Appendix XIII

Air Quality Report & Climate Assessment Report – prepared by AWN Consulting Ltd.

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CONSTRUCTION & OPERATIONAL STAGE ASSESSMENT OF AIR QUALITY IMPACTS ASSOCIATED WITH THE PROPOSED 110 kV SUBSTATION AND GRID CONNECTION IN GREAT ISLAND, CO. WEXFORD

Technical Report Prepared For

Kilmannock Battery Energy Storage Limited

Technical Report Prepared By

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1.0 INTRODUCTION

This report presents the assessment of air quality impacts associated with the construction and operational stages of the proposed associated 110kV electrical substation and underground grid connection that would connect the proposed substation to an existing Eirgrid substation within the SSE Power Station in Great Island, Kilmokea, Co. Wexford.

The site boundary including the grid route, consists of 2.58 hectares and is located approximately 9 km north-east of Waterford City centre. In the immediate region of the proposed development, the land-use is primarily agriculture and the existing Great Island Power Station and Greenlink Converter Station are also in the vicinity of the site. Several residential properties are located within 350 m of the site boundary. The River Barrow and River Nore Special Area of Conservation (SAC) and Special Protection Area (SPA) and the Barrow River Estuary proposed Natural Heritage Area (pNHA), are also located within 350 m of the facility.

The report provides a description of the baseline air quality environment and identification of the sensitivity of the surrounding environment. It then goes on to identify and assess the potential air quality impacts associated with the construction and operational phases of the proposed development. The chapter also include a discussion of the required mitigation measures to reduce or eliminate significant air quality impacts. The residual effects of the proposed development (after the implantation of mitigation measures) are defined.

During the construction stage the main source of air quality impacts will be as a result of fugitive dust emissions from site activities. Dust emissions will primarily occur as a result of site preparation works, earthworks and the movement of trucks on site and exiting the site. Construction stage traffic also has the potential to impact air quality through vehicle exhaust emissions.

During the operational phase, traffic accessing the site for maintenance has the potential to impact on air quality.

2.0 METHODOLOGY

2.1 Criteria for Rating of Impacts

2.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union, have set limit values in ambient air for a range of air pollutants. These limit values or “Air Quality Standards” are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed based on compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2022, which incorporate European Commission Directive 2008/50/EC, which has set limit values for numerous pollutants with the limit values for NO_2, PM_{10}, and $PM_{2.5}$ being relevant to this assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent

daughter directives (including 1999/30/EC and 2000/69/EC) and includes ambient limit values relating to $PM_{2.5}$. The applicable limit values for NO_2, PM_{10}, and $PM_{2.5}$ are set out in Table 1.

Table 1. Ambient Air Quality Standards & TA Luft

Pollutant	Regulation[Note1]	Limit Type	Value
Dust Deposition	TA Luft (German VDI 2002)	Annual average limit for nuisance dust	350 mg/m^2/day
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3 PM_{10}
		Annual limit for protection of human health	40 µg/m^3 PM_{10}
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3 $PM_{2.5}$

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland (Government of Ireland, 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target 3 (IT3) by 2026, the IT4 targets by 2030 and the final targets by 2040 (shown in Table 2). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m^3. The strategy also acknowledges that "*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2*". Ireland will revise its air quality legislation in line with the proposed EU revisions to the CAFE Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets.

Table 2. WHO Air Quality Guidelines

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50 µg/m^3	50 µg/m^3	25 µg/m^3
		Annual limit for protection of human health	30 µg/m^3	20 µg/m^3	10 µg/m^3
PM (as PM_{10})		24-hour limit for protection of human health	75 µg/m^3	50 µg/m^3	45 µg/m^3
		Annual limit for protection of human health	30 µg/m^3	20 µg/m^3	15 µg/m^3
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5 µg/m^3	25 µg/m^3	15 µg/m^3

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
		Annual limit for protection of human health	15 µg/m^3	10 µg/m^3	5 µg/m^3

2.1.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust, which are less than 10 microns, and the EU ambient air quality standards outlined in Section 2.1.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

However, guidelines for dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m^2/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled 'Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006). The document recommends that the TA-Luft limit of 350 mg/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the Proposed Development.

2.2 Construction Phase

2.2.1 Construction Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (2023) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development in order to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their guidance document *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a).

