Iarnród Éireann
Irish Rail

Rosslare ORE Hub

EIAR Environmental Topic Chapters

Chapter 19:

Noise and Vibration

venterra | GDG GAVIN & DOHERTY GEOSOLUTIONS | NICHOLAS O'DWYER an RSK company

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LIST OF ABBREVIATIONS

ANC	Association of Noise Consultants
BCP	Border Control Post
BSI	British Standard Institute
CEMP	Construction Environmental Management Plan
CNL	Construction Noise Level
CNT	Construction Noise Threshold
dB	Decibels
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
IEMA	Institute of Environmental Management and Assessment
mCD	metres Chart Datum
MIOA	member of the Institute of Acoustics
NSL	Noise Sensitive Locations
PPV	Peak Particle Velocity
UKHA	UK Highways Agency
WCC	Wexford County Council

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19 NOISE AND VIBRATION

19.1 INTRODUCTION

Iarnród Éireann – Irish Rail is applying for development permission for the Rosslare Offshore Renewable Energy Hub (hereafter the 'Proposed Development'), located immediately adjacent and to the northwest of the existing Rosslare Europort at Rosslare Harbour in County Wexford, which is operated by Iarnród Éireann. The Proposed Development includes capital dredging to achieve navigable depths for vessels delivering ORE components; land reclamation to create a storage area for these components; and construction of two new berths to facilitate loading and unloading of ORE components. The land reclamation works include infilling the existing small boat harbour, after the construction of a new small boat harbour. The Proposed Development also includes the installation of a new slipway and facility for local clubs, such as the Sea Scouts.

The purpose of the Proposed Development is to provide a facility for the efficient handling and storage, marshalling, staging and integration of ORE components to facilitate installation of offshore wind energy projects by ORE developers and operators. The Proposed Development is designed to provide facilities that accommodate a wide range of infrastructure uses, both for current requirements and anticipated future needs. For instance, the Proposed Development could be used for traditional port activities if required, including during periods of reduced ORE-related activity. Refer to EIAR Chapter 6: Project Description for further detail.

This chapter of the Environmental Impact Assessment (EIA) Report presents the assessment of the likely significant airborne noise and vibration effects (as per the "EIA Regulations") from the construction and operation of the Proposed Development on human receptors, both alone and cumulatively with other projects. Noise and Vibration impacts on marine wildlife are assessed with in Chapter 13. This chapter was informed by the Proposed Development scoping report (21285-R-005-02-Rosslare OWS EIASR), which was issued to the following topic-relevant stakeholders:

- Environmental Protection Agency (EPA)
- Wexford County Council (WCC)

The assessment presented in this chapter has been informed by the following EIAR chapters and technical appendices:

- Chapter 6: Project Description
- Chapter 17: Traffic and Road Transport
- Chapter 20: Shipping and Navigation

This chapter provides a summary of noise and vibration guidance used to inform the impact assessment and outlines the data sources used to characterise the noise and vibration Study Area. Building on the general EIAR methodology outlined in Chapter 1: Introduction and Methodology, the methodology followed in assessing the impacts of the Proposed Development on noise and vibration environmental receptors is set out, as is the assessment of likely effects on the noise and vibration environmental receptors arising from the construction and operation of the Proposed Development. Relevant mitigation measures, following the 'mitigation hierarchy' of avoidance, minimisation,

restoration and offsets, and/or monitoring requirements, are proposed in respect of any significant effects and a summary of residual impacts is provided, where relevant.

19.1.1 RELEVANT LEGISLATION AND GUIDELINES

There are no specific statutory standards in Ireland relating to noise and vibration limit values for construction works or the operational phase. This chapter has been prepared having regard to the following national and international guidelines, standards and regulations;

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018)
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017)
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)
- BS 5228-1:2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (hereafter referred to as BS 5228–1) (British Standard Institute, 2014a)
- BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration (hereafter referred to as BS 5228 – 2) (British Standard Institute, 2014b)
- BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (hereafter referred to as BS 7385–2). (British Standard Institute, 1993)
- BS 6472-1: 2008 Guide to evaluation of human exposure to vibration in buildings, Part 1 Vibration sources other than blasting (hereafter referred to as BS 6472–1) (British Standard Institute, 2008)
- BS 8233: Guidance on sound insulation and noise reduction for buildings (hereafter referred to as BS8233) (British Standard Institute, 2014)
- Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2 (hereafter referred to as DMRB Noise and Vibration) (UK Highways Agency (UKHA), 2020)
- S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018 (hereafter referred to as the Noise Regulations)
- S.I. No. 241/2006 - European Communities Noise Emission by Equipment for Use Outdoors (Amendment) Regulations 2006
- ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation (hereafter referred to as ISO 9613 – 2) (International Organization for Standardization, 1996)

- ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures (hereafter referred to as ISO 1996 – 1) (International Organization for Standardization, 2016)
- ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels (hereafter referred to as ISO 1996 – 2) (International Organization for Standardization, 2017)
- The UK Department of Transport Calculation of Road Traffic Noise (hereafter referred to as the CRTN) (UK Department of Transport 1988)
- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (EPA 2016) (hereafter referred to as NG4)
- Guidelines for Environmental Noise Impact Assessment IEMA, (2014)

19.2 ASSESSMENT METHODOLOGY

19.2.1 STATEMENT OF COMPETENCE

This chapter has been prepared by Alistair Maclaurin, Senior Acoustic Consultant with AWN Consulting. Alistair holds a BSc in Creative Music and Sound Technology and a Diploma in Acoustics and Noise Control. He is a member of the Institute of Acoustics (MIOA). Alistair has worked in the field of acoustics since 2012. He has been the lead noise consultant across various sites on major infrastructure projects such as Crossrail and Thames Tideway Tunnel, specialising in construction noise assessment and control. Additionally, he has undertaken various other environmental noise assessments for infrastructure developments and planning reports across the UK and Ireland.

19.2.2 TOPIC SPECIFIC CONSULTATION

The EIAR Scoping Report was shared with the following bodies:

- Environmental Protection Agency
- Wexford County Council

A meeting was held with Wexford County Council in July 2022 to discuss the EIAR Scoping report. Wexford County Council advised on baseline monitoring requirements and approved the baseline monitoring locations and plan for noise monitoring.

No additional consultation with specific relevant bodies was conducted in relation to the noise and vibration assessment.

19.2.3 APPROACH TO ASSESSMENT OF EFFECTS

The baseline information obtained has been used to provide an understanding of the value of each receptor relevant to this topic (the 'baseline scenario'), and its sensitivity to the potential impacts associated with the construction and operation of the Proposed Development. The baseline scenario has been determined with due consideration of the 'do nothing' scenario. The 'source-pathway-receptor' model has been used to identify potential impacts resulting from the proposed project activities on the environment and sensitive receptors within it.

The potential environmental impacts identified have been assessed using a systematic approach to identify and evaluate the significance of the potential impacts both alone and in combination with other plans and projects. Effects can be beneficial (positive), neutral or adverse (negative) in nature.

Significance of effects has been categorised as follows:

- *Imperceptible* − An effect capable of measurement but without significant consequences.
- *Not Significant* − An effect which causes noticeable changes in the character of the environment but without significant consequences.
- *Slight* − An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
- *Moderate* − An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- *Significant effects* − An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.
- *Very Significant* − An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
- *Profound Effects* − An effect which obliterates sensitive characteristics.

Effects determined as slight or lower are considered to have 'no likely significant effect'. Any effect with a greater than moderate significance is considered to have a 'likely significant effect'.

The assessment described above includes consideration of mitigation measures that are incorporated into the design (i.e., primary mitigation) and which are intended to prevent, reduce and where possible offset any significant adverse impacts on the environment.

Where potentially significant adverse effects have not been eliminated by project design or embedded mitigation, further mitigation measures (i.e., secondary mitigation) have been proposed.

For each significant effect identified, appropriate secondary mitigation measures are prescribed. Secondary mitigation measures have been informed by stakeholder engagement and determined by the relevant technical experts.

Where relevant, residual effects have been determined for each significant effect, considering all proposed mitigation.

