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8 Noise and Vibration

8.1 Introduction

This chapter describes the likely noise and vibration effects of the proposed development, during its construction, operational and decommissioning phases. Mitigation measures are also detailed that minimise noise and vibration effects, where required.

The proposed development consists of the following permanent and temporary elements:

Landfall Compound – a temporary landfall compound at Baginbun, where the high voltage direct current (HVDC) cable will be installed underground, below the beach and cliff at Baginbun Beach, by horizontal directional drilling (HDD);

HVDC Cables – two HVDC electricity cables with a nominal capacity of 500 megawatts (MW), installed underground from the landfall at Baginbun to the converter station, including jointing bays and ground level marker posts at intervals along the route;

Converter Station – a converter station situated close to the existing Great Island substation in Wexford;

Tail Station - a 220kV substation located beside the converter station. The Loughtown tail station connects the HVAC 220kV cable into the 220kV grid via the existing Great Island substation;

MV Substation – an ESB MV substation will be located outside the converter station and tail station perimeter fences but within the landholding. This substation will provide the MV and LV connections required for the development;

Converter station construction compound - temporary compound for the construction of the converter station and tail station at Great Island;

Cable Contractor compound – three temporary cable contractor compounds will be required (i) at the landfall site close to Baginbun Beach (ii) at the proposed converter station and (iii) one along the onshore route in the townland of Lewistown;

HDD Compounds – temporary HDD contractor compounds are required. One will be located close to the cable contractor compound at Baginbun Beach with another HDD compound located at either side of the Campile River Estuary crossing;

High Voltage Alternating Current (HVAC) Cables – one 220 kV HVAC electricity cable circuit consisting of three cables, installed underground connecting the converter station via the tail station to the EirGrid Great Island substation;

Fibre Optic Cables – fibre optic cables for operation and control purposes, laid underground with the HVDC and HVAC cables;

Community Gain Roadside Car Parking near Baginbun Beach – in consultation with Wexford County Council, circa 54 roadside car parking spaces will be constructed; and

Community Gain in Ramsgrange Village – in consultation with Wexford County Council, extension to existing footpaths, four new street lights and a speed activated sign at Ramsgrange.

A detailed description of the proposed development, including design, operation and decommissioning of the proposed development are described in **Chapter 3** whilst **Chapter 4** provides a description of the general activities associated with the construction of the proposed development.

During the construction phase, the potential noise and vibration impacts are associated with site preparation works at the converter station and tail station site, trench and HDD excavation, foundation construction activities and construction vehicle movements.

During the operational phase, the main potential for noise impact is due to the continuous low-level noise emissions from the converter station plant and equipment. The plant and equipment on the site are not expected to generate vibration, and therefore there is no potential for vibration impacts associated with the operation of the development.

During the decommissioning phase, the potential noise and vibration impacts will be similar-to but less intensive, less extensive and of shorter duration than those associated with the construction phase, as discussed below in **Section 8.4.4**.

This chapter has been prepared by Simon Grennan and Cormac McKenna of Arup. A description of the authors' qualifications and experience is presented in **Appendix 1.1**.

8.2 Assessment Methodology

8.2.1 General

This assessment considers the potential for generating significant noise and vibration effects during all phases of the proposed development and the likely significant effects of noise and vibration on noise sensitive locations (NSLs). NSLs are defined as "*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*" (EPA, 2016).

The assessment methodology is set out below, addressing potential sources of noise and vibration and the appropriate limits. The baseline environment is then described, the potential effects of construction, operation and decommissioning are assessed, and following this, a description of appropriate mitigation and monitoring measures that will be implemented is provided. Finally, residual, cumulative and transboundary effects are described.

8.2.2 Guidance and Legislation

The noise and vibration assessment has been undertaken in accordance with:

- EPA (2016) *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*;
- Transport Infrastructure Ireland (TII, formerly NRA) (2014) *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*;
- TII (2004) *Guidelines for the Treatment of Noise and Vibration in National Road Schemes*; and
- British Standards Institution (BSI) (2014) 5228-1 and 2:2009+A1:2014. *Code of practice for noise and vibration control on construction and open sites. Noise and Vibration.*
- British Standards Institution (BSI) (1993) 7385-2:1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.*
- (ISO, 2007) ISO 1996: *Acoustics – Description, measurement and assessment of environmental noise (Part 1 & Part 2) (ISO, 2003 & 2007).*
- Department for Communities and Local Government (1994) *Planning Policy Guidance 24: Planning and Noise*
- British Standards Institution (BSI) (2019) *BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound*

The TII guidance documents, along with British Standard guidance documents, have set out noise and vibration limits during construction which are generally applied by planning authorities to all construction projects in Ireland. The TII Guidance is the most appropriate guidance due to its semi-quantitative approach to determine the likelihood of a significant effect, combined with an assessment of the proposed mitigation measures, during the construction phase.

Although the proposed convertor station and tail station will not be subject to licence by the EPA, cognisance was given to the EPA guidance above in relation to the operational noise assessment as the limits therein are typically considered by planning authorities for noise-generating developments, whether or not they are subject to licence by the EPA.

8.2.3 Study Area

The study area for the noise and vibration assessment focused on the closest residential properties or other noise sensitive receptors around the landfall, cable route, converter station and tail station for potential construction noise and vibration effects. The assessment considered areas beyond the closest receptors if significant effects were identified to review the spatial extent of any effects. Given the types of construction operation and the duration of the works (particularly the transient nature of the moving cable route works), this is considered a sufficient area to assess likely significant effects.

For operational noise, the study area included the nearest sensitive receptors to the converter station site.

8.2.4 Traffic Volumes (Construction and Operation)

The TII *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (TII, 2004) state that routes should be considered for further assessment where traffic flow is likely to increase or decrease by 25% or more in both the construction and operational phases.

It is predicted that, during construction, there will be short-term increases in traffic volumes on the local road to Great Island which exceed 25% (refer to **Chapter 6** *Traffic and Transportation*), but this is in the context of existing low traffic volumes on the road, and addressed in **Section 8.4.2**.

Increases in traffic during the operational phase of the proposed development are predicted to be imperceptible.

8.2.5 Baseline Survey Methodology

8.2.5.1 Introduction

The baseline noise environment was determined by conducting surveys at sensitive locations near the proposed development in July and August 2019 and by consulting noise data gathered from the SSE Great Island Generating Station's Annual Environmental Reports (AERs) from 2016-2018. All noise monitoring carried out was attended. It is considered that noise monitoring in 2020 would not be representative of the baseline, due to the travel restrictions which were imposed during the pandemic.

All noise surveys were conducted in general accordance with *ISO 1996: Acoustics – Description, measurement and assessment of environmental noise (Part 1 & Part 2) (ISO, 2003 & 2007)* (ISO, 2007).

8.2.5.2 Survey Locations

Most of the site comprises roadway which will be subject to short-term impacts while construction of the cable trench is carried out in the vicinity of roadside receptors, for a period of one to two weeks.

There are four locations where the duration of construction-phase noise impacts will be longer than this: the converter station and tail station site, the crossing of the Campile Estuary, the temporary contractor's compound at Lewistown, and the landfall site.

Attended noise measurements were conducted in 2019 at these four locations, as set out in **Table 8.1**. Noise monitoring conducted for the Great Island Generating Station's AERs was carried out at a bungalow to the north west of the proposed development site (NSL1).

These four locations are considered representative of the general area, which is rural in nature.

Table 8.1 Noise Monitoring Locations

Reference	Location	Co-ordinates (ITM)
NML1	Converter station site	669094, 615043
NML2	Southern bank of Campile Estuary	671118, 615344
NML3	Temporary construction compound site in Lewistown	675366, 605679
NML4	Temporary construction compound site near Baginbun Beach	679869, 603433
NSL1	Bungalow near Great Island Power Station	668452, 615145