The major dust generating activities are divided into four types within the IAQM guidance (2023) to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt from the construction site onto the public road network).

The magnitude of each of the four categories is divided into Large, Medium or Small scale depending on the nature of the activities involved. The magnitude of each activity

is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

2.2.2 Construction Phase Traffic Assessment

Construction phase traffic also has the potential to impact air quality. The TII guidance *Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106* (TII, 2022a), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- Daily average speed change by 10 kph or more;
- Peak hour speed change by 20 kph or more;
- A change in road alignment by 5 m or greater.

The construction stage traffic will not increase by 1,000 AADT or 200 HDV AADT and therefore does not meet the above scoping criteria. In addition, there are no proposed changes to the traffic speeds or road alignment. As a result a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

2.3 Operational Phase

2.3.1 Operational Phase Traffic Assessment

Operational phase traffic has the potential to impact local air quality as a result of increased vehicle movements associated with the Proposed Development. The TII scoping criteria detailed in Section 2.2 was used to determine if any road links are affected by the Proposed Development and require inclusion in a detailed air dispersion modelling assessment. Traffic data for the operational phase of the Proposed Development was reviewed and it was determined that the Proposed Development will not increase traffic by 1,000 AADT or 200 HDV AADT. In addition, there are no proposed changes to the traffic speeds or road alignment. Therefore, no road links impacted by the Proposed Development satisfy the screening criteria (see Section 2.2) and a quantitative assessment of the impact of traffic emissions on ambient air quality is not necessary as there is no potential for significant impacts to local air quality.

3.0 RECEIVING ENVIRONMENT

3.1 Meteorological Conditions

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions where pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed

more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Johnstown Castle meteorological station, which is located approximately 5.5 km north-east of the site. Johnstown Castle meteorological data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 1). For data collated during five representative years (2018 – 2022) the predominant wind direction is westerly to south-westerly (Met Eireann, 2023).