In cases where residual uncertainty of impact is identified within the EIAR, or the success of implemented mitigation measures requires validation, commitments have been made for the provision of monitoring.

The assessment will be undertaken using the following methodology:

- A review of the local area to identify the closest sensitive locations has been undertaken (please see Figure 19.1)
- Baseline noise monitoring has been undertaken in the vicinity of the Proposed Development site in order to characterise the existing noise environment (please see Figure 19.1)

- A review of the most applicable standards and guidelines has been reviewed in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the Proposed Development
- Predictive calculations relating to construction phase activities have been undertaken at the nearest sensitive locations to the development site
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the most sensitive locations surrounding the Proposed Development
- A schedule of mitigation measures has been incorporated where required, to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the Proposed Development.

19.2.3.1 CONSTRUCTION NOISE

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Therefore, it is industry standard that British Standard Institute guidance is relied upon.

British Standard BS 5228 – 1: 2009+A1:2014

For residential properties, reference is made to BS 5228-1 'ABC' method for the purposes of setting appropriate construction noise thresholds for the development. This is the most widely accepted standard for this purpose in Ireland.

The ABC approach designates a residential noise-sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates that a potential significant noise impact is associated with the construction activities, depending on context.

Table 19.1: Example Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value in decibels (dB) Category A [A]	Threshold value in decibels (dB) Category B [B]	Threshold value in decibels (dB) Category C [C]
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekends	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

Assessment category and threshold value period (L_{Aeq})	Threshold value in decibels (dB) Category A [A]	Threshold value in decibels (dB) Category B [B]	Threshold value in decibels (dB) Category C [C]
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. D) 19:00–23:00 weekdays, 13:00–23:00 Saturdays and 07:00–23:00 Sundays			

Commercial Receptors

BS 5228-1:2009+A1 2014 gives several examples of acceptable limits for construction or demolition noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."*

Paragraph E.2 goes on to state:

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*
>
> *70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;*
>
> *75 decibels (dBA) in urban areas near main roads in heavy industrial areas".*

For non-residential locations it is considered appropriate to adopt the 75dB(A) criterion.

Proposed Threshold Noise Levels

Figure 19.1 provides an overview of the closest receptor groups surrounding the proposed site that will experience the greatest impact from the construction works.

Taking into account the baseline noise environment monitored around the development site (see Section 19.3), and using the criteria discussed above, the following Construction Noise Threshold (CNT) levels are proposed for the nearby receptors to this development in Table 19.2.

Table 19.2: Construction Noise Thresholds for NSLs

Noise Sensitive Location	BS 5228-1 ABC Category	CNT, Daytime. dB $L_{Aeq,12hr}$	CNT, Evening. dB $L_{Aeq,4hr}$	CNT, Night. dB $L_{Aeq,8hr}$
NSL1	Category A	65	55	45
NSL2	Category A	65	55	45
NSL3	Category A	65	55	45
NSL4	Category A	65	55	45

There are receptors further from the development site, however, the work areas will typically be 500m or greater from these areas and, hence, these receptors can be scoped out of the assessment as the attenuation due to distance will be sufficient to reduce the impacts at these locations to not significant.

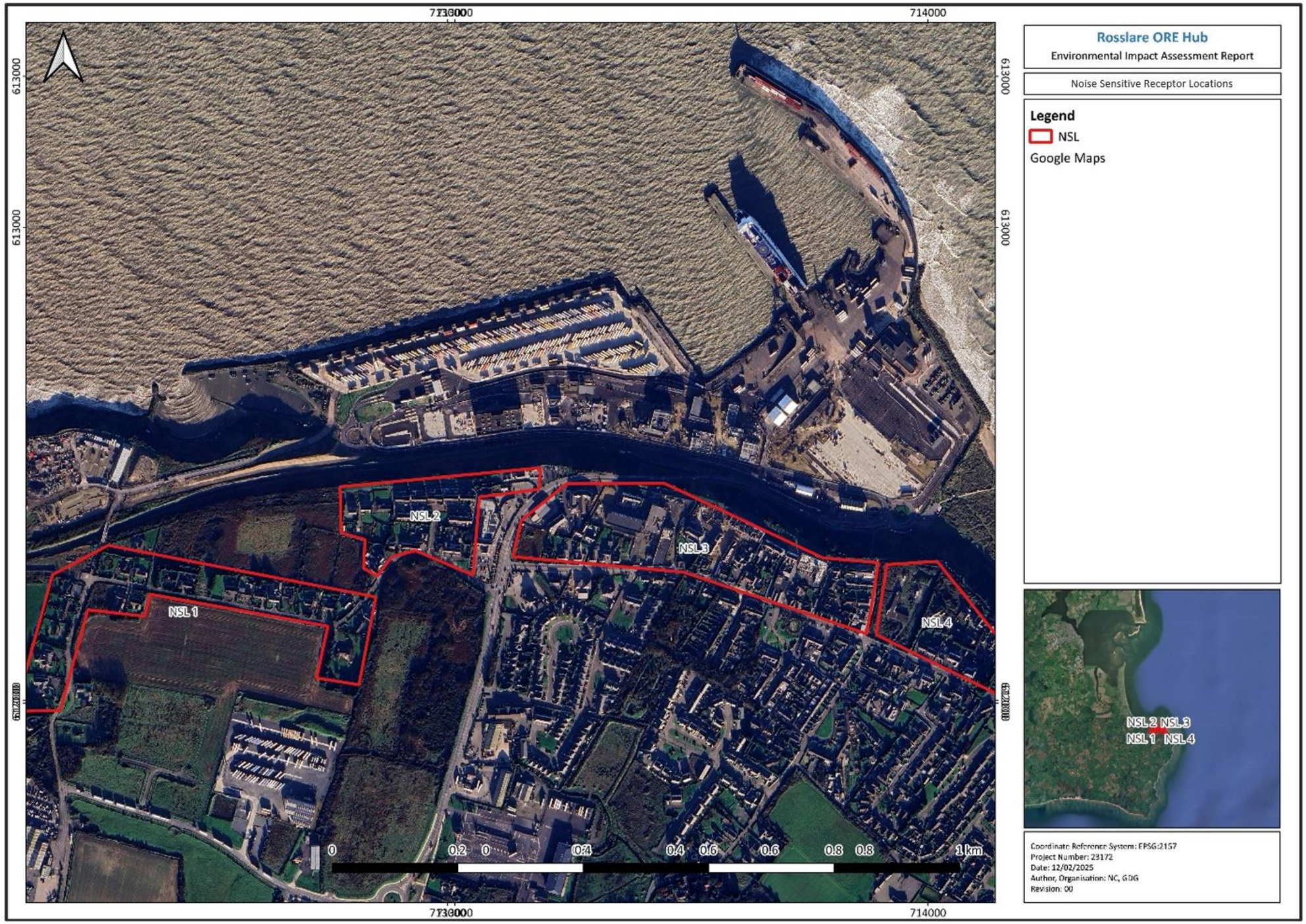

Figure 19.1: Noise Sensitive Receptor Locations

Figure Interpretation of the Construction Noise Level (CNL)

In order to assist with interpretation of significance of calculated CNLs, Table 19.3 includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of *DMRB: Noise and Vibration*.

Table 19.3: Likely Impact due to Construction Noise

Construction Noise Level (CNL)	Guidelines for Noise Impact Assessment Significance (DMRB)	EPA Mapped Effects	Determination
Below or equal to baseline noise level	Negligible	Not Significant to Slight	Depending on CNT, duration & baseline noise level
Above baseline noise level and below or equal to CNT Note 1	Minor	Slight to Moderate	
Above CNT and below or equal to CNT +5dB Note 2	Moderate	Moderate to Significant	
Above CNT +5 and below or equal to CNT +15dB	Major	Significant to Very Significant	
Above +15dB		Very Significant to Profound	

Note 1: CNLs at the upper end of this range will result in higher potential impacts, therefore, this range is categorised as slight to moderate, acknowledging that values approaching the CNT are greater than slight. In accordance with DMRB, noise levels below the CNT are deemed 'Not Significant'.

