

MWP

Chapter 10 Noise and Vibration
Newtown Transmission Gas Pipeline and
Associated Above Ground Infrastructure

Gas Networks Ireland

November 2025

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Appendix 10-1 Glossary of Noise Related Terminology

10. Noise and Vibration

10.1 Introduction

This chapter considers the potential effects on noise and vibration sensitive receptors arising from the proposed development. A full description of the proposed development, development lands and all associated project elements is provided in **Chapter 02 Description of the Proposed Development** of this EIA.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development, during both the temporary 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.

10.1.1 Competency of Assessor

The assessment has been prepared by Kieran Barry and reviewed by Graeme Thornton of MWP.

Kieran is an experienced environmental consultant with 9 years experience working on environmental projects, including three years experience in the measurement, prediction, assessment, and control of environmental noise. He has completed the Institute of Acoustics (IOA) Certificate of Competence in Environmental Noise Measurement course and is currently undertaking the Institute of Acoustics' Diploma in Acoustics and Noise Control.

Graeme is a senior environmental scientist. He has over 20 years' experience working on environmental projects ranging from emergency hazardous waste spills to the project management of environmental impact assessment reports. He has managed the design, planning and preparation of EIA's on a number of large-scale projects.

10.1.2 Fundamentals of Noise

Fundamentally, noise is vibrations of the air which are detectable by the ear. Sound waves radiate out spherically from a sound source in three dimensions. The human ear can detect a very wide range of pressure variations. In order to cope with this wide range, a logarithmic scale (decibel (dB) scale) is used to translate pressure values into manageable numbers from 0 dB to 140 dB. 0 dB is the threshold of hearing and 120 dB is the threshold of pain.

Measuring in decibels means that a 3 dB increase is equivalent to a doubling of the sound energy and a 10 dB increase is a tenfold increase in energy. For broadband sounds which are very similar in all but magnitude, a change or difference in noise level of 1 dB is just perceptible under laboratory conditions, 3 dB is perceptible under most normal conditions, and a 10 dB increase generally appears twice as loud.

A healthy human ear is also sensitive to a large range of frequencies (approximately 20 Hz to 20,000 Hz) and varies in sensitivity depending on the frequency. The human ear is not equally sensitive to sound at all frequencies and

is less sensitive to sound at low frequencies and high frequencies. A-weighting (dB A) is the main way of adjusting measured sound pressure levels (noise) to take account of the uneven human response to frequencies.

Figure 10-1 illustrates some everyday sounds on the dB(A) scale. A quiet bedroom is around 35 dB(A), a busy office around 60dB(A) and a rock concert around 100 dB(A).

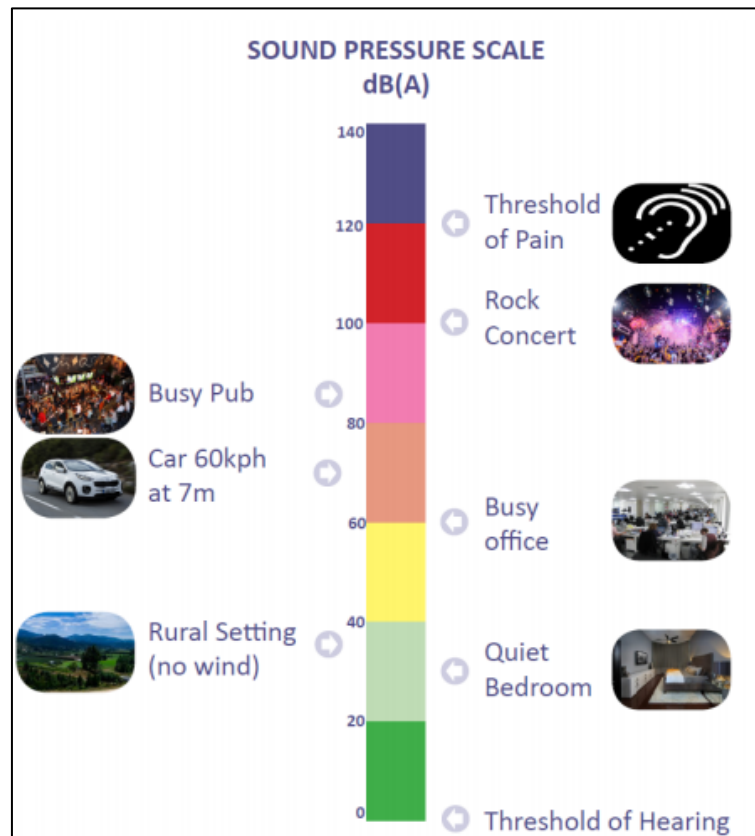


Figure 10-1: The Level of Typical Common Sounds on the dB(A) Scale

10.2 Methodology

The methodology consisted of the following activities:

- An environmental noise desk top study of existing baseline noise data has been undertaken of the proposed development site to characterise the existing baseline noise environment (refer to **Section 10.3**);
- Data from a baseline environmental noise survey, conducted from Wednesday 20th April to 21st April 2022 by AWN Consulting as part of the Kilshane Power Station EIAR was used to quantify the existing noise environment at the nearest noise-sensitive locations.
- 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 (refer to **Section 10.2.3**);
- Predicted noise levels have been assessed against relevant noise limit criteria for both the construction and operational phases at the nearest sensitive receptors (refer to **Section 10.4**); and

- Where necessary, mitigation measures to reduce noise and vibration effects are detailed (refer to **Section 10.5**).

10.2.1 Guidelines and Best Practice

The desk-based research also had regard to published information on public health and infrastructure developments including:

- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound;
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise;
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration;
- BS 6472 Guide to evaluation of human exposure to vibration in buildings (2008): Part 1 - Vibration sources other than blasting;
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration;
- BS 8233: 2014 Guidance on sound insulation and noise reduction for buildings;
- Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2;
- Good Practice Guide for the Treatment of Noise during the Planning of National Road Schemes (NRA, 2014);
- Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (EPA, 2016);
- National Highways Design Manual for Roads and Bridges Part 7 HD 213/11 – Revision 1 Noise and Vibration;
- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment, (IEMA 2014); and
- ISO 1996: 2017: Acoustics – Description, measurement, and assessment of environmental noise.

The assessment methodology also had regard to the following EIA guidelines, local development plans and noise action plan:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports EIAR (EPA 2022);
- Fingal Development Plan 2023-2029; and
- Dublin Agglomeration Noise Action Plan 2024-2028

10.2.2 Study Area

The study area comprised of the proposed development site and its immediate environs. Noise sensitive locations that could potentially be affected by noise and vibration as a result of the proposed development were identified and consisted of residential and commercial properties. A detailed description of the proposed development site including maps and figures is provided in **Chapter 02 Description of the Proposed Development**. A description of the existing environment and location of noise sensitive receptors is given in **Section 10.3** and **Section 10.3.1**.

10.2.3 Assessment Criteria

10.2.3.1 Construction Phase – Noise Impacts

There is no statutory guidance in Ireland relating to the maximum noise levels permitted during construction works, and in the absence of statutory guidance or other specific limits prescribed by local authorities, the thresholds outlined in the British Standard 5228-1:2009+A1:2009, *Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise* has been adopted in this assessment.

Table 10-1: Construction Phase Noise Assessment Criteria

Assessment category and threshold value period (T)	Threshold values, L_{AeqT} dB		
	Category A ^{Note A}	Category B ^{Note B}	Category C ^{Note C}
Night-time (23:00 to 07:00hrs)	45	50	55
Evening and Weekends ^{Note D}	55	60	65
Daytime (07:00 – 19:00hrs) and Saturdays (07:00 -13:00hrs)	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.

For the appropriate periods (i.e., daytime, evening and night time), the ambient noise level is determined and rounded to the nearest 5 dB based on results of baseline noise monitoring. Baseline noise monitoring data, which is discussed in further detail in **Section 10.3.6**, indicates that construction noise thresholds outlined in **Table 10-2** apply to the proposed development surrounding environment.

