



## Chapter 10 – Noise and Vibration

## TABLE OF CONTENTS

---

<b>10. NOISE AND VIBRATION</b>	<b>10-1</b>
<b>10.1 Introduction</b>	<b>10-1</b>
<b>10.2 Methodology</b>	<b>10-1</b>
10.2.1 Fundamentals of Acoustics	10-2
10.2.2 Construction Phase Guidance	10-3
10.2.3 Operational Phase Noise Guidance	10-8
10.2.4 Guidance on Operational Vibration	10-8
<b>10.3 Receiving Environment</b>	<b>10-8</b>
10.3.1 Environmental Noise Survey	10-9
10.3.2 Choice of Measurement Positions	10-9
10.3.3 Survey Periods	10-12
10.3.4 Instrumentation	10-12
10.3.5 Measurement Parameters	10-13
10.3.6 Procedure	10-13
10.3.7 Survey Results and Discussion	10-13
10.3.8 Construction Noise Thresholds	10-18
<b>10.4 Characteristics of the Proposed Development</b>	<b>10-18</b>
10.4.1 Construction Phase	10-18
10.4.2 Operational Phase	10-19
<b>10.5 Potential Impacts of the Proposed Development</b>	<b>10-20</b>
10.5.1 Construction Phase	10-20
10.5.2 Operational Phase	10-30
<b>10.6 Mitigation Measures</b>	<b>10-30</b>
10.6.1 Construction Phase	10-30
10.6.2 Operational Phase	10-33
<b>10.7 Monitoring or Reinstatement Measures</b>	<b>10-33</b>
10.7.1 Construction Phase	10-33
10.7.2 Operational Phase	10-33
<b>10.8 Residual Effects of the Proposed Development</b>	<b>10-33</b>
10.8.1 Construction Phase	10-33
10.8.2 Operational Phase	10-35
<b>10.9 References</b>	<b>10-36</b>

## LIST OF TABLES

---

Table 10-1 - Example threshold of significant effect at dwellings	10-4
Table 10-2 - Construction noise significance ratings	10-5
Table 10-3 Recommended construction vibration thresholds for buildings	10-6
Table 10-4 Human response vibration significance ratings	10-7
Table 10-5 Classification of magnitude of traffic noise changes in the short-term	10-8
Table 10-6 Structured Sections to describe the Proposed Development	10-9
Table 10-7 - Noise Monitoring Equipment Details	10-12
Table 10-8 - Average $L_{Aeq, 5min}$ and $L_{A90, 5min}$ Noise Monitoring Results at USL1	10-14
Table 10-9 - Average $L_{Aeq, 5min}$ and $L_{A90, 5min}$ Noise Monitoring Results at USL2	10-15
Table 10-10 - Attended Noise Measurements at Location ASL1	10-16
Table 10-11 - Attended Noise Measurements at Location ASL2	10-16
Table 10-12 - Attended Noise Measurements at Location ASL3	10-16
Table 10-13 - Attended Noise Measurements at Location ASL4	10-17
Table 10-14 - Attended Noise Measurements at Location ASL5	10-17
Table 10-15 - Attended Noise Measurements at Location ASL6	10-17
Table 10-16 - Construction noise threshold (CNT) levels for the Proposed Development	10-18
Table 10-17 Indicative plant noise levels and predicted CNL at 10m	10-21
Table 10-18 - Indicative noise levels from construction plant at various distances from works activities	10-22
Table 10-19 - Key gas to AGI construction activity noise calculations at nearest NSLs	10-23
Table 10-20 - Temporary Compound construction activity noise calculations at nearest NSLs	10-28
Table 10-21 - Construction noise threshold (CNT) levels for the Proposed Development	10-31
Table 10-22 - Recommended construction vibration thresholds for buildings	10-31

## LIST OF FIGURES

---

Figure 10-1 - Noise Survey Locations (Source: Google Earth)

10-11

## 10. NOISE AND VIBRATION

---

### 10.1 Introduction

This document assesses the likely significant noise and vibration impacts associated with the construction and operation of the proposed GNI143 Ballykilleen Pipeline, Ballykilleen Above Ground Installation (AGI) and Kilwarden Offtake Installation, and all associated ancillary works hereafter collectively referred to as the Proposed Development.

A full description of the development is available in Chapter 2 – Description of the Proposed Development. The assessment of impacts has been undertaken in the context of current relevant standards and guidance, and identifies any requirements or possibilities for mitigation.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the Proposed Development and an assessment of the potential noise and vibration impact associated with the Proposed Development, during both the short-term construction phase and the long-term operational phase, on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the Proposed Development is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

This chapter is supported by figures contained in Volume 4 of this EIAR. While selected figures may be reproduced within the chapter for ease of reference, the full size and quality of those figures are provided in Volume 4. Annotated mark ups, diagrams and photographic records are excluded, as these are provided for illustrative or contextual purposes only and are not replicated at full presentation quality.

The relevant Volume 4 figures to this chapter include:

- ▶ Figure 10-1 Noise Survey Locations

### 10.2 Methodology

The Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022), hereafter referred to as EPA EIAR Guidelines (2022) were considered and consulted in the preparation of this Chapter.

The significance of noise and vibration effects associated with the Proposed Development has been described in accordance with the EPA 2022 Guidelines. The description of effects as per EPA 2022 Guidelines are summarised in Table 1-5 of Chapter 1 of this EIAR.

There are no statutory standards in Ireland relating to noise and vibration for construction works or for environmental noise relating to the operational phase. In the absence of specific statutory Irish guidelines, the assessment has referred to non-statutory national guidelines, where available, in addition to the most appropriate and commonly used international standards and guidelines relating to environmental noise and vibration which are best practice for environmental noise assessments in Ireland. These are set out in the following sections. Reference has also been made to the following documents, which are specific to noise and vibration:

- ▶ British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 – Noise (2014a) (hereinafter referred to as BS 5228-1);
- ▶ British Standard BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration (2014b) (hereinafter referred to as BS 5228-2);

- ▶ British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration (1993) (hereinafter referred to as BS 7385-2);
- ▶ UK *Department* of Transport (UK DOT) Calculation of Road Traffic Noise (UK DOT, 1988);
- ▶ Design Manual for Roads and Bridges LA 111 Sustainability & Environmental Appraisal. Noise and Vibration Rev 2, Highways England (2020) (hereinafter referred to as DMRB: Noise and Vibration);
- ▶ ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise – Part 2: *Determination* of environmental noise levels (2017) (hereinafter referred to as ISO 1996-2);
- ▶ Transport Infrastructure Ireland Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2014) (hereinafter referred to as TII Guidelines).

The following methodology has been adopted for this assessment:

- ▶ A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the Proposed Development;
- ▶ Baseline noise monitoring has been carried out at locations representative of noise sensitive locations (NSLs) in the vicinity of the Proposed Development and in order to characterise the existing noise environment;
- ▶ Predictive calculations have been performed to assess the potential impacts associated with the construction of the development at the most sensitive locations in the vicinity of the Proposed Development;
- ▶ Review of potential operational noise impacts associated with the operational phase has been undertaken for above ground fixed items of plant;
- ▶ A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the Proposed Development; and
- ▶ The potential cumulative impacts of the Proposed Development and surrounding permitted or planned developments has been assessed for noise and vibration impacts.

Appendix 10.1 presents a glossary of the acoustic terminology used throughout this document. In the first instance, it is considered appropriate to review some basic fundamentals of acoustics.

### **10.2.1 Fundamentals of Acoustics**

In order to provide a broader understanding of some of the technical discussions in this EIAR chapter, this section provides a brief overview of the fundamentals of acoustics and the basis for the preparation of this noise assessment.

A sound wave travelling through the air is a regular disturbance of the atmospheric pressure. These pressure fluctuations are detected by the human ear, producing the sensation of hearing. In order to take account of the vast range of pressure levels that can be detected by the ear, it is convenient to measure sound in terms of a logarithmic ratio of sound pressures. These values are expressed as Sound Pressure Levels (SPL) in decibels (dB).

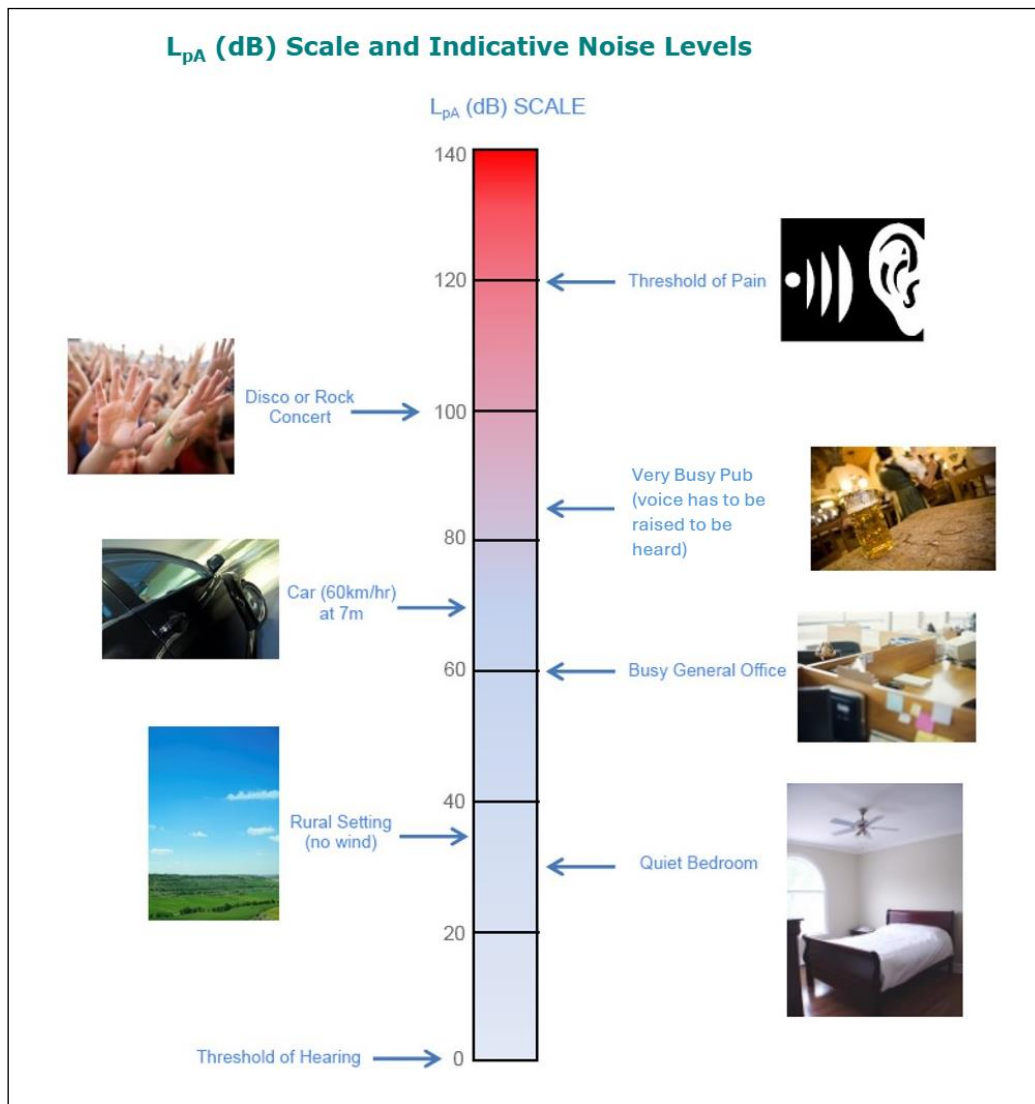
The audible range of sounds expressed in terms of Sound Pressure Levels is 0 dB (for the threshold of hearing) to 120 dB (for the threshold of pain). In general, a subjective impression of doubling of loudness corresponds to a tenfold increase in sound energy which conveniently equates to a 10 dB increase in SPL. It should be noted that a doubling in sound energy (such as may be caused by a doubling of traffic flows) increases the SPL by 3 dB.

