of dust soiling. Therefore, the overall sensitivity of the area to dust soiling impacts is considered high based on the IAQM criteria outlined in Table 6.3.

Table 6.3 Sensitivity of the Area to Dust Soiling Effects on People and Property[14]

Receptor Sensitivity	Number of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the Proposed Development 15 $\mu g/m^3$ and there are between 10 and 100 number of high sensitivity residential properties within 20 m of the proposed site area. Based on the IAQM criteria outlined in Table 6.4, the worst case sensitivity of the area to human health is considered to be low.

Table 6.4 Sensitivity of the Area to Human Health Impacts[14]

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from source (m)			
			<20	<50	<100	<350
High	< 24 $\mu g/m^3$	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24 $\mu g/m^3$	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 $\mu g/m^3$	>1	Low	Low	Low	Low

Consideration has also been given to the IAQM document 'A guide to the assessment of air quality on designated conservation sites 2020' [28] with respect to ecologically sensitive receptors.

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed, and dust deposition ceases. Designated sites within 50m of the boundary of the site or within 50m of the route used by construction vehicles on public highways up to a distance of 500m from a construction site entrance can be affected according to the IAQM guidance[14]. There are no ecologically sensitive sites within 50m of the site boundary, therefore no significant impacts are predicted.

6.3.4 Climate Baseline

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details final emissions up to 2019[29]. The data published in 2021 states that Ireland has exceeded its 2019 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.85 Mt. For 2019, total national greenhouse gas emissions are 59.78 million tonnes carbon dioxide equivalent (Mt CO_2eq) with 45.58 MtCO_2eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2019 at 35.3% of the total, with the transport sector accounting for 20.3% of emissions of CO_2.

GHG emissions for 2020 are estimated to be 9.7% lower than those recorded in 2019. Emission reductions have been recorded in 7 of the last 11 years. However, compliance with the annual EU targets has not been met for five years in a row. Emissions from 2016 – 2020 exceeded the annual EU

targets by 0.29 $MtCO_2eq$, 2.94 $MtCO_2eq$, 5.57 $MtCO_2eq$, 6.98 $MtCO_2eq$ and 6.73 $MtCO_2eq$ respectively. Agriculture is consistently the largest contributor to emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2021 GHG Emissions Projections Report for 2020 – 2040[10] notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the Climate Action Plan published in 2019. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 to 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 12.2$MtCO_2eq$ under the "With Existing Measures" scenario and under the "With Additional Measures" scenario[10]. The projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full implementation of the 2019 Climate Action Plan and the use of the flexibilities available.

6.4 PREDICTED EFFECTS

6.4.1 DO NOTHING SCENARIO

Under the Do Nothing Scenario no construction works will take place and the identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. Impacts from increased traffic volumes and associated air emissions will also not occur.

The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from new developments on the site and in the surrounding area, changes in road traffic, etc.).

6.4.2 CONSTRUCTION PHASE

6.4.2.1 Air Quality

The greatest potential impact on air quality during the construction phase of the Proposed Development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. Sensitive receptors include residential properties within 20 m of the site boundary on the R121 and Bay Lane. A review of Dublin Airport meteorological data (see Section 6.3.1) indicates that the prevailing wind direction is westerly to southerly and wind speeds are generally moderate in nature. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30 year average data for Dublin Airport indicates that on average 191 days per year have rainfall over 0.2 mm[18] and therefore it can be determined that over 50% of the time dust generation will be reduced.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see Section 6.3.3). The major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and

- Trackout (movement of heavy vehicles).

Demolition

There is no demolition required as part of the Proposed Development therefore this category is not relevant to the assessment.

Earthworks

Earthworks primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large**: Total site area > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;
- **Medium**: Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8 m in height, total material moved 20,000 – 100,000 tonnes;
- **Small**: Total site area < 2,500 m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

The site area of proposed works will be greater than 10,000 m^2. Therefore the dust emission magnitude for the proposed earthwork activities can be classified as large.

The sensitivity of the area, as determined in Section 6.3.3, is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 6.5, this results in an overall high risk of short-term dust soiling impacts and a low risk of short-term human health impacts as a result of the proposed earthworks activities.

Table 6.5 Risk of Dust Impacts – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large**: Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium**: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small**: Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude for the proposed construction activities can be classified as small as the total building volume will be less than 25,000 m^3.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity. As outlined in Table 6.6, this results in an overall low risk of short-term dust soiling impacts and negligible risk of short-term human health impacts as a result of the proposed construction activities.

Table 6.6 Risk of Dust Impacts – Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large**: > 50 HDV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium**: 10 - 50 HDV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- **Small**: < 10 HDV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The dust emission magnitude for the proposed trackout can be classified as medium, as at worst-case peak periods there will be between 10 and 50 outward HGV movements per day. As outlined in Table 6.7, this results in an overall medium risk of short-term dust soiling and low risk of short-term human health impacts as a result of the proposed trackout activities.

Table 6.7 Risk of Dust Impacts – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Summary of Dust Emission Risk

The risk of dust impacts as a result of the Proposed Development are summarised in Table 6.8 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

While there is an overall low to medium risk of dust soiling or human health impacts associated with the Proposed Development, nevertheless best practice dust mitigation measures will be implemented on site in order to ensure that no dust nuisance occurs during the earthworks, construction and trackout activities.

Table 6.8 Summary of Dust Impact Risk used to Define Site-Specific Mitigation

Potential Impact	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	n/a	High Risk	Medium Risk	Low Risk
Human Health	n/a	Low Risk	Low Risk	Negligible

When the dust mitigation measures detailed in the mitigation section (Section 6.5.1) of this report are implemented, fugitive emissions of dust and particulate matter from the site will be negative, short-term and imperceptible in nature, posing no nuisance at nearby receptors.

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the Proposed Development satisfy the DMRB assessment criteria in Section 6.1.2.1. It can therefore be determined that the construction stage traffic will have an imperceptible, neutral and short-term impact on air quality.

6.4.2.2 Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Therefore, in accordance with the EPA Guidelines[1], the impact will be short-term, neutral and imperceptible.

6.4.2.3 Human Health

Dust emissions from the construction phase of the Proposed Development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Table 6.7 the surrounding area is considered of medium sensitivity to dust related human health impacts. There is an overall worst-case medium risk of dust related human health impacts as a result of the construction of the Proposed Development (Table 6.8). Best practice mitigation measures are proposed for the construction phase of the Proposed Development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the Proposed Development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, in accordance with the EPA Guidelines[1], the impact of construction of the Proposed Development is likely to be neutral, short-term and imperceptible with respect to human health.