Table 10-2: Baseline Measurement Results Summary and Appropriate Construction Noise Criteria

Period	Baseline Noise Category	Construction Noise Threshold Value $L_{Aeq, 1hr}$ (dB)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	A – B	65-70

Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise are set in the Transport Infrastructure Ireland (TII) publication *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*. The noise levels in **Table 10-3** should not be exceeded at noise sensitive locations during the construction phase of the proposed development and these are noise criteria proposed for the site.

Table 10-3: Maximum Permissible Noise Levels at the Façade of Dwellings during Construction

Days and Times	Noise Levels (dB re. 2×10^{-5} Pa)	
	$L_{Aeq}(1hr)$	L_{Amax}
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 23:00hrs	60*	65*
Saturdays 07:00 to 13:00hrs	65	75
Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Based on the above the following construction noise criteria are proposed for the daytime noise: There will be no evening or night-time works:

70dB $L_{Aeq, 1hr}$ at noise sensitive locations

75dB $L_{Aeq, 1hr}$ at commercial locations

10.2.3.2 Construction Phase – Traffic

There are no specific Irish guidance or limits relating to existing local traffic sources along the local or surrounding road network. As traffic from the proposed development will make use of these existing roads already carrying traffic volumes it is appropriate to assess the calculated increase in traffic noise levels that will arise because of vehicular movements associated with the development.

In order to assess the potential impact of construction traffic, the following two guidelines are referenced:

- *Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal LA 111 Noise and Vibration* Revision 2
- *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*. 2022

Table 10-4 offers guidance to the likely impact associated with any particular change in traffic noise level.

Table 10-4: Magnitude of Impact – Construction Phase Traffic

Change in Sound Level (dB)	DMRB Magnitude of Impact	EPA Significance of Effect
Greater than or equal to 5.0	Major	Significant
Greater than or equal to 3.0 and less than 5.0	Moderate	Moderate
Greater than or equal to 1.0 and less than 3.0	Minor	Not Significant – Slight
Less than 1.0	Negligible	Imperceptible

In accordance with the DMRB Noise and Vibration, 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:

- A period of 10 or more days in any 15 consecutive day or nights; and
- A total number of days exceeding 40 in any 6 consecutive months.

10.2.3.3 Construction Phase – Vibration Impacts

According to NRA’s 2014 *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*, there are two separate considerations for vibration during the construction phase namely 1) that which affects human comfort and 2) that which affects cosmetic or structural damage to buildings.

The guidelines suggest that human tolerance for daytime blasting and piling, two of the primary sources of construction vibration, limits vibration levels to a peak particle velocity (ppv) of 12mm/s and 2.5mm/s respectively.

To avoid the risk of even cosmetic damage to buildings, the guidelines suggest that vibration levels should be limited to 8mm/s at frequencies of less than 10Hz, to 12.5mm/s for frequencies of 10 to 50Hz, and to 20mm/s at frequencies of 50Hz and above.

10.2.3.4 Operational Phase – Noise Impacts

The most appropriate operational phase noise criteria for the proposed development are set out in The Environmental Protection Agency (EPA) Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (Environmental Protection Agency, 2016).

The aforementioned guidelines require that sites are screened to determine whether they are a ‘quiet area’ in accordance with the EPA publication *Environmental Quality Objectives – Noise in Quiet Areas* (2003). This screening is required to determine the most applicable noise limits for sites. The site does not meet the defined criteria of a ‘Quiet Area’.

Next NG4 requires the site to be screened to determine if the site is in an ‘area of low background noise’. Background noise levels are examined to see if they satisfy the following criteria:

- Average Daytime Background Noise Level ≤40dB LAF90,
- Average Evening Background Noise Level ≤35dB LAF90, and
- Average Night-time Background Noise Level ≤30dB LAF90.

Existing background noise level data, sourced from the baseline environmental noise survey, carried out from Wednesday 20th April to 21st April 2022 by AWN Consulting as part of the Kilshane Power Station EIAR, was used to quantify the existing noise environment at the nearest noise-sensitive locations which are discussed further in **Section 10.3.1**. The noise survey data determined that the areas monitored were not considered an ‘an area of low background noise’, as not all of the above criteria were satisfied. Therefore, for this assessment, the ‘All other Areas’ criteria, refer to **Table 10-5**, is applied at sensitive receptors for this assessment. If the predicted operation noise exceeds the ‘All other Areas Noise Category’ criteria (i.e. 55dB Daytime, 50dB Evening, 45dB Night-time), then this is assessed as a potentially significant effect.

Table 10-5: Recommended Noise Limit Criteria (NG4, January 2016)

Scenario	Daytime Noise Criterion, dB, Lar,T (07:00 to 19:00hrs)	Evening Noise Criterion, dB, Lar,T (19:00 to 23:00hrs)	Night-time Noise Criterion, dB, Lar,T (23:00 to 07:00hrs)
Quiet Area	Noise from the licensed site to be at least 10dB below the average daytime background noise level measured during the baseline noise survey	Noise from the licensed site to be at least 10dB below the average evening background noise level measured during the baseline noise survey.	Noise from the licensed site to be at least 10dB below the average night-time background noise level measured during the baseline noise survey
Areas of Low Background Noise	45dB	40dB	35dB
All other Areas	55dB	50dB	45dB

The above limits are also in line with limits already specified for AGI systems by GNI. GNI have published the document ‘Pressure Reduction Systems – Functional Specification & Requirements’ which also specify that noise environmental noise emissions from AGI’s should also be limited to 55dBA during the daytime and 45dBA at night-time, when measured at the boundary of any NSL.

During daytime and evening periods, rigorous efforts should be made to avoid clearly audible tones and impulsive noise at all sensitive locations. A penalty of 5dB for tonal and/or impulsive elements is to be applied to the daytime and evening measured $L_{Aeq,T}$ values to determine the appropriate rating level (LAr,T). During the night-time period, no tonal or impulsive noise from the facility should be clearly audible or measurable at any noise sensitive location.

Airport Noise

Section 8.5.7 of the Fingal Development Plan sets out noise zones relating to Dublin Airport in order to aid land use planning. The noise zoning system has been developed with the overarching objective to balance the potential impact of aircraft noise from the Airport on both the external and internal noise amenity.

The proposed development is located in Zone A. The development plan sets out the following objective for Zone A to prevent impact of airport noise on external and internal noise amenity, outlined in **Table 10-6**.

Table 10-6: Aircraft Noise Zone

Zone	Indication of Potential Noise Exposure during Airport Operations	Objective
A	$\geq 63 \text{ dB } L_{Aeq}$, 16 hr and/or $\geq 55 \text{ dB } L_{night}$	To resist new provision for residential development and other noise sensitive uses. All noise sensitive developments within this zone may potentially be exposed to high levels of aircraft noise, which may be harmful to health or otherwise unacceptable. The provision of new noise sensitive developments will be resisted.

The above objective applies primarily to noise sensitive uses. Given that there are no permanent employees occupying the proposed development, based on professional judgement, it is considered that the proposed development is not a noise sensitive use.

There will be maintenance workers occasionally required to provide service and maintenance to the proposed development infrastructure and instrumentation. However, maintenance workers will be on site only for brief periods.

It is considered, based on the above reasoning, that no detailed noise assessment is required for airport noise effects to the proposed development, during the construction or operational phase.

10.2.3.5 Operational Phase – Vibration Impacts

There will be no vibration impacts associated with proposed development.

10.2.4 Statement on Limitations and Difficulties Encountered

There were no limitations or difficulties encountered during assessment.

10.3 Baseline Environment

This section describes the existing environment in terms of the noise monitoring locations, existing noise sources at these locations and the prevailing background noise levels.