The frequency of sound is the rate at which a sound wave oscillates and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250 Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPLs

measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB (A) scale is presented in Insert 10-1.

The 'A' subscript denotes that the sound levels have been A-weighted. The established prediction and measurement techniques for this parameter are well developed and widely applied. For a more detailed introduction to the basic principles of acoustics, reference should be made to an appropriate standard text.

**Insert 10-1 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2016)).**



**10.2.2 Construction Phase Guidance**

**10.2.2.1 Construction Noise Thresholds**

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. Local Authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS 5228 – 1: 2009+A1:2014: Code

of practice for noise and vibration control on construction and open sites – Noise Annex E Section E.3.2. This standard is commonly accepted as best practice and used in Ireland.

The approach adopted in BS 5228-1 calls for the designation of a 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 a significant noise impact is associated with the construction activities. This is referred to as the Construction Noise Threshold (CNT).

BS5228-1 sets out guidance on permissible noise levels relative to the existing noise environment. Table 10-1 sets out the CNTs which, when exceeded, signify a potential significant effect at the facades of residential receptors as recommended by BS 5228-1, depending on context. These relate to construction noise levels only and not the cumulative noise level due to construction plus existing ambient noise.

**Table 10-1 - Example threshold of significant effect at dwellings**

Assessment category and threshold value period ( $L_{Aeq}$ )	CNT value, in decibels (dB)		
	Category A <sup>Note A</sup>	Category B <sup>Note B</sup>	Category C <sup>Note C</sup>
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends <sup>Note D</sup>	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

It should be noted that this assessment method is only valid for residential properties.

In order to set suitable CNT for the commercial receptors, Section E.2 of BS 5228-1 (BSI 2014a) sets out recommended threshold levels using a fixed limit value set depending on the setting of the noise environment. 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.'*

These limits apply to daytime working outside living rooms and offices. The document notes that where works occur outside other noise sensitive situations with daytime sensitivities, e.g. near hospitals and educational establishments or if works are occurring outside of normal daytime working hours, reduced construction noise levels may be more appropriate.

Given that the Proposed Development is located within a predominantly rural environment, a daytime CNT of 70 dB is considered appropriate for commercial receptors. However, depending on the existing ambient noise levels at specific receptor locations, and following the BS 5228-1 methodology for assigning receptors to Category A, B or C based on baseline noise levels, a higher threshold of 75 dB may be justified.

While this guidance provides an appropriate basis for establishing a daytime CNT for commercial receptors, no commercial NSLs were identified within the along the Proposed Development route. As such, commercial receptors are not included within the construction noise assessment. The CNT values adopted for the Proposed Development are detailed in Section 10.3.8.

See Section 10.5.1 for the construction noise assessment in relation to the Proposed Development. This assessment process determines if a significant construction noise impact is likely. Construction noise calculations have been conducted generally in accordance with BS 5228-1 (BSI, 2014a).

### **10.2.2.2 Significance Ratings relative to the CNT**

In order to assist with interpretation of significance relative to calculated construction noise level (CNL) compared to the CNTs, Table 10-2 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 (UKHA 2020) and adapted to include the relevant significance of the effect from the EPA Guidelines (EPA 2022).

In accordance with the DMRB Noise and Vibration (UKHA 2020), construction noise and construction traffic noise impacts shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- ▶ Ten or more days or night in any 15 consecutive day or nights; and
- ▶ A total number of days exceeding 40 in any six consecutive months.

**Table 10-2 - Construction noise significance ratings**

<b>Guidelines for Noise Impact Assessment Significance (DMRB)</b>	<b>CNT per Period</b>	<b>EPA EIAR Significance Effects</b>	<b>Determination of Significance</b>
Negligible	Below or equal to baseline noise level	Not Significant	Depending on CNT, duration & baseline noise level
Minor	Above baseline and below or equal to CNT	Slight to Moderate	
Moderate	Above CNT and below or equal to CNT +5 dB	Moderate to Significant	
Major	Above CNT +5 dB	Significant to Very Significant	

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

### **10.2.2.3 Criteria for Rating Vibration Impacts**

There are two aspects to the issue of vibration that are addressed in the standards and guidelines: the risk of cosmetic or structural damage to buildings; and human perception of vibration. In the case of this development, vibration levels used for the purposes of evaluating building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

There is no published statutory Irish guidance relating to the maximum permissible vibration level. The following standards are the most widely accepted in this context and are referenced here in relation to cosmetic or structural damage to buildings:

- ▶ British Standard BS 5228-2 (BSI 2014b); and
- ▶ British Standard BS 7385-2 (BSI 1993)

BS 7385-2 and BS5228-2 advise that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above for transient vibration. 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 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.

The documents note that minor structural damage can occur at vibration magnitudes which are greater than twice those presented in Table 10-3 (below). Major damage to a building structure is possible at vibration magnitudes greater than four times the values set out in Table 10-3. It should be noted that these values refer to the vibration at base of the building.

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, or a structure is in an unstable state, then it will tend to be more vulnerable to the possibility of damage arising from vibration or any other ground borne disturbance.

The vibration limit range for protected and historical buildings are equal to or up to 50% of those for light framed structures, 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, a further stringent criteria has 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 10-3 sets out the limits as they apply to vibration frequencies below 4Hz where the most conservative limits are required. At higher frequencies, the limit values for transient vibration within Table B.2 of BS 5228-2 will apply, with similar reductions applied for continuous vibration and those for protected structures.

**Table 10-3 Recommended construction vibration thresholds for buildings**

<b>Structure Type</b>	<b>Allowable Vibration (in terms of PPV) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of 4Hz and less:</b>	
	<b>Transient Vibration</b>	<b>Continuous Vibration</b>
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	25mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15mm/s	7.5mm/s
Protected and Historic Buildings <sup>*Note 1</sup>	6mm/s – 15mm/s	3 mm/s – 7.5mm/s

<b>Structure Type</b>	<b>Allowable Vibration (in terms of PPV) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of 4Hz and less:</b>	
	<b>Transient Vibration</b>	<b>Continuous Vibration</b>
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3mm/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 value within the range will be used.

As per BS 5228-2, below a frequency of 4Hz where a high displacement is associated with a relatively low component PPV, a maximum displacement of 0.6mm (zero to peak) should be used.

Humans are sensitive to vibration stimuli, and perception of vibration at high magnitudes may cause concern to building occupants. BS 5228-2 (BSI 2014b) notes that vibration typically becomes perceptible at around 0.15mm/s to 0.3mm/s and may become disturbing or annoying at higher magnitudes.

Higher levels of vibration are typically tolerated for single events or events of a short-term duration, particularly during construction projects and when the origin of vibration is known.

Table 10-4 presents the significance table relating to potential impacts to building occupants during construction based on guidance from BS 5228 – 2 (BSI 2014b), the DMRB Noise and Vibration (UKHA 2020) and associated EPA significance ratings (EPA 2022).

**Table 10-4 Human response vibration significance ratings**

<b>Criteria</b>	<b>Likely Effect</b>	<b>Significance Rating</b>
≥10 mm/s PPV	Major	Significant to Very Significant
≥1 to <10 mm/s PPV	Moderate	Moderate to Significant
≥0.3 to <1 mm/s PPV	Minor	Not Significant to Slight
≥0.14 to 0.3mm/s PPV	Negligible	Imperceptible to Not Significant
Less than 0.14 mm/s PPV		Imperceptible

Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. Higher levels of vibration are typically tolerated for single events or events of short duration. For example, during piling vibration levels may typically be tolerated at up to 2.5mm/s during daytime periods once the origin of the source is known.

The values are provided to give an initial indication of potential effects. Construction vibration shall constitute a likely 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 or nights in any 15 consecutive days or nights; or 2) a total number of days exceeding 40 in any 6 consecutive months.

#### **10.2.2.4 Criteria for Rating Construction Phase 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 (UKHA 2020) and the EPA

Guidelines (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 Noise and Vibration (UKHA 2020) document.

Table 10-5 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents.

**Table 10-5 Classification of magnitude of traffic noise changes in the short-term**

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

Changes in road traffic noise on the local road network have been considered using prediction guidance contained within Calculation of Road Traffic Noise (CRTN) issued by the UK's Department of Transport in 1988.

### **10.2.3 Operational Phase Noise Guidance**

The proposed transmission gas pipeline development will be located underground and there are no operational noise impacts associated with the Proposed Development (refer to Section 10.5.2). As such operational noise criteria are not set for the Proposed Development.

### **10.2.4 Guidance on Operational Vibration**

There are no specific operational phase guidelines and standards used in the operational phase assessment above those discussed in Section 10.2.2.3 for the assessment of significance.