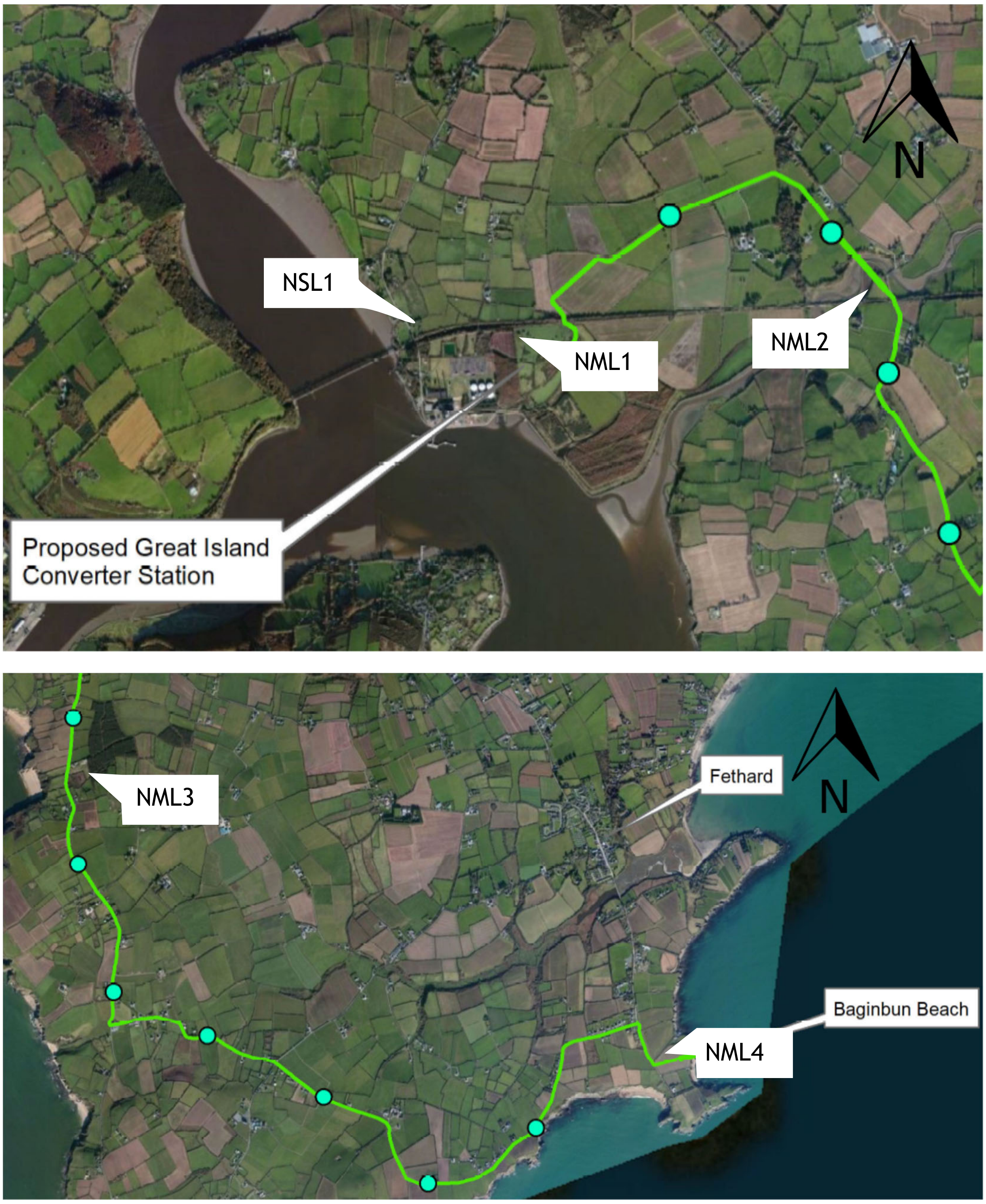

Figure 8.1 Noise Monitoring Locations | mapping: Bing Maps © Microsoft 2020 | not to scale

8.2.6 Survey Periods

The attended noise measurements in 2019 were conducted during the daytime, evening and night time on 30 July and 01 August.

All surveys were carried out during time periods which were selected to provide a typical snapshot of the existing baseline noise climate in the area.

The results were initially noted onto a survey record sheet immediately following each sample and were also saved to the instrument memory for later analysis where appropriate. Survey personnel noted all primary noise sources contributing to noise.

Noise monitoring conducted and reported in the Great Island Generating Station's AERs was conducted during various day time, evening time and night time periods on the 13th November 2018, 21st and 22nd September 2017 and 14th and 15th December 2016.

8.2.6.1 Instrumentation

Brüel & Kjær 2250 Light Class 1 Sound Level Meters were used to carry out the noise surveys. This meter complies with the International Electro-technical Commission (IEC) Specification for Sound Level Meters (IEC, 2002). For each survey, the noise meter was calibrated before and after each measurement using a Brüel & Kjær 4231 Acoustic Calibrator. A windshield was used to provide the microphone with effective wind protection.

8.2.6.2 Meteorological Conditions

Meteorological conditions over the monitoring periods are set out in **Table 8.2** below, as taken from the Johnstown Castle weather station, the nearest weather station to the site. Available SSE reporting does not include meteorological data for the monitoring periods at NSL1.

Table 8.2 Meteorological conditions for 2019 survey periods

Date	Rainfall (mm)	Max Temp (˚C)	Min Temp (˚C)	Mean Wind Speed (m/s)
30/07/2019	0.0	22	11	4.1
01/08/2019	0.0	18.9	12.4	2.6

8.2.6.3 Measurement Parameters

The following parameters were recorded and reported:

- L_{Aeq} – this is the continuous steady sound level during the sample period and effectively represents an average value;
- L_{A10} – this is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise;
- L_{A90} – this is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise; and
- L_{Amax} or L_{AFmax} - this is the maximum sound level, with the inclusion of "F" to indicate measured using the fast time constant.

The "A" suffix denotes the fact that the sound levels are "A-weighted" to account for the non-linear nature of human hearing.

8.2.7 Methodology for Assessment of Effects During Construction and Decommissioning

8.2.7.1 Introduction

The approach to the assessment of construction noise and vibration is described in the following sections. The noise and vibration effects associated with decommissioning are also considered, with these effects likely to be similar, but less intensive than those associated with the construction phase.

8.2.7.2 Construction Noise – Limits and Significance Criteria

BS 5228-1/2:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise and Vibration*[Error! Bookmark not defined.] outlines guidance on construction noise criteria with reference to the existing noise environment, as well as prediction methodologies to estimate the impact. This guidance is considered the most appropriate to apply in this instance as it considers the existing baseline noise environment and includes night-time limits. BS 5228[Error! Bookmark not defined.] states that *a potential significant effect is indicated if the $L_{Aeq,\,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.*

The average daily noise levels at surrounding receptors have been calculated for the worst-case month by considering the individual source noise levels of key noise-generating plant, the numbers of plant operating for different times of the day, the distance to the receptors, and any intervening screening.

Table 8.3 sets out the ABC method for establishing the impact criteria of construction noise as presented in BS5228.

Table 8.3 BS5228 (Part 1) ABC assessment categories and thresholds at dwellings

Assessment Category and Threshold Value Period $L_{Aeq,\,1\,hour}$	Threshold Value in Decibels (dB)		
	A[A)]	B[B)]	C[C)]
Night (23:00-07:00hrs)	45	50	55
Evening and weekends [D)]	55	60	65
Day (07:00-19:00hrs) and Saturdays (08:00-14:00)	65	70	75

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

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

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

19:00 – 23:00hrs weekdays, 14:00-23:00hrs Saturdays and 07:00-23:00hrs Sundays.

The construction noise criteria outlined in **Table 8.4** have been applied at the nearest sensitive receptor to the construction works based on the BS5228Error! Bookmark not defined. criteria.

Table 8.4Noise limits to be applied based on BS5228 criteria

Assessment Category and Threshold Value Period L_{Aeq}	Standard noise limits at sensitive receptors $L_{Aeq,\ 1\ hour}$
Night (23:00-07:00hrs) (L_{Aeq}, dB)	(Cat A) 45
Evening (19:00-23:00hrs) (L_{Aeq}, dB)	(Cat A) 55
Day (07:00-19:00hrs) (L_{Aeq}, dB)	(Cat A) 65

Where an exceedance of the construction noise criteria, as outlined **in Table 8.4**, is predicted, the impact associated with the noise increase is rated in accordance with **Table 8.5.**

Table 8.5 Likely impact associated with exceedance of construction noise criteria

Extent of Noise Impact (Exceedance of Assessment Criteria)	Noise Impact Magnitude	Magnitude Rating
Less than 3dB	No significant change/Imperceptible	Neutral to Slight Impact
Increase of 3-5dB	Slight increase	Slight to Moderate Impact
Increase of 6-10dB	Moderate Increase	Moderate to Major Impact
Increase of more than 10dB	Substantial Increase	Significant Impact

Table 8.6 outlines the duration and frequency of effect based on EPA guidance[1].

Table 8.6 Duration and frequency of effects

Effect Type	Duration
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years
Medium-term Effects	Effects lasting seven to fifteen years
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years

[1] EPA (2017) Guidelines on the information to be contained in Environmental Impact Assessment Reports.

8.2.8 Construction Vibration

Table 1 in BS 7385-2[2] and Table B.2 in BS5228-2Error! Bookmark not defined. outline vibration limit values for transient vibration for cosmetic damage[3]. Both standards state that, *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 1 may need to be reduced by up to 50%.*

As the BS 7385-2 limits are directly applicable to vibration in buildings, for continuous and transient vibration, and are also more onerous at lower frequencies compared to the TII limits, they have been carried through for assessment purposes. **Table 8.7** outlines the vibration limits, for transient vibration, applied in this assessment and recommended for the construction phase of the proposed development.

Vibration from construction traffic was not scoped-in to the assessment as there is no reason to assume construction traffic would give rise to higher vibration than existing heavy goods vehicles traffic using the road network.

Table 8.7 Vibration limits at the nearest sensitive receptor

Type of building	Peak component particle velocity in frequency range of predominant pulse			
	Transient		*Continuous*	
	4 Hz to 15 Hz	15 Hz and above	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures (Industrial and heavy commercial buildings)	50 mm/s		25 mm/s	
Unreinforced or light framed structures (Residential or light commercial type buildings)	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50mm/s at 40 Hz and above	7.5 mm/s at 4 Hz increasing to 10 mm/s at 15 Hz	10 mm/s at 15 Hz increasing to 25mm/s at 40 Hz and above

BS 5228 also outlines guidance on the effects of vibration levels for humans. Vibration levels above 0.3mm/s PPV are likely to be perceptible but higher values can be tolerated if affected residents are given prior warning and explanation. **Table 8.8** outlines the likely human response to vibration levels.

