer	1	25	115	108	98	98	95	94	86	81	**101**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**
Cement mixer	1	25	82	86	79	79	78	74	72	70	**83**
Pre-cast concrete truck	1	5	112	100	96	98	91	86	84	79	**98**

Transition joint bay and joint bay and backfill											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Telehandler	1	25	101	95	88	87	100	88	76	69	**101**
Mobile self-contained welfare unit	1	25	86	89	90	87	80	76	71	64	**88**
Mobile generator	2	25	100	97	101	95	94	90	81	72	**99**
Temporary lighting	4	25	106	99	94	90	87	83	84	77	**94**
Pump	2	100	114	107	101	104	105	103	96	89	**109**

Trench excavation and duct installation											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	2	100	103	102	105	104	100	97	94	89	**106**
20T dumper	2	100	111	104	104	104	104	109	94	85	**112**
21T excavator	2	100	111	114	107	104	103	101	100	97	**109**

Trench excavation and duct installation											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
5T Forward Tipping Dumper	2	100	122	118	104	103	103	103	98	91	**109**
Cement wagon	2	100	98	103	103	103	99	98	93	91	**105**
Loading shovel	2	50	113	111	104	103	103	100	100	89	**108**
Trench Roller	2	50	110	106	95	99	95	92	88	85	**101**
Tractor and trailer	1	50	118	111	101	101	98	97	89	84	**104**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**
Telehandler	1	50	104	98	91	90	103	91	79	72	**104**
Mobile self-contained welfare unit	1	25	86	89	90	87	80	76	71	64	**88**
Mobile generator	2	25	100	97	101	95	94	90	81	72	**99**

Trench excavation and duct installation											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Temporary lighting	8	25	109	102	97	93	90	86	87	80	**97**
Pump	2	100	114	107	101	104	105	103	96	89	**109**

Trench backfill											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	2	100	103	102	105	104	100	97	94	89	**106**
20T dumper	2	100	111	104	104	104	104	109	94	85	**112**
21T excavator	2	100	111	114	107	104	103	101	100	97	**109**
5T Forward Tipping Dumper	2	100	122	118	104	103	103	103	98	91	**109**
Loading shovel	2	100	116	114	107	106	106	103	103	92	**111**
Trench Roller	2	75	112	108	97	101	97	94	90	87	**103**

Trench backfill											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor and trailer	1	25	115	108	98	98	95	94	86	81	**101**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**
Telehandler	1	25	101	95	88	87	100	88	76	69	**101**
Mobile self-contained welfare unit	1	25	86	89	90	87	80	76	71	64	**88**
Mobile generator	2	25	100	97	101	95	94	90	81	72	**99**
Temporary lighting	8	25	109	102	97	93	90	86	87	80	**97**
Pump	2	100	114	107	101	104	105	103	96	89	**109**

Trench route reinstatement											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 Dozer	2	100	116	105	107	104	103	109	93	87	**112**
30T excavator	2	100	103	102	105	104	100	97	94	89	**106**
20T dumper	2	100	111	104	104	104	104	109	94	85	**112**
Smooth drum vibro road roller	1	50	115	107	98	97	95	90	84	79	**100**
Tractor and soil tiller, roller, seeder	1	25	101	93	100	97	100	92	83	77	**102**
Trenching machine	1	100	109	98	100	97	96	102	86	80	**105**
21T excavator	1	100	108	111	104	101	100	98	97	94	**106**
5T Forward Tipping Dumper	1	100	119	115	101	100	100	100	95	88	**106**
Loading shovel	2	100	116	114	107	106	106	103	103	92	**111**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**

Trench route reinstatement											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**
Mobile self-contained welfare unit	1	25	86	89	90	87	80	76	71	64	**88**
Mobile generator	2	25	100	97	101	95	94	90	81	72	**99**
Temporary lighting	8	25	109	102	97	93	90	86	87	80	**97**

Haul road and fencing removal											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
D6 Dozer	2	100	116	105	107	104	103	109	93	87	**112**
30T excavator	2	100	103	102	105	104	100	97	94	89	**106**
20T dumper	2	100	111	104	104	104	104	109	94	85	**112**

Haul road and fencing removal											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Smooth drum vibro road roller	1	50	115	107	98	97	95	90	84	79	**100**
21T excavator	1	100	108	111	104	101	100	98	97	94	**106**
Trenching machine	1	100	109	98	100	97	96	102	86	80	**105**
5T Forward Tipping Dumper	1	100	119	115	101	100	100	100	95	88	**106**
Tipper lorry	3	100	117	111	103	103	103	102	99	96	**108**
Loading shovel	2	100	116	114	107	106	106	103	103	92	**111**
Tractor and fencing kit	1	50	104	96	103	100	103	95	86	80	**105**
Tractor and trailer	1	50	118	111	101	101	98	97	89	84	**104**
Tractor and Fuel bowser (or self-propelled)	1	10	98	99	102	99	102	103	94	84	**107**
Tractor and Water bowser (for dust suppression)	1	25	99	107	105	99	99	98	91	90	**105**

Haul road and fencing removal											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Tractor and soil tiller, roller, seeder	1	25	101	93	100	97	100	92	83	77	**102**
Mobile self-contained welfare unit	2	25	89	92	93	90	83	79	74	67	**91**
Mobile generator	2	25	100	97	101	95	94	90	81	72	**99**
Temporary lighting	12	25	110	103	98	94	91	87	88	81	**98**

Use of trenchless technique compound											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Generator	2	100	106	103	107	101	100	96	87	78	**105**
Telehandler	2	75	109	103	96	95	108	96	84	77	**109**
30T excavator	2	100	103	102	105	104	100	97	94	89	**106**
21T excavator	1	100	108	111	104	101	100	98	97	94	**106**

Use of trenchless technique compound											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Temporary lighting	12	25	110	100	95	91	88	84	85	78	**95**
Mobile crane	1	25	112	103	100	96	99	98	91	83	**104**
Vibratory piling rig	2	10	104	103	100	103	105	103	98	88	**109**
Generator for trenchless equipment	2	100	97	110	104	102	102	102	98	91	**108**
Mounting supports for trenchless equipment	2	25	102	108	98	93	98	105	109	102	**112**
Mud Pump	2	100	91	86	80	80	79	74	71	59	**83**
Water Pump	2	100	88	83	77	77	76	71	68	56	**80**
Mixing Tank	2	100	74	75	81	74	71	69	65	62	**78**
Cuttings/Recycling Tank	2	100	79	80	86	79	76	74	70	67	**83**

Substation groundworks											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
30T excavator	6	100	108	107	110	109	105	102	99	94	**111**
Excavator (hydraulic breaker)	4	100	115	111	109	110	113	113	111	106	**119**
D6 Dozer	4	75	118	107	109	106	105	111	95	89	**114**
Air compressor	4	100	125	114	105	100	98	96	99	88	**107**
20T dumper	8	70	116	109	109	109	109	114	99	90	**117**
Generator	2	100	106	103	107	101	100	96	87	78	**105**
Crusher	2	80	129	122	115	117	111	107	102	95	**117**
Smooth drum vibro road roller	2	70	119	111	102	101	99	94	88	83	**104**