The proposed development is located in the townland of Kilshane on lands at Kilshane Road (L3120) and Bay Lane, Kilshane, Finglas, Dublin 11. The area of the proposed development within the designated boundary extends to c. 3.14 ha. The proposed development is located northwest of the M50 motorway and on the western side of the N2 national road and the R135 regional road. The surrounding area is characterised by agricultural fields and industrial uses such as logistics, power stations, and additional business park operations. Roadstone Huntstown Quarry and Huntstown Power Station are located on lands to the south of the proposed development and the site is located to the east and north of Ballycoolin and Rosemount Industrial Estates. Data from a baseline environmental noise survey, conducted from Wednesday 20th April to 21st April 2022 by AWN Consulting as part of the Kilshane Power Station EIAR was used to quantify the existing noise environment at the nearest noise-sensitive locations that may be affected by the proposed development, specifically the nearest residential receptors. This data was also used in the noise assessment undertaken for the GIS and Grid Connection associated with the Kilshane Power Station.

A baseline survey of vibration at the proposed development was not undertaken as existing levels in the vicinity of the proposed development are not expected to be of a magnitude sufficient to cause disturbance to people or structural damage to property.

10.3.1 Noise Sensitive Locations

In the first instance, it is appropriate to define a noise sensitive location (NSL). In this context, it is considered prudent to give consideration to the definition supplied the Environmental Protection Agency (EPA) which states the following:

“NSL – any dwelling house, hotel or hostel health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.”

There are some commercial properties in the vicinity of the proposed development works. For the purposes of this assessment, they will be included as NSLs.

The NSLs to the proposed development are shown in **Figure 10-2**. Description of noise sensitive location use is presented in **Table 10-7**.

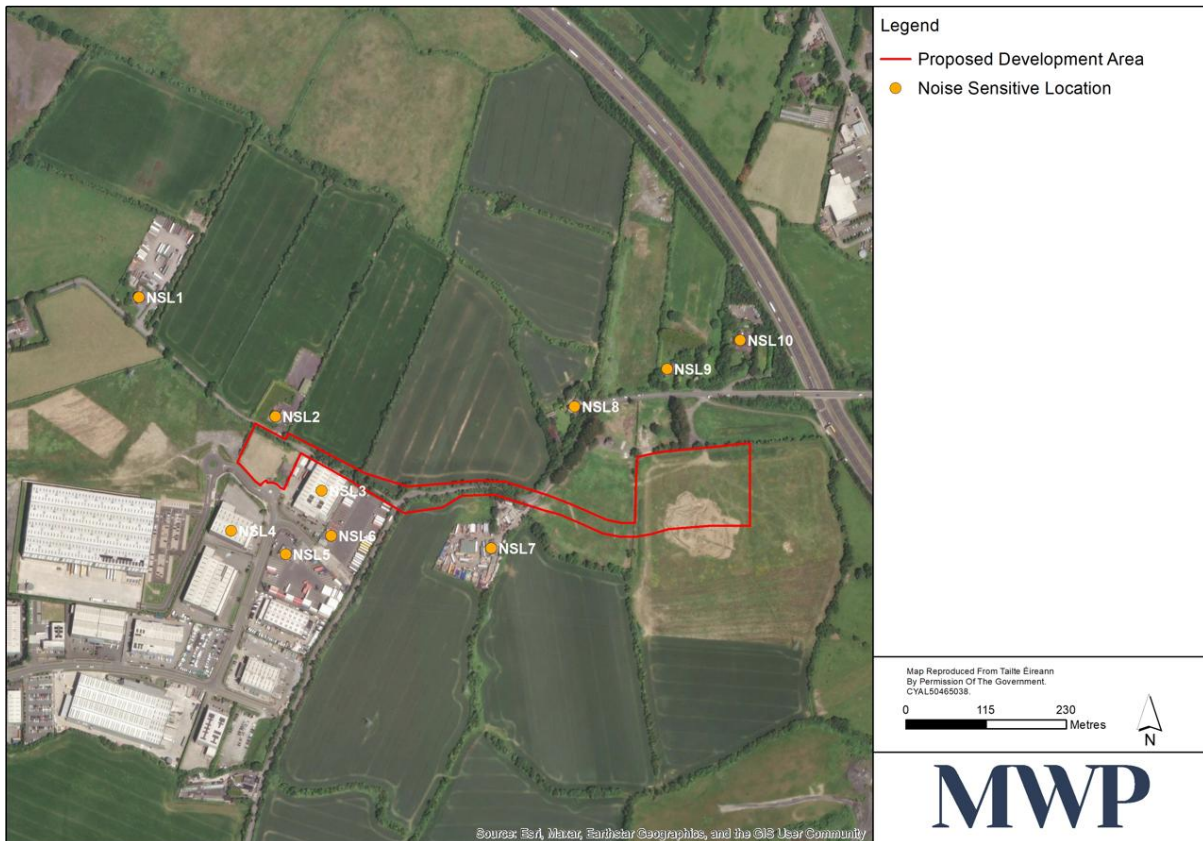


Figure 10-2: Noise Sensitive Locations

Table 10-7: Nearest NSLs to Proposed Development

NSL Reference	Receiver Description
NSL 1	Residential
NSL 2	Residential
NSL 3	Commercial
NSL 4	Commercial
NSL 5	Commercial
NSL 6	Commercial
NSL 7	Commercial
NSL 8	Residential
NSL 9	Residential
NSL10	Residential

10.3.2 Environmental Noise Survey

In order to establish the existing baseline noise environment, the noise levels measured during the environmental noise survey conducted in support of the application for the Kilshane Power Station were reviewed. As mentioned, this data was also used in the noise assessment undertaken for the GIS and Grid Connection associated with the Kilshane Power Station. The noise monitoring locations (NMLs) used for the Kilshane Power Station EIA are NML1 and NML2, as shown in **Figure 10-3** and are considered representative of the NSLs.

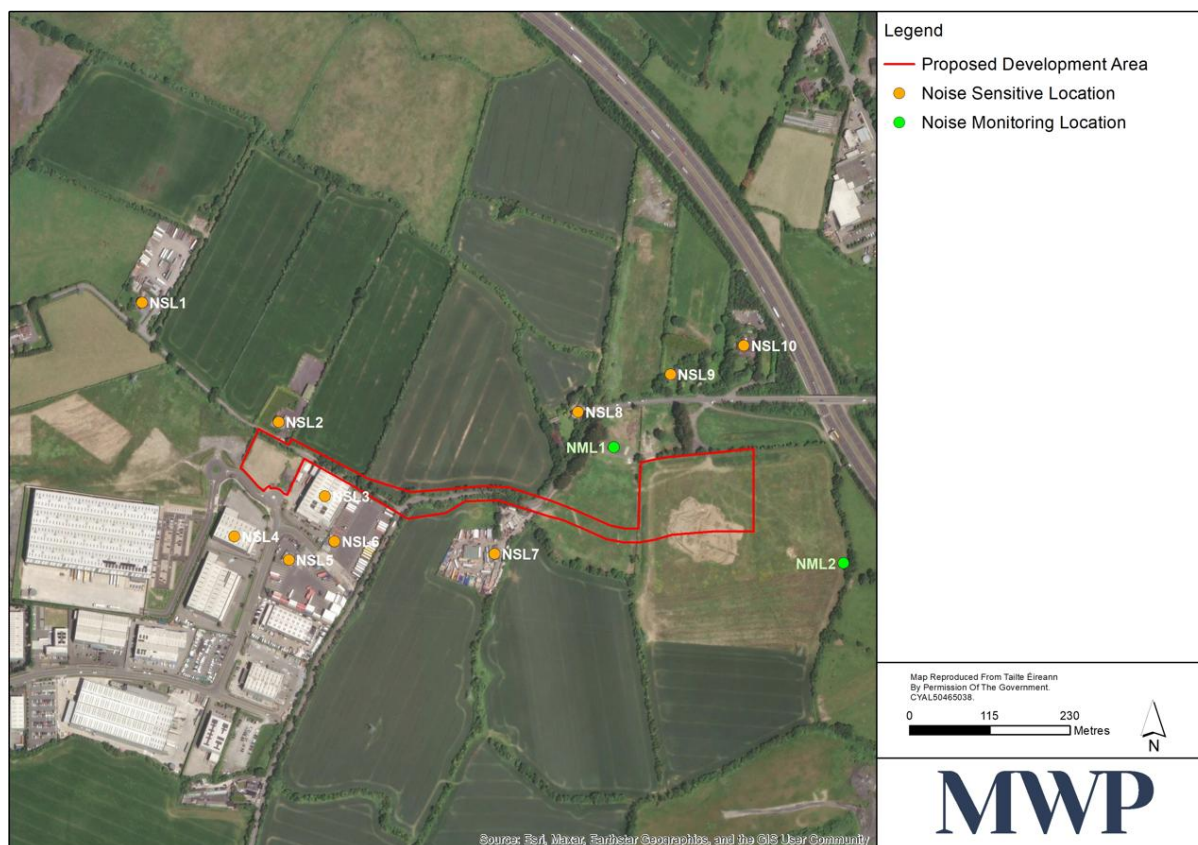


Figure 10-3: Environmental Noise Survey Monitoring Locations and NSLs

Note: For the Kilshane Power Station EIAR, the above locations for NMLs were named UN1 and UN2 however for the purposes of this assessment, the environmental noise survey monitoring locations are named NML1, NML2.