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[2] BS 7385-2 (1993) Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from groundborne vibration

[3] 'Cosmetic' damage is defined in BS ISO 4866:2010 as *The formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick/concrete block construction.*

Table 8.8 Human perception of vibration levels

Vibration level	Significance Level
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level

8.2.9 Construction Equipment

As per TII guidance, noise levels associated with construction may be calculated in accordance with the methodology set out in BS 5228: Part 1. This standard sets out sound power levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels at selected locations. The TII guidance notes that definitive construction methods and number of plant items are not usually set out at this stage and that the overriding requirement of the contractor will be to construct the proposed scheme to the final design ensuring that the development complies with the noise levels/ limits set out in this chapter. This will require the contractor to quantify existing ambient noise levels before fixed noise thresholds can be set. These limits are set out in **Table 8.3**.

8.2.10 Methodology for the Assessment of Operational Effects

Operational noise will be confined to that generated at the converter station site at Great Island, County Wexford.

The effect of the proposed development during the operational phase is assessed through the application of significance criteria based on predicted changes in noise level due to the proposed development. This was done by calculating the change in L_{Aeq} and categorising the significance (refer to **Table 8.9**).

Table 8.9: Changes in Noise Level - Significance Criteria

Change in Sound Level (dB)	Subjective Reaction	Significance Level
None	**No change**	**No change**
< or ~3	Imperceptible	Negligible
4-5	Perceptible	Slight
6-10	Up to doubling of loudness	Moderate
11-15		Significant

Change in Sound Level (dB)	Subjective Reaction	Significance Level
None	**No change**	**No change**
>16	Over a doubling of loudness	Profound

Source: Based on a number of noise documents including EPA Guidelines

EPA guidance [4](EPA, 2016) also sets out permissible noise levels for industrial facilities. These noise levels are also typically used by planning authorities for other noise-generating developments, whether or not they are subject to licence from the EPA. Typical limit values (free field) for noise from industrial sites at sensitive receptors are:

- Daytime (07:00 to 19:00hrs) – 55dB $L_{Ar,T}$;
- Evening time (19:00 to 23:00hrs) – 50dB $L_{Ar,T}$; and
- Night-time (23:00 to 07:00hrs) – 45dB $L_{Aeq,T}$. with no tonal or impulsive noise clearly audible or measurable.

$L_{Ar,T}$ is the rated noise level, equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and/or impulsiveness of the sound, using the EPA guidance for penalties.

$L_{Aeq,T}$ is the equivalent continuous sound level. It is an average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).

The proposed converter station will operate on a 24-hour basis. The limits above are applied to assess the effect of operational sources at the nearest sensitive receptor.

8.2.11 Assessment of Overall Significance

The identified sources of noise were evaluated to determine if there would be adverse impacts, and the potential to cause significant effects according to the criteria described above for construction, operational and decommissioning impacts.

However, other factors specific to individual receptors and the character of the noise impact were also considered in reaching a final assessment decision. Therefore, if potentially significant effects are identified, the overall assessment of significance is evaluated using professional judgement based on the following factors:

Residential Receptors

- the magnitude of the impact and effect identified (based on overall noise level and/or noise change);
- the level and character of the existing noise environment;

[4] EPA (2016) *Guidance Note for Noise Licence Applications, Surveys and Assessments in relation to Scheduled Activities (NG4)*

- any unique features of the source or receiving environment in the local area;
- duration of impact and effect (for construction); and
- the effectiveness of mitigation measures that could avoid or reduce the adverse effects.

Non-residential Receptors

- the generic use (e.g. educational, healthcare, religious buildings or community uses);
- the times of use of the receptor in relation to the impacts;
- the design of the receptor (especially windows, doors and ventilation systems) and hence ability of receptor to experience changes in external noise environment without significant change in internal noise conditions);
- the layout - whether the most sensitive parts of the building are closest to and face the Proposed Development, or are located further away, or on the opposite side of a building;
- duration of impact and effect (for construction); and
- the effectiveness of mitigation measures that could avoid or reduce the adverse effects.

8.3 Baseline Environment

The proposed development, including the converter station site, landfall site, onshore cable route and all associated construction compounds is located in very rural areas, with low ambient noise levels. These noise levels are summarised in **Table 8.10**, including references to the typical sources of the ambient noise at each location, where known (this information was not available for the surveys included in the AERs for Great Island Power Station).

Sensitive receptors (residences) near the proposed converter station site are shown in **Figure 8.2**. The closest residential receptor is 450 metres from the proposed converter station. The converter station is the only element of the proposed development which will generate noise in operation.

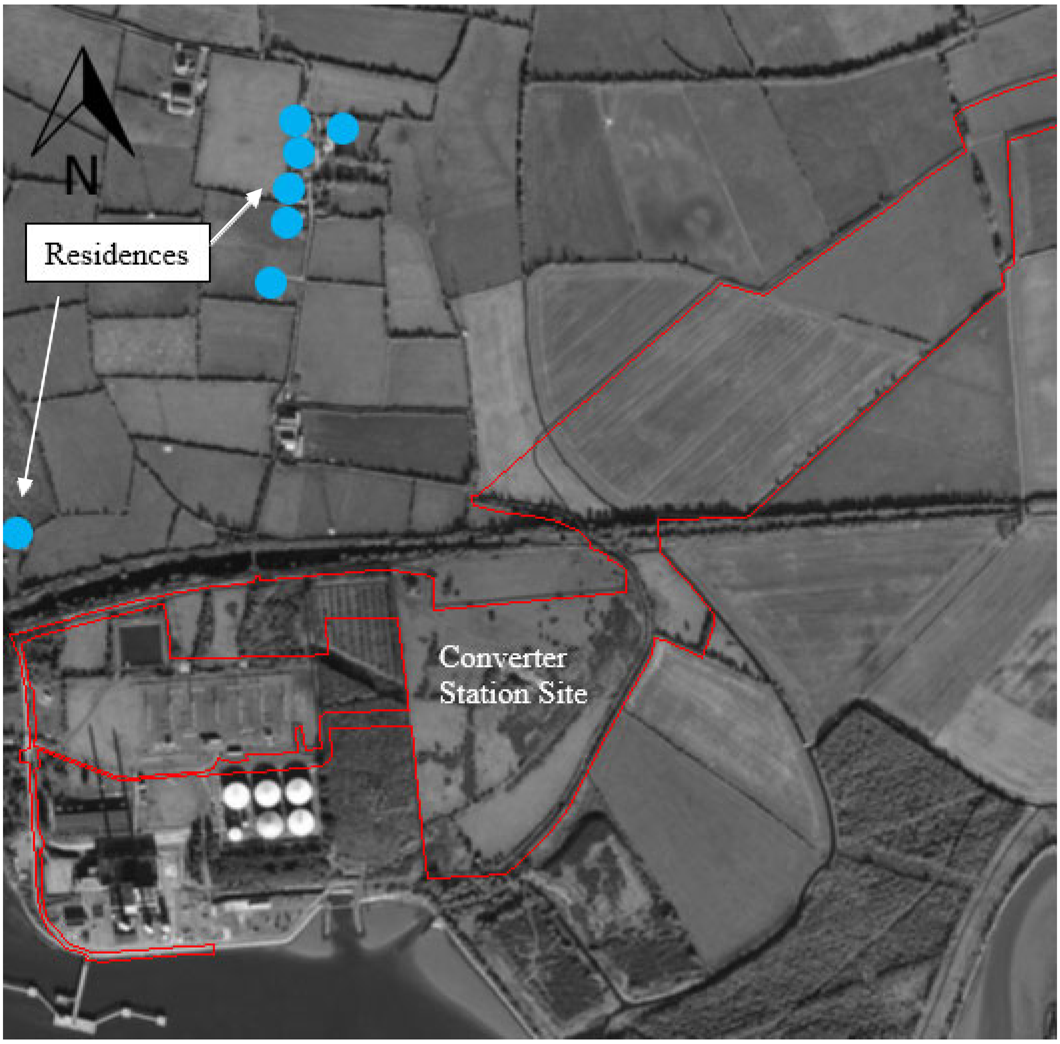

Figure 8.2 Residences near the Converter Station and Tail Station Site | not to scale | background mapping Bing © Microsoft 2020

The study area along the cable route between Great Island and Baginbun Beach is generally sparsely populated, with intermittent ribbon residential development characterising the settlement pattern. Approximately 250 residences are located close to the cable route. The area between Ramsgrange and Baginbun Beach through which the cable route passes is a popular tourist location, as shown in **Figure 8.1**. **Chapter 15** *Population and Human Health* includes further details of the demographic and population characteristics of the study area. The baseline noise environment at the noise survey locations is as outlined in **Table 8.10** below and is considered representative of the overall cable route.

At the proposed horizontal direction drill (HDD) location under the Campile Estuary, noise will be generated by drilling activities, which will be carried out approximately 100 metres from the nearest residence as indicated in **Figure 4.3**. At the landfall site, the closest residence is approximately 150 metres from the planned location of the drilling activity as indicated in **Figure 3.8**.