## **10.3 Receiving Environment**

The Proposed Development commences in agricultural lands to the north of the R161 road within County Meath, approximately 4 km east of Kinnegad. The pipeline extends southwards across rural farmland, crossing the M4 Motorway and passing to the west of Edenderry town (c. 1 km east at its closest point) before crossing the Grand Canal and continuing south to terminate within the Edenderry Renewable Energy Complex, c. 5 km south of Edenderry town.

Across its length, the route requires 17 road crossings (including the M4, and local and regional roads), 2 river crossings (the Kilwarden River and the Yellow River), and 30 watercourse crossings (including the Grand Canal).

At the southern end of the route, the receiving environment transitions from agricultural to industrial lands associated with the Edenderry Renewable Energy Complex, an established energy-generation facility. The proposed Ballykilleen AGI is located within this industrial area.

The Proposed Development predominantly traverses across rural farmlands, with the receiving environment comprising of a scattering of intermittent, rural noise-sensitive locations. As the pipeline route passes to the west of Edenderry Town and intersects the R402 and L5003 roads, the receiving environment

becomes more built up in nature with an increase in noise-sensitive dwellings in this area. The Proposed Development site is shown in Figure 2-1 of Chapter 2 – Description of the Proposed Development.

Given the linear nature of the development, the pipeline has been divided into six sections solely for the purposes of describing the Proposed Development within this EIAR. These sections have been defined on a practical basis, using intervals and identifiable landmark features or crossings along the route. The segmentation does not reflect any environmental or construction rationale, it provides a structure for presenting information of the Proposed Development. Where relevant, this framework also assists in focusing the environmental assessment on specific localised elements of the route. The six sections, defined by key crossing points and chainages along the proposed alignment, are outlined in Table 2-1 of Chapter 2.

In addition to the linear pipeline route, the Proposed Development includes three Temporary Construction Compounds located outside of the main linear portion of the Proposed Development site; Temporary Construction Compound 02 located to the east and adjoining to the route via a private lane off the R148, at Ardnamullen to the north of the M4 Motorway; Temporary Construction Compound 03 is located to the east of the route near Edenderry town; and Temporary Construction Compound 04 is located in the townland of Esker More, Co. Offaly to the west of the Edenderry Renewable Energy Complex. These, along with Temporary Construction Compound 01 (located at the Kilwarden Offtake Installation) and Temporary Construction Compound 05 (located at the Ballykilleen AGI) and all Laydown Areas (see Chapter 2 for further details), lie within the overall red line boundary of the Proposed Development and facilitate the delivery, storage, and management of materials during construction (see Section 10.4.1).

**Table 10-6 Structured Sections to describe the Proposed Development**

<b>Pipeline Section</b>	<b>Start Point (m)</b>	<b>End Point (m)</b>	<b>Length (m)</b>
Pipeline Section 1: Kilwarden Offtake Installation to the L40181 Road (RDX05)	0	3,931	3,931
Pipeline Section 2: L40181 Road (RDX05) to the L4091 (RDX09)	3,931	7,441	3,510
Pipeline Section 3: L4091 Road (RDX09) to the Yellow River (RVX02)	7,441	11,669	4,228
Pipeline Section 4: Yellow River (RVX02) to the R441 (RDX12)	11,669	15,348	3,679
Pipeline Section 5: R441 (RDX12) to the L5003 (RDX15)	15,348	19,494	4,146
Pipeline Section 6: L5003 (RDX15) to the Ballykilleen AGI	19,494	23,650	4,156
GNI 143 Ballykilleen Pipeline	0	23,650	23,650

### 10.3.1 Environmental Noise Survey

An environmental noise survey has been conducted in order to quantify noise emissions across the existing site. The external survey was conducted in general accordance with ISO1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise - Determination of Environmental Noise Levels*. Specific details are set out in the following sections.

### 10.3.2 Choice of Measurement Positions



An environmental noise survey was conducted along the route of the Proposed Development in June 2025 by AWN Consulting in order to quantify the existing noise environment at the most sensitive areas in proximity to the Proposed Development. Six attended measurement locations were carefully selected to align with the most densely populated residential areas along the proposed GNI143 Ballykilleen Pipeline. Unattended noise monitoring was undertaken at locations in the vicinity of the proposed Kilwarden Offtake

Tie-in Point and the Ballykilleen AGI. The noise survey locations are shown in Figure 10-3 and described below.

- ▶ USL1: located within Pipeline Section 1 at the Proposed Kilwarden Offtake Tie-in Point, within a field approximately 340m north of the R161 road.
- ▶ USL2: located within Pipeline Section 6 at the Proposed Ballykilleen AGI location, along the eastern boundary of the Edenderry Power Station / Bord na Mona site, just off the R401 road.
- ▶ ASL1: located within Pipeline Section 1 along the roadside of the L80217 road, approximately 500m north of the M4 road. Representative of rural residential dwellings along the proposed gas pipeline in this vicinity.
- ▶ ASL2: located at the end of Pipeline Section 1 along the roadside of the L40181 road, approximately 900m to the south of the M4 road. Representative of the nearest rural residential dwelling along the proposed gas pipeline in this vicinity.
- ▶ ASL3: located within Pipeline Section 2 along the roadside of the R401 road. Representative of rural residential dwellings in close proximity to the proposed gas pipeline in this vicinity.
- ▶ ASL4: located within Pipeline Section 5 along the roadside of a local road, to the west of Edenderry. Representative of the nearest residential dwellings to the proposed gas pipeline in this vicinity.
- ▶ ASL5: located at the end of Pipeline Section 5 along the roadside of the L5003 road, to the south-west of Edenderry. Representative of rural residential dwellings in close proximity to the proposed gas pipeline in this vicinity.
- ▶ ASL6: located within Pipeline Section 6 on a green area along the L5006 road. Representative of the nearest rural residential dwellings to the proposed gas pipeline in this vicinity.

**Figure 10-1 - Noise Survey Locations (Source: Google Earth)**



<p><b>Project Name:</b> GAS TO BORD NA MONA, EDENDERRY</p> <p><b>Drawing Title:</b> NOISE SURVEY LOCATIONS SHEET 1 OF 1</p>	<p style="text-align: center;"><b>Legend</b></p> <p>Edenderry Pipeline  <span style="color: red;">▭</span> Redline Boundary  <span style="color: orange;">▬</span> Pipeline Route  <span style="color: blue;">●</span> Noise Survey Location</p>	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td>0</td> <td>For Information</td> <td>RAS</td> <td>20/01/2026</td> <td>AR</td> <td>LW</td> <td></td> <td></td> </tr> <tr> <td>Rev</td> <td>Description</td> <td>By</td> <td>Date</td> <td>Check</td> <td>Auth</td> <td></td> <td></td> </tr> </table> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <p style="text-align: center; font-size: small;">Source: Google, 2025</p>									0	For Information	RAS	20/01/2026	AR	LW			Rev	Description	By	Date	Check	Auth		
0	For Information	RAS	20/01/2026	AR	LW																					
Rev	Description	By	Date	Check	Auth																					

### 10.3.3 Survey Periods

The attended noise survey at locations ASL1, ASL2, ASL3, ASL4, ASL5 and ASL6 was conducted between 11:47 hrs and 18:59 hrs on 11th of June 2025.

Unattended measurements at location USL1 were carried out from 11:40 hrs on 5th June 2025 to 11:40 hrs on 12th June 2025. Unattended measurements at location USL2 were carried out from 10:25 hrs on 5th June 2025 to 12:50 hrs on 12th June 2025.

The weather during the attended survey period was predominantly overcast and dry with temperatures of 16 degrees Celsius. A light breeze was noted; however, wind speeds did not exceed 5m/s over the course of the survey period.

The weather during the unattended survey period was unsettled, with periods of rainfall and high wind speeds being recorded. According to rain gauge data collected at location USL1, rainfall was recorded during the following periods:

- ▶ 20:00 hrs to 22:00 hrs on 9th June 2025;
- ▶ 01:30 hrs to 03:00 hrs on 10th June 2025, and;
- ▶ 06:00 hrs to 08:30 hrs and 10:30 hrs to 12:00 hrs on 12<sup>th</sup> June 2025.

Noise data during the above periods has been excluded from the survey results section.

### 10.3.4 Instrumentation

The measurements were performed using the equipment listed in Table 10-6 below:

**Table 10-7 - Noise Monitoring Equipment Details**

Measurement	Manufacturer	Equipment Model	Serial Number	Calibration Date
Attended Sound Level Meter	Brüel & Kjær	Type 2250L	2818091	22/11/2023
Unattended Sound Level Meter	Rion	NL-52	1076328	10/09/2024
Unattended Sound Level Meter	Rion	NL-52	586940	20/02/2024
Calibrator	Rion	Type NC-75	34313057	28/11/2024
Rain Gauge	Omni	TR 525M	62743-1214	N/A

The microphone was protected using a proprietary windshield. The sound level meter was check calibrated using a Rion Type NC-75 Sound Level before and after the survey. Calibration certificates available on request.

An Omni Type TR 525M rain gauge was positioned at location USL1 in order to collect rainfall data for the Unattended noise survey.

### 10.3.5 Measurement Parameters

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

- L<sub>Aeq</sub>** 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.
- L<sub>AFMax</sub>** is the maximum sound pressure level recorded during the sample period.
- L<sub>A90</sub>** is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

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  $2 \times 10^{-5}$  Pa.

### 10.3.6 Procedure

The attended noise monitoring equipment was configured to measure data over a 15-minute period at each location in rotation. Three measurements were taken at each location.

The unattended noise monitoring equipment was configured to log data over 5-minute intervals.