Substation building foundation works											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Large rotary bored piing rig	1	100	84	92	81	80	78	76	68	61	**84**
Tracked rig with hydraulic drifter	1	100	75	79	76	73	74	79	74	69	**83**
Crane mounted auger	1	100	87	86	77	73	75	72	67	59	**79**
Mini piling rig	2	100	90	80	75	76	74	72	68	60	**79**
Compressor for mini piling rig	1	100	75	71	65	70	71	69	62	57	**75**
20T dumper	4	50	111	104	104	104	104	109	94	85	**112**
Truck mixer with pump	2	10	99	90	82	85	86	94	76	71	**96**
21T Excavator	3	80	112	115	108	105	104	102	101	98	**110**
Grinder	5	50	89	83	84	92	102	109	105	105	**113**
Air compressor	2	100	122	111	102	97	95	93	96	85	**104**
Generator	2	100	106	103	107	101	100	96	87	78	**105**

Substation Access Road and Car Parking Road Works											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
21T excavator	2	100	111	114	107	104	103	101	100	97	**109**
20T dumper	4	70	113	106	106	106	106	111	96	87	**114**
Asphalt spreader with support lorry	1	100	109	108	103	103	102	100	93	87	**107**
Smooth drum vibro road roller	2	70	119	111	102	101	99	94	88	83	**104**
Grader	1	100	116	115	111	107	112	106	102	93	**115**

Substation building fabrication and plant installation											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
Mobile crane	1	50	115	106	103	99	102	101	94	86	**107**
Lorry	3	25	118	104	96	95	99	94	93	86	**103**

Substation building fabrication and plant installation											
Plant item	Quantity	% On-time	Sound power level(dB) at Octave band centre frequency (Hz)								dB(A)
			63	125	250	500	1k	2k	4k	8k	
MEWP	2	75	82	81	75	76	75	75	66	57	**80**
20T dumper	4	10	104	97	97	97	97	102	87	78	**105**
Air compressor	1	100	119	108	99	94	92	90	93	82	**101**
Forklift	2	50	108	102	98	96	96	92	88	85	**100**
Grinder	5	50	89	83	84	92	102	109	105	105	**113**
Pneumatic chipper/drill	3	50	111	100	96	99	99	104	112	113	**116**
Scaffolding	1	25	106	99	94	90	87	83	84	77	**94**

Appendix B: Construction noise model output

Location	Receptor	Establish Access and Temporary Construction Compounds							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Landfall	Castle Cove Caravan Park	53	50	65	55	35	35	**Negligible**	**Negligible**
	Dwellings on Cae Eithin (South)	52	46	65	55	38	38	**Negligible**	**Negligible**
	Dwellings on Cae Eithin (West)	52	46	65	55	38	38	**Negligible**	**Negligible**
	Gwrych Castle	53	50	65	55	30	30	**Negligible**	**Negligible**
	Gwyrch Cottage	53	50	65	55	50	50	**Negligible**	**Low**
	Gwyrch House	53	50	65	55	52	52	**Negligible**	**Low**
	Hen Wrych Farm	53	50	65	55	43	43	**Negligible**	**Negligible**
	Hen Wrych Hall	53	50	65	55	42	42	**Negligible**	**Negligible**
	Hen Wrych Lodge	53	50	65	55	48	48	**Negligible**	**Negligible**
	Henblas	44	36	65	55	28	28	**Negligible**	**Negligible**
	Justholme	53	50	65	55	44	44	**Negligible**	**Negligible**
	North Wales Business Park	52	46	65	55	37	37	**Negligible**	**Negligible**
	Northern Towers	53	50	65	55	38	38	**Negligible**	**Negligible**
	Nursery Cottage	53	50	65	55	54	54	**Low**	**Low**

Location	Receptor	Establish Access and Temporary Construction Compounds							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Plas Tan yr Ogof	53	50	65	55	37	37	**Negligible**	**Negligible**
	Ty Crwn	53	50	65	55	32	32	**Negligible**	**Negligible**
Onshore Cable Corridor	Bryn Bela	39	37	65	55	44	44	**Low**	**Low**
	Caravans (South)	47	45	65	55	46	46	**Negligible**	**Low**
	Caravans (West)	53	50	65	55	50	50	**Negligible**	**Low**
	Penrefail Cottage	47	45	65	55	47	47	**Low**	**Low**
	Sirior Bach	47	45	65	55	29	29	**Negligible**	**Negligible**
	Ffynnon Meifod	40	39	65	55	40	40	**Low**	**Low**
	Meiford Lodge	46	43	65	55	35	35	**Negligible**	**Negligible**
	Nant Meifod	40	39	65	55	33	33	**Negligible**	**Negligible**
	Sarn Rug	46	43	65	55	50	50	**Low**	**Low**
	The Barn	40	39	65	55	40	40	**Low**	**Low**
	The Gardeners Cottage	40	39	65	55	41	41	**Low**	**Low**
	Bryn Hen	40	35	65	55	30	30	**Negligible**	**Negligible**
	Bryn y Pin	46	43	65	55	42	42	**Negligible**	**Negligible**
	Bryn y Pin Cottage	46	43	65	55	42	42	**Negligible**	**Negligible**
	Bryn y Pin Mawr	46	43	65	55	37	37	**Negligible**	**Negligible**

Location	Receptor	Establish Access and Temporary Construction Compounds							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Grouse Lodge	46	43	65	55	38	38	**Negligible**	**Negligible**
Onshore Substation	Bryn Arian	45	41	65	55	28	28	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	40	40	**Negligible**	**Negligible**
	Cae Pwll	43	39	65	55	29	29	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	28	28	**Negligible**	**Negligible**
	Carreg Wen	46	40	65	55	30	30	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	32	32	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	29	29	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	31	31	**Negligible**	**Negligible**
	Groesffordd Farm	45	41	65	55	27	27	**Negligible**	**Negligible**
	Isfryn	47	39	65	55	39	39	**Negligible**	**Low**
	Maes	47	39	65	55	25	25	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	17	17	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	33	33	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	31	31	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	38	38	**Negligible**	**Negligible**
	Plas yr Esgob	46	40	65	55	32	32	**Negligible**	**Negligible**
	Rhos Aber	43	39	65	55	34	34	**Negligible**	**Negligible**