Table 8.10 Baseline Noise Conditions

Survey Date and Time		Survey Location	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A10} (dB)	L_{A90} (dB)	Qualitative Description
Day - 30 July 2019	16:56 - 17:56	NML1	38	62	41	32	The dominant noise source at this location was the nearby power station. Other sources of noise included farm animals, trees rustling and birdsong.
	15:37 - 16:37	NML2	41	58	43	35	The dominant noise source at this location was passing local traffic. Other sources of noise included distant traffic, farm animals, trees rustling and birdsong.
	14:12 - 15:16	NML3	47	78	47	39	The dominant noise source at this location was passing local traffic. Other sources of noise included distant traffic, construction work, pedestrians, trees rustling and birdsong.
	12:46 - 13:46	NML4	42	62	46	35	The dominant noise source at this location was passing local traffic. Other sources of noise included distant traffic, pedestrians, trees rustling and birdsong.
Day - 13 November 2018	12:42 - 13:12	NSL1	49	77		39	No information available
	13:12 - 13:42	NSL1	54	81		40	No information available
	13:42 - 14:12	NSL1	52	73		46	No information available
Day - 21 September 2017	08:44 - 09:14	NSL1	53	82		36	No information available
	09:14 - 09:44	NSL1	53	79		36	No information available
	09:44 - 10:14	NSL1	53	78		35	No information available
Day - 30 July 2019	13:58 - 14:28	NSL1	57	86		35	No information available
	14:28 - 14:58	NSL1	58	82		34	No information available
	14:58 - 15:28	NSL1	57	83		38	No information available

Survey Date and Time		Survey Location	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A10} (dB)	L_{A90} (dB)	Qualitative Description
Evening - 30 July 2019	20:22 - 20:52	NML1	37	59	40	30	The dominant noise source at this location was the nearby power station. Other sources of noise included trees rustling and birdsong.
	21:10 - 21:40	NML2	40	64	42	33	The dominant noise source at this location was passing local traffic. Other sources of noise included distant traffic, farm animals, trees rustling and birdsong.
	22:02 - 22:32	NML3	41	61	44	31	The dominant noise source at this location was passing local traffic. Other sources of noise included distant traffic, trees rustling and birdsong.
	22:54 - 22:59	NML4	37	55	40	33	The dominant noise source at this location was passing local traffic. Other sources of noise included distant traffic, pedestrians, trees rustling and birdsong.
Night - 1 August 2019	05:54 - 06:04	NML1	34	49	38	29	The dominant noise source at this location was the nearby power station. Other sources of noise included farm animals, trees rustling and birdsong.
	06:18 - 06:28	NML2	40	53	44	33	The dominant noise source at this location was passing local traffic. Other sources of noise included distant traffic, farm animals, trees rustling and birdsong.
	NA	NML3	NA	NA	NA	NA	Site was not accessible
	06:49 - 06:59	NML4	36	54	38	32	The dominant noise source at this location was passing local traffic. Other sources of noise included trees rustling and birdsong.
Night - 13 November 2018	23:08 - 23:38	NSL1	44	73		40	No information available
	23:38 - 00:08	NSL1	43	68		40	No information available

Survey Date and Time		Survey Location	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A10} (dB)	L_{A90} (dB)	Qualitative Description
Night - 22 September 2017	01:48 - 02:18	NSL1	36	55		34	No information available
	02:18 - 02:48	NSL1	39	55		37	No information available
Night - 15 December 2016	00:54 - 01:24	NSL1	39	33[5]		33	No information available
	01:24 - 01:54	NSL1	57[6]	34[7]		34	No information available

Monitoring Locations:

NML1 - Converter Station

NML2 - Campile Estuary

NML3 - Lewistown Compound

NML4 - Baginbun Beach

NSL1 - Bungalow near Great Island Power Station (grey fill indicates that no data was provided in SSE reporting)

[5] This figure appears anomalous in the context of the other recorded noise levels and has been dismissed as a likely typographical error in the record.
[6] This figure appears anomalous in the context of the other recorded noise levels and has been dismissed as a likely typographical error in the record.
[7] This figure appears anomalous in the context of the other recorded noise levels and has been dismissed as a likely typographical error in the record.

8.4 Potential Effects

8.4.1 Do-Nothing Scenario

In the scenario where the proposed development does not proceed as planned, none of the effects as set out in this chapter would occur. Under the 'do nothing' scenario, the existing baseline as presented in **Section 8.3** is likely to persist and no significant effects would arise in the absence of other developments.

8.4.2 Construction Phase

8.4.2.1 Construction Activities, Phasing and Plant

The construction phase of the proposed development will involve the construction of a HVAC cable between the existing Great Island substation and the proposed converter station, the construction of a converter station and associated infrastructure, together with the construction of a 'tail station' adjacent to the proposed converter station, an onshore HVDC underground cable between Great Island and the landfall site near Baginbun Beach, the establishment of contractor compounds at Great Island, in Lewistown, and near Baginbun Beach, and horizontal directional drilling (HDD) activities to construct the cable under the Campile Estuary, and at the landfall site near Baginbun Beach.

The highest noise levels will be generated during the site preparation, excavation and foundation stage at the site of the converter station and tail station. For the cable construction, again the excavation activities will give rise to the highest noise levels, with the joint bay activities also contributing to the predicted noise levels. The operation of the horizontal directional drill at the crossing of the Campile Estuary and at the landfall site will give rise to relatively lower noise levels, but the duration will be greater. There is potential for vibration impacts to occur during the construction phase, associated with vehicle movements and excavation activities.

Given the distances of the most intensive ground works from surrounding dwellings for the cable route excavation and the converter station works, it is not considered that vibration disturbance would occur. The highest vibration generation is likely to result from vibratory roller compaction, which are predicted to be between 0.1 and 0.3mm/s. BS 5228-2 notes that complaints are likely where levels occur above 1.0mm/s PPV at residential properties. The highest level in this range could result in perceptible vibration, but the exposure would be well below the level where there is a likelihood of complaint. Appropriate liaison with residents would be conducted, and given the vibration level of even the highest potential exposure, this is assessed as not significant.

At the converter station site, rock will be excavated using either rock splitting or blasting, or a combination of both techniques. Rock crushing may be required to reuse the excavated material. No works of this nature will be carried out in close proximity to Dunbrody Bridge.

The construction methodology modelled represents the worst-case for rock excavation activities with regard to noise (rock breaker mounted on an excavator). The noise levels associated with blasting will not exceed those predicted for rock-breaking, and specific mitigation measures will be implemented, as set out in **Section 8.5.1** to ensure that adverse effects on the Gas Networks Ireland transmission pipeline are avoided.

It is not possible at this stage to predict the exact equipment that will be chosen by the Contractor(s) and predicted calculations are indicative only and used for the purposes of comparison with the adopted criteria. Nonetheless, the contractor must comply with all relevant limits at all times. Based on the indicative construction programme available, a reasonable worst-case assessment has been undertaken. For the purposes of this assessment, the following construction phases are considered.

- **Cable**

  HDD at the Campile Estuary and the landfall near Baginbun Beach (24/7 operation)

  Cable route excavation including breaking of road surface

  Cable route excavation without breaking of road surface

  Joint Bay Activities

- **Converter Station (and construction compounds)**

  Site preparation

  General site activities, such as vehicle movements

  Building construction

The calculations assume that plant items are operating simultaneously, as outlined in the following sections.

Typically, construction will be from 7am to 7pm, Monday to Friday and 8am to 2pm on Saturday. Civil works to construct the converter station and tail station will take approximately 22 months. **Section 4.2** of **Chapter 4** provides more information on the duration and phasing of the proposed development.

It is anticipated that there will be times due to exceptional circumstances that construction works will be necessary outside of the standard hours (such as for HDD operations). This will be agreed in advance with Wexford County Council and communicated to local residents with an estimation of the timing and duration.

BS 5228: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise, sets out typical noise levels for equipment used in the construction of new developments. **Table 8.11** and **8.12** sets out assumed plant items during the construction phase.

Table 8.11: Assumed Construction Plant for Cable Route Excavation, HDD and Joint Bay Activities

Item of Plant	BS 5228-1 data reference	Sound Power Level (dB(A)) (from BS 5228)	% on-time (i.e. proportion of day operating)	Number of plant items
Horizontal Directional Drilling				
Directional Drill (Generator)	C 2-44	106	100	1
Water Pump	C 2-45	93	100	1
Landscaping				
Tractor (Towing trailer)	C 4-75	107	50	1
Tracked Crusher	C 1-14	110	50	1
Breaker Mounted on Excavator	C 1-9	118	50	1
Cable route excavation including breaking of road surface				
Hand-held Circular Saw (Petrol)	C 5-36	115	5	1
Mini Excavator with Hydraulic Breaker	C 5-2	111	10	1
Road Breaker (Hand-held Pneumatic)	C 5-3	110	10	1
Mini Tracked Excavator	C 4-68	93	10	1
Dumper (Idling)	C 4-8	84	40	1
Diesel water pump	C 11-2	99	5	1
Concrete Pump + Cement Mixer Truck (Discharging)	C 4-24	95	10	1
Dump Truck (Tipping Fill)	C 2-30	107	20	1
Telescopic Handler	C 2-35	99	10	1
Diesel Generator	C 4-82	84	100	1
Vibratory Roller	C 5-27	95	10	1
Dump Truck (Tipping Fill)	C 2-30	107	5	1
Cable route excavation without breaking of road surface				
Mini Tracked Excavator	C 4-68	93	10	1
Dumper (Idling)	C 4-8	84	40	1
Diesel water pump	C 11-2	99	5	1
Concrete Pump + Cement Mixer Truck (Discharging)	C 4-24	95	10	1
Dump Truck (Tipping Fill)	C 2-30	107	20	1
Telescopic Handler	C 2-35	99	10	1
Diesel Generator	C 4-82	84	100	1
Joint Bay activities Phase 1				
Hand-held Circular Saw (Petrol)	C 5-36	115	5	1
Mini Excavator with Hydraulic Breaker	C 5-2	111	10	1
Tracked Excavator	C 4-65	99	40	1
Vibratory Plate (Petrol)	C 2-41	108	40	1
Concrete Pump + Cement Mixer Truck (Discharging)	C 4-24	95	20	1
Diesel Generator	C 4-82	84	100	1
Joint Bay activities Phase 2				