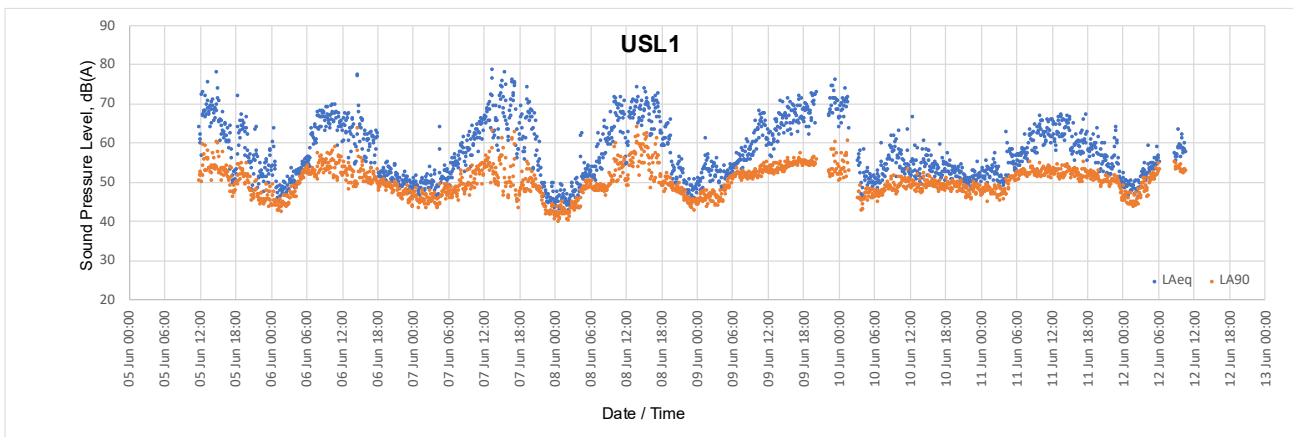
### 10.3.7 Survey Results and Discussion

The results for the Unattended and Attended surveys are discussed in the following sections.

#### 10.3.7.1 USL1

At USL1, distant road traffic noise from the R161 road, nearby livestock and distant agricultural activity were the dominant sources of noise. Other noise sources recorded were intermittent air traffic, birdsong and foliage noise. Noise levels measured at USL1 are graphed in Graph 10-1.

**Graph 10-1 USL1 Graphed Noise Levels**



The average L<sub>Aeq, 5min</sub> and L<sub>A90, 5min</sub> survey results measured during the day and night-time periods at USL1 are summarised in Table 10-7. The results are presented in terms of the average 16-hour daytime (07:00 to 23:00hrs) and 8-hour night-time (23:00 to 07:00hrs).

**Table 10-8 - Average  $L_{Aeq, 5min}$  and  $L_{A90, 5min}$  Noise Monitoring Results at USL1**

Location	Date	Period	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa	
			$L_{Aeq, 5min}$	$L_{A90, 5min}$
USL1	5 <sup>th</sup> June 2025	Day	66	51
		Night	55	48
	6 <sup>th</sup> June 2025	Day	64	52
		Night	52	46
	7 <sup>th</sup> June 2025	Day	68	51
		Night	51	45
	8 <sup>th</sup> June 2025	Day	66	52
		Night	53	48
	9 <sup>th</sup> June 2025	Day	67	54
		Night	66	50
	10 <sup>th</sup> June 2025	Day	55	49
		Night	55	49
	11 <sup>th</sup> June 2025	Day	62	52
		Night	53	48
	12 <sup>th</sup> June 2025	Day	59	54
	5 <sup>th</sup> June 2025 - 12 <sup>th</sup> June 2025	Average Day	65	52
Average Night		59	48	

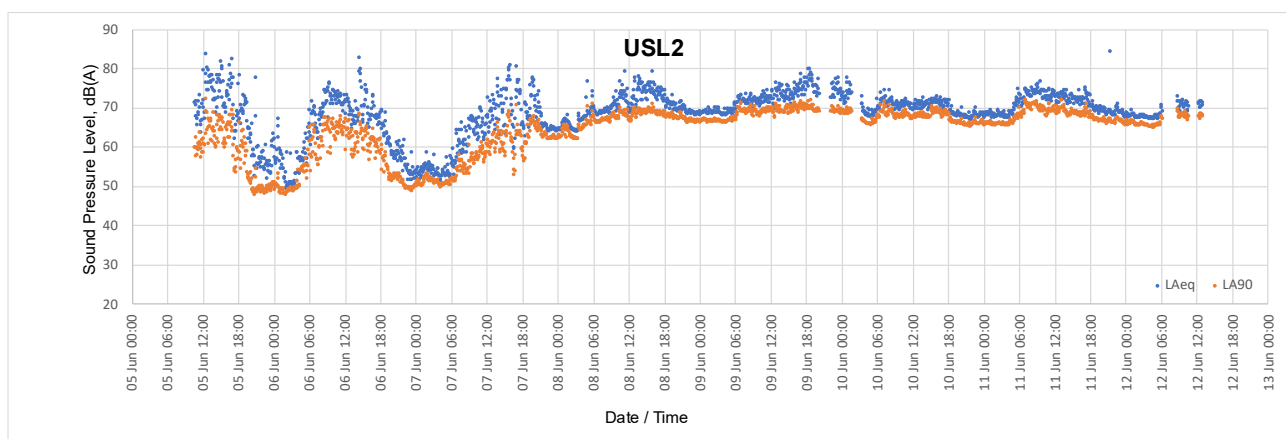
Average daytime values measured 65 dB  $L_{Aeq, 5min}$  with average daytime background noise levels measuring 52 dB  $L_{A90, 5min}$  over the duration of the survey period.

Average night-time values measured 59 dB  $L_{Aeq, 5min}$  with average night-time background noise levels measuring 48 dB  $L_{A90, 5min}$ .

### **10.3.7.2 USL2**

At USL2, distant road traffic noise from the R401 road, industrial activity from the Bord na Mona site and frequent passing of HGVs through the site were the dominant sources of noise. Other noise sources recorded were birdsong and foliage noise. Noise levels measured at USL2 are graphed in Graph 10-2.

**Graph 10-2 USL2 Graphed Noise Levels**



The average  $L_{Aeq, 5min}$  and  $L_{A90, 5min}$  survey results measured during the day and night-time periods at USL2 are summarised in Table 10-8. The results are presented in terms of the average 16-hour daytime (07:00 to 23:00hrs) and 8-hour night-time (23:00 to 07:00hrs).

**Table 10-9 - Average  $L_{Aeq, 5min}$  and  $L_{A90, 5min}$  Noise Monitoring Results at USL2**

Location	Date	Period	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa	
			$L_{Aeq, 5min}$	$L_{A90, 5min}$
USL2	5 <sup>th</sup> June 2025	Day	74	59
		Night	62	53
	6 <sup>th</sup> June 2025	Day	71	60
		Night	56	51
	7 <sup>th</sup> June 2025	Day	71	61
		Night	68	65
	8 <sup>th</sup> June 2025	Day	73	68
		Night	70	67
	9 <sup>th</sup> June 2025	Day	74	70
		Night	73	68
	10 <sup>th</sup> June 2025	Day	71	68
		Night	70	67
	11 <sup>th</sup> June 2025	Day	73	69
		Night	68	66
	12 <sup>th</sup> June 2025	Day	71	68
		Average Day	73	65
5 <sup>th</sup> June 2025 – 12 <sup>th</sup> June 2025	Average Night	69	62	

Average daytime values measured 73 dB  $L_{Aeq, 5min}$  with average daytime background noise levels measuring 65 dB  $L_{A90, 5min}$  over the duration of the survey period.

Average night-time values measured 69 dB  $L_{Aeq, 5min}$  with average night-time background noise levels measuring 62 dB  $L_{A90, 5min}$ .

### 10.3.7.3 Attended Noise Survey

The results of the surveys at attended monitoring locations are summarised in Table 10-9 to Table 10-14.

**Table 10-10 - Attended Noise Measurements at Location ASL1**

Date	Period	Time	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa		
			L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A90</sub>
11 <sup>th</sup> June 2025	Day	16:26-16:41	59	67	53
		17:34-17:49	60	74	56
		18:44-18:59	59	78	54

At ASL1, daytime ambient noise levels were dominated by road traffic noise from the R148 and distant road traffic noise from the M4. Birdsong and an element of foliage noise were also notes during all three measurement periods. Noise levels were measured in the range of 59 to 60 dB L<sub>Aeq,15min</sub> and in the range of 53 to 56 dB L<sub>A90,15min</sub> during the measurement periods.

**Table 10-11 - Attended Noise Measurements at Location ASL2**

Date	Period	Time	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa		
			L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A90</sub>
11 <sup>th</sup> June 2025	Day	16:02-16:17	47	73	35
		17:11-17:26	57	82	36
		18:20-18:35	40	57	36

At ASL2, daytime ambient noise levels were dominated by distant road traffic noise from the M4. Intermittent local road traffic noise was noted during the first and second measurement periods, elevating the ambient noise level during these periods. Distant farmyard activity was noted during the first measurement period. Birdsong, noise from nearby sheep and intermittent air traffic noise were noted during all three measurement periods. Noise levels were in the range of 40 to 57 dB L<sub>Aeq,15min</sub> and in the range of 35 to 36 dB L<sub>A90,15min</sub> during the measurement periods.

**Table 10-12 - Attended Noise Measurements at Location ASL3**

Date	Period	Time	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa		
			L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A90</sub>
11 <sup>th</sup> June 2025	Day	15:42-15:57	68	87	33
		16:50-17:05	68	88	35
		17:58-18:13	67	88	33

At ASL3, daytime ambient noise levels were dominated by road traffic noise from the R401 road. A lawnmower/trimmer operating in the distance was noted during the second measurement period. Birdsong, distant farmyard noise, noise from nearby cattle and an element of foliage noise were noted during all three measurement periods. Noise levels were in the range of 67 to 68 dB L<sub>Aeq,15min</sub> and in the range of 33 to 35 dB L<sub>A90,15min</sub> during the measurement periods.

**Table 10-13 - Attended Noise Measurements at Location ASL4**

Date	Period	Time	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa		
			L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A90</sub>
11 <sup>th</sup> June 2025	Day	12:39-12:54	52	73	38
		13:54-14:09	49	73	39
		15:07-15:22	45	63	36

At ASL4, daytime ambient noise levels were dominated by distant road traffic noise from the R441 road and other connecting roads, as well as intermittent local road traffic noise. Nearby pedestrian chatter was noted during the third measurement period. Nearby yard noise, intermittent air traffic noise, distant dog barking and an element of foliage noise were noted during all three measurement periods. Noise levels were in the range of 45 to 52 dB L<sub>Aeq,15min</sub> and in the range of 36 to 39 dB L<sub>A90,15min</sub> during the measurement periods.

**Table 10-14 - Attended Noise Measurements at Location ASL5**

Date	Period	Time	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa		
			L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A90</sub>
11 <sup>th</sup> June 2025	Day	12:12-12:27	57	86	34
		13:29-13:44	41	74	36
		14:42-14:57	48	77	36

At ASL5, daytime ambient noise levels were dominated by birdsong and distant road traffic noise from the R401 road. Distant cattle noise, intermittent air traffic and an element of foliage noise were also notes during all three measurement periods. Intermittent local road traffic noise was noted during the first measurement period, elevating the ambient noise level during this period. Noise levels were measured in the range of 41 to 57 dB L<sub>Aeq,15min</sub> and in the range of 34 to 36 dB L<sub>A90,15min</sub> during the measurement periods.