Note 2: The DMRB does not distinguish beyond a 'Major' impact. For the purposes of distinguishing between a Very Significant and Profound Impact, CNLs exceeding the CNT by +20dB are categorised as Profound.

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and determine the likely impacts during the construction stages.

Construction Traffic

Vehicular movement to and from the construction site for the Proposed Development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced: *DMRB Noise and Vibration* 2020 and the *EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB document. Table 19.4 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2020).

Table 19.4: Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1 dB	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant
3 – 4.9	Perceptible	Moderate	Slight, Moderate
≥ 5	Up to a doubling of loudness	Major	Significant

19.2.3.2 CONSTRUCTION VIBRATION

Building Damage

BS 7385 - 2 (BSI 1993) gives guidance regarding acceptable vibration in order to avoid damage to buildings. BS 5228 – 2 reproduces these same guidance values.

These standards differentiate between transient and continuous vibration. Surface construction activities are transient because they occur for a limited period of time at a given location. Both documents recommend that, for soundly constructed residential property and similar light framed structures that are generally in good repair, a threshold for minor or cosmetic damage (i.e., non-structural damage) should be taken as a PPV (in frequency range of predominant pulse) of 15mm/s at 4 Hertz (Hz) increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5mm/s PPV the risk of damage tends to zero. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in BS 5228 – 2 (BSI 2014b) Table B.2 might need to be reduced by up to 50%. On a cautious basis, therefore, continuous vibration limits are set as 50% of those for transient vibration across all frequency

ranges. Historically important buildings that are difficult to repair might require special consideration on a case-by-case basis, but buildings of historical importance should not be assumed to be more sensitive unless they are structurally unsound.

If a building is in an unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other groundborne disturbance. The vibration limit range for protected and historical buildings are equal to or up to 50% of those for light framed buildings, depending on their structural integrity. Where no structural defects are noted, the same limit to those for light framed buildings apply. For other structures and buildings that are determined to be potentially vulnerable to vibration due to significant structural defects, further stringent criteria have been applied for transient vibration. It is assumed that known buildings and structures of this kind, will be subject to condition surveys well in advance of the works, and any defects identified repaired. The results of conditions surveys will determine whether a building or structure is classed as "vulnerable".

Table 19.5 sets out the limits as they apply to vibration frequencies at 4Hz where the most conservative limits are required. At higher frequencies, the relevant limit values for transient vibration within Table B.2 and Figure B.1 of BS5228-2 (BSI, 2014) will apply, with similar reductions applied for continuous vibration and those for protected structures. For line 2 of Figure B.1. at frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded. Taking the above into consideration, the vibration criteria for building response is set out in Table 19.5.

Table 19.5: Building Damage Criteria for Construction Vibration

Vibration Limits for Buildings (PPV) at the closest part of building to the source of vibration, at a frequency of 4Hz		
Building Type	Transient Vibration	Continuous Vibration
Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s	25 mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15 mm/s	7.5 mm/s
Protected and Historic Buildings ∗Note 1	6 mm/s – 15 mm/s	3 mm/s – 7 mm/s
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3 mm/s	

Note 1: The relevant threshold value to be determined on a case-by-case basis. Where sufficient structural information is unavailable at the time of assessment, the lower values within the range will be used, depending on the specific vibration frequency.

Human Response Criteria

Humans are sensitive to vibration stimuli, and perception of vibration at high magnitudes may cause concern to building occupants. BS 5228 – 2 notes that vibration typically becomes perceptible at around 0.15 mm/s to 0.3 mm/s and may become disturbing or annoying at higher magnitudes. During surface construction works associated with breaking of ground, piling, and excavation, depending on the methodologies involved have the potential to be perceptible to building occupants and have the potential to cause significant effects.

Higher levels of vibration are, however, typically tolerated for single events or events of temporary duration, particularly during construction projects and when the origin of vibration is known. For example, piling can typically be tolerated at vibration levels up to 2.5 mm/s during the daytime and the evening if those affected are aware of the time-frame and origin of the vibration, and if they have been informed about the limit values relating to the structural integrity of neighbouring properties. Table 19.6 presents the significance table relating to potential impacts to building occupants during construction based on guidance from BS 5228 – 2 and reference to the Association of Noise Consultants (ANC) Measurement and Assessment of Groundborne Noise and Vibration (ANC, 2020).

Table 19.6: Human Response to Vibration Significance Ratings

Criteria	Impact Magnitude	Significance Rating
≥10 mm/s PPV	Very High	Very Significant
≥1 mm/s PPV	High	Moderate to Significant
≥0.3 mm/s PPV	Medium	Slight to Moderate
≥0.14 mm/s PPV	Low	Not significant to Slight
Less than 0.14 mm/s PPV	Very Low	Imperceptible to Not significant

Notes from BS5228-2

A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472 (BS1 2008), and/or other available

guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

Blasting

When assessing the potential impact of blasting, the relevant parameters used are both air overpressure and Peak Particle Velocity (PPV) mm/s. The TII guidelines recommends a PPV limit value of 12mm/s for blasting control. The Irish EPA Guidance Environmental Management in the extraction industry (2006) also recommend a PPV limit of 12mm/s in addition to an acceptable limit for air overpressure of 125dB (Lin) Peak Value. In addition, the EPA recommends blasting is only carried out between 09:00 – 18:00 Monday to Friday.

BS 6472-2 (2008) suggests satisfactory vibration magnitudes from blasting relating to human response. The document notes that for up to three blasts per day, a PPV limit value between 6 and 10mm/s is deemed reasonable, however it states these limit values relate to long term blasting operations from surface mineral extraction sites. The standard notes that for civil engineering projects, such as tunnel and foundation excavations, it should be recognised that the application of human response criteria, rather than conservative damage criteria, could significantly prolong project durations. In turn this could lead to increased complaint levels.

The standard notes higher levels may be more appropriate for short term projects, where good public relations, property surveys etc. are undertaken.

The frequency of blasting for the Project will be no greater than one blast per day every two weeks. Taking the blasting frequency into account, the nature of this engineering project and to expedite works as far as practical in excavation areas to avoid prolonged impacts, the limit values relating to structural damage are considered the most appropriate for this Project which is defined as 12mm/s PPV.

19.2.3.3 OPERATIONAL PHASE – ADDITIONAL TRAFFIC ON PUBLIC ROADS

In order to consider the potential noise impact associated with the Proposed Development introducing additional traffic onto the existing road networks, it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the Proposed Development.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 19.7 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2020).

Table 19.7: Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Long-term)	EPA Significance of Effect
0.0 – 2.9	Barely Perceptible	Negligible	Imperceptible to Not Significant [Note 1]

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Long-term)	EPA Significance of Effect
3 – 4.9	Perceptible	Minor	Slight to Moderate
5 – 9.9	Up to a doubling of loudness	Moderate	Significant
10+	Doubling of loudness and above	Major	Very significant

Note 1: Change in noise levels at the upper end of this range will approach perceptibility, therefore this range is categorised as Imperceptible to Not significant.

19.2.3.4 OPERATIONAL PHASE – INDUSTRIAL NOISE (MECHANICAL PLANT AND SERVICES)

EPA – Noise Guidance 4 Document

The EPA Noise Guidance 4 document is typically used to provide operational noise emission limits (ELVs) at EPA licensed sites across Ireland. The document has been used to provide guidance on noise level emissions for the Proposed Development in the context of similar operating facilities. An assessment of noise under the EPA NG4 guidance requires a noise survey of baseline conditions and then derives appropriate criteria for noise due to the operation of the site. The criteria apply at the façades of the noise-sensitive locations.

The first part of selecting the noise criteria is to carry out a 'quiet area' screening on the location of the site. To be considered a 'quiet area', the following three criteria are required to be met:

- The site must be located **at least 3km from an urban area with a population of more than 1,000 people**: in this instance the site is located less than 3 km from Rosslare Harbour which has a population of over 1,000, therefore this criterion is not met.
- The site must be **at least 3 km away from any local industry**: the Proposed Development is located adjoining an existing active port and there are a number of other industries existing within 3km, therefore this criterion is not met.
- The site must be **at least 5km away from any National Primary Route**: the N25 road is adjacent to the site, therefore this criterion is not met.