Item of Plant	BS 5228-1 data reference	Sound Power Level (dB(A)) (from BS 5228)	% on-time (i.e. proportion of day operating)	Number of plant items
Telescopic Handler	C 2-35	99	10	1
Diesel Generator	C 4-76	89	40	1
Diesel Generator	C 4-82	84	100	1
Joint Bay activities Phase 3				
Diesel Generator	C 4-76	89	100	1
Diesel water pump	C 11-2	99	10	1
Diesel Generator	C 4-82	84	100	1
Joint Bay activities Phase 4				
Concrete Pump + Cement Mixer Truck (Discharging)	C 4-24	95	10	1
Dump Truck (Tipping Fill)	C 2-30	107	40	1
Telescopic Handler	C 2-35	99	10	1
Diesel Generator	C 4-82	84	100	1
Joint Bay activities Phase 5				
Vibratory Roller	C 5-27	95	50	1
Dump Truck (Tipping Fill)	C 2-30	107	20	1
Diesel Generator	C 4-82	84	100	1

Table 8.12: Assumed Construction Plant for the Converter Station and Associated Infrastructure (including construction compounds)

Item of Plant	BS 5228-1 data reference	Sound Power Level (dB(A)) (from BS 5228)	% on-time (i.e. proportion of day operating)	No. of plant items
Wheeled Loader	C.2.26	107	50	2
Mobile Telescopic Crane	C.4.39	105	50	1
Compressor for Hand-held Pneumatic Breaker	C.5.5	93	50	2
Diesel Generator	C.4.76	89	50	2
Large Concrete Mixer	C.4.22	104	50	1
Tractor (Towing trailer)	C 4-75	107	50	1
Tracked Crusher	C 1-14	110	50	1
Breaker Mounted on Excavator	C 1-9	118	50	1
Tracked Excavator	C.2.3	106	50	2
Articulated Dump Truck	C.4.2	106	50	3
Dozer	C.2.12	109	50	1
Roller	C.2.38	101	50	1
Pre-cast Concrete Piling – Hydraulic Hammer	C.3.1	112	50	1
Asphalt Paver (+Tipper Lorry)	C.5.30	103	50	1
Crawler Mounted Rig	C.3.21	107	50	1
Tracked Excavator	C.3.23	96	50	1
Concrete Pump	C.3.25	106	50	1

Table 8.13 shows the results calculated assuming the simultaneous operation of the plant machinery summarised in **Tables 8.11** and **8.12.** The calculations were carried out for two scenarios as follows:

- Cable route construction (including HDD activities and joint bay works)
- Converter station, tail station and associated infrastructure works (including the construction compound works).

Noise levels for cable construction have been predicted based on an assumption that the cable route trenching works will progress at a rate of 50 metres per day. This is a conservative assumption, as the actual rate is likely to be in the range 70m per day to 200m per day, as described in **Chapter 4 Construction Strategy**.

It is also assumed that all relevant works at that location are taking place at the same time to simulate a worst-case scenario. Most of the cable route is on-road, where additional machinery will be required to break and re-surface the road, and this activity has been included in the modelling and assessment.

The final locations of the proposed joint bays have not been determined, so it has been assumed that they will be constructed close to sensitive receptors and located at approximately one-kilometre intervals along the cable route, to ensure a conservative assessment, and that a worst-case scenario has been addressed.

8.4.2.2 Predicted Construction Noise and Vibration Levels

Cable Route Construction

The average daily noise levels at surrounding receptors have been calculated for the worst-case month by considering the individual source noise levels of key noise-generating plant, the numbers of pieces of plant operating for different periods of the day, the distance to the receptors, and any intervening screening.

The worst case month average noise levels are calculated on the basis of the periods and distances of the works moving along the linear route over the month and are assumed to be as follows:

- 2 days works at 5m from the receptor along road;
- 4 days work at 50m from the receptor along road;
- 8 days work at 150m from the receptor along road;
- 14 days work at 350m from the receptor along road.

The results in **Table 8.13** show the logarithmic average of construction noise at a series of setback distances (for the worst case month) from the cable route construction activity. The number of residential properties within these buffer zones are also shown.

This assessment is based on the following assumptions:

- Assumed straight road (in reality the road may curve around some properties and therefore the noise levels will be sustained for longer at a few locations).
- There is no screening between the cable route excavation and noise sensitive receptors.
- All ground between the cable route excavation and the nearest noise sensitive receptors is soft (acoustically absorptive).
- Existing ambient noise levels are assumed to be less than 62.5dB(A), i.e. this would relate to the most sensitive BS 5228 ABC category (category A) for all receptors.
- Assumed 50m per day progress rate of works.

Table 8.13: Construction Noise Levels Associated with Cable Route Excavation

Buffer Zone from Work Area	10m	25m	50m	100m	150m	250m
Number of Properties in Zone	18	96	185	225	259	345
Worst case month Log Average dB(A)	79	73	70	66	64	61

The noise associated with cable route construction will exceed the daytime 65dB$_{LAeq}$ criterion for short periods of time at residences along the route. Noise levels are expected to exceed 65dB for a distance of 150m from the route prior to mitigation. Hence, approximately 250 properties would be potentially subject to significant effects from cable route excavation works (ABC criterion), in the absence of acoustic barriers and the other proposed mitigation measures.

Although the noise impacts for the construction of the cables in the roadway will be temporary and discontinuous, the effects will be **temporary and locally significant** for residences adjacent to the cable route during the daytime. It is expected that the duration of effect would be relatively short, i.e. no more than a few weeks. Mitigation measures that will be implemented to lessen these impacts are set out in **Section 8.5.1**. Routine construction works are not planned for evening and night-time, so no impacts from construction within the roadway are predicted for these periods.

All joint bays have been assumed to be located at the closest point to nearby receptors, to ensure that the worst-case scenario has been considered. At these locations, the effects at the closest receptors are predicted to be **temporary and locally significant**.

Wildlife Receptors

Wildlife receptors in the surrounding area will already be habituated to road traffic noise and the intermittent operation of agricultural machinery. Although construction noise can be louder and more intensive than that typically generated by traffic and agricultural activity, the wildlife species of conservation interest in the vicinity of the proposed works are generally mobile, and likely to respond to temporary disturbance (should it occur) by moving to similar habitats in the wider area. However, the particular sensitivity of the Campile River Estuary crossing has been noted, with the mud flats and surrounding area being of particular value to wintering bird species. To eliminate the potential for adverse noise and vibration effects on these species, no construction works will take place at this location during the months of October to March inclusive.

HDD

HDD will be used to construct the cables at the landfall and under the Campile Estuary. At the Campile Estuary, the HDD works is likely to be carried out in 12-hour shifts.

During the daytime, even in the absence of standard 2.4m high site hoarding, the daytime limits at the nearest sensitive receptor will be complied with. In the evening time, in the absence of site hoarding a moderate temporary negative impact would be experienced, and in the unlikely event that drilling activity were carried out at night-time at the Campile Estuary, significant temporary negative impacts would be experienced at the closest receptor in the absence of site hoarding. **Section 8.5.1** describes the hoarding that will be provided at this location to ensure that the limits at the closest receptor will be complied with.

At the landfall, the HDD works are likely to be continuous (24-hour operation), and in the absence of site hoarding, again slight to significant negative impacts would be experienced at the closest receptor. With the hoarding, daytime and evening limits will be complied with, and there will be slight temporary negative impacts at night time at the closest receptor only.

No significant vibration impacts are envisaged during the construction phase and compliance with the limits outlined in **Table 8.6** will be achieved.

Converter Station, Tail Station, Associated Infrastructure and Contractors' Compounds

For the construction of the converter station and tail station (and associated infrastructure such as construction compounds), results are presented in **Table 8.14** for receptors at distances of 300m, 400m and 700m from the construction site. This assessment has been based on the following conservative assumptions prior to mitigation:

- It was assumed activities take place at the closest point of the construction site to the surrounding receptors.
- All activities associated with constructing the facility occur simultaneously.
- All ground between the construction site and the nearest noise sensitive receptor is soft.
- There is no screening between the construction site and noise sensitive receptors.

Table 8.14 Noise Levels at Given Distances from the Site

Distance to Receptor (m)	Noise Level at Receptor dB(A)
300	64
400	61
700	56

The nearest receptor is 450m from the proposed construction works and contractors' compounds at the converter and tail station, so no exceedances of the 65dB(A) criterion are predicted from this worst-case scenario.

For the contractor's compounds near Baginbun Beach and at Lewistown, the closest activity to a residential receptor will be approximately 100 metres, to the north of the compounds. The construction activity here will be restricted to fencing, site clearance, laying of temporary hard-standing, and these activities in reverse on completion of construction activities. No significant noise or vibration effects are predicted at these locations.

There is likely to be some ground-breaking/rock-breaking as part of the excavation works at the converter station site. Further, piling will also likely be required in this location. The equipment associated with these construction activities has been included in the assessment. Specific mitigation measures have also been committed to in **Section 8.5.1** with regard to the impulsive noise associated with the pre-cast piling activity.