**Table 10-15 - Attended Noise Measurements at Location ASL6**

Date	Period	Time	Measured Noise Levels, dB re 2x10 <sup>-5</sup> Pa		
			L <sub>Aeq</sub>	L <sub>AFmax</sub>	L <sub>A90</sub>
11 <sup>th</sup> June 2025	Day	11:47-12:02	53	76	40
		13:06-13:21	50	76	40
		14:20-14:35	49	67	39

At ASL6, daytime ambient noise levels were dominated by birdsong, distant road traffic noise from the R401 road, noise from nearby wind turbines and noise from a nearby yard. Intermittent local road traffic noise, including HGV's passing, and an element of foliage noise were also notes during all three measurement periods. Noise levels were measured in the range of 49 to 53 dB L<sub>Aeq,15min</sub> and in the range of 39 to 40 dB L<sub>A90,15min</sub> during the measurement periods.

### 10.3.8 Construction Noise Thresholds

For the appropriate periods (i.e. daytime, evening and night-time) the residential receiver’s ambient noise level is determined and rounded to the nearest 5 dB, and then categorised into the corresponding Construction Noise Threshold (CNT).

Baseline monitoring carried out as part of this assessment indicates that the baseline categories summarised in Table 10-15 are appropriate in terms of the nearest noise sensitive locations being considered in this instance.

**Table 10-16 - Construction noise threshold (CNT) levels for the Proposed Development**

<b>Period over Which Criterion Applies</b>	<b>Location</b>	<b>CNT (L<sub>Aeq,T</sub>)</b>
Monday to Friday: Daytime (07:00 – 19:00hrs)	BS 5228-1 Category A - All residential NSLs along proposed route with exception of Category C detailed below.	65 dB
Saturday: Daytime (07:00-13:00hrs)	BS 5228-1 Category C - Residential NSLs located in immediate vicinity of road crossing no. RDX07 (R401 Road).	75 dB
Monday to Friday: Evening: (19:00 – 23:00hrs)	BS 5228-1 Category A - All residential NSLs along proposed route with exception of Category C detailed below.	55 dB
Saturdays (13:00 – 23:00hrs)	BS 5228-1 Category C - Residential NSLs located in immediate vicinity of road crossing no. RDX07 (R401 Road).	65 dB
Monday to Friday: Night-time (23:00 – 07:00hrs)	BS 5228-1 Category A - All residential NSLs along proposed route with exception of Category C detailed below.	45 dB
	BS 5228-1 Category C - Residential NSLs located in immediate vicinity of road crossing no. RDX07 (R401 Road).	55 dB

## 10.4 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction phase of the Proposed Development particularly in areas where potential impacts due to noise and vibration may occur. The information presented in this section is informed by the project design, but it is not a complete description of the Proposed Development. Therefore, it should be read in conjunction with the full development package. For a more comprehensive understanding of the Proposed Development, please refer to Chapter 2 of the EIA Report. Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to technical specifications, plans, and other relevant documents.

### 10.4.1 Construction Phase

A variety of items of plant will be in use for the purposes of site preparation, construction and site works. There will be vehicular movements to and from the site that will make use of existing roads. Due to the nature of these activities, there is potential for generation of high levels of noise.

It is expected that the construction of the Proposed Development will be completed during normal construction hours i.e., daytime periods from 07:00 to 19:00 Monday to Friday, and 08:00 to 14:00 on Saturdays. Nighttime works are not envisaged during the construction phase of the Proposed Development. Normal construction hours will be specified by planning conditions of a grant of permission for the Proposed Development, or by the local authority.

The overall start-to-finish duration would take up to 22 months if the construction activities for the hot tap, pipeline and AGI do not run concurrently. Construction is anticipated to commence in Q1 2028. Commissioning of the Proposed Development is estimated to take place over 1 – 2 months.

The construction works for the Proposed Development largely take place in greenfield sites using a combination of trenchless and open-cut methods for installing the Edenderry Pipeline. The 23.65 km 300mm NB steel pipeline includes 17 No. Road crossings and 32 No. watercourse crossings (river/stream/ditch/canal) before entering the AGI at Edenderry Power Station.

Trenchless crossing techniques for the underground gas transmission pipeline will be required at the Kilwarden River (RVX01), the Yellow River (RVX02), the M4 Motorway (RDX04) and the Grand Canal (WCX23).

It is also anticipated that trenchless crossing techniques will be used at the following regional roads: the R148 (RDX02) / L80217 (RDX03); the R401 (RDX07 and RDX17); the R441 (RDX12); and the R402 (RDX14). The trenchless crossing at the R402 (RDX14) will simultaneously cross the watercourse crossing no. WCX29. The use of trenchless crossing techniques at the regional roads listed above is to be confirmed during the construction phase by the appointed contractor, who may decide to use open-cut methods.

The construction works include the construction of the proposed Kilwarden Offtake Installation, comprising a pipeline isolation valve and pigging facilities, enclosed within a 2.4m high palisade fence and a 1.2m high stook-proof fence. The construction works will also include the construction of a new Above Ground Installation (AGI), Ballykilleen AGI.

Temporary bridge structures will be installed over the Kilwarden River (RVX01), the Yellow River (RVX02), and all other watercourse crossings, excluding the Grand Canal (WCX23), to facilitate construction access. The temporary bridges will remain operational for the duration of the construction works, with installation and dismantling phases expected to take approximately 4 weeks.

5 no. Temporary Construction Compounds will be established within the Proposed Development site. The Temporary Construction Compounds will facilitate key construction activities by providing space for site offices, welfare cabins, plant and machinery storage, and car parking. Temporary Construction Compound 02, 03 and 04 has capacity for the storage of the full project line pipe quantity.

Additionally 7 no. Laydown Areas (Type A) and 8 no. Laydown Areas (Type B) (see Chapter 2 for further details) will be established during the Proposed Development works)

A working width of 30 m will be fenced off and the topsoil will be cleared to a typical depth of 300 mm. An additional working width of 40 x 45 m is required at road and water crossings.

#### **10.4.2 Operational Phase**

Once constructed, the proposed pipeline will not require any on site staff to operate it. GNI maintenance staff, one van, will carry out checks every two weeks to a month along with routine inspection and maintenance, including pigging, of the asset every seven to ten years. The Ballykilleen AGI Packaged Boiler Unit (PBU) Kiosk will contain small boilers (<1MWth) and a gas-fired backup generator.

The proposed Kilwarden Offtake Installation is a dead site (no onsite electrical equipment) with a below ground isolation valve in an access pit and an above ground connection for a pig (Pipeline Inspection Gauges) launcher. Approximately every 7 - 10 years, the pipeline will be 'pigged' using an intelligent pig launched from the AGIs in order to monitor the mechanical status of the pipeline itself.

## 10.5 Potential Impacts of the Proposed Development

### 10.5.1 Construction Phase

#### 10.5.1.1 Construction Noise

Construction noise predictions have been carried out using guidance set out in British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.

Construction works associated with the Proposed Development will be temporary in duration. It is estimated that the full construction will take up to c. 8 to 10 months, with construction elements overlapping. It should be noted that the overall start-to-finish duration would take up to 22 months if the construction activities for the hot tap, pipeline and AGI do not run concurrently. The excavation and reinstatement of the underground elements of the works will be ongoing in sections as the project proceeds. During construction phase it has been assumed that plant operates at 66% duration i.e. 8 hours in a 12 hour shift, unless otherwise stated (e.g. rock breaking equipment will only occur for limited periods and is calculated with 40% on time).

Whilst the phasing of works and location of activities and work sites have been progressed to detailed stages as part of the EIAR, the specifics in terms of plant items, plant numbers, their locations and operational duration will be subject to site conditions, work scheduling and contractor proposals. Notwithstanding, it is possible to determine indicative noise levels associated with typical construction activities associated with the various works activities.

Due to the nature of the activities undertaken on a construction site, there is potential for generation of high levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels, the impact at nearby NSLs will depend upon a number of variables, the most notable of which are:

- ▶ The amount of noise generated by plant and equipment being used at any one time generally expressed as a sound power level;
- ▶ The periods of operation of the plant at the development site, known as the 'on-time';
- ▶ The distance between the noise source and the NSLs;
- ▶ The attenuation due to ground absorption or barrier screening effects; and
- ▶ Reflections of noise due to the presence of hard vertical faces such as walls.

Along the Proposed Development, the key construction activities of the project are:

- ▶ Activity A: Kilwarden Offtake Installation;
- ▶ Activity B: Pipeline Construction;
- ▶ Activity C: Trenchless Crossings;
- ▶ Activity D: Ballykilleen AGI Construction;
- ▶ Activity E: Temporary Bridge Installations; and
- ▶ Temporary Compounds.

**Table 10-17 Indicative plant noise levels and predicted CNL at 10m**

Item (BS 5228 Ref)	Plant Noise Level at 10m Distance (dB L <sub>Aeq,T</sub> )				
	Kilwarden Offtake Installation (A)	Pipeline Construction(B)	Trenchless Crossings (C)	Ballykilleen AGI Construction (D)	Temporary Bridge Installations (E)
HGV Movement (C.2.30)	79	N/A	N/A	79	79
Tracked Excavator (C.4.64)	77	77	N/A	77	77
Dumper Truck (C.4.4)	76	N/A	N/A	76	76
Mobile Telescopic Crane (C.4.39)	77	N/A	N/A	77	77
Dewatering Pumps (D.7.70)	80	N/A	N/A	80	N/A
Wheeled Loader Lorry (C2.28)	N/A	76	76	N/A	N/A
Dump Truck (C.4.2)	N/A	78	78	N/A	N/A
Vibratory Roller (C5.25)	N/A	75	75	N/A	N/A
HGV Movements (10 per hour)	N/A	61	61	N/A	N/A
Generator (C.2.44)	N/A	77	N/A	N/A	N/A
Drilling Rig (C3.15)	N/A	N/A	82	N/A	N/A
Mini Tracked Excavator with Rock Breaker (C5.2) (40% on time)	N/A	79	79	N/A	N/A
<b>Total CNL at 10m distance</b>	<b>85</b>	<b>84 - 85</b> <sup>Note A</sup>	<b>87</b>	<b>85</b>	<b>83</b>

Note A: Where rock breaking is required for made ground at road crossings, the higher noise level has been used. In greenfield open-cut trench construction, this activity is unlikely to be required.