In this instance, three of the above criteria are not met and therefore the site is not considered to be in a 'quiet area'.

Having confirmed that the site is not in a 'quiet area', the next part of the derivation of Noise criteria according to NG4 is to test whether the site meets the criteria for an 'area of low background noise'.

For a noise-sensitive location in the vicinity of the site to be considered an 'area of low background noise', the noise levels measured at that location during the environmental noise survey need to satisfy all three of the following criteria:

- Arithmetic Average of L_{A90} During Daytime Period ≤40 dB L_{A90}, and;
- Arithmetic Average of L_{A90} During Evening Period ≤35 dB L_{A90}, and;
- Arithmetic Average of L_{A90} During Night-time Period ≤30 dB L_{A90}.

The noise levels measured during the baseline noise surveys are presented in Section 19.3. It is noted that in every 24-hour period at least one of the criteria for areas of low background noise is exceeded, hence, this area is not considered to be of low background noise. The relevant criteria that would apply to the Proposed Development based on NSLs that are not categorised as low background noise are set out in Table 19.8.

Table 19.8: EPA NG4 Noise Criteria

Scenario	Daytime Noise Criterion, dB $L_{Ar,T}$ (07:00 to 19:00hrs)	Evening Noise Criterion, dB $L_{Ar,T}$ (19:00 to 23:00hrs)	Night Noise Criterion, dB L_{Aeq} (23:00 to 07:00hrs)
All Other Areas	55 dB	50 dB	45 dB

As the Proposed Development would operate continuously (i.e., on a '24/7' basis), the night-time noise criterion is critical to the assessment. As these nearest noise-sensitive locations are not identified as areas of low background noise as per the NG4 guidance, a 45 dB $L_{Aeq,T}$ night time criterion applies.

Assessment of Significance

The 'Guidelines for Environmental Noise Impact Assessment' produced by the Institute of Environmental Management and Assessment (IEMA, 2014) have been referenced in order to categorise the potential effect of changes in the ambient noise levels during the operational phases of the Proposed Development.

The guidelines state that for any assessment, the potential significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. Due to varying factors which effect human response to environmental noise (prevailing environment, noise characteristics, time periods, duration and level etc.,) assigning a subjective response must take account of these factors.

The scale adopted in this assessment is shown in Table 19.9 is based on an example scale within the IEMA guidelines. The corresponding significance of effect from in the EPA's EIA Report Guidelines (2022) is also presented.

Table 19.9: Noise Effect Scale

Noise Level Change dB(A)	Subjective Response	Long Term Change in Magnitude Classification (IEMA)	Effect Guidelines on the Information to be contained in EIARs (EPA)
0	No change	Negligible	Imperceptible
0.1 – 2.9	Barely perceptible		Not Significant
3.0 – 4.9	Noticeable	Minor	Slight to Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Moderate	Moderate to Significant
10.0 or more	More than a doubling or halving of loudness	Major	Significant to Profound

It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels and have been used to assess the impact of operational noise.

BS 8233:2014: Guidance on sound insulation and noise reduction for buildings

To determine the potential operational noise impact at the closest residential dwellings, guidance has been drawn from BS 8233:2014. It is appropriate to derive external assessment criteria based on the internal criteria noted in the Table 19.10. This is done by factoring in the degree of noise reduction afforded by a partially open window. This is nominally deemed to be 15 dB as defined within the BS8233 guidance.

Table 19.10: Indoor ambient noise levels for dwellings from BS 8233:2014

Activity	Location	Day 07:00 to 23:00hrs dB $L_{Aeq,16hour}$	Night 23:00 to 07:00hrs dB $L_{Aeq,8hour}$
Resting	Living room	35	-
Dining	Dining room/area	40	-

Activity	Location	Day 07:00 to 23:00hrs dB $L_{Aeq,16hour}$	Night 23:00 to 07:00hrs dB $L_{Aeq,8hour}$
Sleeping (daytime resting)	Bedroom	35	30

Based on the guidance outlined the BS 8233 standard, the following external noise levels would be considered reasonable in order to achieve suitable internal noise levels within the nearest residential properties and hence is recommended for the criteria for the Proposed Development:

- Daytime (07:00 to 23:00 hrs) 50 dB $L_{Aeq,16hour}$
- Night (23:00 to 07:00 hrs) 45 dB $L_{Aeq,8hour}$

19.2.4 MITIGATION

As discussed in Chapter 1: Introduction and Methodology, three types of mitigation measures are considered in this chapter.

- Primary mitigation
- Secondary mitigation
- Tertiary mitigation

19.2.5 RESIDUAL EFFECTS

Where relevant, residual effects have been determined for each significant effect, considering all proposed mitigation. In cases where residual uncertainty of impact is identified within the EIAR, or the success of implemented mitigation measures requires validation, commitments have been made for the provision of monitoring.

19.2.6 DIFFICULTIES AND UNCERTAINTIES

There are no known limitations or difficulties for this assessment.

19.3 BASELINE: NOISE AND VIBRATION IN RECEIVING ENVIRONMENT

An environmental noise survey was conducted by AONA Environmental in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise - Determination of Sound Pressure Levels*. A summary of the survey is presented in the following sections. The aim of the noise monitoring survey was to produce a baseline dataset of noise measurements for the proposed Rosslare Europort Offshore Renewable Energy Hub.

19.3.1 MEASUREMENT LOCATIONS

Four survey locations (Figure 19.2) were selected to determine the prevailing noise climate in the vicinity of the Proposed Development and the identified receptors with potential to be impacted by the Proposed Development. All survey locations are presented in Figure 19.2, and are discussed in the following sections. The monitoring locations were selected with Wexford County Council's Environment Team (as the relevant noise planning authority) to be representative of all groups of sensitive receptors. These are as follows:

- **STN 1 - Caragh Lodge**

  A noise unit EM2030 (10153)) was installed in the back garden of this dwelling. It is located circa. 70 metres from the railway line and circa 600 metres from what was deemed to be the nearest port activity. A water treatment plant is also located towards the back of the house circa 275 metres. Quiet area with little or no influence from Rosslare harbour activities.

- **STN 2 – Dwelling at the end of Cliff Road**

  A EM2030 noise unit was installed in the front garden of a dwelling located at the end of the Cliff Road. The entrance to the dwelling is overlooking the west border of the port. The dwelling is located circa 70 metres from the railway line and circa 175 metres from the nearest port activity. Noise climate is influenced by Rosslare harbour activities.

- **STN 3 – Dwelling at the entrance of Cliff Road**

  A noise unit EM2030 (10219)) was installed in the back garden of this dwelling. It is circa. 40 metres to the railway and circa 120 meters to port activity. This dwelling is overlooking the main loading area for HGVs. Noise climate is influenced by Rosslare harbour activities.

- **STN 4 - RNLI Station**

  A noise unit EM2030-A (10218)) was installed on the RNLI Lookout. It is located circa 120 metres to the main entrance to the port and circa 75 metres to the Irish Rail turntable. This location is between the port and dwellings located on the Bay view Road. Noise climate is influenced by Rosslare harbour activities.