10.3.3 Survey Periods

The Kilshane Power Station EIAR baseline noise measurements, carried out by AWN Consulting, were conducted using unattended noise monitoring over five days that encompassed typical day, evening and night-time periods. The night survey represents the time of night that provides a measure of existing background noise levels during a period where people are attempting to go to sleep or are sleeping. As the development will have capacity to operate at any time of day and night, the potential impact during night time periods is a critical issue. The survey was conducted during the following periods:

- NML1: 16:20 hrs on Wednesday 20 April 2022 to 10:50 hrs on Monday 25 April 2022, and
- NML2: 16:10 hrs on Thursday 21 April to 10:50 hrs on Monday 25 April 2022.

10.3.4 Instrumentation

AWN Consulting carried out the environmental noise survey for NML1 and NML2, as part of the Kilshane Power Station EIAR. The noise measurements were performed using a Rion NL-52 Sound Level Analyser (S/Ns 164427 and 186671). Before and after the survey, the measurement apparatus was checked and calibrated using a Brüel & Kjaer Type 4231 Sound Level Calibrator.

10.3.5 Measurement Parameters

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

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period. This parameter is representative of the specific noise from plant when plant is the dominant noise source, i.e. there is no extraneous noise from sources such as traffic.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise. This parameter is representative of the specific noise from plant when there is extraneous noise from intermittent noise sources such as intermittent traffic.

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 2×10^{-5} Pa. A summary of the acoustic terminology used in this report is included in **Appendix 10-1**.

10.3.6 Survey Results

The results of the Kilshane Power Station EIA surveys at attended monitoring locations are summarised in **Table 10-8** and **Table 10-9**.

Table 10-8: NML1 Noise Survey Results

Date	Day	Period	Ambient Noise dB $L_{Aeq, T}$	Background Noise dB $L_{A90, T}$
20/4/2022	Wednesday	Day	64	60
		Evening	64	56
		Night	60	50
21/4/2022	Thursday	Day	65	61
		Evening	64	58
		Night	61	52
22/4/2022	Friday	Day	66	62
		Evening	64	58
		Night	60	51
23/4/2022	Saturday	Day	65	61
		Evening	62	56
		Night	60	49
24/4/2022	Sunday	Day	65	59
		Evening	63	57
		Night	61	50
25/4/2022	Monday	Day	66	62
		Day	65	60
		Evening	63	57
Overall		Night	60	50

Table 10-9: NML2 Noise Survey Results

Date	Day	Period	Ambient Noise dB $L_{Aeq, T}$	Background Noise dB $L_{A90, T}$
21/4/2022	Thursday	Day	69	67
		Evening	66	62
		Night	63	53
21/4/2022	Friday	Day	69	66
		Evening	66	61
		Night	62	53
22/4/2022	Saturday	Day	68	65
		Evening	65	60
		Night	61	51
23/4/2022	Sunday	Day	67	63
		Evening	65	60
		Night	63	52
24/4/2022	Monday	Day	69	66
Overall		Day	68	65
		Evening	65	61
		Night	62	52

The above recorded baseline noise levels have been considered when determining appropriate noise criteria in relation to the proposed development, refer to **Section 10.2.3**.

10.4 Assessment of Impacts and Effects

10.4.1 Construction Phase Noise

The exact equipment to be used is not known at this stage, however the plant and machinery outlined in the following sections are typical of plant that are commonly used by the applicant in construction projects of this nature and scale and can provide an accurate assessment of construction noise levels during the construction phase.

It is unlikely that rock breaking will be required for any of the construction elements described below, as the depth of bedrock has been predicted to be between 3 -5m bgl and 5 - 10m bgl, across the site, refer to **Section 6.4.3.3** of **Chapter 06 Water**.

There are three potential sheet piling locations, refer to **Figure 10-4**. Two potential piling locations are located on the main gas pipeline route and one is located within the footprint of the BV extension.

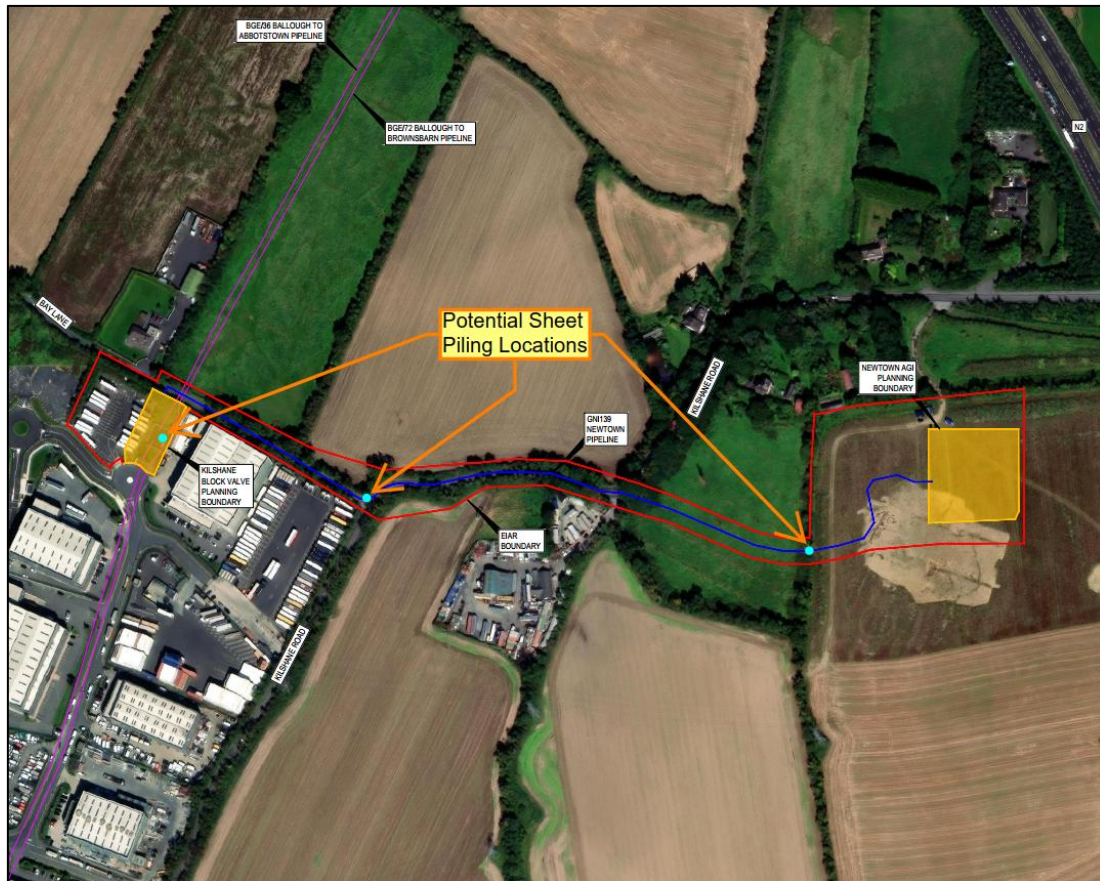


Figure 10-4: Potential Sheet Piling Locations

The associated noise levels have been sourced from BS 5228 *Noise and Vibration from open and construction sites*, totalled, and extrapolated to the nearest noise sensitive receptor. The resultant noise level is then compared against the relevant noise threshold. The result is a theoretical worst case, as it assumes all machinery will be operating simultaneously which will not be the case and accounts for attenuation due to distance only. In reality, there will be further noise attenuation due to atmospheric absorption, ground absorption, and landform screening. Therefore, the noise levels presented herein are overestimated.