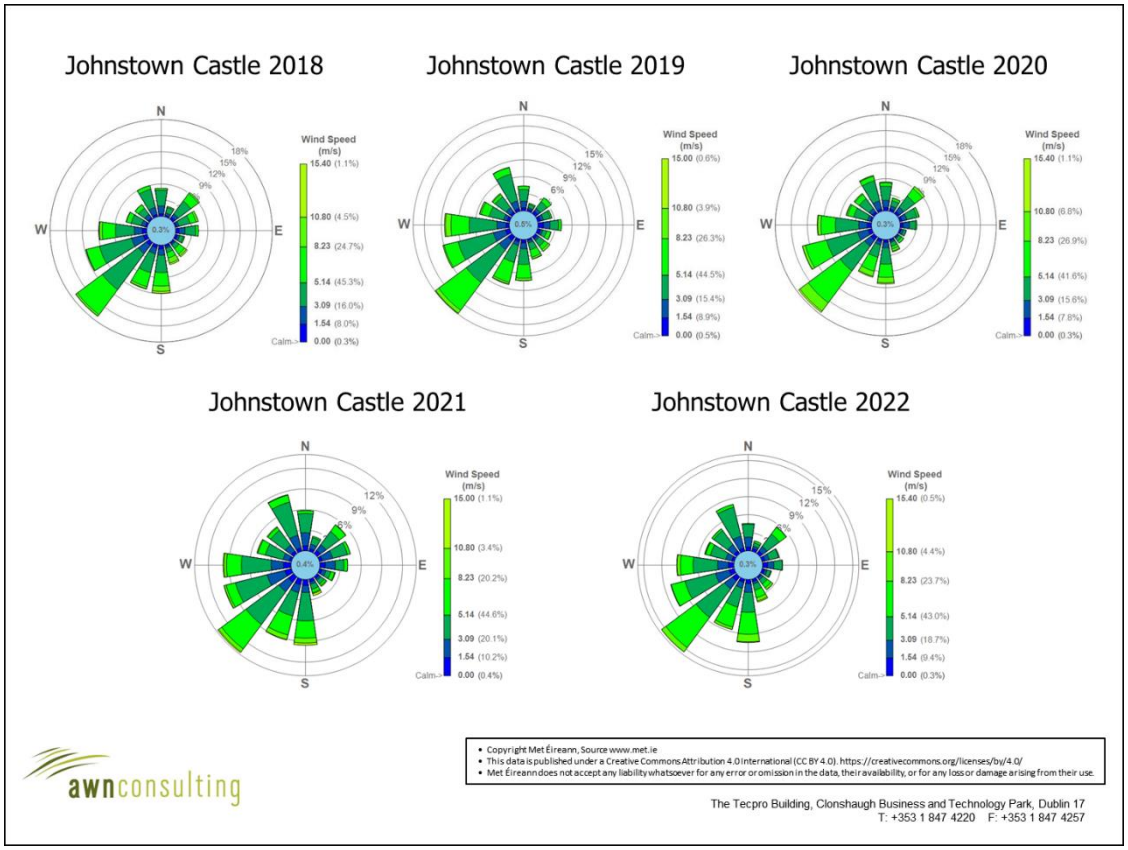

Figure 1. Johnstown Castle Meteorological Station Windrose 2018 - 2022

3.2 Baseline Air Quality

The EPA and Local Authorities have undertaken air quality monitoring programs in recent years. The most recent EPA published annual report on air quality "Air Quality In Ireland 2021" (EPA, 2022b) details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes as outlined within the EPA document titled 'Air Quality In Ireland 2021' (EPA, 2022b). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D. In terms of air monitoring, Great Island and the area of the Proposed Development are categorised as Zone D.

In 2020 the EPA reported (EPA, 2022b) that Ireland was compliant with EU legal air quality limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA Air Quality in Ireland 2020 report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, data from 2020 has been included for representative purposes only and has not been used to determine baseline levels of pollutants in the vicinity of the Proposed Development.

3.2.1 NO_2

NO_2 monitoring was carried out at two rural Zone D locations in recent years, Emo Court and Kilkitt and in one urban location in Castlebar (EPA, 2022a). The NO_2 annual average in 2021 for both rural sites, Emo and Kilkitt was 4 µg/m^3 and 2 µg/m^3, respectively; with the 2021 results for the urban station in Castlebar averaging 6 µg/m^3. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m^3. The average results over the five year period 2017-2021 at these Zone D locations suggests an upper average of no more than 8 µg/m^3 as a rural background concentration representative of the proposed development (see Table 3). Based on this information, a conservative estimate of the background NO_2 concentration, for the region of the proposed development is 8 µg/m^3.

Table 3. Trends In Zone D Air Quality – Nitrogen Dioxide (µg/m^3)

Station	Averaging Period	Year				
		2017	2018	2019	2020	2021
Emo Court	Annual Mean NO_2 (µg/m^3)	3	3	4	3	4
Castlebar	Annual Mean NO_2 (µg/m^3)	7	8	8	6	6
Kilkitt	Annual Mean NO_2 (µg/m^3)	2	3	5	2	2

Note 1 Data for 2020 shown for representative purposes only, not used in determining background concentrations

3.2.2 PM_{10}

PM_{10} monitoring was carried out at two rural Zone D location in Kilkitt and Claremorris and in two urban locations in Castlebar and Enniscorthy (EPA, 2022a). The PM_{10} annual average in 2021 for both rural sites, Claremorris and Kilkitt was 9.5 µg/m^3 and 7.8 µg/m^3, respectively; with the 2021 results for the urban stations in Castlebar and Enniscorthy averaging 9.8 µg/m^3 and 13.7 µg/m^3. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m^3. The average results over the five year period 2017-2021 at these Zone D locations suggests an upper average of no more than 16 µg/m^3 as a rural background concentration representative of the proposed development (see Table 4). Based on this information, a conservative estimate of the background PM_{10} concentration, for the region of the proposed development is 16 µg/m^3.

Table 4. Trends in Zone D Air Quality – PM_{10} (µg/m^3)

Station	Averaging Period	Year				
		2017	2018	2019	2020	2021
Castlebar	Annual Mean PM_{10} (µg/m^3)	11	11	16	14	9.8

Station	Averaging Period	Year				
		2017	2018	2019	2020	2021
	24-hr Mean > 50 µg/m^3 (days)	1	0	1	2	0
Kilkitt	Annual Mean PM_{10} (µg/m^3)	8	9	7	8	7.8
	24-hr Mean > 50 µg/m^3 (days)	0	0	1	0	0
Claremorris	Annual Mean PM_{10} (µg/m^3)	11	12	11	10	9.5
	24-hr Mean > 50 µg/m^3 (days)	1	0	0	0	1
Enniscorthy	Annual Mean PM_{10} (µg/m^3)	-	-	18	15	13.7
	24-hr Mean > 50 µg/m^3 (days)	-	-	14	4	1