Location	Receptor	Establish Access and Temporary Construction Compounds							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Squirrels Lodge	43	39	65	55	34	34	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	48	48	**Low**	**Low**
	Tan y Bryn Uchaf	43	42	65	55	44	44	**Low**	**Low**
	Tan y Graig	43	39	65	55	12	12	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	25	25	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	35	35	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	42	65	55	38	38	**Negligible**	**Negligible**
	Tyn y Caeau	46	40	65	55	32	32	**Negligible**	**Negligible**
	Tyn y Ffordd	47	39	65	55	22	22	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	36	36	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	33	33	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	32	32	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	31	31	**Negligible**	**Negligible**
	Ysgubor EOS	45	41	65	55	24	24	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	15	15	**Negligible**	**Negligible**

Transition Joint Bay (TJB) and Joint Bay Excavation									
Location	Receptor	LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Landfall	Dwellings on Cae Eithin (South)	52	46	65	55	30	30	**Negligible**	**Negligible**
	Dwellings on Cae Eithin (West)	52	46	65	55	30	30	**Negligible**	**Negligible**
	Gwrych Castle	53	50	65	55	24	24	**Negligible**	**Negligible**
	Gwyrch Cottage	53	50	65	55	40	40	**Negligible**	**Negligible**
	Gwyrch House	53	50	65	55	42	42	**Negligible**	**Negligible**
	Hen Wrych Farm	53	50	65	55	35	35	**Negligible**	**Negligible**
	Hen Wrych Hall	53	50	65	55	31	31	**Negligible**	**Negligible**
	Hen Wrych Lodge	53	50	65	55	39	39	**Negligible**	**Negligible**
	Henblas	44	36	65	55	21	21	**Negligible**	**Negligible**
	Justholme	53	50	65	55	34	34	**Negligible**	**Negligible**
	North Wales Business Park	52	46	65	55	29	29	**Negligible**	**Negligible**
	Northern Towers	53	50	65	55	28	28	**Negligible**	**Negligible**
	Nursery Cottage	53	50	65	55	47	47	**Negligible**	**Negligible**
	Plas Tan yr Ogof	53	50	65	55	28	28	**Negligible**	**Negligible**
	Ty Crwn	53	50	65	55	26	26	**Negligible**	**Negligible**
	Bryn Bela	39	37	65	55	37	37	**Negligible**	**Low**

Transition Joint Bay (TJB) and Joint Bay Excavation									
Location	Receptor	LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Cable Corridor	Caravans (South)	47	45	65	55	42	42	**Negligible**	**Negligible**
	Caravans (West)	53	50	65	55	47	47	**Negligible**	**Negligible**
	Penrefail Cottage	47	45	65	55	43	43	**Negligible**	**Negligible**
	Sirior Bach	47	45	65	55	28	28	**Negligible**	**Negligible**
	Ffynnon Meifod	40	39	65	55	34	34	**Negligible**	**Negligible**
	Meiford Lodge	46	43	65	55	31	31	**Negligible**	**Negligible**
	Nant Meifod	40	39	65	55	31	31	**Negligible**	**Negligible**
	Sarn Rug	46	43	65	55	46	46	**Low**	**Low**
	The Barn	40	39	65	55	34	34	**Negligible**	**Negligible**
	The Gardeners Cottage	40	39	65	55	34	34	**Negligible**	**Negligible**
	Bryn Hen	40	35	65	55	27	27	**Negligible**	**Negligible**
	Bryn y Pin	46	43	65	55	36	36	**Negligible**	**Negligible**
	Bryn y Pin Cottage	46	43	65	55	36	36	**Negligible**	**Negligible**
	Bryn y Pin Mawr	46	43	65	55	32	32	**Negligible**	**Negligible**
	Grouse Lodge	46	43	65	55	33	33	**Negligible**	**Negligible**
Onshore Substation	Bryn Arian	45	41	65	55	25	25	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	35	35	**Negligible**	**Negligible**

Location	Receptor	Transition Joint Bay (TJB) and Joint Bay Excavation							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Cae Pwll	43	39	65	55	25	25	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	25	25	**Negligible**	**Negligible**
	Carreg Wen	46	40	65	55	26	26	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	28	28	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	26	26	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	27	27	**Negligible**	**Negligible**
	Groesffordd Farm	45	41	65	55	24	24	**Negligible**	**Negligible**
	Isfryn	47	39	65	55	35	35	**Negligible**	**Negligible**
	Maes	47	39	65	55	22	22	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	15	15	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	29	29	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	27	27	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	33	33	**Negligible**	**Negligible**
	Plas yr Esgob	46	40	65	55	27	27	**Negligible**	**Negligible**
	Rhos Aber	43	39	65	55	29	29	**Negligible**	**Negligible**
	Squirrels Lodge	43	39	65	55	29	29	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	43	43	**Low**	**Low**
	Tan y Bryn Uchaf	43	42	65	55	42	42	**Negligible**	**Low**

Location	Receptor	Transition Joint Bay (TJB) and Joint Bay Excavation							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Tan y Graig	43	39	65	55	11	11	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	23	23	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	31	31	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	42	65	55	33	33	**Negligible**	**Negligible**
	Tyn y Caeau	46	40	65	55	28	28	**Negligible**	**Negligible**
	Tyn y Ffordd	47	39	65	55	20	20	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	31	31	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	29	29	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	26	26	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	27	27	**Negligible**	**Negligible**
	Ysgubor EOS	45	41	65	55	21	21	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	14	14	**Negligible**	**Negligible**

Location	Receptor	Transition Joint Bay (TJB) and Joint Bay Base Construction							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Landfall	Dwellings on Cae Eithin (South)	52	46	65	55	29	29	**Negligible**	**Negligible**
	Dwellings on Cae Eithin (West)	52	46	65	55	29	29	**Negligible**	**Negligible**
	Gwrych Castle	53	50	65	55	23	23	**Negligible**	**Negligible**
	Gwyrch Cottage	53	50	65	55	40	40	**Negligible**	**Negligible**
	Gwyrch House	53	50	65	55	42	42	**Negligible**	**Negligible**
	Hen Wrych Farm	53	50	65	55	34	34	**Negligible**	**Negligible**
	Hen Wrych Hall	53	50	65	55	33	33	**Negligible**	**Negligible**
	Hen Wrych Lodge	53	50	65	55	39	39	**Negligible**	**Negligible**
	Henblas	44	36	65	55	21	21	**Negligible**	**Negligible**
	Justholme	53	50	65	55	35	35	**Negligible**	**Negligible**
	North Wales Business Park	52	46	65	55	29	29	**Negligible**	**Negligible**
	Northern Towers	53	50	65	55	28	28	**Negligible**	**Negligible**
	Nursery Cottage	53	50	65	55	46	46	**Negligible**	**Negligible**
	Plas Tan yr Ogof	53	50	65	55	28	28	**Negligible**	**Negligible**
	Ty Crwn	53	50	65	55	26	26	**Negligible**	**Negligible**
	Bryn Bela	39	37	65	55	38	38	**Negligible**	**Low**