Vibration Effects

In terms of vibration effects, vibratory roller compaction will also be used, generating vibration with a magnitude of between 0.1 and 0.3mm/s. BS 5228-2 notes that complaints are likely where levels occur above 1.0mm/s PPV at residential properties.

Construction Traffic

Chapter 6, **Section 6.5.1** describes the temporary increase in traffic associated with the construction activities, identifying two roads which will be subject to moderate to significant temporary negative effects relating to traffic. It is noted that the large percentage increase in traffic predicted (70-74% on the local road to Great Island, and 17-21% on the R733 North of Horeswood Nurseries) is in the context of existing low traffic volumes on the roads, and that the predicted temporary increase in traffic is within the carrying capacity of the roads.

The predicted temporary increase in traffic will give rise to associated noise and vibration effects at roadside receptors along the identified roads. These are illustrated in **Figure 8.3** below.

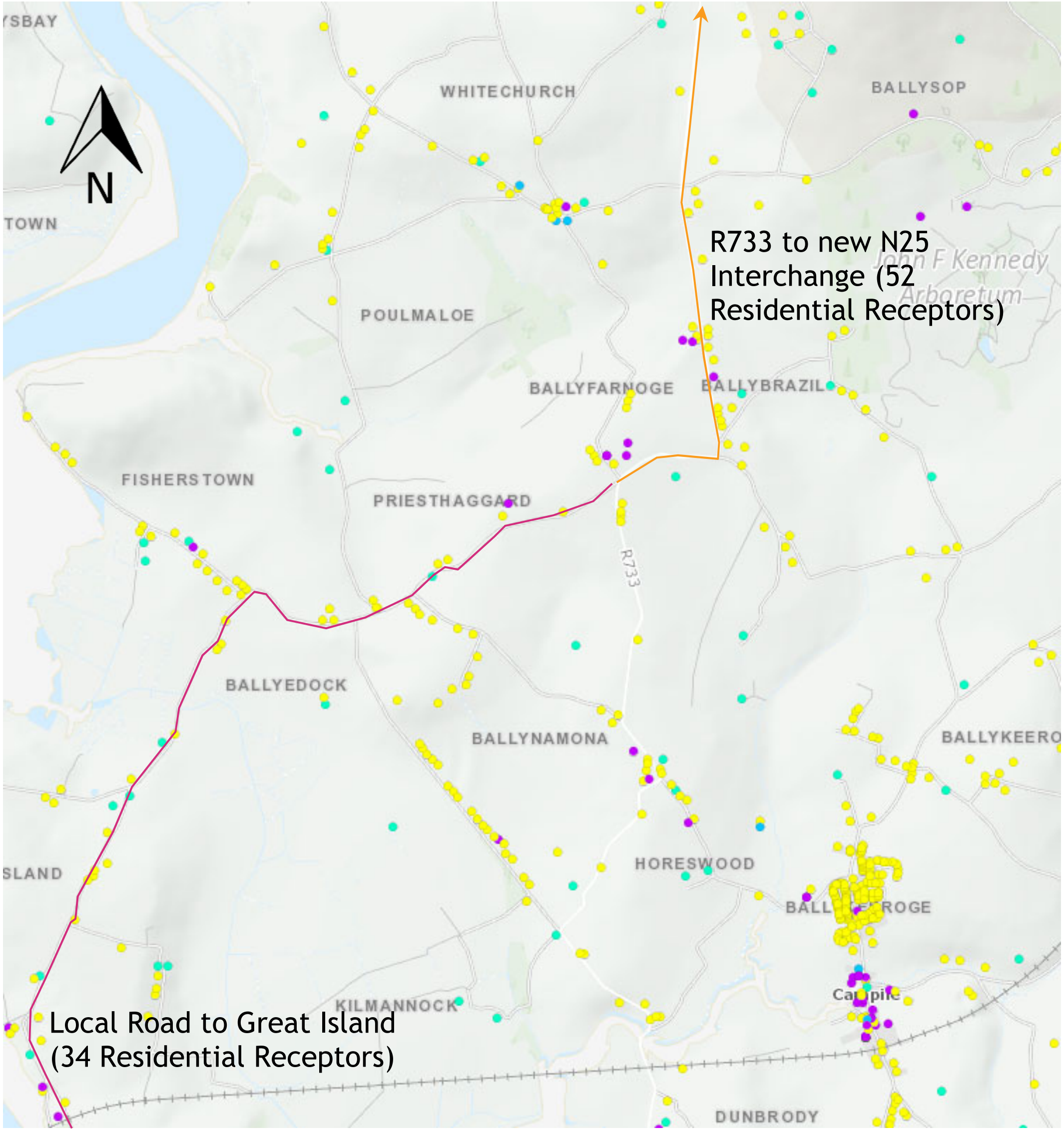

Figure 8.3: Residential Receptors Adjacent to Construction Haul Route | not to scale [source: myplan.ie 2020]

Noise associated with predicted additional heavy goods vehicles movements has been estimated from a reference noise level of 80dBL_{Aeq} at 10m (from BS5228, Table C6 item 21). Although the temporary increase in traffic noise will be noticeable at these locations, particularly at times of peak activity, the total L_{Aeq} noise contribution across the working day from construction vehicles at these receptors is not predicted to the Category A threshold values as set out in **Table 8.1**.

Vibration associated with construction traffic movements is not predicted to exceed the level of 1.0mm/s PPV as set out in **Table 8.6**.

Heavy goods vehicle movements associated with cable route excavation and cable laying would be minimal, and would be negligible in terms of noise and vibration impact.

8.4.3 Operational Phase

8.4.3.1 Cable Installation

The cable will be underground hence there will be no operational noise effects. Occasional maintenance and testing of the cable will not give rise to any significant noise and vibration effects.

8.4.3.2 Converter Station and Tail Station

The converter station and tail station will operate 24-7. Receptors were modelled near the site to the northwest, and also at Cheekpoint across the estuary to the southwest. Modelling was carried out using SoundPLAN – ISO9613-2 Propagation Method, for receptors illustrated in **Figures 8.4, 8.5** and **8.6**.

The following assumptions were made in developing the model:

- Terrain was modelled as flat ground, which is likely to represent a worst-case scenario. Ground areas were input in to the model – soft ground for grass, hard ground for water, etc.
- Addresses of potential sensitive receptor locations were compiled from the myplan.ie website.
- Typical built fabric was assumed with vents, louvres and doors as shown in the associated planning drawings ('Kingspan' panels for the main buildings, or equivalent).

The operation of the plant and equipment listed in **Table 8.15** was modelled.

Table 8.15: Acoustic Characteristics of Modelled Plant and Equipment

Plant equipment	Octave band centre frequency (Hz)									Sound Power Level, Lw (dBA)	Quantity	Height (m)	Environment	% on time
	31	63	125	250	500	1000	2000	4000	8000					
Valve/converter coolers	82	100	95	92	92	88	85	76	66	93*	10	3	outdoor	100
Air conditioning unit	70	75	73	72	74	71	64	61	62	75	2	1.5	outdoor	100
Valve reactor (DC) - [smoothing reactor]	76	76	93	90	89	71	66	70	62	88	2	6	Indoor	100
Valve reactor (AC) - [smoothing reactor]	76	76	93	90	89	71	66	70	62	88	3	6	indoor	100
Converter transformers	78	95	92	91	73	68	72	64	78	90^	3	5	within acoustic enclosure	100
Converter transformer coolers	80	97	93	90	90	85	83	73	80	94*	18	5	outdoor	100
AC harmonic filter reactors	*91*	91	91.6	75	78.3	74.1	50	*50*	*50*	80	3	5	outdoor	100
AC harmonic filter capacitors	*81*	81	81	74	78	*78*	*78*	*50*	*50*	76	3	7	outdoor	100
Auxiliary transformer	63	63	80	77	76	58	53	57	49	75	1	2	outdoor	100
Limb reactor (VSC)	101	101	118	115	114	96	91	95	87	113	1	6	indoor	100

* indicates sound power level for *group* of items, i.e. for the total quantity. The other given levels are *per item*.
^ indicates sound power level for item when inside enclosure, i.e. the noise reduction qualities of the enclosure do *not* need to be calculated.
Values in *blue italics* has been estimated as data missing in these octave bands.

Figure 8.4: Receptors and Potential Receptors to the northwest of the Site | not to scale [mapping: Bing Maps © Microsoft 2020] (note that the nearest occupied residence is Receptor 68) (the worst-case configuration of the converter station was assessed and is indicated in this Figure)

Figure 8.5: Receptors at Cheekpoint to the southwest of the Site | not to scale [mapping: Bing Maps © 2020 Microsoft] (the worst-case configuration of the converter station was assessed and is indicated in this Figure)

Figure 8.6: Receptors at Cheekpoint to the southwest of the Site | not to scale [mapping: Bing Maps © 2020 Microsoft]

Predicted noise levels associated with the operation of the proposed development were generated using ISO9613-2 Propagation Method, using a worst-case option for the layout of equipment on the converter station site, and are summarised in **Table 8.17** and illustrated in **Figure 8.7**.