6.4.2.4 Sensitive Ecosystems

There are no sensitive ecosystems within 50m of the Proposed Development during the construction phase. Therefore, there is no potential for significant impacts to sensitive ecosystems as a result of the Proposed Development.

6.4.3 Operational Phase

6.4.3.1 Air Quality

There are no potential impacts associated with the proposed development during the operational stage as the transmission line will be buried underground.

6.4.3.2 Climate

There are no potential impacts associated with the proposed development during the operational stage as the transmission line will be buried underground.

6.4.3.3 Human Health

There are no potential impacts associated with the proposed development during the operational stage as the transmission line will be buried underground.

6.4.3.4 Sensitive Ecosystems

There are no potential impacts associated with the proposed development during the operational stage as the transmission line will be buried underground.

6.5 MITIGATION AND MONITORING MEASURES

6.5.1 Construction Phase

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to ensure that no dust nuisance occurs a series of measures drawing on will be implemented, drawing on best practice guidance from Ireland, the UK and the USA based on the following publications:

- 'Guidance on the Assessment of Dust from Demolition and Construction'[14];
- 'Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings'[30];
- 'Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance'[31];
- 'Controlling Particles, Vapours & Noise Pollution From Construction Sites'[32];
- 'Fugitive Dust Technical Information Document for the Best Available Control Measures'[33]; and
- 'Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition' (periodically updated)[34].

In summary the measures which will be implemented include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic;
- Any road that has the potential to give rise to fugitive dust shall be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20kph, and on hard surfaced roads as site management dictates;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; and
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

6.5.2 Operational Phase

There are no predicted impacts for the operational phase of the proposed development and therefore, no additional mitigation measures are proposed.

6.6 RESIDUAL IMPACTS

Once the mitigation measures outlined in Section 6.5 are implemented, the residual impacts on air quality or climate from the construction of the proposed development will be short-term and imperceptible and for the operational phases of the proposed development will be long-term, negative and ranging from imperceptible to slight.

6.7 CUMULATIVE IMPACT

6.7.1 Construction Phase

Construction is currently being completed at other sites within the wider area (including developments outlined in sections 2, 3.7 and 8.7.1 of this ER and in the Planning Application Report). According to the IAQM guidance (IAQM, 2014) should the construction phase of the proposed development coincide with the construction phase of any other development within 350m then there is the potential for cumulative construction dust impacts. Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will

be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. It is standard construction practice that these measures are incorporated into a construction environmental management plan (CEMP). Provided these mitigation measures are in place for the duration of the construction phase cumulative dust related impacts to nearby sensitive receptors are not predicted to be significant. Cumulative impacts to air quality and human health will be short-term, localised, negative and not significant.

Due to the short-term duration of the construction phase and the low potential for significant CO_2 emissions cumulative impacts to climate are considered neutral.

6.7.2 Operational Phase

There are no operational emissions from the proposed development, therefore the cumulative impact is predicted to be long-term, neutral and imperceptible with regards to air quality, climate and human health.

6.8 INTERACTIONS

Air quality does not have a significant number of interactions with other topics. The most significant interactions are between population and human health and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits and therefore the predicted impact is short-term, negative and imperceptible with respect to the construction phase and long-term, neutral and imperceptible with respect to the operational phase in terms of human health impacts.

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, e.g. due to congestion, the emissions of vehicles increase. The impacts of the proposed development on air quality are assessed by reviewing the change in annual average daily traffic on roads close to the site. In this assessment, the impact of the interactions between traffic and air quality are considered to be imperceptible.

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land and soils and the water environment (hydrology) in the form of dust emissions. With the appropriate mitigation measures to prevent fugitive dust emissions, it is predicted that interactions between air quality and land and soils and hydrology will be short-term and imperceptible.

Dust emissions have the potential to settle on plants causing impacts to local ecology. Mitigation measures during the construction phase of the proposed development will ensure that dust generation is minimised and the effect on biodiversity will be short term, imperceptible and neutral.

6.9 REFERENCES

(1) Environmental Protection Agency (2008) BAT Guidance Note on Best Available Techniques for the Energy Sector (Large Combustion Plant Sector)
(2) Environmental Protection Agency (2022) Guidelines on the Information to be contained in Environmental Impact Statements
(3) Environmental Protection Agency (2015) Advice Notes for Preparing Environmental Impact Statements – Draft September 2015
(4) Environmental Protection Agency (2020) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)
(5) German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft

(6) Environmental Protection Agency (2006) Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)
(7) Government of Ireland (2015) Climate Action and Low Carbon Development Act
(8) Government of Ireland (2019) Climate Action Plan 2019
(9) Government of Ireland (2020) Draft General Scheme of the Climate Action (Amendment) Bill 2019
(10) Environmental Protection Agency (2021) GHG Emissions Projections Report - Ireland's Greenhouse Gas Emissions Projections 2020 – 2040
(11) Government of Ireland (2021) Climate Action Plan 2021
(12) Government of Ireland (2021) Climate Action and Low Carbon Development (Amendment) Act 2021
(13) SDCC and Codema 2019) South Dublin County Council Climate Change Action Plan 2019-2024
(14) IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction
(15) UKHA (2019). Design Manual for Roads and Bridges – LA 105 Air Quality. Available from https://www.standardsforhighways.co.uk/prod/attachments/10191621-07df-44a3-892e-c1d5c7a28d90?inline=true
(16) Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes
(17) USEPA (2018) AERMAP Users Guide
(18) Met Éireann (2022) Met Éireann Website: www.met.ie
(19) USEPA (2008) AERSURFACE User's Guide
(20) USEPA (2021) AERMOD Description of Model Formulation and Evaluation
(21) USEPA (2019) User's Guide to the AERMOD Meteorological Preprocessor (AERMET)
(22) Alaska Department of Environmental Conservation (2008) ADEC Guidance re AERMET Geometric Means (http://dec.alaska.gov/air/ap/modeling.htm)
(23) USEPA (1985) Good Engineering Practice Stack Height (Technical Support Document For The Stack Height Regulations) (Revised)
(24) Paine, R & Lew, F. "Consequence Analysis for Adoption of PRIME: an Advanced Building Downwash Model" Prepared for the EPRI, ENSR Document No. 2460-026-450 (1997).
(25) Paine, R & Lew, F. "Results of the Independent Evaluation of ISCST3 and ISC-PRIME" Prepared for the EPRI, ENSR Document No. 2460-026-3527-02 (1997).
(26) UK DEFRA (2016) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. TG(16)
(27) Environmental Protection Agency (2021) Air Quality Monitoring Report 2020 (& previous reports)
(28) IAQM (2020). A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites
(29) Environmental Protection Agency (2022) Ireland's Final Greenhouse Gas Emissions 1990 – 2020
(30) The Scottish Office (1996) Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings
(31) UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance
(32) BRE (2003) Controlling Particles, Vapours & Noise Pollution From Construction Sites
(33) USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures
(34) USEPA (1986) Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition (periodically updated)
(35) SEAI (2022) https://www.seai.ie/data-and-insights/seai-statistics/conversion-factors/
(36) UK Highways Agency (2019) UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate

7 NOISE AND VIBRATION

7.1 INTRODUCTION/METHODOLOGY

As detailed in s1 Introduction, this report has been prepared to accompany an application for the development of a grid connection and substation to connect the Kilshane Energy Centre (subject of a separate planning application) to the existing substation at Cruiserath.

The subject site is illustrated in Figure 7.1 below.

Figure 7.1 Proposed Development approximate boundary

The nearest noise-sensitive locations (NSLs) are principally residential locations along the roads which the route follows. There are also some commercial buildings near the grid connection route.

7.1.1 METHODOLOGY

7.1.1.1 Proposed Approach

The following methodology has been adopted for this assessment:

- Review appropriate guidance in order to identify appropriate noise criteria for the site operations;
- Review the EPA Noise Maps[16] to characterise the general noise environment in the areas along the development route;

[16] EPA Round 3 Noise Maps: https://gis.epa.ie/EPAMaps/

- Calculate indicative construction noise levels associated to consider the potential noise impact of the proposed development, and;
- Comment on predicted levels against the appropriate criteria and existing noise levels and outline required mitigation measures (if any).

Appendix 7 of this document presents a glossary of the acoustic terminology used throughout this document. In the first instance it is considered appropriate to review some basic fundamentals of acoustics.

7.1.1.2 Fundamentals of Acoustics

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

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

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

The frequency of sound is the rate at which a sound wave oscillates, and is expressed in Hertz (Hz). The sensitivity of the human ear to different frequencies in the audible range is not uniform. For example, hearing sensitivity decreases markedly as frequency falls below 250Hz. In order to rank the SPL of various noise sources, the measured level has to be adjusted to give comparatively more weight to the frequencies that are readily detected by the human ear. Several weighting mechanisms have been proposed but the 'A-weighting' system has been found to provide one of the best correlations with perceived loudness. SPL's measured using 'A-weighting' are expressed in terms of dB(A). An indication of the level of some common sounds on the dB(A) scale is presented in Figure 7.2.

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

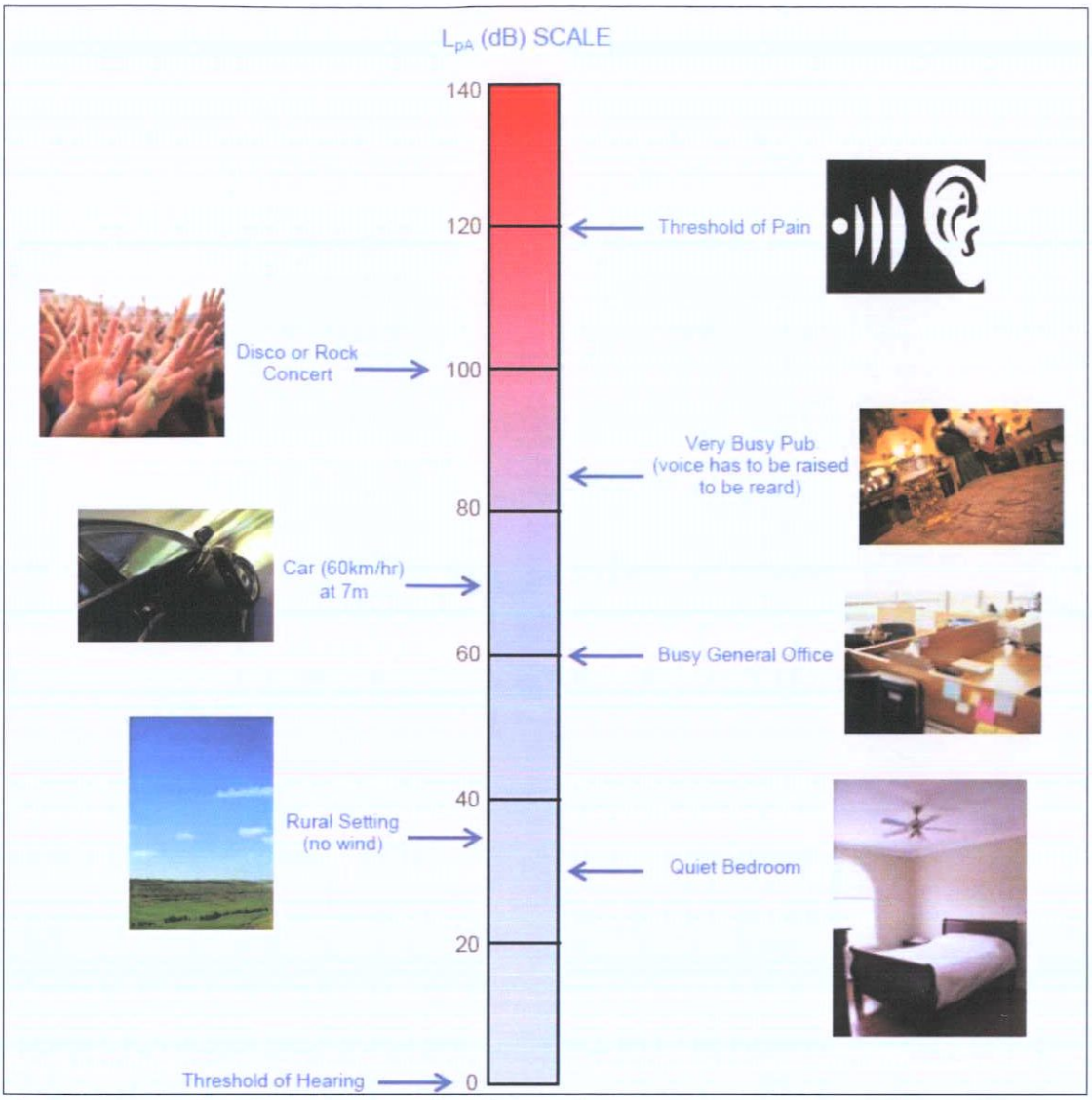

Figure 7.2 dB(A) Scale & Indicative Noise Levels – (EPA: Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4 – 2012))

7.1.1.3 Construction Phase Guidance

Criteria for Rating Noise Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

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

The approach adopted here calls for the designation of a noise sensitive location into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This

then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

The BS 5228 document sets out guidance on permissible noise levels relative to the existing noise environment. Table 7.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors as recommended by BS 5228 – 1.