Note 1 Data for 2020 shown for representative purposes only, not used in determining background concentrations

3.2.3 $PM_{2.5}$

Annual mean concentrations of $PM_{2.5}$ at the Zone D rural background location of Claremorris over the period 2017 – 2021 (EPA, 2022b) ranged from 4 – 8 µg/m^3. Based on this information, a conservative background $PM_{2.5}$ concentration for the region of the proposed development is 8 µg/m^3.

Based on the above information the air quality in the area is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA have indicated that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in future years if burning of solid fuels for residential heating continues (EPA, 2022b).

3.3 Sensitivity of Receiving Environment

In line with the UK Institute of Air Quality Management (IAQM) guidance document '*Guidance on the Assessment of Dust from Demolition and Construction'* (2023) prior to assessing the impact of dust from a Proposed Development the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties (where people are likely to spend the majority of their time), schools and hospitals.

In terms of receptor sensitivity to dust soiling, there are a between 1 - 10 high sensitivity residential properties within 100 – 350 m of the site boundary (see Figure 2). These are individual residential dwellings to the north-west of the site. Therefore, the overall sensitivity of the area to dust soiling impacts is considered low based on the IAQM criteria outlined in Table 5.

Table 5. Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Source (IAQM, 2023) Guidance on the Assessment of Dust from Demolition and Construction

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 is 16 µg/m^3 and there are between 1 – 10 high sensitivity receptors within 100 – 350 m of the Proposed Development boundary (see Figure 2). Based on the IAQM criteria outlined in Table 6, the worst-case sensitivity of the area to human health is low.

Table 6. Sensitivity of the Area to Dust Related Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	**<50**	**<100**	**<200**	**<350**
High	< 24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	**Low**
		1-10	Low	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low	Low

Source (IAQM, 2023) Guidance on the Assessment of Dust from Demolition and Construction

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological impacts. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant as well as other effects. The guidance states that dust impacts to vegetation can occur up to 50 m from the site and 50 m from site access roads, up to 500 m for the site entrance. The sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present.

There are no designated sites within 50 m of the site boundary of 500 m from site access roads, therefore no assessment of dust impacts to ecology was required.