Location	Receptor	Transition Joint Bay (TJB) and Joint Bay Base Construction							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Cable Corridor	Caravans (South)	47	45	65	55	42	42	**Negligible**	**Negligible**
	Caravans (West)	53	50	65	55	47	47	**Negligible**	**Negligible**
	Penrefail Cottage	47	45	65	55	42	42	**Negligible**	**Negligible**
	Sirior Bach	47	45	65	55	27	27	**Negligible**	**Negligible**
	Ffynnon Meifod	40	39	65	55	35	35	**Negligible**	**Negligible**
	Meiford Lodge	46	43	65	55	32	32	**Negligible**	**Negligible**
	Nant Meifod	40	39	65	55	30	30	**Negligible**	**Negligible**
	Sarn Rug	46	43	65	55	44	44	**Negligible**	**Low**
	The Barn	40	39	65	55	35	35	**Negligible**	**Negligible**
	The Gardeners Cottage	40	39	65	55	34	34	**Negligible**	**Negligible**
	Bryn Hen	40	35	65	55	27	27	**Negligible**	**Negligible**
	Bryn y Pin	46	43	65	55	36	36	**Negligible**	**Negligible**
	Bryn y Pin Cottage	46	43	65	55	36	36	**Negligible**	**Negligible**
	Bryn y Pin Mawr	46	43	65	55	32	32	**Negligible**	**Negligible**
	Grouse Lodge	46	43	65	55	32	32	**Negligible**	**Negligible**
Onshore Substation	Bryn Arian	45	41	65	55	30	30	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	37	37	**Negligible**	**Negligible**

Location	Receptor	Transition Joint Bay (TJB) and Joint Bay Base Construction							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Cae Pwll	43	39	65	55	27	27	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	32	32	**Negligible**	**Negligible**
	Carreg Wen	46	40	65	55	30	30	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	30	30	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	31	31	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	31	31	**Negligible**	**Negligible**
	Groesffordd Farm	45	41	65	55	29	29	**Negligible**	**Negligible**
	Isfryn	47	39	65	55	36	36	**Negligible**	**Negligible**
	Maes	47	39	65	55	24	24	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	16	16	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	35	35	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	35	35	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	39	39	**Negligible**	**Negligible**
	Plas yr Esgob	46	40	65	55	31	31	**Negligible**	**Negligible**
	Rhos Aber	43	39	65	55	31	31	**Negligible**	**Negligible**
	Squirrels Lodge	43	39	65	55	31	31	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	44	44	**Low**	**Low**
	Tan y Bryn Uchaf	43	42	65	55	43	43	**Low**	**Low**

Location	Receptor	Transition Joint Bay (TJB) and Joint Bay Base Construction							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Tan y Graig	43	39	65	55	13	13	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	25	25	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	32	32	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	42	65	55	39	39	**Negligible**	**Negligible**
	Tyn y Caeau	46	40	65	55	31	31	**Negligible**	**Negligible**
	Tyn y Ffordd	47	39	65	55	20	20	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	32	32	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	29	29	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	29	29	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	34	34	**Negligible**	**Negligible**
	Ysgubor EOS	45	41	65	55	22	22	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	14	14	**Negligible**	**Negligible**

Location	Receptor	Jointing of Cables in Transition Joint Bays and Joint Bays							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Landfall	Dwellings on Cae Eithin (South)	52	46	65	55	33	33	**Negligible**	**Negligible**
	Dwellings on Cae Eithin (West)	52	46	65	55	33	33	**Negligible**	**Negligible**
	Gwrych Castle	53	50	65	55	25	25	**Negligible**	**Negligible**
	Gwyrch Cottage	53	50	65	55	46	46	**Negligible**	**Negligible**
	Gwyrch House	53	50	65	55	48	48	**Negligible**	**Negligible**
	Hen Wrych Farm	53	50	65	55	39	39	**Negligible**	**Negligible**
	Hen Wrych Hall	53	50	65	55	39	39	**Negligible**	**Negligible**
	Hen Wrych Lodge	53	50	65	55	41	41	**Negligible**	**Negligible**
	Henblas	44	36	65	55	22	22	**Negligible**	**Negligible**
	Justholme	53	50	65	55	39	39	**Negligible**	**Negligible**
	North Wales Business Park	52	46	65	55	32	32	**Negligible**	**Negligible**
	Northern Towers	53	50	65	55	33	33	**Negligible**	**Negligible**
	Nursery Cottage	53	50	65	55	53	53	**Low**	**Low**
	Plas Tan yr Ogof	53	50	65	55	30	30	**Negligible**	**Negligible**
	Ty Crwn	53	50	65	55	31	31	**Negligible**	**Negligible**
	Bryn Bela	39	37	65	55	43	43	**Low**	**Low**

Location	Receptor	Jointing of Cables in Transition Joint Bays and Joint Bays							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Cable Corridor	Caravans (South)	47	45	65	55	46	46	**Negligible**	**Low**
	Caravans (West)	53	50	65	55	51	51	**Negligible**	**Low**
	Penrefail Cottage	47	45	65	55	46	46	**Negligible**	**Low**
	Sirior Bach	47	45	65	55	28	28	**Negligible**	**Negligible**
	Ffynnon Meifod	40	39	65	55	39	39	**Negligible**	**Low**
	Meiford Lodge	46	43	65	55	34	34	**Negligible**	**Negligible**
	Nant Meifod	40	39	65	55	34	34	**Negligible**	**Negligible**
	Sarn Rug	46	43	65	55	50	50	**Low**	**Low**
	The Barn	40	39	65	55	39	39	**Negligible**	**Low**
	The Gardeners Cottage	40	39	65	55	39	39	**Negligible**	**Low**
	Bryn Hen	40	35	65	55	30	30	**Negligible**	**Negligible**
	Bryn y Pin	46	43	65	55	40	40	**Negligible**	**Negligible**
	Bryn y Pin Cottage	46	43	65	55	41	41	**Negligible**	**Negligible**
	Bryn y Pin Mawr	46	43	65	55	36	36	**Negligible**	**Negligible**
	Grouse Lodge	46	43	65	55	36	36	**Negligible**	**Negligible**
Onshore Substation	Bryn Arian	45	41	65	55	34	34	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	42	42	**Negligible**	**Low**

Location	Receptor	Jointing of Cables in Transition Joint Bays and Joint Bays							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Cae Pwll	43	39	65	55	30	30	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	36	36	**Negligible**	**Negligible**
	Carreg Wen	46	40	65	55	33	33	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	34	34	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	34	34	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	36	36	**Negligible**	**Negligible**
	Groesffordd Farm	45	41	65	55	33	33	**Negligible**	**Negligible**
	Isfryn	47	39	65	55	41	41	**Negligible**	**Low**
	Maes	47	39	65	55	26	26	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	17	17	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	40	40	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	39	39	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	44	44	**Low**	**Low**
	Plas yr Esgob	46	40	65	55	36	36	**Negligible**	**Negligible**
	Rhos Aber	43	39	65	55	32	32	**Negligible**	**Negligible**
	Squirrels Lodge	43	39	65	55	34	34	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	49	49	**Low**	**Low**
	Tan y Bryn Uchaf	43	42	65	55	48	48	**Low**	**Low**