Table 7.1 Example Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (LAeq)	Threshold value, in decibels (dB)		
	Category A Note A	Category B Note B	Category C Note C
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends Note D	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.
Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.
Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.
Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

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

For the appropriate periods (i.e. daytime, evening and night time) the ambient noise level is determined and rounded to the nearest 5dB. Baseline monitoring carried out at the nearest noise sensitive locations and considered in this assessment indicate that Categories A applies based on the measured levels at UN1 and Category B applies based on the measured levels at UN2, as detailed in Table 7.2 is appropriate in this instance.

Table 7.2 Rounded Baseline Noise Levels and Associated Categories

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

See Section 10.4.1 for the assessment in relation to the proposed development. If the construction noise level exceeds the appropriate category value, then a potential significant effect is deemed to occur.

This assessment process determines if a significant construction noise impact is likely.

Notwithstanding the outcome of this assessment, the overall acceptable levels of construction noise set out in the Transport Infrastructure Ireland (TII) publication Guidelines for the Treatment of Noise and Vibration in National Road Schemes. The noise levels in Table 7.3 should not be exceeded at noise sensitive locations during the construction phase of the proposed development.

Table 7.3 Maximum Permissible Noise Levels at the Facade of Dwellings during Construction

Days and Times	Noise Levels (dB re. $2x10^{-5}$ 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 site:

70dB $L_{Aeq,1hr}$ at noise sensitive locations
75dB $L_{Aeq,1hr}$ at commercial locations

It will be required that demolition and construction activities associated with development shall take place between the hours of:

- Mondays to Fridays – 7am to 7pm
- Saturday – 7am to 2pm
- On Sundays and Public Holidays there should be no activity on the site.

If it is deemed necessary to conduct works outside these times, prior written approval will be sought from the relevant local authority.

Criteria for Rating Vibration Impacts

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

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

- British Standard BS 5228-2 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration (BSI 2014); and
- British Standard BS 7385-2 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (BSI 1993)

BS 5228-2 and BS 7385-2 define the following thresholds for cosmetic damage to residential or light commercial buildings: PPV should be below 15 mm/s at 4 Hz to avoid cosmetic damage. This increases to 20 mm/s at 15 Hz and to 50 mm/s at 40 Hz and above. At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded. This is summarised in Table 7.4.

Table 7.4 Allowable Vibration during Construction Phase

Type of building	**Peak component particle velocity in frequency range of predominant pulse**	
	4 Hz to 15 Hz	**15 Hz and above**
Unreinforced or light framed structures. **Residential or light commercial buildings.**	**15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz**	**20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above**

Note 1: Values referred to are at the base of the building.
Note 2: At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

Furthermore, BS 5228-2 and BS 7385-2 state that minor structural damage can occur at vibration magnitudes greater than twice those in Table 7.4 and major structural damage can occur at vibration magnitudes greater than four times those in Table 7.4.

BS 5228-2 also provides guidance relating to the human response to vibration. Guidance is again provided in terms of PPV in mm/s since this parameter is routinely measured when monitoring the structural effects of vibration. The potential human response at different vibration levels, as set out in BS 5228-2, is summarised in Table 7.5.

Table 7.5 Guidance on human response to vibration levels

Vibration level Note A) B) C) (mm/s)	Effect
0.14	**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	**Vibration might be just perceptible in residential environments.**
1.0	**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.**
10	**Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.**

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

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

Note C Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.

Construction Phase Traffic

Vehicular movement to and from the construction site for the Proposed Development will make use of the existing road network. In order to assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced DMRB Noise and Vibration (UKHA 2020) and the EPA Guidelines (EPA, 2022). For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB Noise and Vibration (UKHA 2020) document.

Table 7.6 sets out the classification of changes in noise level to impact on human perception based on the guidance contained in these documents.

Table 7.6 Classification of magnitude of traffic noise changes in the short-term

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

7.1.1.4 Operational Phase - Noise Guidance

Due to the fact that the proposed grid connection will be located underground there are is no operational operation noise impact associated with the Proposed Development.

Similarly, there will be no vibration emissions from the operation of the proposed grid connection. Consequently, there is no requirement to assess any vibration emissions.

The following section on noise guidance is introduced here in order to inform the assessment of noise from the proposed substation.

EPA NG4

It is understood that the development will operate under the provisions of an Environmental Protection Agency (EPA) Industrial Emissions (IE) license. The discussion of appropriate IE License noise emission criteria for the overall facility will be conducted in accordance with the NG4 document. This approach is summarized below in accordance with guidance detailed in Section 4 of the (EPA) document Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) 2016.

Quiet Area Screening

The proposed development is not considered a quiet area in this instance as it fails to meet any of the criteria outlined in EPA's Guidance. The most stringent of these criteria are noted in bullet point and commented on below.

At least 3km from urban area with a population >1,000 people;

- The site within the Dublin agglomeration and is therefore located less than 3km from a population significantly greater than 1,000.

At least 3km away from any local industry;

- Other industrial sites operate within 3km of the site.

At least 5km away from any National Primary Route;

- A section of the N2 national road is located along the western boundary of the site.

Low Background Noise Area Screening

In order to establish whether the noise sensitive locations in the vicinity of the site would be considered 'low background noise' areas, the noise levels measured during the environmental noise survey carried out in support of the application for the Kilshane Energy Centre are reviewed. For full details of the noise survey, see the main EIAR document for the energy centre, section 10.3. To determine whether the area is considered low-noise, the measured levels would need to satisfy all three of the following criteria:

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

Table 7.7 Comparison of Measurement Results with NG4 Low Background Noise Area Criteria

Location	Period	$L_{A90,T}$, dB	NG4 Screening (dB $L_{A90,T}$)	Satisfies All Criteria for Low Background Noise Area?
UN1	Daytime	60	≤40	No
	Evening	57	≤35	

	Night-time	**50**	**≤30**	
UN2	**Daytime**	**65**	**≤40**	**No**
	Evening	**61**	**≤35**	
	Night-time	**52**	**≤30**	

The arithmetic average L_{A90} results at the monitoring location considered here (see Section 10.3) are compared against the criteria in Table 7.7. The locations UN1 and UN2 would not be considered a 'Areas of Low Background Noise' as the measured noise levels do not satisfy the criteria.