The formula, as shown below, to calculate sound attenuation over distance for a point source is based on the inverse square law¹. Using the following equation, noise levels from the construction are extrapolated to the nearest noise sensitive receptor.

$$\text{SPL1} = \text{SPL2} - 20\log(r_2/r_1)$$

Where:

- Sound Pressure Level 1 (SPL1) = Known noise level at 10m from construction site;
- Sound Pressure Level 2 (SPL2) = Unknown noise level at nearest receptor;
- r2 = Distance between noise sensitive receptor and construction site.
- r1 = 10m distance from construction site

¹ <https://www.wkcgroup.com/tools-room/inverse-square-law-sound-calculator/#:~:text=According%20to%20the%20inverse%20square,values%2C%20small%20pumps%20and%20motors.>

10.4.1.1 Main Gas Pipeline

The length of the pipeline from Kilshane BV boundary fence to Newtown AGI boundary fence is approximately 0.715km. Upon exiting the BV site, the pipeline will continue by means of open-cut excavation for approximately 0.1km through the site, crossing an existing hedgerow before turning 90 degrees onto Bay Lane. From there, it will be laid within the road in Bay Lane using open-cut method for approximately 180m.

The proposed route lies in proximity to a number of NSLs along these roads, refer to **Figure 10-4**.

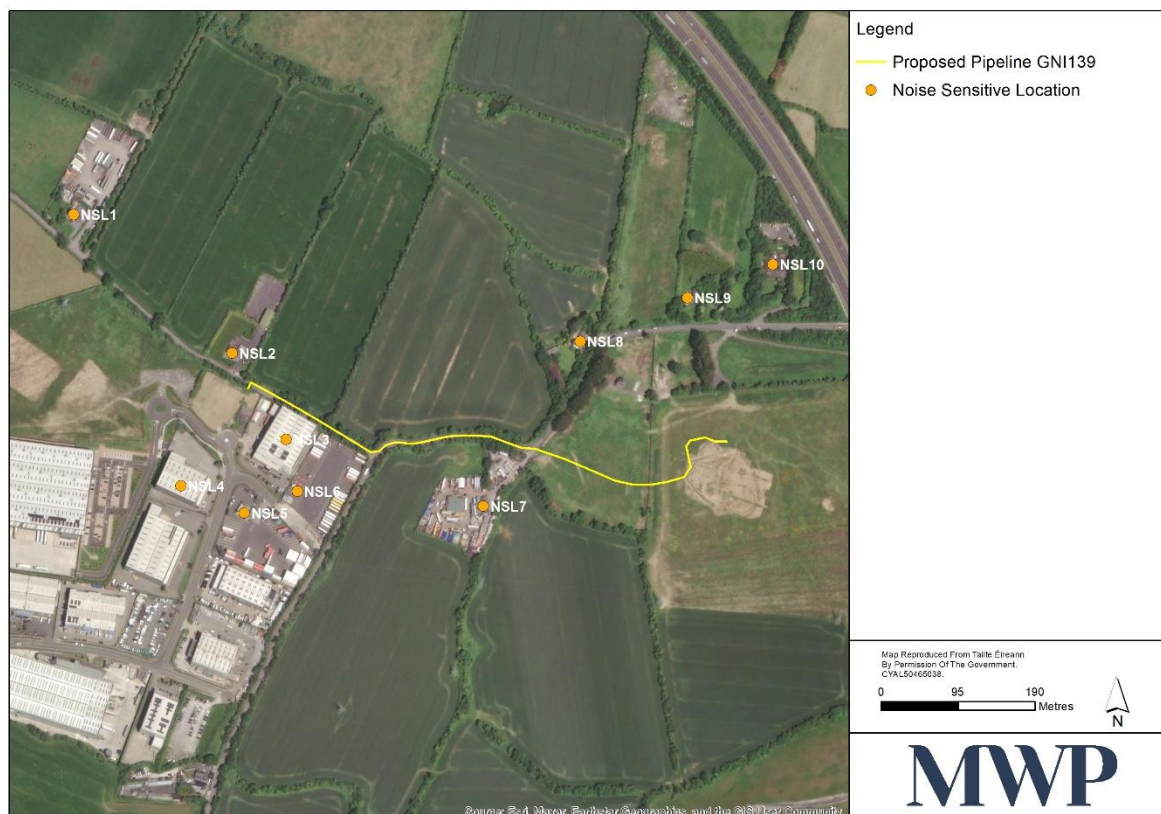


Figure 10-5: Nearest NSLs to Gas Pipeline works

The nearest residential NSL to the gas pipeline works is NSL2 which is approximately 36m from the nearest point of construction works at the gas pipeline. The nearest commercial NSL to the pipeline is NSL 3 which will be approximately 10m from the gas pipeline works.

Table 10-10 outlines the noise levels at a reference distance of 10m associated with typical construction noise sources assessed with the gas pipeline works. Typical sound pressure levels sourced from BS5228 – 1: 2009+A1:2014 have been used for sound noise levels at 10m and noise levels at distances shown in **Table 10-10** have been calculated using methodology outlined in **Section 10.4.1**. There will be 1 no. construction crew working on the pipeline construction element.

Table 10-10: Construction Plant Noise Predictions for Kilshane Gas Pipeline Route Works

Plant/Machinery	Sound Pressure Level @ 10m dB (A)	Predicted Sound Pressure Level dB $L_{Aeq,T}$				
		25	30m	36m (NSL2)	40m	50m
Tracked Excavator (C.4.64)	79					
Wheeled Loader Lorry (C.2.28)	76					
Dump Truck (C.4.2)	78					
Vibratory Roller (C.5.25)	75	76	74	73	72	70
HGV Movements (10 per hour)	61					
Generator (C.2.44)	77					
Total	84					

The construction noise levels presented in **Table 10-10** show that the adopted construction noise limits of 75 dB $L_{Aeq,1hr}$ for commercial properties are exceeded within 25m of the proposed development gas pipeline works, and construction noise limits of 70 dB $L_{Aeq,1hr}$ for residential properties are exceeded within 50m, in the absence of mitigation. NSL2 is approximately 36m from the gas pipeline and therefore, in the absence of mitigation, may experience an exceedance of 3dB above the 70 dB $L_{Aeq,1hr}$ construction noise limit for residential properties, during the temporary period gas pipeline works are passing. Noise levels at the nearest commercial, NSL, NSL3, is predicted to be 84 dB $L_{Aeq,T}$ which is 9 dB above the adopted construction noise limits of 75 dB $L_{Aeq,1hr}$ for commercial properties.

The remaining commercial NSLs are over 25m from works and residential NSLs are over the 50m from works, therefore no significant impacts are predicted at these NSLs.

Potential sheet piling positions are displayed in **Figure 10-4**. For the purposes of assessing a worst-case noise effects scenario, it is considered prudent to calculate the level of noise resulting from sheet piling, in combination with the general noise emissions calculated in **Table 10-10**. The nearest NSL to a potential sheet piling location is NSL3, a commercial property, at a distance of 80m. Using a reference source level of 88 dB $L_{Aeq,T}$ at 10 m for piling (BS 5228, C.3.8), the predicted noise level from piling alone is approximately 70 dB $L_{Aeq,T}$ at NSL3. When combined with the general construction noise predicted for NSL3, there is no increase. The total predicted noise levels (general construction noise and sheet piling) at NSL3 is 84 dB $L_{Aeq,T}$ which is 9 dB above the adopted construction noise limits of 75 dB $L_{Aeq,1hr}$ for commercial properties.