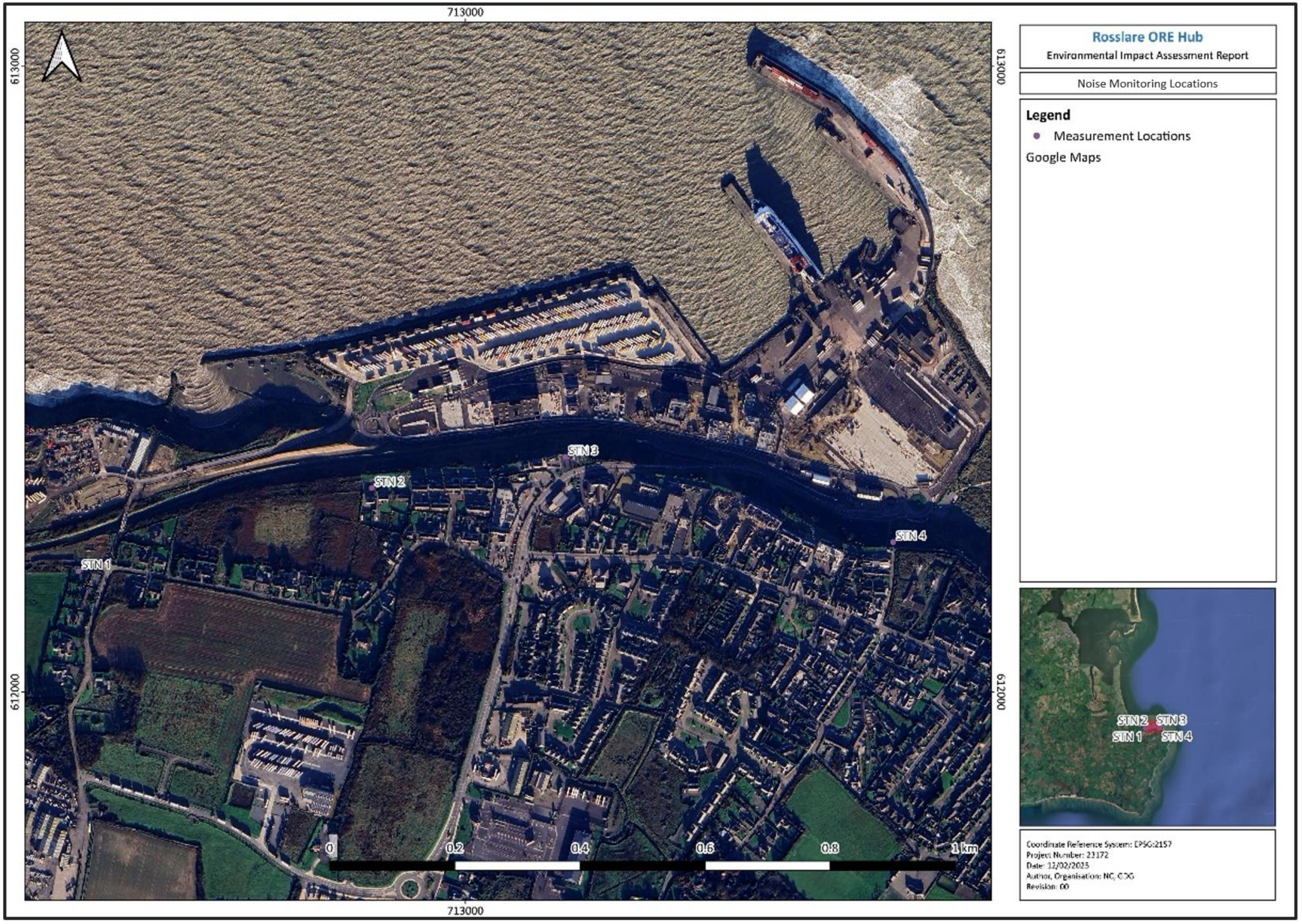

Figure 19.2: Noise monitoring locations

19.3.2 SURVEY PERIODS

A Continuous daytime, evening and night-time baseline noise survey at the selected monitoring locations representative of the surrounding residential properties in proximity to the Proposed Rosslare Europort Offshore Renewable Energy Hub site was undertaken between 23rd March 2023 and 18th July 2023.

19.3.3 INSTRUMENTATION

Measurements were made using EM2010 Sound Level Meters. The EM2010s were fitted with a suitable outdoor noise measurement kit, which allows the microphone to retain its Class 1 specifications according to IEC6051 and IEC61672-1 when the weather protection system is in place.

Noise measurements were taken at a height of approximately 1.5 m above ground level. The noise monitoring location was selected to be representative of the existing background noise level in the area. The sound level meter was set to record data over 15-minute intervals. The meters were calibrated before and after the survey period. The Time Weighting used was Fast and the Frequency Weighting was A-Weighted.

19.3.4 MEASUREMENT PARAMETERS

The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period. It is typically used as a descriptor for ambient noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

L_{AMax} is the maximum sound pressure level recorded during the sample period.

The 'A' suffix denotes the fact that the sound levels have been 'A-weighted' in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

19.3.5 RESULTS

The baseline survey notes indicate that the site area is dominated by traffic noise on the N25 and the existing Rosslare Harbour noise sources in proximity to the site.

19.3.5.1 DAYTIME RESULTS

Table 19.11: Noise measurement results for Daytime

DAYTIME – 12 HOUR (07:00 – 19:00)				
Location	$L_{Aeq, 12\ Hour}$	L_{AMax}	$L_{A10, 12\ Hour}$	$L_{A90, 12\ Hour}$
STN 1	47.0	61.4	49.4	40.9
STN 2	44.2	57.7	46.2	40.0
STN 3	54.7	67.9	57.4	49.3

STN 4	57.7	70.3	60.0	53.2

19.3.5.2 EVENING RESULTS

Table 19.12: Noise measurement results for Evening

EVENING – 4 HOUR (19:00 – 23:00)				
Location	$L_{Aeq, 4\ Hour}$	L_{AMax}	$L_{A10, 4\ Hour}$	$L_{A90, 4\ Hour}$
STN 1	43.0	54.9	45.1	38.3
STN 2	42.7	53.9	44.5	39.4
STN 3	52.4	65.3	54.8	47.3
STN 4	56.3	68.6	58.4	52.3

19.3.5.3 NIGHT-TIME RESULTS

Table 19.13: Noise measurement results for Night-time

NIGHT-TIME – 4 HOUR (23:00 – 07:00)				
Location	$L_{Aeq, 8\ Hour}$	L_{AMax}	$L_{A10, 8\ Hour}$	$L_{A90, 8Hour}$
STN 1	40.3	51.2	42.7	35.4
STN 2	40.4	50.7	42.2	37.4
STN 3	49.9	61.4	51.9	45.9
STN 4	53.0	64.3	54.9	49.3

19.4 ASSESSMENT OF EFFECTS

19.4.1 "DO-NOTHING" SCENARIO

In the Do Nothing scenario it is expected that the noise environment will remain as per the baseline which will include the operational port noise in its existing state (this includes 24/7 operation of the facilities with ship movements to and from the port).

19.4.2 CONSTRUCTION PHASE NOISE IMPACTS

Construction is planned to commence in early 2026, pending grant of permission of the Proposed Development, with a construction programme spanning 18 to 24 months. Project completion is anticipated to be in 2027.

Generally, construction works excluding dredging will be conducted primarily between 7am to 7pm Monday to Saturday. Sunday working is not anticipated to occur. However, work outside of these hours may be required on an infrequent basis to suit tides and vessel movements.

Dredging works are expected to be carried out on a 24 hours per day, 7 days per week, working basis over a period of 11 months. As this includes for beneficial re-use of the arising spoil, the reclamation of this material into the bunded reclamation area will also necessitate 24 hours per day and 7 days per week activity over a period of 14 months coinciding with the dredging works.

It is expected that construction work will span 24 months from commencement to completion, with multiple tasks ongoing in parallel. The sequencing of activities and overlaps are detailed in this chapter under indicative project programming.

The key stages and activities with potential to result in noise impacts are discussed below.

19.4.2.1 DRIVEN PILING

The proposed methodology for piling indicates that there is the potential for driven piles depending on ground conditions. For this activity a construction noise level of 89 dB L_{Aeq} at 10m has been used as referenced from BS 5228-1:2009 Table C.3:1. This noise level will inform calculations of piling noise at receptor locations.

19.4.2.2 CONCRETE PUMPING

Concrete pumping will also be required at the small boat harbour where quay wall edges will be formed from a concrete capping beam, concrete yards will be laid around the O&M building and the two slipways into the water will also be laid as concrete structures. For this activity a construction noise level of 75 dB L_{Aeq} at 10 m has been used as referenced from BS 5228-1:2009 Table C.4:28. This noise level will inform calculations of concrete pumping at receptor locations.