Determining Appropriate Noise Criteria

Based on the EPA NG4 guidance, the following noise criteria are appropriate at the nearest NSLs to the proposed development:

- Daytime (07:00 to 19:00hrs) 55dB $L_{Ar,15min}$
- Evening (19:00 to 23:00hrs) 50dB $L_{Ar,15min}$
- Night time (23:00 to 07:00hrs) 45dB $L_{Aeq,15min}$

During the night period, no tonal or impulsive noise from the facility should be clearly audible or measurable at any NSL.

Note plant noise emissions are to be designed such that they are not tonal and do not have impulsive characteristics or excessive low frequency noise at the nearest noise sensitive locations.

7.1.1.5 Forecasting Methods

Construction noise calculations have been conducted generally in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise.*

7.2 THE PROPOSED DEVELOPMENT

The proposed development is described in section 2.

7.3 THE RECEIVING ENVIRONMENT

The following figures show the grid connection route superimposed on the EPA Round 3 Noise maps for the road traffic noise in terms of L_{den} and L_{night}, and also for airport noise:

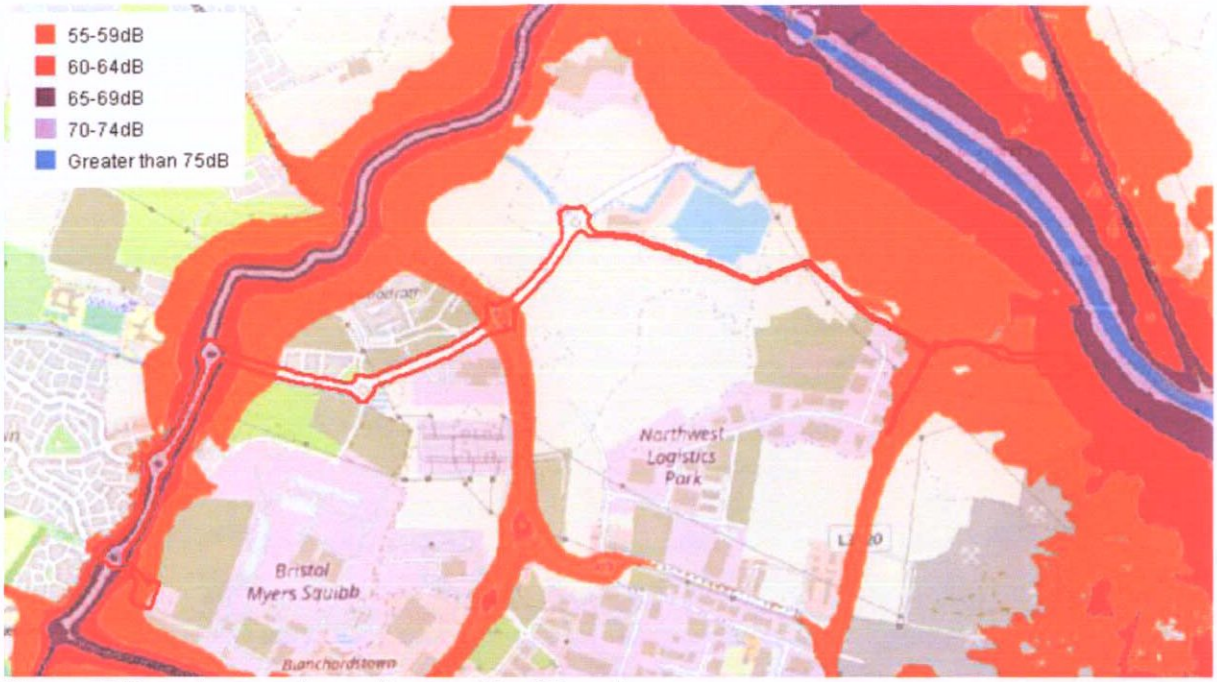

Figure 7.3 L_{den} **contours for road traffic noise**

Figure 7.4 L_{night} **contours for road traffic noise**

Figure 7.5 L_{den} contours for airport noise

As can be seen the grid connection route passed through variety of noise environments, the noisier areas being closer to major roads and to the airport.

7.4 PREDICTED EFFECTS

The proposed development will involve the construction of an underground grid line along the route shown in the figure above and a substation at Kilshane to facilitate electrical power connection to the Kilshane Energy Centre.

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages:

- construction phase, and;
- operational phase.

The construction phase will involve extensive excavation, rock breaking, general site preparation over the development site and the installation of the cable and substation plant. Comment will also be presented in the following sections in relation to construction traffic on local roads in terms of noise and vibration.

7.4.1 CONSTRUCTION PHASE

The largest noise and vibration impact of the proposed development will occur during the construction phase due to the operation of various plant machinery and HGV movement to, from and around the site. However, the construction phase can be classed as a short-term phase.

BS 5228-1 contains noise level data for various construction machinery. The noise levels relating to site clearance, ground excavation and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB $L_{Aeq,T}$ at a distance of 10 m. For this assessment, a worst-case scenario is assumed of 3 no. such items with a sound pressure level (SPL) of 81 dB at 10 m operating simultaneously along the closest works boundary. This would result in a total noise level of 86 dB at 10 m and an equivalent combined sound power level of 114 dB L_{WA}. This worst-case scenario is the typical assumption made for developments of this nature, on the basis that it is unlikely that more

than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other.

The nearest NSLs to the proposed grid connection development are the houses at Bay Meadows and at Ballentree / Bishops Orchard. In the calculations presented in Table 7.8, it is assumed that construction works are taking place various distances at the closest from a NSL, starting at 15 metres. A 10dB reduction in noise levels due to the effect of a solid hoarding placed along the works boundary has been assumed. This will be erected where the proposed works have a boundary with housing areas.

Table 7.8 Predicted Construction Noise Levels

Description of Noise Source	Calculated noise levels at varying distances (dB $L_{Aeq,1hr}$)				
	15 m	25 m	35 m	45 m	55 m
3 no. items each with SPL of 81 dB at 10 m operating simultaneously	70	66	63	61	59

The calculated noise levels in Table 7.8 show that there is predicted noise levels are within the adopted construction noise criteria of 70 dB $L_{Aeq,1hr}$. This indicates that construction noise effects are negative, not significant and short-term.