Temporary Construction Compounds will be used for storage, offices, generators and occasional loading and unloading of construction materials. Any noise generated will be at a much lower level than those activities listed in Table 10-17 above. For the purposes of noise calculations, a conservative total CNL of

78 dB  $L_{Aeq,T}$  at 10m has been used for compound activities. This is based on professional judgement and, as stated this is a conservative assumption based on activities expected to occur at these compounds. This would include, for example, the plant items listed above which have typical noise levels in the range of 70 to 75 dB  $L_{Aeq}$  at 10m in line with BS 5228-1. Given the variations of on-site activities and noise levels over any one day and considering that all activities will not operate simultaneously, the values noted above are considered robust for the purposes of assessing potential construction impacts.

As demonstrated in Table 10-17, the cumulative noise level of each of the key construction activities (A, B, D and E) ranges between 83 and 85 dB (A)  $L_{Aeq, T}$  at 10m distance. The cumulative noise level during stream / river crossing construction activities (C) is 87 dB (A)  $L_{Aeq, T}$  at 10m distance.

For the purpose of a worst-case assessment, a cumulative CNL of 85 dB  $L_{Aeq, T}$  at 10m for construction activities A, B, D and E has been used. For construction activity C, a cumulative CNL of 87 dB  $L_{Aeq, T}$  at 10m has been used. CNLs at specific distances have been calculated in Table 10-17 to determine a range of potential noise levels representative of the key construction activities of the Proposed Development. The CNLs include plant typical operating time of 66%.

**Table 10-18 - Indicative noise levels from construction plant at various distances from works activities**

Cumulative Plant Noise Level at 10m Distance (dB)	Predicted CNL at Stated Distance from Edge of Works Based on 66% Plant On-Time (dB $L_{Aeq,T}$ )								
	10m	15m	20m	30m	50m	75m	100m	150m	250m
78 (Temporary Compounds)	76	72	70	62	57	52	49	45	39
85 (Construction Activity A, B, D and E) <sup>Note A</sup>	83	79	77	69	64	59	56	52	46
87 (Construction Activity C) <sup>Note A</sup>	85	81	79	69	64	61	58	52	46

Note A: Activity A (Kilwarden Offtake Installation); Activity B (Pipeline Construction); Activity C (Trenchless Crossings); Activity D (Ballykilleen AGI Construction), and; Activity E (Temporary Bridge Installations).

The following sections outline the closest NSLs to the proposed construction works for each of the 6 no. GNI143 Ballykilleen Pipeline Sections. The identified NSLs are those which bound the road edge and are not screened by intervening buildings.

A summary of the potential construction phase noise impacts for the 6 no. GNI143 Ballykilleen Pipeline Sections is provided in Section 10.5.1.1-4 below.

Making reference to the predicted CNLs at given distances in Table 10-17, the closest NSLs to the key construction activities for each geographical pipeline associated with the application are outlined in Table 10-18.

**Table 10-19 - Key gas to AGI construction activity noise calculations at nearest NSLs**

<b>Pipeline Section</b>	<b>Works Activity Type</b>	<b>Nearest NSL to Edge of Works (m)</b>	<b>Predicted Total CNL at Stated Distance from Edge of Works (dB L<sub>Aeq,T</sub>)</b>	
1	A	Residential NSLs directly to the south of Tie-in Point, along the R161 Road (260m)	46	
	B	Residential NSL to the north of the R161 Road (75m)	59	
		Residential NSLs located to the south of the Kilwarden River (40m)	66	
		Residential NSLs along the R148 and L80217 Roads (20m)	77	
	C	Residential NSLs located to the south-west of the Kilwarden River Crossing (RVX1) (280m)	47	
		Residential NSLs located to the north and south of the R148 (RDX02) / L80217 (RDX03) road crossing (25m)	73	
		Residential NSLs located to the north of the M4 Motorway crossing (RDX04) (340m)	43	
	E	Residential NSL located to the south-west of the Kilwarden River Crossing (RVX1) (280m)	45	
		Residential NSL located to the south-west of WCX01 (240m)	46	
		Residential NSL located to the north of WCX02 (590m)	37	
	2	B	Residential NSL along the L40181 Road (RDX05) (15m)	79
			Residential NSL along the L8022 Road (RDX06) (115m)	54
Residential NSLs along the R401 Road (15m)			79	
Residential NSL along the L80241 Road (RDX08) (30m)			69	
C		Residential NSLs to the north and south of the R401 Road (RDX07) (50m)	66	
E		Residential NSL located to the south-east of WCX03 (250m)	46	
		Residential NSL along the R401 Road, located to the east of WCX04 (110m)	55	
		Residential NSL located to the north-west of WCX05 (130m)	53	
3		B	Residential NSLs along the L4091 Road (140m)	52

<b>Pipeline Section</b>	<b>Works Activity Type</b>	<b>Nearest NSL to Edge of Works (m)</b>	<b>Predicted Total CNL at Stated Distance from Edge of Works (dB LAeq,T)</b>
		Residential NSL to the north of the Yellow River (160m)	51
	C	Residential NSL to the north of the Yellow River Crossing (RVX2) (350m)	44
	E	Residential NSL along the L4091 Road, located to the east of WCX06 (230m)	47
		Residential NSL located to the north-west of WCX07 (260m)	46
		Residential NSL located to the north-west of WCX08 (500m)	39
		Residential NSL located to the north of WCX09 (320m)	43
		Residential NSL located to the north of WCX10 (560m)	37
		Residential NSL located to the south-west of WCX11 (660m)	36
		Residential NSL located to the south-west of WCX12 (590m)	37
Residential NSL to the north of the Yellow River Crossing (RVX2) (350m)	42		
4	B	Residential NSLs to the west of the L1004 Road (30m)	69
		Residential NSLs along the L1004 Road, south of road crossing no. RDX10 (175m)	50
		Residential NSL to the west of Private Lane crossing (RDX11) (125m)	54
	E	Residential NSLs located to the west of WCX13 (430m)	40
		Residential NSLs located to the west of WCX14 (490m)	39
		Residential NSLs located to the west of WCX15 (500m)	39
		Residential NSLs located along the L1004 Road, to the east of WCX16 (250m)	46
5	B	Residential NSLs to the south of the R441 (80m)	58
		Residential NSLs along the L5007 Road (120m)	54
		Residential NSLs at survey location ASL4 (100m)	56
		Residential NSLs along the R402 Road (10m)	83
		Residential NSL (farmhouse) to the south of the R402 Road (30m)	69

<b>Pipeline Section</b>	<b>Works Activity Type</b>	<b>Nearest NSL to Edge of Works (m)</b>	<b>Predicted Total CNL at Stated Distance from Edge of Works (dB L<sub>Aeq,T</sub>)</b>	
	C	Residential NSLs along the L5003 Road (RDX15) (10m)	83	
		Residential NSLs to the east of the R441 crossing (RDX12) (120m)	56	
		Residential NSL to the north-east of the Grand Canal crossing (WCX23) (390m)	43	
		Residential NSLs to the east of the R402 crossing (RDX14) (50m)	66	
	E	Residential NSLs located along the R441 Road, to the north-east of WCX17 (120m)	54	
		Residential NSLs located along the R441 Road, to the north-east of WCX18 (420m)	40	
		Residential NSLs located to the south-east of WCX19 (440m)	40	
		Residential NSLs located to the east of WCX20 (160m)	51	
		Residential NSLs located to the north-east of WCX21 (200m)	48	
		Residential NSLs located to the south-east of WCX22 (220m)	47	
	6	B	Residential NSL to the west of the R401 Road (180m)	50
			Residential NSLs along the L5006 Road (25m)	71
			Residential NSL to the northeast of the R401 / L5006 Intersection (25m)	71
C		Residential NSL to the south-west of the R401 and watercourse crossing (RDX17 & WCX29) (100m)	58	
D		Residential NSL to the northeast of the Ballykilleen AGI site, along the R401 Road (490m)	39	
E		Residential NSL along the R401 Road, located to the east of WCX24 (620m)	36	
		Residential NSL located to the south-west of WCX25 (670m)	35	
		Residential NSL located to the west of WCX26 (350m)	42	
		Residential NSL along the L5006 Road, located to the west of WCX27 (270m)	45	
		Residential NSL along the R401 Road, located to the south of WCX28 (135m)	53	

Pipeline Section	Works Activity Type	Nearest NSL to Edge of Works (m)	Predicted Total CNL at Stated Distance from Edge of Works (dB L <sub>Aeq,T</sub> )
		Residential NSL along the R401 Road, located to the south-west of WCX29 (100m)	56
		Residential NSL along the R401 Road, located to the north-west of WCX30 (330m)	43

#### 10.5.1.1.1 Activity A: Kilwarden Offtake Installation

The Kilwarden Offtake Installation will be located to the north of the R161 Road in an agricultural field. The compound site boundary is approximately 260 m from the nearest noise-sensitive location.

The predicted CNL presented in Table 10-18 at the closest NSL, within 260 m of the closest works boundary, is 46 dB L<sub>Aeq,T</sub>. Given the daytime CNT value of 65 dB L<sub>Aeq,T</sub>, a significant effect is therefore not predicted in relation to the nearest NSLs at these distances in terms of this aspect of potential construction noise.

At all receivers the associated effect is **negative, not significant** and **temporary**.

#### 10.5.1.1.2 Activity B: Pipeline Construction

The GNI Ballykilleen Pipeline Route intersects multiple roads in the Edenderry area including the M4, R161, R148, R401 and the R402. The proposed route lies in proximity of a number of residential NSLs along these roads, with the closest distances ranging from 10 m to 40 m.

The CNLs presented in Table 10-18 are above the daytime CNT value of 65 dB L<sub>Aeq,T</sub> where works are taking place simultaneously within 45 m from the pipeline construction works boundary in the absence of noise mitigation.

The associated effect at the nearest NSLs at distances within 45 m of pipeline construction works is therefore **negative, significant** to **very significant** and **temporary**.

At further distances, the associated effect is **negative, not significant** to **moderate** and **temporary**.