Location	Receptor	Jointing of Cables in Transition Joint Bays and Joint Bays							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Tan y Graig	43	39	65	55	14	14	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	27	27	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	36	36	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	42	65	55	44	44	**Low**	**Low**
	Tyn y Caeau	46	40	65	55	36	36	**Negligible**	**Negligible**
	Tyn y Ffordd	47	39	65	55	22	22	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	36	36	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	33	33	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	31	31	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	38	38	**Negligible**	**Negligible**
	Ysgubor EOS	45	41	65	55	25	25	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	15	15	**Negligible**	**Negligible**

Location	Receptor	Backfill Over Transition Joint Bays and Joint Bays							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Landfall	Dwellings on Cae Eithin (South)	52	46	65	55	31	31	**Negligible**	**Negligible**
	Dwellings on Cae Eithin (West)	52	46	65	55	31	31	**Negligible**	**Negligible**
	Gwrych Castle	53	50	65	55	25	25	**Negligible**	**Negligible**
	Gwyrch Cottage	53	50	65	55	43	43	**Negligible**	**Negligible**
	Gwyrch House	53	50	65	55	45	45	**Negligible**	**Negligible**
	Hen Wrych Farm	53	50	65	55	37	37	**Negligible**	**Negligible**
	Hen Wrych Hall	53	50	65	55	37	37	**Negligible**	**Negligible**
	Hen Wrych Lodge	53	50	65	55	38	38	**Negligible**	**Negligible**
	Henblas	44	36	65	55	22	22	**Negligible**	**Negligible**
	Justholme	53	50	65	55	38	38	**Negligible**	**Negligible**
	North Wales Business Park	52	46	65	55	31	31	**Negligible**	**Negligible**
	Northern Towers	53	50	65	55	30	30	**Negligible**	**Negligible**
	Nursery Cottage	53	50	65	55	50	50	**Negligible**	**Low**
	Plas Tan yr Ogof	53	50	65	55	29	29	**Negligible**	**Negligible**
	Ty Crwn	53	50	65	55	28	28	**Negligible**	**Negligible**
	Bryn Bela	39	37	65	55	40	40	**Low**	**Low**

Backfill Over Transition Joint Bays and Joint Bays									
Location	Receptor	LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Cable Corridor	Caravans (South)	47	45	65	55	44	44	**Negligible**	**Negligible**
	Caravans (West)	53	50	65	55	49	49	**Negligible**	**Negligible**
	Penrefail Cottage	47	45	65	55	44	44	**Negligible**	**Negligible**
	Sirior Bach	47	45	65	55	28	28	**Negligible**	**Negligible**
	Ffynnon Meifod	40	39	65	55	37	37	**Negligible**	**Negligible**
	Meiford Lodge	46	43	65	55	33	33	**Negligible**	**Negligible**
	Nant Meifod	40	39	65	55	34	34	**Negligible**	**Negligible**
	Sarn Rug	46	43	65	55	48	48	**Low**	**Low**
	The Barn	40	39	65	55	37	37	**Negligible**	**Negligible**
	The Gardeners Cottage	40	39	65	55	36	36	**Negligible**	**Negligible**
	Bryn Hen	40	35	65	55	29	29	**Negligible**	**Negligible**
	Bryn y Pin	46	43	65	55	39	39	**Negligible**	**Negligible**
	Bryn y Pin Cottage	46	43	65	55	39	39	**Negligible**	**Negligible**
	Bryn y Pin Mawr	46	43	65	55	35	35	**Negligible**	**Negligible**
	Grouse Lodge	46	43	65	55	35	35	**Negligible**	**Negligible**
Onshore Substation	Bryn Arian	45	41	65	55	32	32	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	40	40	**Negligible**	**Negligible**

Location	Receptor	Backfill Over Transition Joint Bays and Joint Bays							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Cae Pwll	43	39	65	55	29	29	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	34	34	**Negligible**	**Negligible**
	Carreg Wen	46	40	65	55	32	32	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	32	32	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	33	33	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	34	34	**Negligible**	**Negligible**
	Groesffordd Farm	45	41	65	55	32	32	**Negligible**	**Negligible**
	Isfryn	47	39	65	55	38	38	**Negligible**	**Negligible**
	Maes	47	39	65	55	26	26	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	17	17	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	38	38	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	37	37	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	41	41	**Negligible**	**Negligible**
	Plas yr Esgob	46	40	65	55	33	33	**Negligible**	**Negligible**
	Rhos Aber	43	39	65	55	32	32	**Negligible**	**Negligible**
	Squirrels Lodge	43	39	65	55	33	33	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	46	46	**Low**	**Low**
	Tan y Bryn Uchaf	43	42	65	55	44	44	**Low**	**Low**

Location	Receptor	Backfill Over Transition Joint Bays and Joint Bays							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Tan y Graig	43	39	65	55	14	14	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	27	27	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	34	34	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	42	65	55	42	42	**Negligible**	**Low**
	Tyn y Caeau	46	40	65	55	34	34	**Negligible**	**Negligible**
	Tyn y Ffordd	47	39	65	55	22	22	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	34	34	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	32	32	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	31	31	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	37	37	**Negligible**	**Negligible**
	Ysgubor EOS	45	41	65	55	24	24	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	16	16	**Negligible**	**Negligible**

Use of trenchless techniques compounds													
Location	Receptor	LOAEL, dB(A)			SOAEL, dB(A)			Construction Noise Level, dB(A)			Magnitude of Impact		
		Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night
Landfall	Dwellings on Cae Eithin (South)	52	46	42	65	55	45	26	26	**27**	**Negligible**	**Negligible**	**Negligible**
	Dwellings on Cae Eithin (West)	52	46	42	65	55	45	26	26	**27**	**Negligible**	**Negligible**	**Negligible**
	Gwrych Castle	53	50	46	65	55	45	21	21	**29**	**Negligible**	**Negligible**	**Negligible**
	Gwyrch Cottage	53	50	46	65	55	45	35	35	**38**	**Negligible**	**Negligible**	**Negligible**
	Gwyrch House	53	50	46	65	55	45	39	39	**40**	**Negligible**	**Negligible**	**Negligible**
	Hen Wrych Farm	53	50	46	65	55	45	30	30	**36**	**Negligible**	**Negligible**	**Negligible**
	Hen Wrych Hall	53	50	46	65	55	45	26	26	**32**	**Negligible**	**Negligible**	**Negligible**
	Hen Wrych Lodge	53	50	46	65	55	45	33	33	**35**	**Negligible**	**Negligible**	**Negligible**
	Henblas	44	36	35	65	55	45	18	18	**23**	**Negligible**	**Negligible**	**Negligible**
	Justholme	53	50	46	65	55	45	31	31	**34**	**Negligible**	**Negligible**	**Negligible**