All residential properties are located at a sufficient distance from potential sheet piling activities along the main gas pipeline, and therefore are not expected to experience any increase on the general construction noise, which is summarised in **Table 10-10**. The nearest residential property to a potential piling location is NSL8 at an approximate distance of 180m.

Given the temporary time frame which works will take place in vicinity receptors, in combination with the low number of receptors impacted at any one time, the potential effect of noise, based on professional judgement is considered **likely** to be **negative, not significant to moderate, localised, temporary, and direct**, in the absence of mitigation.

Construction mitigation measures for the construction phase of works are set out in **Section 10.5.1.1**. To reduce the effects of construction noise from the proposed development gas pipeline route works, screening will be implemented using standard site hoarding or using mobile/demountable screens around noisy items of plant or works. A 10 dB reduction in noise levels due to the effect of a solid hoarding along the works boundary has been assumed. This will be erected where the proposed works are in close proximity to a house or commercial property, such as is the case with NSL2 and NSL3. With hoarding in place, construction noise levels are predicted to be 74 dB $L_{Aeq,T}$ at NSL3 and 63dB $L_{Aeq,T}$ at NSL2. With hoarding in place, no significant impacts are predicted. Refer to **Section 10.6** for Residual Effects.

10.4.1.2 Block Valve (BV) Extension – Tie Point & Pigging Compound

The tie in point and permanent (above ground) pigging compound at the hot tap is located west and adjacent to unit 804 of Northwest Business Park. The compound site is approximately 30m from the nearest residential noise sensitive receptor, NSL2 and 22m from the nearest commercial property, NSL3 as shown in **Figure 10-5**.



Figure 10-5: Nearest NSLs to BV Extension works

Table 10-11 outlines the noise levels at a reference distance of 10m associated with typical construction noise sources assessed with the BV Extension Works. Typical sound pressure levels sourced from BS5228 – 1: 2009+A1:2014 have been used for sound noise levels at 10m and noise levels at distances shown in **Table 10-11** have been calculated using methodology outlined in **Section 10.4.1**.

Table 10-11 Construction Plant Noise Predictions for Block Valve (BV) Extension Works

Plant/Machinery	Sound Pressure Level @ 10m dB (A)	Predicted Sound Pressure Level dB $L_{Aeq,T}$					
		22m (NSL3)	25m (NSL2)	30m	40m	50m	55m
HGV Movement (C.2.30)	79						
Tracked Excavator (C.4.64)	77						
Dumper Truck (C.4.4)	76	78	77	75	73	71	70
Mobile Telescopic Crane (C.4.39)	77						
Dewatering Pumps (D.7.70)	80						
Total	85						

Predicted noise levels from the BV Extension works are 78 dB $L_{Aeq,T}$ at the nearest NSL, NSL3 (commercial) and 77 dB $L_{Aeq,T}$ at the nearest residential NSL, NSL2. These levels are 7 dB above the adopted construction noise criterion of 70 dB $L_{Aeq,1hr}$ for residential receptors (NSL2) and 3 dB above the 75 dB $L_{Aeq,1hr}$ criterion for commercial receptors (NSL3).

Noise modelling indicates that the 70 dB $L_{Aeq,1hr}$ threshold will be exceeded within approximately 55 m of the BV Extension works. The next nearest receptor, NSL4, is located c.70 m south of the works and is therefore predicted to not to exceed the adopted construction noise criteria.

The nearest potential sheet piling location within the BV Extension works to a commercial NSL, NSL3 is approximately 30m. The nearest potential sheet piling location within the BV Extension works to a residential NSL, NSL2 is approximately 75m.

Using a reference source level of 88 dB $L_{Aeq,T}$ at 10 m for piling (BS 5228, C.3.8), the predicted noise level from piling alone is approximately 78 dB $L_{Aeq,T}$ at NSL3 and 71 dB $L_{Aeq,T}$ at NSL2. When noise from sheet piling is combined with general construction noise, the total predicted noise level at NSL3 is 81 dB $L_{Aeq,T}$ and 78 dB $L_{Aeq,T}$ at NSL2. This represents an exceedance of 8 dB above the residential criterion at NSL2 and 6 dB above the commercial criterion at NSL3.

Overall, construction noise levels from the construction stage of the BV extension works are **likely** to result in a **negative, not significant to slight, temporary, local and direct** effect, in the absence of mitigation.

Construction mitigation measures for the construction phase of works are set out in **Section 10.5.1.1**. To reduce the effects of construction noise from the proposed development BV Extension works, screening will be implemented using standard site hoarding or using mobile/demountable screens around noisy items of plant or works, as will be the case with the gas pipeline works. A 10 dB reduction in noise levels due to the effect of a solid hoarding along the works boundary has been assumed. This hoarding/screening will be erected where the proposed works in close proximity to houses and commercial properties. There will be 1 no. construction crew working on the BV Extension element.

With the mitigation in place, the predicted construction noise from the BV Extension Works at NSL2 will be 2 dB below the adopted construction noise limit of 70 dB $L_{Aeq,1hr}$ for residential properties. Predicted construction noise at NSL3 will be 4 dB below the adopted construction noise limit of 75 dB $L_{Aeq, 1hr}$ for commercial properties, and therefore no significant effects are predicted with mitigation in place. With hoarding in place, no significant impacts are predicted. Refer to **Section 10.6** for Residual Effects.

10.4.1.3 Above Ground Installation (AGI)

The AGI will be located in an agricultural field which will also be the location of the proposed Kilshane Energy Facility, approximately 110m south of L3120 Kilshane Road. The AGI works area is approximately 142m from the nearest noise sensitive receptor, NSL, NSL9, as shown in **Figure 10-6**.

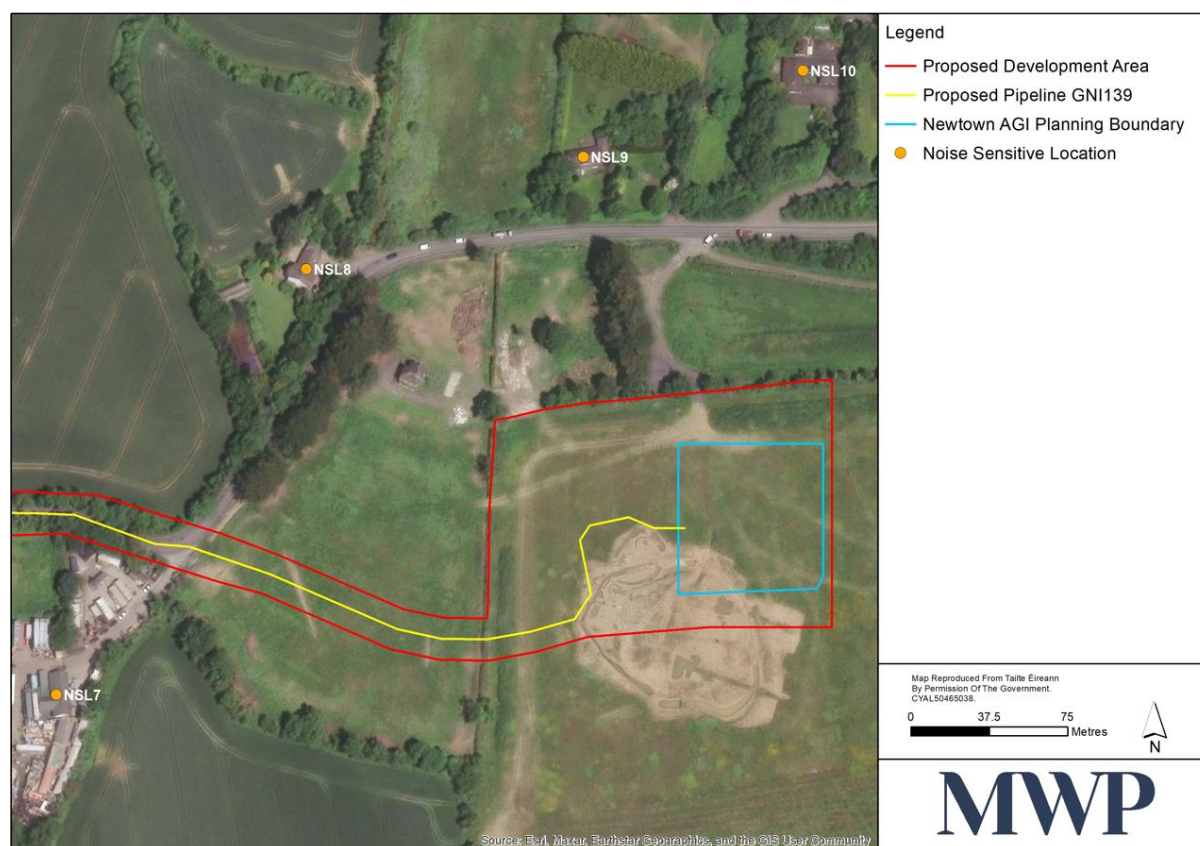


Figure 10-6 Nearest NSLs to AGI works

The construction plant items for the AGI will be the same as the BV Extensions works items.