Table 8.17: Predicted Operational Noise Levels at Identified Receptors

Receptor	Baseline Night-time Noise L_{Aeq}	Predicted L_{Aeq} (24 hour)
3	36-44	35.1
4	36-44	36.7
5	36-44	36.5
16	36-44	32.0
19	36-44	37.1
21	36-44	35.0
33	36-44	33.9
46	36-44	31.6
47	36-44	40.6
48	36-44	41.1
51	36-44	37.1
57	36-44	35.5
59	36-44	40.3
60	36-44	34.0
62	36-44	34.2
68	36-44	39.6
70	36-44	35.4
100	36-44	29.7

Receptor	Baseline Night-time Noise L_{Aeq}	Predicted L_{Aeq} (24 hour)
102	36-44	34.5
105	36-44	30.5
106	36-44	34.4
107	36-44	30.9
108	36-44	33.0
109	36-44	35.0
110	36-44	34.7
111	36-44	34.5
112	36-44	33.9
114	36-44	34.1
115	36-44	34.9
118	36-44	34.6
119	36-44	30.9
124	36-44	34.4
125	36-44	33.3
131	36-44	31.5
132	36-44	33.3
135	36-44	34.0
139	36-44	34.3
140	36-44	34.7
141	36-44	34.3
142	36-44	30.2

Note that the closest occupied sensitive receptor (68) is highlighted, with a predicted noise level of 39.6dB L_{Aeq}. Note that receptors 47, 48 and 59 are not occupied.

With reference to the baseline noise data for that location (including baseline noise data) (night-time values ranging from 36dB(A) to 44dB(A)), and with regard to the impact significance criteria outlined in Table 8.8, the worst-case predicted change in noise levels at this location is 5db(A) and is **long-term slight negative,** but within EPA limits.

The next-closest receptor is number 51, with a predicted noise level of 37.1 L_{Aeq}. The worst-case change in noise levels at this location is **imperceptible** and **negligible**, as are all other occupied modelled receptors.

At all receptors the predicted noise levels are within the EPA guidelines for typical noise limits from licensed industrial facilities. As noted above, these limits are typically used by planning authorities for a wide range of proposed developments which have the potential for generating noise.

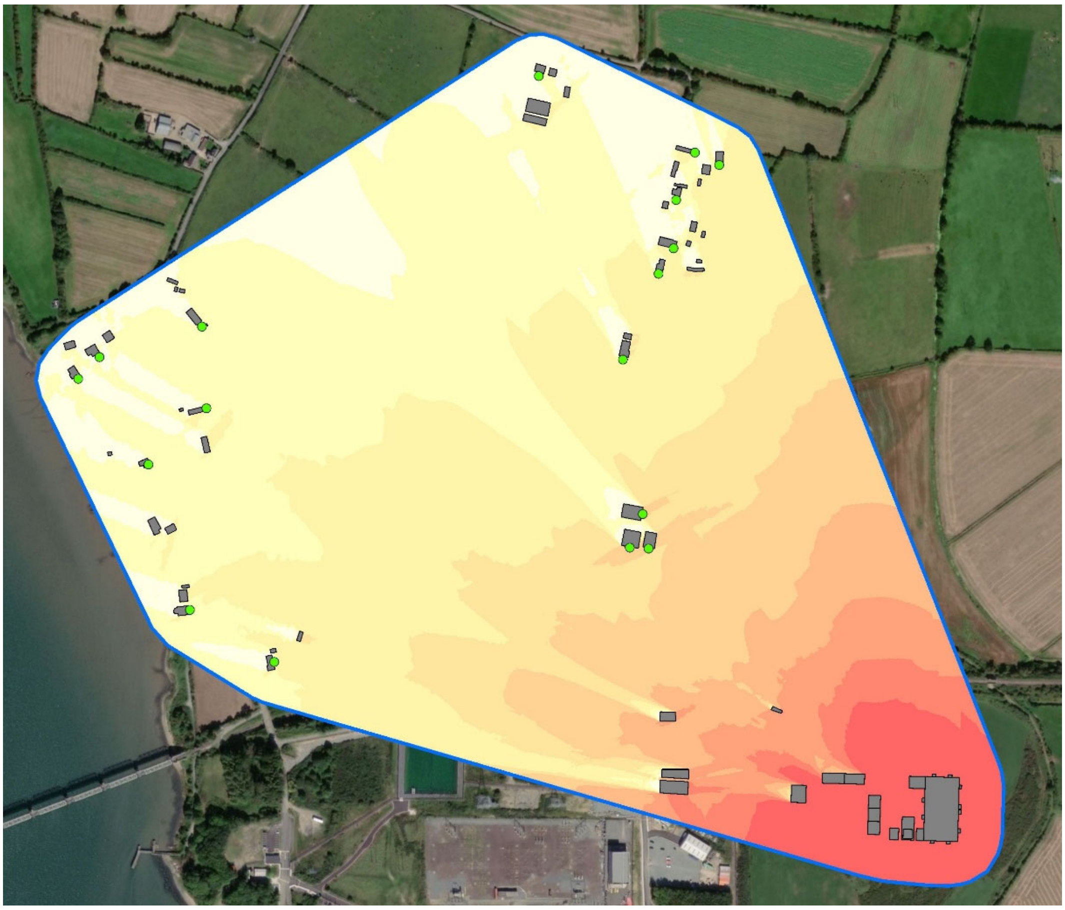

Figure 8.7: Operation Noise Emissions from the Site | not to scale

Noise emission from site
Leq,24h (dB(A))

- ≤ 33
- ≤ 36
- ≤ 39
- ≤ 41
- ≤ 44
- ≤ 47
- ≤ 50
- ≤ 53
- > 53

8.4.4 Decommissioning

As mentioned in **Chapter 3** *Proposed Development*, once the interconnector ceases operation the proposed development will be decommissioned. Equipment and all above ground civil works at the converter station will be removed and the site returned to its previous state. Underground cables will remain in-situ as there would be more of an environmental impact in their removal. Above ground structures will be removed, and their locations reinstated.

Noise and vibration will be generated by the decommissioning activities, as they will be similar to many of the proposed construction activities, albeit less intensive and geographically extensive and for shorter durations. The activity will be focussed at the converter and tail station site, and the impacts will be less than those summarised in **Table 8.14** above.

8.5 Mitigation Measures and Monitoring

8.5.1 Mitigation

8.5.1.1 Construction Phase

This section describes measures that will be taken to minimise the potential for noise and vibration disturbance to the surrounding area which will be employed in the construction phase of the proposed development.

Specific noise abatement measures will be taken to comply with the recommendations of BS 5228-1 and 2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites: Noise and vibration* (BSI, 2014) and the *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001* (EC, 2001).

The following specific measures will be implemented during the construction phase to ensure noise and vibration effects are minimised:

- Site representatives shall be appointed to be responsible for matters relating to noise and vibration;
- Equipment will be switched off when not required;
- Internal haul routes will be well maintained;
- Rubber linings shall be used in chutes and dumpers etc. to reduce impact noise;
- Drop heights of materials will be minimised;
- Plant and vehicles will be started sequentially rather than all together;
- Construction plant and activities to be employed on site will be reviewed to ensure that they are the quietest available for the required purpose;
- Generators will be located away from sensitive receivers and will be enclosed;
- Where required, improved sound reduction methods e.g. enclosures shall be used;
- Site equipment will be located away from noise sensitive areas, as much as is feasible;
- Regular and effective maintenance by trained personnel will be carried out to reduce noise and/or vibration from plant and machinery;
- Acoustic barriers with a density of at least 7kg per square metre will be provided around construction works to minimise the effects of noise

generating activities in the vicinity of sensitive locations, including HDD compounds;

- Typically, site activities shall be limited to 7am – 7pm, Monday to Friday; and 7am – 2pm, Saturday. It may also be necessary in exceptional circumstances to undertake some other types of activities outside of normal construction core working hours. Any such working hours outside the normal construction core working hours will be agreed with Wexford County Council. The planning of such works will have regard to nearby sensitive receptors; and
- A Community Liaison Plan will be prepared to provide for effective community liaison to help ensure the smooth running of construction activities and to address any issues that may arise.
- Construction work within 400 metres of the Gas Networks Ireland transmission pipeline will be carried out in accordance with the Code of Practice for Working in the Vicinity of the Gas Transmission Network (included as **Appendix 4.2** to this EIAR). This may include the assessment of potential peak particle velocity effects associated with rock removal activities.
- For the locations where significant temporary noise effects are predicted during cable route excavation, Greenlink Interconnector Ltd and the appointed contractor will develop and implement specific measures to mitigate impacts, potentially including temporary acoustic screening and discretionary pre-condition surveys.
- The use of vibratory roller compactors will be in 'static' mode only, for compaction activities within 50m of properties.
- To minimise the impulsive noise and vibration associated with the driving of pre-cast piles, the following measures will be taken as required, to meet the established noise and vibration thresholds: acoustic screen for hammer head and top of pile and the use of a resilient pad (dolly) between the pile and the hammer head.

8.5.1.2 Operational Phase

The key operational mitigations are the enclosure of key noise-emitting equipment. This includes acoustic enclosures for transformers, and the placing of particular items of plant at the converter station within buildings, thereby already limiting noise breakout to the atmosphere.

8.5.1.3 Decommissioning Phase

The mitigation measures, described above for the construction phase, updated to reflect best practice at the time, will be implemented for the decommissioning phase where required.

8.5.2 Monitoring

8.5.2.1 Construction Phase

Noise and vibration monitoring will be carried out at sensitive receptors nearby the working areas during the construction phase to demonstrate the effectiveness of the mitigation measures and compliance with the limit values outlined in **Table 8.1**. If exceedances are recorded, alternative construction methodologies will be proposed to ensure limits are complied with.