19.4.2.3 DREDGING

Dredging will be required to provide adequate safe navigable waters to approach and berth along the new quays, with the primary berth pocket dredged to a depth of -12 mCD (metres Chart Datum), and the approach channel dredged to a depth of -10 mCD. During night works the dredging ship will be initially located at 200m from the coast line to ensure that noise thresholds are not exceeded. As noise levels from the works will be monitored it may be possible for the ship to encroach the shoreline if the monitored levels indicate that there is sufficient headroom in the construction noise levels.

For this activity a construction noise level of 77 dB L_{Aeq} at 10 m has been used as referenced from BS5228 Table C.4:63 for the dredging excavator; 82 dB L_{Aeq} at 10 m has been used as referenced from BS5228 Table C.7:2 for the dredging ship; 78 dB L_{Aeq} at 10 m has been used as referenced from BS5228 Table C.8:6 for the bulldozer, and; 78 dB L_{Aeq} at 10 m has been used as referenced from BS5228 Table C.6:41 for the pump. These noise levels will inform calculations of dredging at receptor locations.

19.4.2.4 EXCAVATION AND EARTHWORKS

A small extent of excavation around the northern side of the cliff face adjacent to the small boat harbour is required to tie-in with the infilled levels from reclamation. General earthworks will be required to re-handle dredged spoil as it is deposited into the reclamation lagoons. For this activity a construction noise level of 79 dB L_{Aeq} at 10 m has been used as referenced from BS 5228-1:2009 Table C.2:14. This noise level will inform calculations of excavation and earthworks at receptor locations.

Construction noise predictions are presented in Table 19.14. The construction noise predictions indicate that all construction related noise levels will likely be within the construction noise thresholds, even when all activities occur simultaneously. Additionally, predictions have been undertaken to account for the potential for dredging during the night period, the resultant calculation indicates a noise level of 45 dB $L_{Aeq,8hr}$ at NSL2 which is within the construction criteria, all other receptors are

predicted to receive a lower level of noise. The predicted impact due to construction noise is **negative, not significant to moderate** and **short term**.

Table 19.14: Predicted Construction Noise Levels

Receptor	Predicted Construction Noise Level, dB LAeq,T				Total Construction Noise, dB LAeq,T
	Driven Piling	Concrete Pumping	Dredging	Excavation and Earthworks	
NSL1	62	48	44	52	**63**
NSL2	61	47	49	51	**62**
NSL3	54	40	49	44	**56**
NSL4	46	32	42	36	**48**

19.4.2.5 CONSTRUCTION PHASE VIBRATION IMPACTS

Blasting

There is the potential for blasting be undertaken periodically at the site during the construction phase. It's expected that a single blast would occur every 2 to 3 weeks during the piling works. Blasting impacts relate to both ground vibration and air overpressure, the magnitude of which depends on a variety of factors.

Air overpressure is energy transmitted from the blast site within the atmosphere in the form of pressure waves. As such a wave passes a given position, the pressure of the air at this point rises very rapidly to a value above the ambient pressure, and then falls more slowly to a value below, before returning to the ambient value after a series of oscillations. The maximum excess pressure in this wave is known as the peak air overpressure. This value is typically measured in terms of dB (Lin).

These pressure waves will consist of energy over a wide range of frequencies, some of which are audible and known as sound waves or noise, but most of the energy is inaudible at frequencies of less than 20Hz which is not heard by the human ear but is sensed as pressure.

The main sources of air overpressure from blasting relate to blast design and set up (e.g. detonating cord, stemming release and gas venting) and physical properties of the site (movement of rock and reflection of stress waves). The intensity of air overpressure levels at a receiver location is highly dependent on meteorological conditions which affect ambient air pressure including temperature, cloud cover, humidity, wind speed and direction etc. Due to the large variability in these conditions, it is not possible to reliably calculate AOP. The control of its intensity is therefore undertaken at source through careful blast design.

It is important to note that routine open-pit blasting operations regularly generate air overpressures up to a magnitude of 120dB (Lin), with levels in excess of 125dB (Lin) being relatively rare. Damage levels are rarely approached let alone exceeded. BS 5228-2 notes that there is no known evidence of structural damage to structures from excessive air overpressure levels from quarry blasting in the UK.

The level of vibration at a receiver location from a blast depends predominately on the distance from the blast, the maximum instantaneous charge (MIC), sequencing of charges and ground conditions between the blast area and the receiver location. In line with the current best practice operations all blasts will be designed to ensure the PPV limits defined in Table 19.5 are not exceeded. Given the distance between the blasting sites and the NSLs (greater than 150m), as well as the infrequency of blasting events it is expected that the effects of blasting will be **negative, moderate and momentary.**

Piling

Potential for vibration impacts during the construction phase programme are likely to be limited to piling activities. In terms of piling, this activity is expected to occur at greater than 150 m distance to the nearest sensitive property. Expected vibration levels driven piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2: Vibration, publishes the measured magnitude of driven piles into granular fill over compact sand (Table D.9, Ref. No. C31) as 2.45 mm/s at a distance of 25 m.

Considering the additional distance to the receptors which are at least 150 m from the site, vibration emissions from this activity will likely be lower than those quoted above. For building occupants there is the potential that vibration levels will be at a level that could cause disturbance, however, TII guidance document *Guidelines for the Treatment of Noise and Vibration in National Road Schemes 2004* indicates that vibration due to construction phase piling is typically tolerated at vibration levels up to 2.5 mm/s once the origin of the source is known. Hence, it is considered that with prior warning the vibration levels will be tolerable for local residents.

The impacts due to driven piling in terms of building response and human perception during all phases are predicted to be **temporary, negative** and **not significant** in the absence of mitigation.

19.4.2.6 CHANGE IN NOISE LEVEL DUE TO CONSTRUCTION ROAD TRAFFIC

The traffic data contained in the Traffic and Transport Assessment chapter, and submitted with this application, indicates that a maximum increase of AADT on any road is predicted to be an increase of 0.3% on the N25 in the year 2027. Given that an increase of traffic flow by approximately 25% would be required to increase noise levels by 1 dB, in this instance the change in traffic flows would result in a negligible increase of less than 1 dB. The noise impact of traffic volumes accessing the surrounding network is determined to be **neutral, short term** and **imperceptible.**

19.4.3 OPERATIONAL PHASE IMPACTS

19.4.3.1 OPERATIONAL ACTIVITY

During the operational phase of the Proposed Development there will be a number of items of plant in operation on site in addition to a number of Crew Transfer Vessel (CTV) and ship movements to and from the site. A 3D computer-based acoustic prediction model has been prepared in order to quantify the noise level associated with the development. Given that existing operations at the port are already

accounted for in the baseline surveys, the predicted noise levels associated with any new or modified plant items, are compared against existing ambient and background noise levels to determine the potential noise effects. The predictions for both the potential Offshore Renewable Energy activities and the Roll on Roll Off activities

ISO 9613-2: 2024

ISO 9613-2:2024 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT}(DW)$, for the following conditions:

- wind direction at an angle of ±45° to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
- wind speed between approximately $1ms^{-1}$ and $5ms^{-1}$, measured at a height of 3 m to 11 m above the ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear calm nights.

The basic formula for calculating $L_{AT}(DW)$ from any point source at any receiver location is given by:

$$L_{fT}(DW) = L_W + D_c - A \qquad \text{Eqn. A}$$

Where:

$L_{fT}(DW)$	is an octave band centre frequency component of $L_{AT}(DW)$ in dB relative to 2 x 10-5 Pa;
L_W	is the octave band sound power of the point source;
D_c	is the directivity correction for the point source;
A	is the octave band attenuation that occurs during propagation, namely attenuation due to geometric divergence, atmospheric absorption, ground effect, barriers and miscellaneous other effects.

The estimated accuracy associated with this methodology is shown in Table 19.15 below:

Table 19.15: Estimated Accuracy for Broadband Noise of $L_{AT}(DW)$

Height, h*	Distance, d†	
	0 < d < 100m	100m < d < 1,000m
0<h<5m	±3dB	±3dB
5m<h<30m	±1dB	±3dB

* h is the mean height of the source and receiver. † d is the mean distance between the source and receiver.

N.B. These estimates have been made from situations where there are no effects due to reflections or attenuation due to screening.