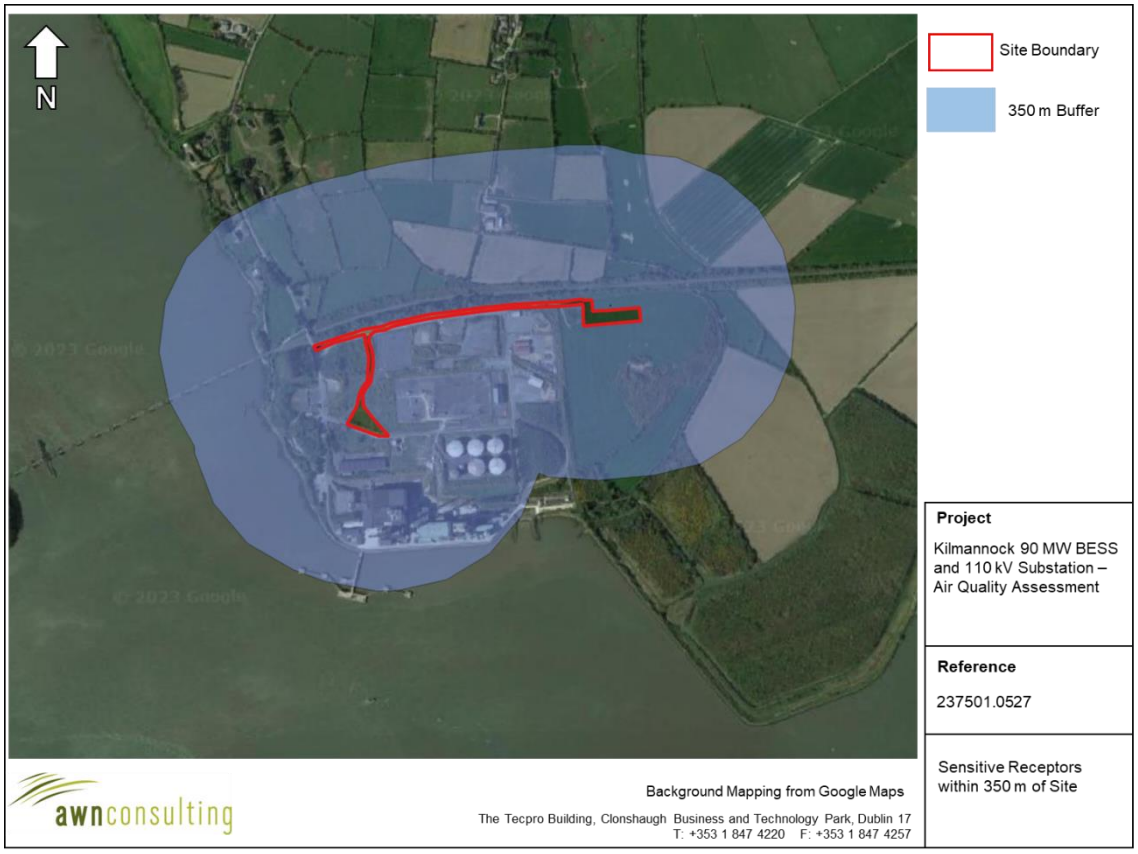

Figure 2. Sensitive Receptors within 350 m of Site Boundary

4.0 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

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 will not occur. The site will continue to operate in line with the current requirements of the IE licence which ensures the protection of the ambient air environment. 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 in the surrounding area, changes in road traffic, etc.). Therefore, overall the Do Nothing scenario can be considered neutral in terms of air quality.

4.2 Construction Phase

4.2.1 Construction Dust Assessment

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. A review of Johnstown Castle meteorological data indicates that the prevailing wind direction is westerly to south-westerly and wind

speeds are generally moderate in nature (see Figure 1). 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 Johnstown Castle meteorological station indicates that on average 200 days per year have rainfall over 0.2 mm (Met Eireann, 2023) and therefore it can be determined that 55% 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 3.3). As per Section 2.2 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 (transport of dust and dirt from the construction site onto the public road network).

4.2.1.1 Demolition

There are no demolition activities associated with the Proposed Development. Therefore, there is no demolition impact predicted as a result of the works.

4.2.1.2 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 > 110,000 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 > 6 m in height;
- **Medium:** Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 3 m – 6 m in height;
- **Small:** Total site area < 18,000 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, earthworks during wetter months.

The dust emission magnitude for the proposed earthwork activities can be classified as medium as the total site area is between 18,000 – 110,000 m^2.

The sensitivity of the area, as determined in Section 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 **7**, this results in an overall low risk of dust soiling impacts and dust related human health impacts as a result of the proposed earthworks activities.

Table 7. 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

4.2.1.3 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 > 75,000 m^3, on-site concrete batching, sandblasting;
- Medium: Total building volume 12,000m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- Small: Total building volume < 12,000 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 a worst-case as the total building volume will be less than 12,000 m^3. As outlined in Table 8, this results in an overall negligible risk of dust soiling impacts and human health impacts as a result of the proposed construction activities.

Table 8. Risk of Dust Impacts – Construction

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**

4.2.1.4 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 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium:** 20 - 50 HGV (> 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:** < 20 HGV (> 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 small, as at worst-case peak periods there will be less than 20 outward HGV movements per day. As outlined in Table 9, this results in an overall negligible risk of dust soiling impacts and human health impacts as a result of the proposed trackout activities.

Table 9. 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**

4.2.1.5 Summary of Dust Emission Risks

The risk of dust impacts as a result of the Proposed Development are summarised in Table 10 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.

There is at most a low risk of dust soiling impacts and human health impacts associated with the proposed works, therefore, best practice dust mitigation measures will be implemented to ensure there are no significant impacts at nearby sensitive receptors. In the absence of mitigation, dust impacts are predicted to be short-term, negative and imperceptible.