7.4.1.1 Construction Traffic

In terms of the additional construction traffic on local roads that will be generated as a result of the proposed development the following comment is presented: Considering that in order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% it is considered that additional traffic introduced onto the local road network due to the construction phase associated of the development will not result in a significant noise impact.

7.4.2 Operational Phase

7.4.2.1 Grid connection Noise

Due to the fact that the proposed grid connection will be located underground there are is no operational operation noise impact associated with the Proposed Development. Mitigation measures are therefore not required.

7.4.2.2 Substation Noise

In the following extract from the "EirGrid Evidence Based Environmental Studies Study 8: Noise – Literature review and evidence based field study on the noise effects of high voltage transmission development (May 2016) states the following in relation to noise impacts associated with 220KvA transformer installations:

> *"The survey on the 220kv substation at Gorman indicated that measured noise levels (LAeq) were approximately 43dB(A) at 5m from the most affected boundary of the substation. This is marginally above the WHO night-time threshold limit for preventing disturbance to sleep (i.e. 42dB). Spectral analysis of the noise from the Gorman substation demonstrated that there are a number of distinct tonal elements to noise in the low to mid frequency range. To avoid any noise impacts from 220kV substations at sensitive receptors, it is recommended that a distance of 20m is maintained between the nearest site boundary and the nearest sensitive receptor."*

Considering the distance between the substation and the nearest NSLs of some 150m, noise from this installation is not predicted to be an issue off site. Mitigation measures are therefore not required.

7.5 MITIGATION AND MONITORING MEASURES

In order to sufficiently ameliorate the likely noise impact, a schedule of noise control measures has been formulated for the construction. No mitigation is required for operational phase.

7.5.1 CONSTRUCTION PHASE

With regard to construction activities, reference will be made to BS5228 Parts 1 and 2, which offer detailed guidance on the control of noise and vibration from demolition and construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development. Specific examples of such measures are:

- Limiting the hours during which site activities likely to create high levels of noise or vibration are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to noise and vibration;
- Monitoring levels of noise and/or vibration during critical periods and at sensitive locations; and
- All site access roads will be kept even so as to mitigate the potential for vibration from lorries.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of barriers as necessary around items such as generators or high duty compressors; and
- Situation of any noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

It is recommended that vibration from construction activities to off-site residences be limited to the values set out in Table 7.7. It should be noted that these limits are not absolute, but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Where there is existing damage these limits may need to be reduced by up to 50%.

7.6 RESIDUAL IMPACTS

This section summarises the likely noise and vibration impact associated with the proposed development, taking into account the mitigation measures.

7.6.1 CONSTRUCTION PHASE

During the construction phase of proposed development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits and hours of operation (i.e. as per Table 7.2, 7.3 and Section 7.1.1.3), along with implementation of appropriate noise and vibration control measures (as summarised in Section 70.5.1), will ensure that noise and vibration impact is kept to a minimum. Also it is reiterated that any construction noise effects will be not significant, negative and short term in nature.

7.6.2 Operational Phase

As the proposed grid connection lines will be located underground there is no operational operation noise impact associated with the Proposed Development.

The resultant noise impact is neutral, imperceptible and long-term.

7.6.2.1 Power Station Noise

Proprietary noise and vibration control measures have been employed including plant selection and acoustic screening, in order to ensure that noise emissions from building services plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions should be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise effect is negative, not significant to slight and long-term.

7.6.2.2 Additional Vehicular Traffic on Public Roads

Any change in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is expected to be imperceptible. The resultant noise effect is neutral, imperceptible and long term.

7.7 CUMULATIVE IMPACT

As there are no operational noise and/or vibration impacts associated with the Proposed Development, hence cumulative impacts do not arise in this instance.

During construction of the Proposed Development it is anticipated that noise and vibration associated with construction work on the proposed cable installation routes, cable bays and substation will typically be lower than those generated by existing traffic movements on the local road network. The noise environments at the nearest noise sensitive locations to the proposed works are and will continue to be dominated by road traffic noise

7.8 REFERENCES

- EPA Guidelines on Information to be contained in Environmental Impact Statements (2002).
- Draft 'Guidelines for Noise Impact Assessment' produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.
- British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise.
- Transport Infrastructure Ireland (TII) publication Good Practice Guidelines for the Treatment of Noise and Vibration in National Road Schemes.
- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- British Standard BS 5228-2: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Vibration.
- BS 4142:2014: Methods for rating and assessing industrial and commercial sound.
- Environmental Protection Agencies Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (January 2016).
- ISO 1996-2:2017 Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels.
- British Standard BS 6472 (1992): Guide to Evaluation of human exposure to vibration in buildings (1Hz to 80Hz).
- ISO 9613 (1996): Acoustics – Attenuation of sound outdoors – Part 2: General method of calculation.
- Calculation of Road Traffic Noise (CRTN) issued by the Department of Transport in 1988.
- BS EN 1793-1:1998: Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 1: Intrinsic characteristics of sound absorption

- BS EN 1793-2:1998: Road traffic noise reducing devices – Test method for determining the acoustic performance – Part 2: Intrinsic characteristics of airborne sound insulation.
- BS EN 1794-1:2003: Road traffic noise reducing devices. Non-acoustic performance. Mechanical performance and stability requirements
- BS EN 1794-2:2003: Road traffic noise reducing devices. Non-acoustic performance. General safety and environmental requirements.

8 WASTE MANAGEMENT

8.1 INTRODUCTION/METHODOLOGY

This section evaluates the impacts, if any, which the proposed development may have on Material Assets – Waste Management as defined in Directive 2014/52/EU, the EPA EIA Report Guidelines 2022 and EPA Draft Advice Notes for EIS 2015.

This section has also been prepared to address the issues associated with Material Assets – waste Management during the construction phase of the proposed development as described in Section 2.

A site-specific Resource Waste Management Plan (RWMP) has been prepared by AWN Consulting Ltd to deal with waste generation during the excavation and construction phases of the proposed Development and has been included as Appendix 8 to this ER. The RWMP was prepared in accordance with the Environmental Protection Agency's (EPA) document 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government (DoEHLG)(2006).

The Section has generally been prepared in accordance with European Commission's Guidelines, Guidance on the preparation of the Environmental Impact Assessment Report (2017), the EPA Guidelines on the Information to be contained in EIAR (2022) and the EU Commission Notice on changes and extensions to projects, 2021.

These documents will ensure the management of wastes arising at the Development Site in accordance with legislative requirements and best practice standards.