Use of trenchless techniques compounds													
Location	Receptor	LOAEL, dB(A)			SOAEL, dB(A)			Construction Noise Level, dB(A)			Magnitude of Impact		
		Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night
	North Wales Business Park	52	46	42	65	55	45	26	26	**27**	**Negligible**	**Negligible**	**Negligible**
	Northern Towers	53	50	46	65	55	45	25	25	**26**	**Negligible**	**Negligible**	**Negligible**
	Nursery Cottage	53	50	46	65	55	45	40	40	**42**	**Negligible**	**Negligible**	**Negligible**
	Plas Tan yr Ogof	53	50	46	65	55	45	25	25	**26**	**Negligible**	**Negligible**	**Negligible**
	Ty Crwn	53	50	46	65	55	45	22	22	**25**	**Negligible**	**Negligible**	**Negligible**
Onshore Cable Corridor	Bryn Bela	39	37	36	65	55	45	39	39	**40**	**Low**	**Low**	**Low**
	Caravans (South)	47	45	43	65	55	45	43	43	**42**	**Negligible**	**Negligible**	**Negligible**
	Caravans (West)	53	50	46	65	55	45	45	45	**45**	**Negligible**	**Negligible**	**Negligible**
	Penrefail Cottage	47	45	43	65	55	45	43	43	**44**	**Negligible**	**Negligible**	**Low**
	Sirior Bach	47	45	43	65	55	45	29	29	**35**	**Negligible**	**Negligible**	**Negligible**
	Ffynnon Meifod	39	37	36	65	55	45	38	38	**38**	**Negligible**	**Negligible**	**Low**

Use of trenchless techniques compounds													
Location	Receptor	LOAEL, dB(A)			SOAEL, dB(A)			Construction Noise Level, dB(A)			Magnitude of Impact		
		Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night
	Meiford Lodge	47	45	43	65	55	45	42	42	**42**	**Negligible**	**Negligible**	**Low**
	Nant Meifod	53	50	46	65	55	45	35	35	**36**	**Negligible**	**Negligible**	**Negligible**
	Sarn Rug	47	45	43	65	55	45	34	34	**34**	**Negligible**	**Negligible**	**Negligible**
	The Barn	47	45	43	65	55	45	38	38	**39**	**Negligible**	**Negligible**	**Low**
	The Gardeners Cottage	40	39	37	65	55	45	38	38	**38**	**Negligible**	**Negligible**	**Low**
	Bryn Hen	46	43	38	65	55	45	27	27	**30**	**Negligible**	**Negligible**	**Negligible**
	Bryn y Pin	40	39	37	65	55	45	29	29	**30**	**Negligible**	**Negligible**	**Negligible**
	Bryn y Pin Cottage	46	43	38	65	55	45	30	30	**30**	**Negligible**	**Negligible**	**Negligible**
	Bryn y Pin Mawr	40	39	37	65	55	45	26	26	**28**	**Negligible**	**Negligible**	**Negligible**
	Grouse Lodge	40	39	37	65	55	45	27	27	**28**	**Negligible**	**Negligible**	**Negligible**
Onshore Substation	Bryn Arian	40	35	34	65	55	45	22	22	**23**	**Negligible**	**Negligible**	**Negligible**
	Cae Llwyd	46	43	38	65	55	45	35	35	**35**	**Negligible**	**Negligible**	**Negligible**
	Cae Pwll	46	43	38	65	55	45	7	7	**8**	**Negligible**	**Negligible**	**Negligible**

Use of trenchless techniques compounds													
Location	Receptor	LOAEL, dB(A)			SOAEL, dB(A)			Construction Noise Level, dB(A)			Magnitude of Impact		
		Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night
	Caer Delyn	46	43	38	65	55	45	20	20	**20**	**Negligible**	**Negligible**	**Negligible**
	Carreg Wen	46	43	38	65	55	45	17	17	**18**	**Negligible**	**Negligible**	**Negligible**
	Cefn Farm	45	41	40	65	55	45	14	14	**17**	**Negligible**	**Negligible**	**Negligible**
	Craig Llwyd	43	42	37	65	55	45	18	18	**21**	**Negligible**	**Negligible**	**Negligible**
	Derwen Deg	43	39	36	65	55	45	16	16	**18**	**Negligible**	**Negligible**	**Negligible**
	Groesffordd Farm	46	40	37	65	55	45	13	13	**18**	**Negligible**	**Negligible**	**Negligible**
	Isfryn	46	40	37	65	55	45	51	51	**54**	**Low**	**Low**	**High**
	Maes	43	39	36	65	55	45	20	20	**23**	**Negligible**	**Negligible**	**Negligible**
	Pant Farm	45	41	40	65	55	45	7	7	**8**	**Negligible**	**Negligible**	**Negligible**
	Pentre Bach	46	40	37	65	55	45	0	0	**0**	**Negligible**	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	40	65	55	45	28	28	**28**	**Negligible**	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	37	65	55	45	11	11	**15**	**Negligible**	**Negligible**	**Negligible**
	Plas yr Esgob	47	39	38	65	55	45	43	43	**44**	**Low**	**Low**	**Low**
	Rhos Aber	47	39	38	65	55	45	16	16	**16**	**Negligible**	**Negligible**	**Negligible**

Use of trenchless techniques compounds													
Location	Receptor	LOAEL, dB(A)			SOAEL, dB(A)			Construction Noise Level, dB(A)			Magnitude of Impact		
		Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night
	Squirrels Lodge	43	39	36	65	55	45	10	10	**15**	**Negligible**	**Negligible**	**Negligible**
	Tan y Bryn	45	41	40	65	55	45	17	17	**18**	**Negligible**	**Negligible**	**Negligible**
	Tan y Bryn Uchaf	45	41	40	65	55	45	22	22	**25**	**Negligible**	**Negligible**	**Negligible**
	Tan y Graig	43	42	37	65	55	45	25	25	**26**	**Negligible**	**Negligible**	**Negligible**
	Trebanog	46	40	37	65	55	45	1	1	**2**	**Negligible**	**Negligible**	**Negligible**
	Ty Celyn	43	39	36	65	55	45	23	23	**23**	**Negligible**	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	39	36	65	55	45	19	19	**21**	**Negligible**	**Negligible**	**Negligible**
	Tyn y Caeau	43	42	37	65	55	45	36	36	**39**	**Negligible**	**Negligible**	**Low**
	Tyn y Ffordd	43	42	37	65	55	45	19	19	**20**	**Negligible**	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	43	39	36	65	55	45	5	5	**6**	**Negligible**	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	45	41	40	65	55	45	17	17	**17**	**Negligible**	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	36	65	55	45	18	18	**18**	**Negligible**	**Negligible**	**Negligible**
	Waen Meredydd	43	42	37	65	55	45	9	9	**14**	**Negligible**	**Negligible**	**Negligible**