Table 10. Summary of Dust Impact Risk used to Define Site-Specific Mitigation

Potential Impact	Dust Emission Risk			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Emission Magnitude	N/A	Medium	Small	Small
Dust Soiling Risk	N/A	Low Risk	Negligible Risk	Negligible Risk
Human Health Risk	N/A	Low Risk	Negligible Risk	Negligible Risk

4.2.2 Construction Phase Traffic Assessment

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 TII scoping assessment criteria in Section 2.2. It can therefore be determined that the construction stage traffic will have an imperceptible, direct, neutral and short-term impact on air quality.

4.3 Operational Phase

4.3.1 Operational Phase Traffic Assessment

There is the potential for vehicles accessing the site to result in emissions of NO_2, PM_{10} and $PM_{2.5}$. However, the increased levels of traffic as a result of the Proposed Development are not of the magnitude to require a detailed air assessment. A detailed air quality assessment was scoped out for the operational stage of the development as per the TII screening criteria. Operational stage impacts to air quality are predicted to be imperceptible, direct, neutral and long-term.

5.0 MITIGATION MEASURES

5.1 Construction Phase

The proposed development has been assessed as having a low risk of dust soiling impacts and dust related human health impacts during the construction phase as a result of earthworks, construction and trackout activities (see Section 4.2.1). Therefore, the following dust mitigation measures shall be implemented during the construction phase of the proposed development. These measures are appropriate for sites with a low risk of dust impacts and aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC, 2018), the UK (IAQM (2023), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the overall Construction Environmental Management Plan (CEMP) prepared for the site. The measures are divided into different categories for different activities.

5.1.1 Communications

- Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses.
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

5.1.2 Site Management

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions. Dry and windy conditions are favourable to dust suspension therefore mitigations must be implemented if undertaking dust generating activities during these weather conditions.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.

5.1.3 Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

5.1.4 Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.

- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 kph haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)

5.1.5 Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

5.1.6 Waste Management

- Avoid bonfires and burning of waste materials.

5.1.7 Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

5.1.8 Measures Specific to Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

5.1.9 Measures Specific to Trackout

- A speed restriction of 15 kph will be applied as an effective control measure for dust for on-site vehicles.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

5.1.10 Monitoring

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

5.2 Operational Phase

No mitigation is proposed for the operational phase of the Proposed Development as impacts to air quality will be imperceptible.

6.0 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

6.1 Construction Phase

6.1.1 Air Quality

When the dust mitigation measures detailed in the mitigation section of this report (Section 5.0) are implemented, the residual effect of fugitive emissions of dust and particulate matter from the site will be ***short-term, direct, negative*** and ***imperceptible*** in nature, posing no nuisance at nearby receptors.

6.1.2 Human Health

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, the residual effect of construction of the Proposed Development will be ***short-term, direct, negative*** and ***imperceptible*** with respect to human health.

6.2 Operational Phase

The residual effect of the operational phase impacts associated with the Proposed Development are predicted to be ***neutral***, ***long-term*** and ***imperceptible***.

7.0 CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

7.1 Construction Phase

According to the IAQM guidance (2023), there is the potential for cumulative dust impacts to any nearby sensitive receptors should the construction phase of the Proposed Development coincide with the construction phase of any other permitted projects within 350 m of the site. If a simultaneous construction phase were to occur this would result in cumulative dust soiling and dust-related human health impacts associated with the proposed works localised to the works area. A review of the planned and permitted projects indicated that there were a number of developments within 350 m of the site that have the potential for cumulative construction phase impacts, including Planning Ref. 20220628.

There is a low risk of dust soiling and human health impacts associated with the Proposed Development. The dust mitigation measures outlined in Section 5.1 will be applied during the construction phase which will avoid significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the Proposed Development and the aforementioned developments are deemed ***short-term, direct, negative*** and ***imperceptible***.

7.2 Operational Phase

There is the potential for cumulative impacts to air quality during the operational phase due to traffic associated with other existing and permitted developments within the area. The traffic data provided for the operational stage air quality assessment considered cumulative developments. Therefore, the cumulative operational phase impact is assessed within Section 4.3.1 and was found to have a neutral impact on air quality. The cumulative operational stage impact is ***long-term, localised, direct, neutral, imperceptible*** and ***non-significant***.