Sound Power Levels

The following items of plant, locations and associated sound power levels have been assumed for the purposes of this assessment. As indicated in the Shipping and Navigation Chapter, there will likely be one large vessel per week during typical operations. To assess a worst case scenario, this large vessel movement has been modelled to operate simultaneously with the CTV movements in the Proposed Development.

Table 19.16: Sound Power Levels Utilised in Noise Model

Item	Number	Percentage on Time	Source Noise Level Reference	Sound Power Level dB L_{WA}
CTV	8 movements per worst case hour and 8 movements per night	N/A	Imagine EU Database	99
Large Vessel (JUV, SOV, RoRo etc.)	1 movement per worst case hour and 1 movement per night	N/A	Imagine EU Database	108
Forklift	6 movements per worst case hour and 12 movements per night period	N/A	Imagine EU Database	101
Crane	2	20%	BS 5228-1	95
Tractor (delivering materials to the RoRos)	6 movements per worst case hour and 12 movements per night period	N/A	BS 5228-1	101
Substation	1	100%	Manufacturer Data	87

The assessment has assumed the following:

- All reverse alarms are broadband or turned off for the duration of the night period.
- Forklifts and cranes are powered by diesel motors
- One tractor movement every 10 minutes during the worst case 1 hr period, and 12 movements over the course of an 8-hour night
- One forklift movement every 10 minutes during the worst case 1 hr period, and 12 movements over the course of an 8-hour night
- All CTV vehicles and large vessels will leave the port simultaneously during the worst case 1 hr period (worst case scenario)

- Noise levels calculated over a 1-hour period to consider worst case of all plant working within the most sensitive night period, and also over the course of an 8-hour period for comparison with current baseline noise levels.

Assessment in Comparison with NG4 Methodology

The output of the model generated predicted noise levels at the closest selected noise-sensitive locations (NSLs are shown in Figure 19.1). Note that the night period has been assessed as it is the most sensitive period and operational works will take place 24/7. The results of the noise model are presented in Table 19.17. Note that these are worst case predictions of all boats in operation simultaneously during a one-hour period. Given that the large vessel is only expected to be in operation once per week, operational noise levels will be lower than those predicted for the majority of the time.

Table 19.17: Comparison of predicted operational noise levels vs. adopted noise criteria

Location	Period	Predicted dB $L_{Aeq,T}$	NG4 – Night-time Limit dB	Complies?
NSL1	Night (1hr)	37	45 dB	✓
NSL2		40		✓
NSL3		39		✓
NSL4		35		✓
NSL1	Night (8hr)	32		✓
NSL2		35		✓
NSL3		32		✓
NSL4		28		✓

The predicted noise levels fall significantly below the adopted EPA NG4 noise limits for night-time periods.

Review of Potential Increases in Noise Level

Table 19.18 presents the predicted changes in noise level associated with the Proposed Development at the nearest noise sensitive locations to the site. For comparison with baseline levels, the 8-hour predictions are used. The baseline ambient noise measurements have been analysed to determine the average noise level occurring during these periods for the purpose of comparison between existing and future noise levels. Again, the night period is presented due to it being the most sensitive period with typically the lowest noise level, and hence, the most likely period to experience a change in noise level.

Table 19.18: Review of Predicted Changes in Ambient Noise Levels

Receptor	Predicted dB $L_{Aeq, 8hr}$	Existing Noise Level dB $L_{Aeq,8hr}$	Total Noise Level dB	Change (dB)	Impact
NSL1	32	40	41	+1	Not Significant
NSL2	35	40	41	+1	Not Significant
NSL3	32	50	50	0	Imperceptible
NSL4	28	53	53	0	Imperceptible

The results of the assessment indicate that the change in ambient noise levels will range from +0 to a potential +1 dB with impacts ranging from **Imperceptible to Not Significant**. There will likely be an increase above the background noise levels during the quietest periods, however, it will remain within a similar range of background noise levels that are experienced during current operations at the port.

The highest change in noise level occurs between the predicted worst-case scenario and an existing scenario when the port is operating minimally. It is understood that operations at the port are currently undertaken 24/7 and hence the local noise environment is considered to vary depending on the operations being undertaken at the port. Hence, the existing local noise environment will fluctuate with existing operations at the port.

Locations where there is a predicted increase in noise are predicted to have a total noise level of 41 dB $L_{Aeq,8hr}$ during the night period. As discussed in Section 19.2.3.4, an external noise level of 45 dB $L_{Aeq,T}$ will still allow for occupants of a dwelling to have their windows to be open and to still meet the guidance criteria for internal noise levels of 30 dB $L_{Aeq,T}$.

The NSLs with a predicted change in noise level are NSL1 & NSL2 where the predicted total value of 41 dB L_{Aeq} would result in an internal noise level of 26 dB $L_{Aeq,T}$ with windows open during the worst-case assessment, which is well below the guidance noise levels.

Giving consideration to the existing character of the noise environment, the low level of absolute noise calculated and the prediction of internal noise levels, it is considered that the impact due to the operation of the port will be **negative, slight** and **long-term.**

19.4.3.2 CHANGE IN NOISE LEVEL DUE TO ROAD TRAFFIC

The traffic data contained in the Traffic and Transport Assessment chapter, and submitted with this application, indicates that a maximum increase of AADT on any road is predicted to be an increase of up to 20% in the years 2028 and 2040, this accounts for Offshore Renewable Energy activities as well as Roll On Roll Off activities. Given that an increase of traffic flow by approximately 25% would be required to increase noise levels by 1 dB, in this instance the change in traffic flows would result in a negligible increase of less than 1 dB.

The noise impact of traffic volumes accessing the surrounding network is determined to be **neutral, long term** and **imperceptible.**

19.4.4 CUMULATIVE EFFECTS AND OTHER INTERACTIONS

19.4.4.1 CONSTRUCTION PHASE

The following developments were identified as having the highest potential for cumulative impacts should the construction phases coincide due to their scale or location:

- N25 Rosslare Europort Access Road (Ref: 314015);

The environmental screening assessment for the permitted Access Road indicates that *"It is anticipated that construction noise and vibration can be adequately controlled to be within TII/NRA threshold of acceptability with the application of Best Available Techniques".* The layout of the access road indicates that locations NSL1 and NSL2 have the potential to be impacted the most by cumulative construction noise. Whilst the screening report for the Access Road doesn't provide construction noise predictions for these locations, there appears to be substantial distance of 80 – 100 m between these receptors and the access road construction works. Given that this proposed project is predicting total construction noise levels of 62 – 63 dB at these receptor locations, which is below the construction noise threshold, and the predictions of construction noise from the Access Road are also within the construction noise threshold it is considered unlikely that cumulative construction noise would cause a significant impact.

- Rosslare Coastal Erosion and Flood Relief Scheme

  Given the distance between the projects is approximately 2km it is concluded that a cumulative construction impact will not occur.

- Permission for an extension to the existing Berth 3 (Ref. 20211672)

  A review of the planning documentation for the Berth 3 Extension project was undertaken to inform the cumulative noise and vibration assessment. The Berth 3 extension planning report states that all construction works will be carried out during daytime hours and will implement best-practice noise and vibration mitigation measures as set out in the project's Outline Construction Environmental Management Plan (CEMP). As a result, construction-phase noise impacts associated with the Berth 3 project are not predicted to be significant. During the operational phase, the report concludes that the nature of the berth extension and linkspan replacement, relative to existing Port activities, will give rise to only negligible long-term noise effects. Overall, the Berth 3 project is not expected to result in significant noise or vibration impacts during either construction or operation. Given the above, no significant cumulative noise or vibration effects are anticipated.

19.4.4.2 OPERATIONAL PHASE

Two permitted developments have the potential for a cumulative impact. These are detailed below.

Ref 20211322 - Rosslare Europort Terminal 7

Permission for the construction of Rosslare Europort Terminal 7, a new Border Control Post (BCP) at Rosslare Europort. The EIAR screening report concludes that there will be minimal increases in noise levels and a potential for a decrease in traffic levels. Given the minimal predicted noise effects of the

Rosslare Europort Terminal 7 development it is considered that there will not be a cumulative impact associated with this Proposed Development.