Use of trenchless techniques compounds													
Location	Receptor	LOAEL, dB(A)			SOAEL, dB(A)			Construction Noise Level, dB(A)			Magnitude of Impact		
		Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night	Day	Evening and Weekends	Night
	Ysgubor EOS	46	40	37	65	55	45	23	23	**24**	**Negligible**	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	38	65	55	45	18	18	**20**	**Negligible**	**Negligible**	**Negligible**

Substation Groundworks									
Location	Receptor	LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Substation	Bryn Arian	45	41	65	55	39	39	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	39	39	**Negligible**	**Negligible**
	Cae Pwll	43	39	65	55	47	47	**Low**	**Low**
	Caer Delyn	46	40	65	55	50	50	**Low**	**Low**
	Carreg Wen	46	40	65	55	36	36	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	39	39	**Negligible**	**Low**
	Craig Llwyd	45	41	65	55	39	39	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	39	39	**Negligible**	**Negligible**

Location	Receptor	Substation Groundworks LOAEL, dB(A)		Substation Groundworks SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Groesffordd Farm	45	41	65	55	34	34	**Negligible**	**Negligible**
	Hendy Farm	43	42	65	55	39	39	**Negligible**	**Negligible**
	Isfryn	47	39	65	55	41	41	**Negligible**	**Low**
	Maes	47	39	65	55	43	43	**Negligible**	**Low**
	Pant Farm	43	39	65	55	42	42	**Negligible**	**Low**
	Pentre Bach	45	41	65	55	40	40	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	39	39	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	39	39	**Negligible**	**Negligible**
	Plas yr Esgob	46	40	65	55	40	40	**Negligible**	**Low**
	Rhos Aber	43	39	65	55	39	39	**Negligible**	**Low**
	Squirrels Lodge	43	39	65	55	44	44	**Low**	**Low**
	Tan y Bryn	43	42	65	55	47	47	**Low**	**Low**
	Tan y Bryn Uchaf	43	42	65	55	48	48	**Low**	**Low**
	Tan y Graig	43	39	65	55	49	49	**Low**	**Low**
	Trebanog	45	41	65	55	33	33	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	35	35	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	42	65	55	23	23	**Negligible**	**Negligible**
	Tyn y Caeau	46	40	65	55	25	25	**Negligible**	**Negligible**

Location	Receptor	Substation Groundworks LOAEL, dB(A)		Substation Groundworks SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Tyn y Ffordd	47	39	65	55	44	44	**Negligible**	**Low**
	Tyn y Ffordd Bach	44	40	65	55	46	46	**Low**	**Low**
	Tyn y Ffordd Fawr	44	40	65	55	41	41	**Negligible**	**Low**
	Tyn y Ffordd Newydd	43	39	65	55	44	44	**Low**	**Low**
	Waen Meredydd	44	39	65	55	50	50	**Low**	**Low**
	Ysgubor EOS	45	41	65	55	51	51	**Low**	**Low**
	Ysgubor Newydd	47	39	65	55	39	39	**Negligible**	**Low**

Location	Receptor	Substation Building Foundation Works							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Substation	Bryn Arian	45	41	65	55	33	33	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	44	44	**Low**	**Low**
	Cae Pwll	43	39	65	55	29	29	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	32	32	**Negligible**	**Negligible**
	Carreg Wen	46	40	65	55	29	29	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	35	35	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	35	35	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	31	31	**Negligible**	**Negligible**
	Groesffordd Farm	45	41	65	55	31	31	**Negligible**	**Negligible**
	Hendy Farm	43	42	65	55	33	33	**Negligible**	**Negligible**
	Isfryn	47	39	65	55	45	45	**Negligible**	**Low**
	Maes	47	39	65	55	21	21	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	12	12	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	40	40	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	36	36	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	48	48	**Low**	**Low**
	Plas yr Esgob	46	40	65	55	32	32	**Negligible**	**Negligible**
	Rhos Aber	43	39	65	55	21	21	**Negligible**	**Negligible**

Location	Receptor	Substation Building Foundation Works							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Squirrels Lodge	43	39	65	55	31	31	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	34	34	**Negligible**	**Negligible**
	Tan y Bryn Uchaf	43	42	65	55	50	50	**Low**	**Low**
	Tan y Graig	43	39	65	55	12	12	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	29	29	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	39	39	**Negligible**	**Low**
	Tyddyn Meredydd	43	42	65	55	49	49	**Low**	**Low**
	Tyn y Caeau	46	40	65	55	31	31	**Negligible**	**Negligible**
	Tyn y Ffordd	47	39	65	55	12	12	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	32	32	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	30	30	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	26	26	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	36	36	**Negligible**	**Negligible**
	Ysgubor EOS	45	41	65	55	30	30	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	12	12	**Negligible**	**Negligible**

Location	Receptor	Substation Access Road and Car Parking Road Works							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Substation	Bryn Arian	45	41	65	55	44	44	**Negligible**	**Low**
	Cae Llwyd	43	42	65	55	48	48	**Low**	**Low**
	Cae Pwll	43	39	65	55	34	34	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	43	43	**Negligible**	**Low**
	Carreg Wen	46	40	65	55	40	40	**Negligible**	**Low**
	Cefn Farm	43	39	65	55	37	37	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	46	46	**Low**	**Low**
	Derwen Deg	46	40	65	55	41	41	**Negligible**	**Low**
	Groesffordd Farm	45	41	65	55	44	44	**Negligible**	**Low**
	Hendy Farm	43	42	65	55	49	49	**Low**	**Low**
	Isfryn	47	39	65	55	45	45	**Negligible**	**Low**
	Maes	47	39	65	55	33	33	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	22	22	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	47	47	**Low**	**Low**
	Pentre Mawr Farm	45	41	65	55	47	47	**Low**	**Low**
	Pentre Meredydd	43	42	65	55	49	49	**Low**	**Low**
	Plas yr Esgob	46	40	65	55	41	41	**Negligible**	**Low**
	Rhos Aber	43	39	65	55	37	37	**Negligible**	**Negligible**

Location	Receptor	Substation Access Road and Car Parking Road Works							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Squirrels Lodge	43	39	65	55	38	38	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	42	42	**Negligible**	**Low**
	Tan y Bryn Uchaf	43	42	65	55	46	46	**Low**	**Low**
	Tan y Graig	43	39	65	55	20	20	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	43	43	**Negligible**	**Low**
	Ty Celyn	43	39	65	55	39	39	**Negligible**	**Low**
	Tyddyn Meredydd	43	42	65	55	49	49	**Low**	**Low**
	Tyn y Caeau	46	40	65	55	41	41	**Negligible**	**Low**
	Tyn y Ffordd	47	39	65	55	28	28	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	38	38	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	38	38	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	33	33	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	48	48	**Low**	**Low**
	Ysgubor EOS	45	41	65	55	36	36	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	21	21	**Negligible**	**Negligible**