Table 10-12 outlines the noise levels at a reference distance of 10m associated with typical construction noise sources assessed with the AGI works. Typical sound pressure levels sourced from BS5228 – 1: 2009+A1:2014 have been used for sound noise levels at 10m and noise levels at distances shown in **Table 10-12** have been calculated using methodology outlined in **Section 10.4.1**. There will be 1 no. construction crew working on the AGI element.

For the purposes of this assessment, it has been assumed that construction works associated with the Kilshane Energy power plant will occur concurrently with the construction of the AGI. This has been addressed in **Section 10.7**.

Table 10-12: Construction Plant Noise Predictions for AGI Works

Plant/Machinery	Sound Pressure Level @ 10m dB (A)	Predicted Sound Pressure Level dB $L_{Aeq,T}$					
		50m	70m	90m	110m	130m	142m (NSL9)
HGV Movement (C.2.30)	79						
Tracked Excavator (C.4.64)	77						
Dumper Truck (C.4.4)	76	71	68	65	64	63	62
Mobile Telescopic Crane (C.4.39)	77						
Dewatering Pumps (D.7.70)	80						
Total	85						

Noise levels from the AGI works are predicted to exceed 70 dB $L_{Aeq,1hr}$ within 50m of the AGI works. At NSL9, the nearest residential NSL to the AGI works area, c.142m to the north east, the noise levels from AGI works are predicted to be 62 dB $L_{Aeq,T}$, which is 8 dB below the adopted construction noise limit of 70 dB $L_{Aeq,1hr}$. Noise levels at the remaining further away NSLs will also be lower than 70 dB $L_{Aeq,1hr}$ given that noise will dissipate further due to distance. As commercial properties are at further distances than NSL9, noise levels at these NSLs are also predicted to be below 75 dB $L_{Aeq,1hr}$ criterion adopted for commercial properties. Therefore the construction noise from AGI works will **likely** result in a **negative, not significant, temporary, local and direct** effect, in the absence of mitigation.

Construction mitigation measures for the construction phase of works are set out in **Section 10.5.1.1**. It is worth noting that although construction noise levels are within construction limits, best practice measures will be applied and hoarding will be in place during construction works which will further reduce noise levels by 10 dB.

10.4.1.4 Construction Traffic

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 Traffic and Transportation**, additional traffic introduced onto the L3120 Kilshane Road and Bay Lane Roads due to the construction phase of the proposed development will not result in a significant noise impact.

The construction traffic noise effects are **likely** to be **negative, imperceptible, temporary, localised and direct**.

10.4.2 Construction Phase Vibration

There are no significant vibrations anticipated. In addition, vibration levels will be controlled to levels outlined in **Section 10.2.3.3**.

The construction phase vibration noise effects are **likely** to be **negative, imperceptible, temporary, localised and direct**.

10.4.3 Operational Phase

10.4.3.1 Operational Phase

The Kilshane Gas Pipeline will be underground and therefore there will be no operational noise and vibration impacts associated with this aspect of the proposed development.

The AGI and BV Extension are the above ground components of the proposed development.

The BV extension consists of a pipeline isolation valve and therefore a partial section of gas pipe will be above ground. With regular maintenance of the BV Extension, there is no significant noise from components of the BV Extension predicted.

The AGI compound comprises an internal access roadway and local surface water drainage system, PIG Trap (launch and receiving point for inspection and maintenance modules), heat exchangers, meters and boilers, regulators & instrument housing, and all ancillary service connections. As is the case with the BV Extension, significant noise is not predicted from the above ground gas pipeline infrastructure at the AGI works area, once regular maintenance is carried out. Pressure reduction can lead to significant noise, however this noise will be limited to 85 dB (A) at 1m from centre of stream (inside building). The GNI document 'Pressure Reduction Systems – Functional Specification & Requirements' which also specifies that noise from AGI systems should be limited to 55 dB (A) during the daytime and 45dB (A) at night-time, when measured at the boundary of any NSL. The nearest NSL to the AGI, NSL9, is also a significant distance away at 142m and therefore no operational noise will be noticeable to NSLs from the AGI operation area.

The operational phase noise and vibration effects from the proposed development are **likely** to be **negative, imperceptible, temporary, localised and direct**.

10.5 Mitigation and Monitoring Measures

10.5.1 Mitigation Measures

10.5.1.1 Construction Phase

Best practice in the form of BS5228 –1&2:2009 + A1 2014, *Code of Practice for the Control of Noise and Vibration on Construction and Open Sites* will be adopted during the construction phase in order to minimise the noise generated by construction activities and nuisance to NSLs including the following:

- A pre-construction commitment to managing nuisance noise will be agreed through notification and consultation with affected parties, if deemed necessary.
 - In addition a designated liaison officer will be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations at the time and expected duration of the noisy works.

- Working hours at the site during the construction phase will be limited to 07:00 to 19:00 Monday to Friday and 08:00 to 14:00 on Saturdays. Work on Sundays or public holidays will only be conducted in exceptional circumstances and subject to prior notification insofar as possible with the local community.
- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations, 1988 as amended in 1990 and 1996 (S.I. No. 320 of 1988, S.I. No. 297 of 1990 and S.I. No. 359 of 1996), and the Safety, Health, and Welfare at Work (Control of Noise at Work) Regulations, 2006 (S.I. No. 371 of 2006).

The main control measures will be control of noise at source using the following methods in line with Clause 8 'Control of noise' of BS 5228-1:2009+A1:2014:

- Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery (Clause 8.2.1 General).
- Use of appropriate plant and equipment where possible with low noise level generation where possible (Clause 8.2.2 Specification and substitution).
- All construction plant to be used on site should have effective well-maintained silencers and mufflers (in the case of pneumatic drill) (Clause 8.2.3 Modification of existing plant and equipment).
- Noise generating equipment will be located as far as possible away from local noise sensitive areas identified (Clause 8.2.5 Use and siting of equipment); and
- Regular and effective maintenance of site machinery including a full maintenance schedule to ensure that all pieces of equipment are in good working order. With efficient use of well-maintained mobile equipment, considerably lower noise levels than those predicted can be attained (Clause 8.2.6 Maintenance).

In addition, the following best practice measures are proposed:

- Training of site staff in the proper use and maintenance of tools and equipment.
- The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. While high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.
- Avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment.
- Machines that could be in intermittent use will be shut down between work periods or will be throttled down to a minimum.
- Plant start-up will be sequential rather than all together.
- Internal access tracks to be well maintained.
- Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise-sensitive locations and
- Drop heights for materials such as gravels will be minimised whenever practicable
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.

- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- 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.

Screening

Screening is an effective method of reducing the noise level at an NSL and can be used successfully as an additional measure to all other forms of noise control. Where required, the use of temporary hoarding or mobile screens will be used to aid in reducing noise levels from potential high levels of construction activity. Screening will be erected around the AGI and BV Extension Areas and also where gas pipeline works are within 50m of a residential NSL and 25m of a commercial NSL. This will be implemented using standard site hoarding or using mobile/demountable screens around noisy items of plant or works.