Ref 314015 - N25 Rosslare Europort Access Road

The N25 Rosslare Europort Access Road is likely to result in increased traffic noise levels along the new route, it is likely that noise from road traffic associated with the Europort Access Road would dominate the noise environment once operational and that the operation of this Proposed Development would likely not increase cumulative impacts as a result.

19.5 MITIGATION MEASURES FOR NOISE AND VIBRATION

19.5.1 CONSTRUCTION PHASE MITIGATION MEASURES

The following recommendations must be considered in conjunction with the detailed guidance set out in the BS 5228-1: 2009+A1: 2014: and BS 5228-2: 2009+A1: 2014.

BS 5228 includes guidance on various aspects of construction site noise and vibration mitigation, including, but not limited to:

- Hours of work
- Liaison with neighbours
- Selection of quiet plant
- Control of noise sources
- Screening
- Noise and vibration monitoring.

These issues are discussed in the following paragraphs. Noise control measures that should be considered include the selection of suitable plant, enclosures and screens around noise sources, consideration of the hours of work and ongoing monitoring.

19.5.1.1 HOURS OF WORK

Construction works, except for dredging works, will generally be limited to the hours 0700 – 1900 Monday to Saturday. Sunday working is not anticipated to occur.

Dredging, due to the nature of the activity, is undertaken on a 24-hour basis.

If works are required outside of these hours, in exceptional circumstances, the planning authority will be notified in advance.

19.5.1.2 LIAISON WITH INTERESTED PARTIES

The contractor will appoint a liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the contractor's Construction Environmental Management Plan (CEMP).

19.5.1.3 SELECTION OF QUIET PLANT

Careful consideration must be given to the noise emission levels of plant items when they are being considered for use on the site.

19.5.1.4 BLASTING AND AIR OVERPRESSURE

Air overpressure from a blast is difficult to control because of its variability, however, much can be done to reduce the effect and the control of the blast design at source.

In terms of blast design control, specific guidance will be obtained from the recommendations contained within BS 5228-2 (2009+A1:2014) in relation to blasting operations in addition to experienced blast control techniques used by the contractor. These will include some or all of the following:

- All blasting will be undertaken by professionally trained blast contractors
- Restriction of hours within which blasting can be conducted (09:00 – 19:00hrs)
- During the commencement of the blasting activities an initial low level blast will be carried out (i.e. a low Maximum Instantaneous Charge (MIC)) and monitoring will be carried out simultaneously at a number of sensitive properties in different directions in order to generate specific scaled distance graphs
- The scaled distance graphs will be used to determine the optimum MIC for subsequent blasts area in order control vibration and AOP limits below the relevant limit values (as set out in Section 0) at the nearest sensitive buildings
- Explosive charges will be properly confined by a sufficient amount of stemming
- Blasting contractors will ensure that the minimum amount of primer cord is used, and that no primer cord is located above ground
- The design, execution and completion of any blasting within 100 metres of any vulnerable structure shall require special considerations. This will include the use of pre and post condition structural surveys by a competent structural engineer
- Ground vibration and air over pressure (AOP) will be recorded simultaneously for each blast at the most sensitive locations, depending on the works area being blasted

In line with best practice mitigation measures from vibration sources, good communication and public relations are a key factor in reducing any startle effects to residents. In this instance, a Public Communications Strategy will be implemented by the contractor prior to the commencement of any blast works. In such cases the following recommended mitigation measures are proposed:

- Relevant nearby residents will be notified before any work, and blasting starts (e.g. a minimum of 24-hour written notification)
- The implementation of an onsite documented complaints procedure will be maintained by the contractor
- The use of independent monitoring will be undertaken by external bodies for verification of results

19.5.1.5 DREDGING DURING NIGHT PERIODS

It's noted that dredging has the potential to take place 24/7. During periods outside of day time hours the dredging vessel will be located a minimum of 200m from the shoreline in order that noise levels attenuate sufficiently to the local receptor locations. Should noise monitoring results indicate that noise levels are below the specified construction noise thresholds then there is the potential for the dredging works to be undertaken closer to the shoreline. Noise measurements must be monitored closely when moving the dredging activity closer to the shoreline (and hence the NSLs) to ensure that the construction thresholds are not exceeded.

19.5.1.6 CONTROL OF NOISE SOURCES

If the use of low noise plant or replacing a noisy item of plant are not viable or practicable options, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods, often in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that "as far as reasonably practicable sources of significant noise should be enclosed". In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators. Demountable enclosures that could be moved around site as necessary may also be used to screen operatives using hand tools such as angle grinders.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are relevant and hence are reproduced below. These recommendations should be implemented on the site.

> *"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas.*
>
> *Circumstances can arise when night-time working is unavoidable. Bearing in mind the special constraints under which such work has to be carried out, steps should be taken to minimise disturbance to occupants of nearby premises.*
>
> *Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.*
>
> *Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.*
>
> *Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.*

Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."

Also note the following outline guidance in relation to specific considerations which may be deployed as required by the contractor:

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels during operation can reduce noise levels by up to 10 dB. Mobile plant should be switched off when not in use and not left idling.
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover.
- For percussive tools such as pneumatic concrete breakers, rock drills and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- For all materials handling ensure that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials.
- For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

19.5.2 OPERATIONAL PHASE MITIGATION MEASURES

The assessment indicates that operational noise will not cause a significant impact (see Section 19.4.3) hence specific mitigation is not required.

As a general mitigation, as part of the detailed design of the development, selection of quiet plant items and, where necessary, appropriately selected remedial measures (e.g., enclosures, silencers etc.) will be specified in order that the adopted criteria is achieved at the façades of noise sensitive properties.

Additionally, a range of 'good practice' measures are recommended for operatives that arrive to site during the night period:

- Vehicle engines shall not be left idling once on site.
- Drivers should minimise impact sounds whilst exiting or entering their vehicle.
- All radios and amplified music in the vehicles shall be turned off prior to the doors being opened.

- There should be no unnecessary shouting or communicating in raised voices whilst on site.
- There should be no unnecessary sounding of horns whilst on site.

19.6 RESIDUAL EFFECTS

The predicted impact due to construction noise is **negative, not significant to moderate and short term**. The predicted impact due to construction vibration is **negative, not significant and temporary**. During blasting works the impact is assessed as **negative, moderate and momentary.**

The predicted impact due to operational stage activity is **negative, slight** and **long-term**.

19.7 MONITORING

The contractor will be required to ensure construction activities operate within the noise limits set out within this assessment.

Any noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

There is no monitoring recommended for the operational phase of the development as impacts due to noise and vibration are predicted to be not significant.

19.8 SUMMARY

This chapter of the EIAR has assessed the potential environmental impacts on Noise and Vibration from the construction and operation phases of the Proposed Development, the assessment is summarised in Table 19.19.

Table 19.19: Assessment Summary

Potential Effect	Construction/ Operation	Beneficial / Adverse/ Neutral	Extent (Site/Local/National / Transboundary)	Short term/ Long term	Direct/ Indirect	Permanent / Temporary	Reversible / Irreversible	Significance of Effect (according to defined criteria)	Proposed mitigation	Residual Effects (according to defined criteria)
Impact from construction noise	Construction	Adverse	Local	Short-term	Direct	Temporary	Reversible	Negative, not significant to moderate, short-term	Section 19.5.1	Negative, not significant to moderate, short-term
Impact from Construction Vibration	Construction	Adverse	Local	Temporary	Direct	Temporary	Reversible	Negative, not significant, temporary	Section 19.5.1	Negative, not significant, temporary
Impact from Construction Traffic Noise	Construction	Adverse	Local	Temporary	Direct	Temporary	Reversible	Neutral, short-term, imperceptible	N/A	Neutral, short-term, imperceptible
Impact from Operation of hub	Operational	Adverse	Local	Long-term	Direct	Permanent	Reversible	Negative, Slight, Long-term	Section 19.5.2	Negative, Slight, Long-term
Impact from Operational Traffic	Operational	Adverse	Local	Long-Term	Direct	Permanent	Reversible	Neutral, long-term, imperceptible	N/A	Neutral, long-term, imperceptible

19.9 REFERENCES

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