8.0 REFERENCES

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USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures

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CONSTRUCTION & OPERATIONAL STAGE ASSESSMENT OF CLIMATE IMPACTS ASSOCIATED WITH THE PROPOSED 110 kV SUBSTATION AND GRID CONNECTION IN GREAT ISLAND, CO. WEXFORD

Technical Report Prepared For

Kilmannock Battery Energy Storage Limited

Technical Report Prepared By

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Our Reference

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1.0 INTRODUCTION

This report presents the assessment of climate impacts associated with the construction and operational stages of the proposed associated 110kV electrical substation and underground grid connection that would connect the proposed substation to an existing Eirgrid substation within the SSE Power Station in Great Island, Kilmokea, Co. Wexford.

The site boundary including the grid route, consists of 2.58 hectares and is located approximately 9 km north-east of Waterford City centre. In the immediate region of the proposed development, the land-use is primarily agriculture and the existing Great Island Power Station and Greenlink Converter Station are also in the vicinity of the site. Several residential properties are located within 350 m of the site boundary. The River Barrow and River Nore Special Area of Conservation (SAC) and Special Protection Area (SPA) and the Barrow River Estuary proposed Natural Heritage Area (pNHA), are also located within 350 m of the facility.

The report provides a description of the baseline climate environment and identification of the sensitivity of the surrounding environment. It then goes on to identify and assess the potential climate impacts associated with the construction and operational phases of the proposed development. The chapter also include a discussion of the required mitigation measures to reduce or eliminate significant climate impacts. Finally, the residual effects of the proposed development (after the implantation of mitigation measures) are defined.

During the construction stage the main source of climate impacts will be as a result of GHG emissions and embodied carbon associated with the proposed construction materials and activities for the proposed development.

During the operational phase, traffic accessing the site for maintenance purposes has the potential to impact on climate. In addition, the vulnerability of the proposed development in relation to future climate change must be considered during the operational phase.

2.0 METHODOLOGY

2.1 Criteria for Rating of Impacts

2.1.1 Climate Agreements and Policies

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by*

Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013 (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 42% and 30%, respectively, by 2030 compared to 2005. The Regulation was amended in April 2023 and Ireland now has a requirement to limit its non-ETS GHG emissions by at least 42% by 2030. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the Act). The purpose of the Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*' (3.(1) of No. 46 of 2015). This is referred to in the Act as the '*national transition objective*'. The Act made provision for, *inter alia*, a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019a). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021a). The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce our greenhouse gas emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal of to achieving net-zero emissions no later than 2050. The 2021 CAP outlines that emissions from the Built Environment sector must be reduced to 4 - 5 Mt CO_2e (million tonnes carbon dioxide equivalent) by 2030 in order to meet our climate targets. This will require further measures in addition to those committed to in the 2019 CAP. This will include phasing out the use of fossil fuels for the space and water heating of buildings, improving the fabric and energy of our buildings, and promoting the use of lower carbon alternatives in construction.

A third revision of the Climate Action Plan was published in December 2022 – Climate Action Plan 2023 (Government of Ireland, 2022). This is the first CAP since the publication of the carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030. The CAP has six vital high impact sectors where the biggest savings can be made: renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland 2019b) followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (hereafter referred to as the 2021 Climate Act) in July 2021 (Government of Ireland,

2021b). The 2021 Climate Act was prepared for the purposes of giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'*. The 2021 Climate Act will also '*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy*'. The 2021 Climate Act defines the carbon budget as '*the total amount of greenhouse gas emissions that are permitted during the budget period*'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a '*local authority climate action plan'* lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

In relation to carbon budgets, the Climate Action and Low Carbon Development (Amendment) Act states 'A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'. The carbon budget is to be produced for 3 sequential budget periods, as shown in Table 1. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 were published July in 2022 and are shown in Table 2. Industry has a 35% reduction required and emissions ceiling of 4 Mt CO_2e, while Electricity has a 75% reduction required and an emissions ceiling of 3 Mt CO_2e.