8.1.1 METHODOLOGY

The assessment of the impacts of the proposed development, arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management; including national and regional waste policy, waste strategies, management plans, legislative requirements and relevant reports.

This Section is based on the proposed development, as described in Section 2 (Description of the Proposed Development) and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation, excavation and construction);
- Operational phase

A desktop study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the typical waste materials that will be generated during the Construction and Operational phases; and
- Identification of mitigation measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy.

Estimates of waste generation during the construction phase of the proposed development have been calculated and are included in section 14.3 of this section. The waste types and estimated quantities are based on published data by the EPA in the National Waste Reports and National Waste Statistics, data recorded from similar previous developments, Irish and US EPA waste generation research as well as other available research sources.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 14.5 of this section.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Section 4 of this ER (Soils and Geology).

8.1.2 LEGISLATION AND GUIDANCE

Waste management in Ireland is subject to EU, national and regional waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Act 1996 (as amended). European and national waste management policy is based on the concept of 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal) (Figure 8.1).

Figure 8.1 Waste Hierarchy[17]

EU and Irish National waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (CE) is a sustainable alternative to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products. (Figure 8.2).

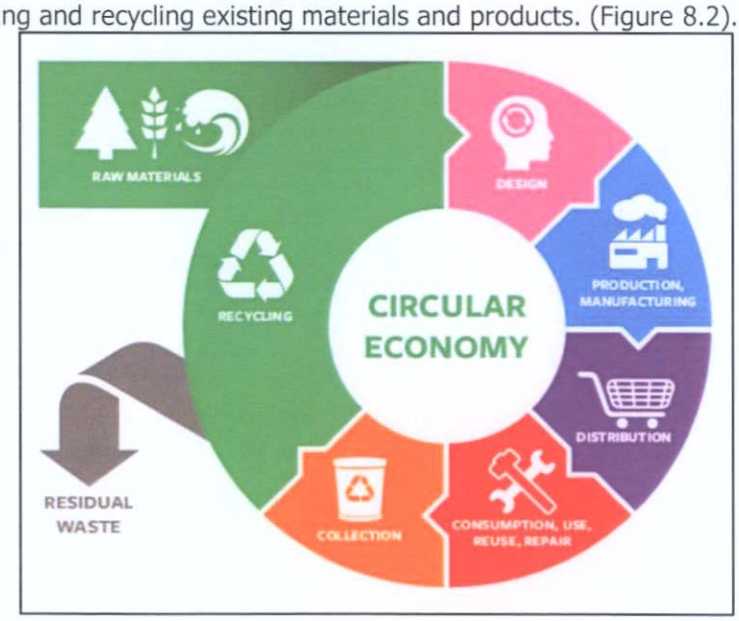

Figure 8.2: Circular Economy[18]

[17] Source: European Commission
[18] Source: Repak

The Irish government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland, was published in 2020 and shifts focus away from waste disposal and moves it back up the production chain. The move away from targeting national waste targets is due to the Irish and international waste context changing in the years since the launch of the previous waste management plan, A Resource Opportunity, in 2015.

One of the first actions to be taken from the WAPCE was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021.

The strategy for the management of waste from the construction phase is in line with the requirements of the EPA's 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021). The guidance documents, Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects and Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers (FÁS & Construction Industry Federation, 2002), were also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the Eastern Midlands Region (EMR) Waste Management Plan 2015 – 2021, BS 5906:2005 Waste Management in Buildings – Code of Practice, the Fingal County Council (FCC) (Segregation Storage, Presentation and of Household and Commercial Waste) Bye-Laws (2020), the EPA National Waste Database Reports 1998 – 2019 and the EPA National Waste Statistics Web Resource.

8.1.3 TERMINOLOGY

Note that the terminology used herein is consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste - Any substance or object which the holder discards or intends or is required to discard.

Prevention - Measures taken before a substance, material or product has become waste, that reduce:

- the quantity of waste, including through the re-use of products or the extension of the life span of products;
- the adverse impacts of the generated waste on the environment and human health; or
- the content of harmful substances in materials and products.

Reuse - Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse - Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment - Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery - Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling - Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal - Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I of the Waste Framework Directive sets out a non-exhaustive list of disposal operations.

8.2 THE PROPOSED DEVELOPMENT

The proposed development primarily comprises the provision of a 220kV Gas Insulated Switchgear (GIS) substation and associated Air Insulated Switchgear (AIS) compound on lands at Kilshane Road,

Kilshane, Finglas, Dublin 11, and an underground 220kV transmission line connection from the proposed GIS substation to the existing Cruiserath 220kV GIS substation, located within an overall landholding bound to the south by the R121/Cruiserath Road, to the west by the R121/ Church Road and to the north by Cruiserath Drive, along with all associated and ancillary works.
A full description of the proposed development can be found in Section 2 (Description of the Proposed Development). The characteristics of the proposed development that are relevant in terms of waste management are summarised below.

8.2.1 Demolition Phase

There will be no demolition associated with this development.

8.2.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The appointed Contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.
There will be soil and stones generated from site clearance and excavations required to facilitate the construction of foundations, the installation of services and roads for the development. Excavated material will be reused on site where possible with the remainder made available for re-use off-site. The volume of material to be excavated has been estimated at c. 3,950m^3. It is currently envisaged that all of the excavated material will need to be removed offsite due to the limited opportunities for reuse on site. This will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.
If the material that requires removal from the site is deemed to be a waste, removal and reuse / recycling / recovery / disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume of waste requiring recovery / disposal will dictate whether a Certificate of Registration (COR), permit or licence is required for the receiving facility. Alternatively, the material may be classed as by-product under Regulation 15 (By-products) (Previously Article 27 of the European Communities (Waste Directive) Regulations 2011) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020. For more information in relation to the envisaged management of by-products and waste, refer to the RWMP (appended).
In order to establish the appropriate reuse, recovery and / or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2019). Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste, including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities / landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment / recovery or exported abroad for disposal in suitable facilities.
Waste will also be generated from construction phase workers e.g. organic / food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and, potentially, sewage sludge from temporary welfare facilities provided on-site during the Construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated in small volumes from site offices.
Further detail on the waste materials likely to be generated during the excavation and construction works are presented in the project-specific RWMP (appended). The RWMP provides an estimate of the main waste types likely to be generated during the Construction phase of the proposed development. These are summarised in Table 8.1.