Vibration monitoring will take place at the nearest sensitive receptors to the site during the construction phase to confirm that the limits outlined in **Table 8.2** are being complied with.

8.5.2.2 Operational Phase

No monitoring is proposed during the operational phase of the proposed development.

8.5.2.3 Decommissioning Phase

The monitoring measures, described above for the construction phase, updated to reflect best practice at the time, will be implemented for the decommissioning phase if required.

8.6 Residual Effects

8.6.1 Construction Phase

There will be temporary and locally significant noise effects at residences located adjacent to the cable route. At any given location these effects will be of short duration, and mitigation measures outlined above will be implemented to ensure that the adverse effects are minimised. No significant vibration effects are predicted associated with the cable route construction. There will be no significant residual noise or vibration effects arising from the construction works at the site of the converter station and tail station.

8.6.2 Operational Phase

A noise assessment of the operational phase effects has shown that the relevant noise limits are predicted to be complied with at all sensitive receptors near the proposed development. No significant residual negative noise and vibration effects are envisaged during the operational phase.

8.6.3 Decommissioning

Following the implementation of the mitigation measures committed to in this chapter, updated as required to reflect current best practice, no significant negative residual noise and vibration effects associated with decommissioning are predicted.

8.7 Cumulative and Transboundary Effects

8.7.1 Cumulative Effects

The proposed development forms part of the Greenlink project, which also includes offshore elements, and works in the United Kingdom. The only potential for cumulative or interactive effects with the wider project occur at the landfall site near Baginbun Beach. The potential effects at this location have been fully documented in **Chapter 18** *Cumulative, Transboundary and Interactive Effects*.

The proposed development may also give rise to cumulative effects with regard to other proposed developments, either consented or currently under construction. Two projects have been identified which may give rise to cumulative effects –

- Great Island – Kilkenny 110kV Line Uprate Project
- Great Island Energy Storage System.

The uprate project has sufficient physical separation from the site of the proposed development to reduce the potential for cumulative noise and vibration effects to a negligible level.

If the construction of the energy storage system is concurrent with the bulk excavation works on the site of the converter there is potential for cumulative effects, as the sites are located adjacent to each other. Should this situation arise, noisy construction activities will be planned and phased, in consultation with the construction management team for the energy storage system project, to ensure that the relevant noise limits are achieved as set out in this chapter.

No other proposed developments have been identified which could have cumulative noise and vibration effects.

8.7.2 Transboundary Effects

Considering the nature and location of the proposed development as described in **Chapter 3** and **Chapter 4** no transboundary noise or vibration effects are predicted.

8.8 Impact Assessment Summary

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
All Noise and Vibration Receptors	Noise and vibration from construction processes associated with the cable construction	Specific noise abatement measures will be taken to comply with the recommendations of BS 5228-1 and 2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites: Noise and vibration* (BSI, 2014) and the *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001* (EC, 2001). The following specific measures will be implemented during the construction phase to ensure noise and vibration effects are minimised: • Site representatives shall be appointed to be responsible for matters relating to noise and vibration; • Equipment will be switched off when not required; • Internal haul routes will be well maintained; • Rubber linings shall be used in chutes and dumpers etc. to reduce impact noise; • Drop heights of materials will be minimised;	• Noise and vibration monitoring will be carried out at sensitive receptors nearby the working areas during the construction phase to demonstrate the effectiveness of the mitigation measures and compliance with the limit values. If exceedances are recorded, alternative construction methodologies will be proposed to ensure limits are complied with.	Temporary significant noise effects for receptors adjacent to the cable route

		• Plant and vehicles will be started sequentially rather than all together; • Construction plant and activities to be employed on site will be reviewed to ensure that they are the quietest available for the required purpose; • Generators will be located away from sensitive receivers and will be enclosed; • Where required, improved sound reduction methods e.g. enclosures shall be used; • Site equipment will be located away from noise sensitive areas, as much as is feasible; • Regular and effective maintenance by trained personnel will be carried out to reduce noise and/or vibration from plant and machinery; • Acoustic barriers will be provided around construction works to minimise the effects of noise and vibration generating activities in the vicinity of sensitive locations; • Typically, site activities will be limited to 7am – 7pm, Monday to Friday; and 7am – 2pm, Saturday. It may also be necessary in exceptional circumstances to undertake some other types of activities outside of normal construction core working hours. Any such working hours outside the normal construction core working hours will be agreed with Wexford County Council. The planning		

		of such works will have regard to nearby sensitive receptors; and • A Community Liaison Plan shall be prepared to provide for effective community liaison to help ensure the smooth running of construction activities and to address any issues that may arise.		
All Noise and Vibration Receptors	Noise and vibration from construction processes associated with the construction of the converter station and the tail station, and temporary contractors' compounds.	Greenlink Interconnector Ltd will ensure that the following specific noise abatement measures are taken to comply with the recommendations of BS 5228-1 and 2:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites: Noise and vibration* (BSI, 2014) and the *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001* (EC, 2001). The following specific measures will be implemented during the construction phase to ensure noise and vibration effects are minimised: • Site representatives shall be appointed to be responsible for matters relating to noise and vibration; • Unnecessary revving of engines will be avoided and equipment will be switched off when not required; • Internal haul routes will be well maintained; • Rubber linings shall be used in chutes and dumpers etc. to reduce impact noise;	Noise and vibration monitoring will be carried out at sensitive receptors nearby the working areas during the construction phase to monitor the effectiveness of the mitigation measures and compliance with the limit values. If exceedances are recorded, alternative construction methodologies will be proposed to ensure limits are complied with.	No significant effects

		• Drop heights of materials will be minimised; • Plant and vehicles will be started sequentially rather than all together; • Construction plant and activities to be employed on site will be reviewed to ensure that they are the quietest available for the required purpose; • Generators will be located away from sensitive receivers and will be enclosed; • Where required, improved sound reduction methods e.g. enclosures shall be used; • Site equipment will be located away from noise sensitive areas, as much as is feasible; • Regular and effective maintenance by trained personnel will be carried out to reduce noise and/or vibration from plant and machinery; • Acoustic barriers will be provided around construction works to minimise the effects of noise and vibration generating activities in the vicinity of sensitive locations; • Typically, site activities will be limited to 7am – 7pm, Monday to Friday; and 7am – 2pm, Saturday. It may also be necessary in exceptional circumstances to undertake some other types of activities outside of normal construction core working hours. Any such working hours outside the normal construction core working hours will be		

		agreed with Wexford County Council. The planning of such works will have regard to nearby sensitive receptors; • A Community Liaison Plan will be prepared to provide for effective community liaison to help ensure the smooth running of construction activities and to address any issues that may arise. • Construction work within 400 metres of the Gas Networks Ireland transmission pipeline will be carried out in accordance with the Code of Practice for Working in the Vicinity of the Gas Transmission Network (included as **Appendix 4.2** to this EIAR). This may include the assessment of potential peak particle velocity effects associated with rock removal activities. • For the locations where significant temporary noise effects are predicted during cable route excavation, Greenlink Interconnector Ltd and the appointed contractor will develop and implement specific measures to mitigate impacts, potentially including temporary acoustic screening and discretionary pre-condition surveys. • The use of vibratory roller compactors will be in 'static' mode only, for compaction activities within 50m of properties. • To minimise the impulsive noise and vibration associated with the driving of pre-cast piles, the		

		following measures will be taken as required, to meet the established noise and vibration thresholds: acoustic screen for hammer head and top of pile and the use of a resilient pad (dolly) between the pile and the hammer head.		
All Noise and Vibration Receptors	Operation of the Proposed Development	The key operational mitigations are the enclosure of key noise-emitting equipment. This includes acoustic enclosures for transformers, and the placing of particular items of plant at the converter station within buildings, thereby already limiting noise breakout to the atmosphere.	None	Within EPA limits, with a slight to moderate negative effect at the closest receptor only.

8.9 Conclusion

The proposed development will give rise to temporary noise effects at construction stage, particularly associated with trench excavation activities. The duration of these effects at any one location will be in the order of weeks, as the construction of the cable is a linear and sequential process along the cable route. No significant negative noise and vibration effects are predicted relating to the construction of the converter station, tail station or contractors' compounds.

The operation of the proposed development is predicted to comply with industry-standard EPA guidelines for industrial developments, with a slight to moderate negative effect predicted at one receptor, closest to the converter station site, based on comparison with the lowest levels of background noise recorded at that location.

Following the implementation of the mitigation measures committed to in this chapter, updated as required to reflect current best practice, no significant negative residual noise and vibration effects associated with decommissioning are predicted.

8.10 References

British Standards Institution (BSI) (2014) *BS 5228-1 and 2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites. Noise and Vibration.*

EPA (2016) *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*

European Communities (EC) (2001) *European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001.*

International Electrotechnical Commission (IEC), 2002. *IEC 61672-1: Electroacoustics – Sound Level Meters – Part 1: Specifications*. IEC, Geneva, Switzerland.

ISO (2007) ISO *1996-2: Acoustics – Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*. ISO, Geneva, Switzerland (2nd edition).

Transport Infrastructure Ireland (TII, formerly the NRA) (2014) *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes.*

TII (2004) *Guidelines for the Treatment of Noise and Vibration in National Roads Schemes.*

SSE (2017, 2018, 2019) *Annual Environmental* Reports (viewed online at www.epa.ie on 04 December 2019 at 11:00)