Vibration

Vibration levels will not exceed those described in BS5228 –1&2:2009 + A1 2014, *Code of Practice for the Control of Noise and Vibration on Construction and Open Sites* and this chapter. The contractor undertaking the construction works will be responsible for construction phase noise mitigation.

10.5.1.2 Operational Phase

Effects during the operational phase are **imperceptible** at NSLs therefore mitigation measures are not required.

10.5.2 Monitoring Measures

10.5.2.1 Construction Phase

It is required that the appointed contractor monitor levels of noise during critical periods and at the nearest noise sensitive locations during the construction phase.

10.5.2.2 Operational Phase

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

10.6 Residual Impacts and Effects

Table 10-13 shows the Noise and Vibration Residual Effects. With the outlined mitigation in place, there will be no significant negative residual noise and vibration effects at sensitive receptors as a result of the proposed development.

Table 10-13: Noise and Vibration Residual Effects

IMPACT (PRE-MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (POST-MITIGATION)					
		QUALITY OF EFFECT	SIGNIFICANCE	SPATIAL EXTENT	DURATION	OTHER RELEVANT CRITERIA	LIKELIHOOD
CONSTRUCTION PHASE NOISE							
Main Gas Pipeline Construction Noise	Refer to Section 10.5.1.1	Negative	Not Significant	Localised	Temporary	Direct	Likely
Block Valve (BV) Extension – Tie in Point and Piggings Compound Construction Works	Refer to Section 10.5.1.1	Negative	Not Significant	Localised	Temporary	Direct	Likely
Above Ground Installation (AGI)	Refer to Section 10.5.1.1	Negative	Imperceptible	Localised	Temporary	Direct	Likely
Construction Traffic Impacts	No Mitigation Required	Negative	Imperceptible	Localised	Temporary	Direct	Likely
CONSTRUCTION PHASE VIBRATION							
Construction Phase Vibration	No Mitigation Required	Negative	Imperceptible	Localised	Temporary	Direct	Likely
OPERATIONAL PHASE NOISE							
Operational Phase Noise	No Mitigation Required	Negative	Imperceptible	Localised	Long Term	Direct	Likely
OPERATIONAL PHASE VIBRATION							
Operational Phase Vibration	No Mitigation Required	Neutral	Imperceptible	Localised	Long Term	Direct	Likely

10.7 Cumulative Impacts and Effects

The cumulative effects of the proposed development with the ‘Kilshane Energy Facility’, Proposed 220kV Gas Insulated Switchgear (GIS) Substation and Underground 220kV Transmission Line Connection to the Existing Cruiserath 220kV Substation are discussed further in the following sections.

10.7.1 Construction Phase

The construction programme for the AGI, block valve (BV) and pipeline works will be determined by the client’s phased delivery of works around the roadway network and power station site. The power station development is expected to be delivered over a 20-month period, comprising of six distinct phases.

Given the uncertainty associated with project sequencing, this EIAR assumes that all works, including the 220 kV Transmission Line connection, the proposed gas pipeline, the Kilshane Power Station, the 220 kV GIS Substation and AGI, will be constructed concurrently. Therefore, it was considered prudent to assess the cumulative construction stage impacts of all of these projects.

AWN consulting carried out the noise assessment for the grid connection works and GIS permitted development. In terms of construction noise, the grid connection works was identified as most likely to affect receptors rather than the GIS substation which is approximately 150m from the nearest receptor and therefore GIS works were considered unlikely to cause significant effects. The assessment predicted no significant noise effects from grid connection works at the nearest receptors, provided hoarding was in place during construction.

No significant effects are predicted from gas pipeline works noise and therefore no significant cumulative effects are predicted from the combined projects.

As no significant effects are predicted from gas pipeline and grid connection works noise, the construction works with most potential for cumulative noise effects are associated with construction works of the permitted Kilshane Power Station and construction of the AGI and BV extension. These works are predicted to occur concurrently. The BV extension is considered sufficient distance from the Kilshane Power Station so cumulative effects from noise are not expected. Therefore, construction works from the AGI and Kilshane Power Station are further assessed below as these are positioned in closer proximity.

AWN consulting carried out a noise assessment as part of the Kilshane Power Station EIAR and predicted the construction noise levels at the nearest noise sensitive locations from the main construction works (i.e. re-aligned road and gas generator compound), refer to **Table 10-14**.

Table 10-14: Kilshane Power Station Noise Levels (Source: Kilshane Power Station EIAR)

Calculated noise levels at varying distances (dB $L_{Aeq,T}$)				
50m	60m	70m	80m	100m
70	68	67	66	64

The Kilshane Power Station EIAR predicted a noise level of 70 dB $L_{Aeq,1hr}$ at the nearest NSL which was noted to be 50m from works. The nearest NSLs to the Kilshane Power Station are NSL8 and NSL9, refer to **Figure 10-6**. For the purposes of the cumulative assessment, the above 70 dB $L_{Aeq,1hr}$ value is taken as the worst case predicted noise at NSL8/NSL9 from the Kilshane Power Station construction works.

The closest NSL to this proposed development AGI works is NSL9 and therefore is potentially the most effected NSL in terms of cumulative noise from the combined projects.

Table 10-15 shows the cumulative construction noise levels from the AGI works and Kilshane Power Station works at NSL9.

Table 10-15: Cumulative Noise

Sound Pressure Level at NSL9 dB ($L_{Aeq,T}$)		
Kilshane Power Station Construction Noise	Kilshane AGI Construction Noise	Cumulative
70	52	70

Table 10-15 shows that the cumulative noise will not exceed the adopted construction noise limit of 70 dB $L_{Aeq,1hr}$. It is worth noting that the predictions are conservative and based on a worst-case scenario where all construction plant is operating simultaneously. In reality, works from each project will be phased accordingly to reduce noise levels.

Taking the above in to account, cumulative noise effects are predicted to be **negative, not significant, temporary, localised** and **direct**.

10.7.2 Operational Phase

The Kilshane Gas Pipeline and underground 220kV transmission line will be underground and therefore there will be no operational noise and vibration impacts associated with these aspects of the development.

The BV extension consists of a pipeline isolation valve and therefore a partial section of gas pipe will be above ground. With regular maintenance of the BV Extension, there is no significant noise from components of the BV Extension predicted.

Therefore, the main cumulative noise effects are predicted to results from the AGI operational area in operation together with the adjacent permitted Kilshane Power Station and GIS Substation.

As part of the Kilshane Power Station EIAR, the effects of operational phase noise were assessed. Operational phase noise was assessed in terms of noise from traffic and also in terms of noise from the power station.

In terms of additional traffic on local roads, it was predicted that traffic increases associated with the development would be below 25% and therefore would not increase noise levels by 1dB. Therefore the assessment concluded there would be no significant noise effects associated with operational phase traffic for the Kilshane Power Station. The residual noise levels at road junctions in the vicinity of the Kilshane Power Station were predicted to be **neutral, imperceptible** and **long term**.

In terms of operational noise from the Kilshane Power Station, the EIAR noise assessment identified two modes in which the dual-fire power plant can operate and emit noise:

- Gas fuel operation,
- Liquid fuel operation.

Noise from both modes were modelled at nearest receptors and were found to be within EPA noise criteria adopted for the assessment (Daytime 55 $L_{Aeq,T}$, Evening 50 $L_{Aeq,T}$, Night 45 $L_{Aeq,T}$). Residual noise from the Kilshane Power Station is predicted to be **negative, not significant** to **slight** and **long-term**.

As reported in the Environmental Report for the proposed GIS and Grid Connection for Kilshane Energy, noise from the GIS substation is not expected to cause any significant off-site impact due to the 150 m separation from the nearest sensitive receptor

Considering these findings, alongside the operational noise predicted from the proposed development itself (imperceptible; see **Section 10.4.3.1**), no cumulative operational noise effects are anticipated from the Kilshane Power Station, GIS Substation, and AGI in combination.

10.8 References

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