#### 10.5.1.1.3 Activity C: Trenchless Crossings

Trenchless crossing techniques for the underground gas transmission pipeline will be required at the Kilwarden River (RVX01), the Yellow River (RVX02), the M4 Motorway (RDX04) and the Grand Canal (WCX23). It is also anticipated that trenchless crossing techniques will be used to cross the R148 (RDX02), L80217 (RDX03), R401 (RDX07 and RDX17), R441 (RDX12) and R402 (RDX14) regional roads.

The distance from the nearest NSLs to the trenchless crossing works at the Kilwarden River (RVX01), the Yellow River (RVX02), the M4 Motorway (RDX04) and the Grand Canal (WCX23) ranges from 280 m to 390 m. The CNLs presented in Table 10-18 are significantly below the daytime CNT value of 65 dB L<sub>Aeq,T</sub> where works are taking place at these distances. A significant effect is therefore not predicted in relation to the nearest NSLs to trenchless crossing works at the Kilwarden River (RVX01), the Yellow River (RVX02), the M4 Motorway (RDX04) and the Grand Canal (WCX23).

Along Pipeline Section 1, there are residential NSLs located 25 m from the RDX02 / RDX03 trenchless crossing works boundaries. Along Pipeline sections 2 and 5, there are residential NSLs located within 50 m of the nearest trenchless crossing works boundaries at road crossings RDX07 and RDX14.

The CNLs presented in Table 10-18 are above the daytime CNT value of 65 dB  $L_{Aeq,T}$  where works are taking place simultaneously within 50 m from trenchless crossing works boundaries in the absence of noise mitigation.

As outlined in Table 10-15, a daytime CNT value of 75 dB  $L_{Aeq,T}$  will be applied for trenchless crossing works at RDX07. At the nearest residential NSL, within 50 m of the RDX07 trenchless crossing works boundary, the predicted CNL is 66 dB  $L_{Aeq,T}$ .

Where a daytime CNT value of 75 dB  $L_{Aeq,T}$  applies at the nearest NSLs to the RDX07 trenchless crossing works boundary, the associated effect at distances within 50 m of trenchless crossing works is therefore **negative, slight** and **temporary**. Where a daytime CNT value of 65 dB  $L_{Aeq,T}$  applies, the associated effect at NSLs at distances within 50 m of trenchless crossing works is therefore **negative, moderate to very significant** and **temporary**. At all other receivers the associated effect is **negative, not significant to slight** and **temporary**.

Should open-cut methods be adopted for crossing regional roads, the associated effects stated above would remain the same.

#### **10.5.1.1.4 Activity D: Ballykilleen AGI Construction**

The Ballykilleen AGI will be located within Bord na Mona's Renewable Energy Complex at Edenderry Power Station and is 490 m distance from the closest NSL, located to the north along the R401 Road.

The predicted CNL presented in Table 10-18 at the closest NSL, within 490 m of the closest works boundary, is 39 dB  $L_{Aeq,T}$ . Given the daytime CNT value of 65 dB  $L_{Aeq,T}$ , a significant effect is therefore not predicted in relation to the nearest NSLs at these distances in terms of this aspect of potential construction noise.

At all receivers the associated effect is **negative, not significant** and **temporary**.

#### **10.5.1.1.5 Activity E: Temporary Bridge Installations**

Temporary bridge structures will be installed over the Kilwarden River (RVX01), the Yellow River (RVX02), and all other watercourse crossings, excluding the Grand Canal (WCX23), to facilitate construction access.

The nearest NSLs to temporary bridge installation works boundaries are located within Pipeline Sections 2, 5 and 6, with the closest distances ranging from 100 m to 160 m. At the closest NSL, within 100m of the closest works boundary, the predicted CNL is below the daytime CNT value of 65 dB  $L_{Aeq,T}$ . A significant effect is not predicted in relation to the nearest NSLs at these distances in terms of this aspect of potential construction noise.

The associated effect at the nearest NSLs at distances between 100 m and 160 m of temporary bridge installation works is therefore **negative, slight to moderate** and **temporary**.

At all other receivers the associated effect is **negative, not significant** and **temporary**.

#### **10.5.1.1.6 Comment on Nearest NSLs to Temporary Compounds**

There will be 5 no. Temporary Construction Compounds along the proposed route. Making reference to the predicted CNLs at given distances in Table 10-17, the closest NSLs to each temporary compound associated with the application are outlined in Table 10-19.

**Table 10-20 - Temporary Compound construction activity noise calculations at nearest NSLs**

<b>Compound Name</b>	<b>Easting</b>	<b>Northing</b>	<b>Nearest NSL to Edge of Works (m)</b>	<b>Predicted Total CNL at Stated Distance from Edge of Works (dB L<sub>Aeq,T</sub>)</b>
Temporary Construction Compound 01	53.464915	-7.045484	Residential NSLs along the R161 Road, to the south of temporary compound (200m)	41
Temporary Construction Compound 02	53.446186	-7.054215	Residential NSLs to the south of the R148 Road (270m)	38
Temporary Construction Compound 03	53.345428	-7.069357	Residential NSLs along Millmount, to the north of temporary compound (170m)	43
Temporary Construction Compound 04	53.292128	-7.146862	Residential NSL along the R402 Road, to the west of temporary compound (15m)	72
Temporary Construction Compound 05	53.295213	-7.086900	Residential NSL to the northeast of the AGI site, along the R401 Road (490m)	32

At Temporary Construction Compound 04, the nearest residential NSL is within 15 m of the temporary compound works boundary. The CNL presented in Table 10-19 is above the daytime CNT value of 65 dB L<sub>Aeq,T</sub> where works are taking place simultaneously within 15 m from the pipeline construction works boundary in the absence of noise mitigation. It should be noted however, that on-site activities and noise levels over any one day will be varied, and that all activities are not expected to be operating simultaneously.

The associated effect at the nearest NSL to Temporary Construction Compound 04, where works are taking place simultaneously within 15 m of the nearest works boundary, is therefore **negative, very significant** and **temporary**.

The distance from the nearest NSLs to all other Temporary Construction Compounds associated with the application ranges from 170 m to 490 m. The CNLs presented in Table 10-19 are significantly below the daytime CNT value of 65 dB L<sub>Aeq,T</sub> where works are taking place at these distances. The associated effect is therefore **negative, not significant** and **temporary**.

#### **10.5.1.1.7 Construction Noise Impact Assessment Summary**

Further mitigation measures are recommended where residential NSLs are within 50 m of the closest works boundary of any construction activity type A, B, C, D and E, and within 30 m of the closest works boundary of temporary compounds.

Notwithstanding the above, any construction activities undertaken as part of the construction phase will be required to operate within the Construction Noise Thresholds set out in Table 10-15. Mitigation measures and recommended good practices have been outlined in Section 10.6.1.

In the absence of mitigation, where works are taking place within 50 m of NSLs the Proposed Development potential noise impacts are **negative, significant to very significant** and **temporary**.

In the absence of mitigation, at all other distances the Proposed Development potential noise impacts are **negative, not significant to moderate** and **temporary**.

#### **10.5.1.2 Construction Traffic Noise**

Additional construction traffic on local roads that will be generated as a result of this overall development has been considered in the impact assessment. In order to increase traffic noise levels by 1 dB traffic volumes would need to increase by the order of 25% along the local road network.

As outlined in the relevant sections of Chapter 13 relating to traffic, additional traffic introduced onto the local road network due to the construction phase of the Proposed Overall Development have a percentage increase that ranges between 0.6 to 2.2% at affected road links and will not result in a significant noise impact. An increase of 25% in traffic is required to increase overall traffic noise levels by 1 dB.

In terms of noise associated with these construction activities the associated effect is stated to be **neutral, imperceptible** and **short-term**.

#### **10.5.1.3 Construction Vibration**

The potential for elevated levels of vibration at sensitive locations during construction activities associated with the Proposed Development is typically associated with road surface breaking activities for trench excavation.

During surface breaking activities, there is the potential for vibration to be generated through the ground. Empirical data for this activity is not provided in BS 5228-2 (BSI 2014b), however the likely levels of vibration from this activity will be significantly below the vibration criteria for building damage based on monitoring data and experience from other sites. AWN Consulting has previously conducted vibration measurements under controlled conditions, during trial construction works on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- ▶ 3 tonne hydraulic breaker on small CAT tracked excavator; and
- ▶ 6 tonne hydraulic breaker on large Liebherr tracked excavator.

Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 tonne breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10m to 50m respectively from the breaking activities. Using a 6 tonne breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10m to 50m respectively. Whilst these measurements relate to a solid concrete slab, the range of values recorded provides some context in relation to typical ranges of vibration generated by construction breaking activity. Vibration levels associated with this activity will be of similar or lower magnitude to breaking activities discussed above.

The construction works will include surface breaking activities during road crossings and where trenchless crossing techniques are to be used at rivers and watercourses. The key construction activities where surface breaking will be required are within 25 m to 50 m of the nearest residential NSLs.

##### **10.5.1.3.1 Residential or other Light Framed Structures**

Considering the vibration levels at very close distances to breaking activity, vibration levels at the surrounding buildings including the closest residential NSLs (within 25m) will be below those associated with cosmetic or structural damage (15mm/s) set out in Table 10-3 to any of the buildings in proximity to

the development works or any of the other nearby buildings. The impact to light framed and residential buildings is ***negative, not significant*** and ***temporary***.

#### **10.5.1.3.2 Building Occupants – Human Response**

The closest occupied NSLs are within 25 m of the closest works boundary where surface breaking will occur. Vibration levels are likely to be in the range of  $\geq 0.3$  to  $< 1$  mm/s at these buildings, depending on the proximity and nature of surface breaking.

Making reference to human response vibration significance ratings in Table 10-4, the potential vibration impacts at the closest NSLs are ***negative, not significant*** to ***slight*** and ***temporary***. It is noted that these activities will only occur for intermittent periods of time over the course of a working day.

Mitigation measures and recommended good practices have been outlined in Section 10.6.1.

### **10.5.2 Operational Phase**

Once operational, the GNI143 Ballykilleen Pipeline and associated Kilwarden Offtake Installation and Ballykilleen AGI will not require permanent on-site staffing. Routine operational checks will be carried out by GNI personnel approximately every two weeks to one month, with a single van accessing the sites via the established entrances. More extensive maintenance, including pipeline pigging operations, is anticipated only every seven to ten years and will be undertaken using the same access routes.

The Ballykilleen AGI will contain small boilers ( $< 1$  MWth) and a gas-fired backup generator. Due to the distance between the AGI site and the nearest NSLs, any noise generated from these items are unlikely to give rise to significant impacts.