Location	Receptor	Substation Building Fabrication and High-Voltage Plant Installation							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
Onshore Substation	Bryn Arian	45	41	65	55	34	34	**Negligible**	**Negligible**
	Cae Llwyd	43	42	65	55	44	44	**Low**	**Low**
	Cae Pwll	43	39	65	55	28	28	**Negligible**	**Negligible**
	Caer Delyn	46	40	65	55	31	31	**Negligible**	**Negligible**
	Carreg Wen	46	40	65	55	30	30	**Negligible**	**Negligible**
	Cefn Farm	43	39	65	55	32	32	**Negligible**	**Negligible**
	Craig Llwyd	45	41	65	55	36	36	**Negligible**	**Negligible**
	Derwen Deg	46	40	65	55	30	30	**Negligible**	**Negligible**
	Groesffordd Farm	45	41	65	55	31	31	**Negligible**	**Negligible**
	Hendy Farm	43	42	65	55	47	47	**Low**	**Low**
	Isfryn	47	39	65	55	41	41	**Negligible**	**Low**
	Maes	47	39	65	55	18	18	**Negligible**	**Negligible**
	Pant Farm	43	39	65	55	11	11	**Negligible**	**Negligible**
	Pentre Bach	45	41	65	55	40	40	**Negligible**	**Negligible**
	Pentre Mawr Farm	45	41	65	55	38	38	**Negligible**	**Negligible**
	Pentre Meredydd	43	42	65	55	52	52	**Low**	**Low**
	Plas yr Esgob	46	40	65	55	31	31	**Negligible**	**Negligible**
	Rhos Aber	43	39	65	55	20	20	**Negligible**	**Negligible**

Location	Receptor	Substation Building Fabrication and High-Voltage Plant Installation							
		LOAEL, dB(A)		SOAEL, dB(A)		Construction Noise Level, dB(A)		Magnitude of Impact	
		Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends	Day	Evening and Weekends
	Squirrels Lodge	43	39	65	55	29	29	**Negligible**	**Negligible**
	Tan y Bryn	43	42	65	55	33	33	**Negligible**	**Negligible**
	Tan y Bryn Uchaf	43	42	65	55	44	44	**Low**	**Low**
	Tan y Graig	43	39	65	55	12	12	**Negligible**	**Negligible**
	Trebanog	45	41	65	55	31	31	**Negligible**	**Negligible**
	Ty Celyn	43	39	65	55	35	35	**Negligible**	**Negligible**
	Tyddyn Meredydd	43	42	65	55	50	50	**Low**	**Low**
	Tyn y Caeau	46	40	65	55	30	30	**Negligible**	**Negligible**
	Tyn y Ffordd	47	39	65	55	15	15	**Negligible**	**Negligible**
	Tyn y Ffordd Bach	44	40	65	55	30	30	**Negligible**	**Negligible**
	Tyn y Ffordd Fawr	44	40	65	55	28	28	**Negligible**	**Negligible**
	Tyn y Ffordd Newydd	43	39	65	55	27	27	**Negligible**	**Negligible**
	Waen Meredydd	44	39	65	55	36	36	**Negligible**	**Negligible**
	Ysgubor EOS	45	41	65	55	32	32	**Negligible**	**Negligible**
	Ysgubor Newydd	47	39	65	55	12	12	**Negligible**	**Negligible**

Appendix C: Construction traffic noise assessment results

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
A55 between Junctions 27 and 27A	53,774	2,467	80	54,261	2672	80	0	**Negligible**
A55 between Junctions 27 and 26	47,854	2,457	80	48,341	2662	80	0	**Negligible**
A55 between Junctions 26 and 25	47,854	2,457	80	48,408	2662	80	0	**Negligible**
A55 between Junctions 25 and 24A	47,854	2,457	80	48,435	2662	80	0	**Negligible**
A55 between Junctions 24A and 24	47,854	2,457	80	48,435	2662	80	0	**Negligible**
A55 between Junctions 24 and 23A	56,720	2,236	80	57,141	2441	80	0	**Negligible**
A55 between Junctions 23A and 23	71,493	2,551	81	71,914	2756	81	0	**Negligible**
A547 through Llanddulas	8,593	772	69	8,836	849	69	0	**Negligible**
A547 between Rhyd-Y-Foel and TCC 1	6,998	830	68	7,242	908	68	0	**Negligible**

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
A547 between TCC1 and Busnes Gogledd Cymru	6,998	830	68	7,205	863	68	0	**Negligible**
A547 between Parc Busnes Gogledd Cymru and A548 Chapel Street	9,460	857	68	9,667	890	68	0	**Negligible**
A547 between A548 Chapel Street and A55	6,131	672	62	6,374	705	63	1	**Low**
A548 Chapel Street between A547 and Lon Dirion	9,241	995	64	9,500	1061	64	0	**Negligible**
A548 Chapel Street between Lon Dirion and Abergele Hospital	4,088	842	68	4,346	908	68	0	**Negligible**
A548 Chapel Street between Abergele Hospital and B5381 Roman Road	2,983	470	66	3,242	536	67	1	**Low**
B5381 Roman Road between A548 and Moelfre	2,018	376	64	2,068	376	65	1	**Low**

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
B5381 Roman Road between Moelfre and Capel Carmel	1,590	229	63	1,640	229	64	1	**Low**
B5381 Roman Road between Capel Carmel and Roberts D a O	1,624	305	64	1,674	305	64	0	**Negligible**
B5381 Roman Road between Roberts D a O and to TCC 4	1,776	291	64	1,826	291	64	0	**Negligible**
B5381 Roman Road between TCC 4 and TCC 5	1,776	291	64	1,895	312	64	0	**Negligible**
B5381 Roman Road between TCC 5 and Engine Hill	1,776	291	64	2,027	359	65	1	**Low**
B5381 Glascoed Road between Engine Hill and Ffordd William Morgan	1,811	241	64	2,028	309	65	1	**Low**

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
B5381 Glascoed Road between Ffordd William Morgan and National Grid Substation access	4,217	509	64	4,451	604	64	0	**Negligible**
Ffordd William Morgan between A55 and Carlton Court	4,111	420	61	4,512	583	61	0	**Negligible**
Ffordd William Morgan between Carlton Court and B5381 Glascoed Road	6,373	531	63	6,774	693	63	0	**Negligible**
Engine Hill between A55 and B5381 Glascoed Road	3,574	579	67	3,723	579	67	0	**Negligible**
B5381 Roman Road west of A548 crossroad up to construction compound	768	15	60	810	15	60	0	**Negligible**

Link	2026 Baseline Traffic Flows			2026 Baseline Traffic Flows + Construction Traffic Flows			Change in BNL of Closest Public Road used for Construction Traffic(dB)	Impact
	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)	Total Vehicles (AADT)	HGVs (AADT)	BNL+C, dB(A)		
A548 south of B5381 Roman Road crossroad up to construction compound	2,865	64	66	2,907	64	66	0	**Negligible**