Table 8.1 Predicted on and off-site reuse, recycle and disposal rates for construction waste

Waste Types	Waste tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	10.7	10	1.1	80	8.6	10	1.1
Timber	7.9	40	3.2	55	4.4	5	0.4
Metals	3.7	5	0.2	90	3.3	5	0.2
Concrete	1.7	30	0.5	65	1.1	5	0.1
Other	4.2	20	0.8	60	2.5	20	0.8
Total	28.2		5.8		19.9		2.6

8.2.3 Operational Phase

There will be no operational waste generated during the operational stage of this development.

8.3 RECEIVING ENVIRONMENT

In terms of waste management, the receiving environment is largely defined by Fingal FCC as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the *Eastern Midlands Region Waste Management Plan 2015 – 2021*, which sets out the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 55% of managed municipal waste by 2025; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

Ireland achieved 84 per cent material recovery of such waste in 2019, and therefore surpassed the 2020 target and is currently surpassing the 2025 target. The National Waste Statistics update published by the EPA in November 2021 identifies that Ireland's current against "Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)" was met for 2020 at 51% however they are currently not in line with the 2025 target (55%).

The Fingal County Development Plan 2017 – 2023 (2017) and the Draft Fingal County Development plan 2023-2029 (2022) set out objectives for the FCC area which reflect those sets out in the regional waste management plan.

In terms of physical waste infrastructure, FCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the EMR Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, municipal waste landfills, material recovery facilities and waste transfer stations.

8.4 PREDICTED EFFECTS

This section details the potential waste effects associated with the proposed development.

8.4.1 Construction Phase

The proposed Development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction (see Appendix f8 or further detail). General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored in the construction site compound or adjacent to it, on-site pending collection by a waste contractor. If

waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the Development Site and in adjacent areas. The indirect effect of litter issues is the presence of vermin in areas affected. In the absence of mitigation, the effect on the local and regional environment is likely to be **short-term, significant** and **negative**.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including pollution. It is essential that all waste materials are dealt with in accordance with regional and national legislation, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of mitigation, the effect on the local and regional environment is likely to be **long-term, significant** and **negative**.

Wastes arising will need to be taken to suitably registered / permitted / licenced waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous licensed waste facilities in the EMR which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the Development Site would be in line with daily activities at these facilities. At present, there is sufficient capacity for the acceptance of the likely C&D waste arisings at facilities in the region. The majority of construction materials are either recyclable or recoverable. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **short-term, significant** and **negative.**

There is a quantity of excavated material which will need to be excavated to facilitate the proposed Development. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Section 4. Material that has to be removed will be subject to correct classification and segregation to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site. However, in the absence of mitigation, the effect on the local and regional environment is likely to be **short-term, significant** and **negative**.

8.4.2 Operational Phase

There will be no impacts from the operational phase of this development.

8.4.3 Do Nothing Scenario

If the proposed development was not to go ahead (i.e. in the Do-Nothing scenario) there would be no excavation, construction or operational at this site. There would, therefore, be a neutral effect on the environment in terms of waste.

8.5 MITIGATION MEASURES

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

The concept of the 'waste hierarchy' is employed when considering all mitigation measures. The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal.

8.5.1 Construction Phase

The following mitigation measures will be implemented during the construction phase of the proposed development:

As previously stated, a project specific RWMP has been prepared in line with the requirements of the requirements of The EPA, *Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)* and is appended to this ER. The mitigation measures outlined in the RWMP will be implemented in full and form part of mitigation strategy for the site. The mitigation measures presented in this RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the RWMP (appended) in agreement with FCC and in compliance with any planning conditions, or submit an addendum to the RWMP to FCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The Contractor will implement the RWMP throughout the duration of the proposed excavation and construction phases.

Is have been calculated by the project design team that all of excavated material will need to be removed off-site. If material has to be removed offsite then correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.
In addition, the following mitigation measures will be implemented:

- Building materials will be chosen to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery. The following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Metals;
  - Glass;
  - Hazardous material; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks / bricks) and any suitable construction materials shall be re-used on-site, where possible; (alternatively, the waste will be sorted for recycling, recovery or disposal);
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A Resource Manager will be appointed by the main Contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered, where possible, to avoid material designated for disposal;
- All waste leaving the site will be transported by suitably permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Regulation 15 (By-products) (Previously Article 27 of the European Communities (Waste Directive) Regulations 2011) of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2020. EPA approval will be obtained prior to moving material as a by-product.
These mitigation measures will ensure that the waste arising from the construction phase of the proposed development is dealt with in compliance with the provisions of the Waste Management Act 1996, as amended, associated Regulations and the Litter Pollution Act 1997, and the EMR Waste Management Plan 2015 – 2021. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will promote more sustainable consumption of resources.

8.5.2 Operational Phase

There will be no mitigation measures required from the operational phase of this development as no operational waste will be generated.

8.6 RESIDUAL IMPACTS

The implementation of the mitigation measures outlined in Section 8.5 and in the appended RWMP. will ensure that high rates of reuse, recovery and recycling are achieved at the Site of the proposed development during the construction phase. It will also ensure that European, National and Regional legislative waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

8.6.1 CONSTRUCTION PHASE

A carefully planned approach to waste management as set out in Section 14.5.1 and adherence to the RWMP (which includes mitigation) during the construction phase will ensure that the predicted effect on the environment will be **short-term, imperceptible and neutral.**

8.6.2 OPERATIONAL PHASE

There will be no residual impacts as there is no operational waste being generated.

8.6.3 CONCLUSION

The full and proper implementation of the mitigation measures set out herein and, in the RWMP (appended), no likely significant negative effects are predicted to occur as a result of the construction or operational of the proposed development.

8.7 CUMULATIVE IMPACT

The following considers the cumulative impacts of the proposed development and proposed and permitted and operating facilities in the surrounding area in relation to Material Assets – Waste Management. This considers the proposed development and other surrounding proposed and permitted developments including those outlined in sections 2, 3.7 and 8.7.1 of this ER and in the Planning Application Report.

As has been identified in the receiving environment section all cumulative developments that are already built and in operation contribute to our characterisation of the baseline environment. As such any further environmental impacts that the proposed development may have in addition to these already constructed and operational cumulative developments has been assessed in the preceding parts of this section.

8.7.1 CONSTRUCTION PHASE

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place in the area. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase.

Developments that potentially could overlap during the construction phase of note:

- **FW22A/0108**
- **FW21A/0151**
- **F21A/0144**
- **FW19A/0015**
- **FW18A/0082**
- **Kilshane Energy Power Station and Road Realignment**

Due to the high number of waste contractors in the FCC region as provided from the National Waste Collection Permit Office and the Environmental Protection Agency there would be sufficient contractors