The resultant noise effect is ***neutral, imperceptible*** and ***long term***.

## **10.6 Mitigation Measures**

Based on the assessment results in Section 10.6.1, the following mitigation measures are applicable across the entirety of the Proposed Development.

### **10.6.1 Construction Phase**

Best practice noise and vibration control measures will be employed by the contractor during the construction phase in order to avoid significant impacts at the nearest sensitive buildings. The best practice measures set out in BS 5228-1 and BS 5228-2 will be complied with. The above documents include guidance on several aspects of construction site mitigation measures, which include:

- ▶ Selection of quiet plant;
- ▶ Noise control at source;
- ▶ Screening;
- ▶ Hours of work; and
- ▶ Liaison with the public.

Further comment is offered on these items in the following paragraphs. Noise control measures that will be implemented include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring, where required. The contractor will put in place the most appropriate noise and vibration control measures depending on the level of noise or vibration reduction required at individual working areas i.e. based on the construction threshold values for noise and vibration set out in Table 10-15 and Table 10-3, which have been reproduced below for clarity.

**Table 10-21 - Construction noise threshold (CNT) levels for the Proposed Development**

<b>Period over Which Criterion Applies</b>	<b>Location</b>	<b>CNT (L<sub>Aeq,T</sub>)</b>
Monday to Friday: Daytime (07:00 – 19:00hrs)	BS 5228-1 Category A - All residential NSLs along proposed route with exception of Category C detailed below.	65 dB
Saturday: Daytime (07:00-13:00hrs)	BS 5228-1 Category C - Residential NSLs located in immediate vicinity of road crossing no. RDX07 (R401 Road).	75 dB
Monday to Friday: Evening: (19:00 – 23:00hrs)	BS 5228-1 Category A - All residential NSLs along proposed route with exception of Category C detailed below.	55 dB
Saturdays (13:00 – 23:00hrs)	BS 5228-1 Category C - Residential NSLs located in immediate vicinity of road crossing no. RDX07 (R401 Road).	65 dB
Monday to Friday: Night-time (23:00 – 07:00hrs)	BS 5228-1 Category A - All residential NSLs along proposed route with exception of Category C detailed below.	45 dB
	BS 5228-1 Category C - Residential NSLs located in immediate vicinity of road crossing no. RDX07 (R401 Road).	55 dB

**Table 10-22 - Recommended construction vibration thresholds for buildings**

<b>Structure Type</b>	<b>Allowable Vibration (in terms of PPV) at the Closest Part of Sensitive Property to the Source of Vibration, at a Frequency of 4Hz and less:</b>	
	<b>Transient Vibration</b>	<b>Continuous Vibration</b>
Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s	25mm/s
Unreinforced or light framed structures. Residential or light commercial-type buildings	15mm/s	7.5mm/s
Protected and Historic Buildings <sup>*Note 1</sup>	6mm/s – 15mm/s	3 mm/s – 7.5mm/s
Identified Potentially Vulnerable Structures and Buildings with Low Vibration Threshold	3mm/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 value within the range will be used.

#### **10.6.1.1 Selection of Quiet Plant**

This practice is recommended in relation to static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

### **10.6.1.2 Noise Control at Source**

If replacing a noisy item of plant is not a viable or practical option, consideration will 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 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.

The following best practice mitigation measures will be employed:

- ▶ Site compounds will be located away from noise sensitive boundaries within the site constraints.
- ▶ The lifting of bulky items, dropping and loading of materials within these areas will be restricted to normal working hours.
- ▶ Mobile plant will be switched off when not in use and not left idling.
- ▶ For steady continuous noise, such as that generated by diesel engines, noise control measures include fitting a more effective exhaust silencer system to reduce the noise emitted.
- ▶ For percussive tools such as pneumatic breakers, 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.
- ▶ Erecting localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.
- ▶ For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- ▶ For compressors, generators and pumps, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.
- ▶ All items of plant will 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.

### **10.6.1.3 Screening**

Screening is an effective method of reducing construction noise levels at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver. BS 5228–1 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material.

Erection of localised demountable enclosures or screens will be used around breakers or drill bits when in operation in proximity to NSLs with the potential to exceed the construction noise thresholds. Annex B of BS 5228–1 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on-site from standard materials. A well placed and designed mobile temporary screen around a breaker or excavation can effectively reduce noise emissions by 10 dB(A).

In addition, careful planning of the construction site layout will also be considered. The placement of site buildings such as offices and stores between the site and sensitive locations can provide a good level of noise screening.

### **10.6.1.4 Hours of Work**

Construction activity will mostly take place during daytime hours Monday to Friday and a half day on Saturdays. In the event of works being proposed outside of these, prior written approval will be sought if necessary.

Consideration should be given to the scheduling of activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity should be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control.

Depending on the noise emission levels experienced and associated noise impact, the contractor should be flexible and able to conduct certain works at hours which reflect periods when the neighbouring properties have lower sensitivities to noise.

#### **10.6.1.5 Liaison with the Public**

A designated Community Liaison Officer (CLO) will be appointed to site during construction works. Any noise and vibration complaints will be logged and followed up in a prompt fashion by the CLO. In addition, prior to particularly noisy or vibratory construction activity the CLO will inform the nearest sensitive locations of the time and expected duration of the works.

#### **10.6.2 Operational Phase**

As the operational noise effect associated with the Proposed Development is *imperceptible* at noise-sensitive locations, mitigation measures are not required.

### **10.7 Monitoring or Reinstatement Measures**

#### **10.7.1 Construction Phase**

During the Construction Phase, the appointed contractor shall carry out noise monitoring at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise monitoring will be conducted in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017). The selection of monitoring locations will be based on the nearest representative NSLs to the working area which will progress along the length of the Proposed Development.

On review of the likely vibration levels associated with construction activities, it may be concluded that the construction of the Proposed Development is not expected to give rise to vibration that is either significantly intrusive or capable of giving rise to structural or cosmetic damage to adjacent buildings.

In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, vibration monitoring is recommended at a selection of sensitive buildings, where proposed works have the potential to be at or exceed the vibration limit values.

#### **10.7.2 Operational Phase**

There are no noise and vibration monitoring or reinstatement requirements during the operational phase.

### **10.8 Residual Effects of the Proposed Development**

This section summarises the likely noise and vibration impact associated with the Proposed Development, considering the mitigation measures.

#### **10.8.1 Construction Phase**

During the construction phase of the Proposed Development there will be some impact on nearby noise sensitive properties due to noise emissions from construction activities. The application of noise limits and hours of operation (i.e. as per Table 10-2), along with implementation of appropriate noise and vibration control measures, as summarised in Section 10.6.1, will ensure that the residual noise and vibration effect

is kept to a minimum. With the inclusion of site screening and localised screening, CNL can be reduced by 10 dB compared to those discussed in Table 10-19.

### ***10.8.1.1 Construction Noise***

#### **10.8.1.1.1 Activity A: Kilwarden Offtake Installation**

In terms of noise associated with Kilwarden Offtake Installation construction works, the overall residual effects are ***negative, not significant*** and ***temporary***.

#### **10.8.1.1.2 Activity B: Pipeline Construction**

In terms of noise associated with pipeline construction works, the associated residual effects at NSLs at distances ranging between 10 m and 25 m from works are ***negative, moderate*** to ***very significant*** and ***temporary***. Where pipeline construction activities occur within 25 m of NSLs, the receptors comprise either individual dwellings or small clusters of two or three houses.

For the majority of NSLs along the pipeline route, at distances greater than 25 m, the associated residual effects are ***negative, not significant*** to ***slight*** and ***temporary***.

#### **10.8.1.1.3 Activity C: Trenchless Crossings**

In terms of noise associated with trenchless crossings construction works, the associated residual effects at NSLs at distances within 30 m of works are ***negative, moderate*** and ***temporary***. Where trenchless crossing construction activities occur within 30 m of NSLs, the receptors comprise either individual dwellings or small clusters of two or three houses.

For the majority of NSLs along the pipeline route, at distances greater than 30 m from trenchless crossing works, the associated residual effects are ***negative, not significant*** to ***slight*** and ***temporary***.

#### **10.8.1.1.4 Activity D: Ballykineen AGI Construction**

In terms of noise associated with Ballykilleen AGI construction works, the overall residual effects are ***negative, not significant*** and ***temporary***.

#### **10.8.1.1.5 Activity E: Temporary Bridge Installations**

In terms of noise associated with temporary bridge installation construction works, the overall residual effects are ***negative, not significant*** and ***temporary***.

#### **10.8.1.1.6 Temporary Compounds**

In terms of noise associated with temporary compound construction works, the associated residual effects at the individual NSL within 15 m of Temporary Construction Compound 04 are ***negative, moderate*** and ***temporary***.

At all other NSLs, the associated residual effects are ***negative, not significant*** and ***temporary***.

### ***10.8.1.2 Construction Traffic Noise***

In terms of noise associated with construction traffic, the overall residual effects are stated to be ***neutral, imperceptible*** and ***temporary***.

### ***10.8.1.3 Construction Vibration***

#### **10.8.1.3.1 Residential or other Light Framed Structures**

In terms of the construction phase vibration impacts on light framed and residential buildings, the overall residual effects are stated to be ***negative, not significant*** and ***temporary***.

#### **10.8.1.3.2 Building Occupants – Human Response**

In terms of the construction phase vibration impacts on human response, the overall residual effects are stated to be ***negative, not significant*** to ***slight*** and ***temporary***.

### **10.8.2 Operational Phase**

As the operational noise impact associated with the Proposed Development is ***neutral, imperceptible*** and ***long term***, there are no residual noise or vibration effects associated with the Proposed Development.

## 10.9 References

- ▶ Department of Housing, Planning & Local Government (DHPLG) (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment
- ▶ Department of the Environment Heritage and Local Government (DEHLG) (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities
- ▶ Dublin City Council (DCC) (2018) Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition
- ▶ Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- ▶ EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIA Reports) (2022) and draft revised Guidelines on information to be contained in Environmental Impact Statements; and Advice Notes for preparing EIS (2015).
- ▶ British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise.
- ▶ Transport Infrastructure Ireland (TII) publication Guidelines for the Treatment of Noise and Vibration in National Road Schemes (2014).
- ▶ British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- ▶ British Standard BS 5228-2: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Vibration.
- ▶ Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (January 2016).
- ▶ ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels.UK