Table 1. 5-Year Carbon Budgets 2021-2025, 2026-2030 and 2031-2025 (Department of the Taoiseach, 2022)

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO_2e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO_2e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO_2e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 2. Sectoral Emission Ceilings 2030 (Department of the Taoiseach, 2022)

Sector	Baseline (Mt CO_2e)	Carbon Budgets (Mt CO_2e)		2030 Emissions (Mt CO_2e)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Transport	12	54	37	6	50
Electricity	10	40	20	3	75

Sector	Baseline (Mt CO_2e)	Carbon Budgets (Mt CO_2e)		2030 Emissions (Mt CO_2e)	Indicative Emissions % Reduction in Final Year of 2025- 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Built Environment - Residential	7	29	23	4	40
Built Environment - Commercial	2	7	5	1	45
Agriculture	23	106	96	17.25	25
Land Use, Land-use Change and Forestry (LULUCF)	5	TBC	TBC	TBC	TBC
Industry	7	30	24	4	35
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Unallocated Savings	-	7	5	-5.25	-
Total	**68**	**TBC**	**TBC**	**-**	**-**
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	**-**	**295**	**200**	**-**	**51**

2.1.2 Climate Assessment Significance Criteria

The climate assessment is divided into two distinct sections – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- Greenhouse Gas Emissions Assessment (GHGA) – Quantifies the GHG emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude.
- Climate Change Risk Assessment (CCRA) – Identifies the impact of a changing climate on a project and receiving environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience.

The significance criteria for each assessment are described below.

2.1.2.1 Significance Criteria for Greenhouse Gas Assessment

The Transport Infrastructure Ireland (TII) guidance document entitled *PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document* (TII 2022a) outlines a recommended approach for determining the significance of both the construction and operational phases of a development. The approach is based on comparing the '*Do Something*' scenario and the net project GHG emissions (i.e. *Do Something – Do Minimum*) to the relevant carbon budgets (Department of the Taoiseach 2022). With the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2 project GHG emissions from the proposed development. The Industry sector emitted approximately 7 Mt CO_2e in 2018 and has a ceiling of 4 Mt CO_2e in 2030 which is a 35% reduction over this period (see Table 2).

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022a) is based on IEMA guidance (IEMA, 2022) which is consistent with the terminology contained within Figure 3.4 of the EPA's (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'.

The 2022 IEMA Guidance (IEMA, 2022) sets out the following principles for significance:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors (i.e. Ireland's National GHG targets). In relation to climate, there is no project specific assessment criteria, but the project will be assessed against the recommended IEMA significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

TII (TII, 2022a) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. In line with IEMA Guidance (IEMA, 2022), TII state that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero*[1] *by 2050*".

Significance is determined using the criteria outlined in Table 3 (derived from Table 6.7 of PE-ENV-01104 (TII, 2022a)) along with consideration of the following two factors:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

[1] Net Zero: "*When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period.*" Net zero is achieved where emissions are first educed in line with a 'science-based' trajectory with any residual emissions neutralised through offsets.

Table 3. GHGA Significance Criteria

Effects	Significance Level	Description
Significant adverse	Major adverse	• The project's GHG impacts are not mitigated. • The project has not complied with do-minimum standards set through regulation, nor provided reductions required by local or national policies; and • No meaningful absolute contribution to Ireland's trajectory towards net zero.
	Moderate adverse	• The project's GHG impacts are partially mitigated. • The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and • Falls short of full contribution to Ireland's trajectory towards net zero.
Not Significant	Minor adverse	• The project's GHG impacts are mitigated through 'good practice' measures. • The project has complied with existing and emerging policy requirements; and • Fully in line to achieve Ireland's trajectory towards net zero.
	Negligible	• The project's GHG impacts are mitigated beyond design standards. • The project has gone well beyond existing and emerging policy requirements; and • Well 'ahead of the curve' for Ireland's trajectory towards net zero.
Beneficial	Beneficial	• The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration. • The project has gone well beyond existing and emerging policy requirements; and • Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

2.1.2.2 Significance Criteria for CCRA

The CCRA involves an initial screening assessment to determine the vulnerability of the proposed development to various climate hazards. The vulnerability is determined by combining the sensitivity and the exposure of the proposed development to various climate hazards.

Vulnerability = Sensitivity x Exposure

The vulnerability assessment takes any proposed mitigation into account. Table 4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale. TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. The impact from climate change on the proposed development can therefore considered to be not significant. However, where residual medium or high vulnerabilities exist the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks.

Table 4. Vulnerability Matrix

		Exposure		
		High (3)	**Medium (2)**	**Low (1)**
Sensitivity	**High (3)**	9 - High	6 – High	3 - Medium
	Medium (2)	6 - High	4 - Medium	2 - Low
	Low (1)	3 - Medium	2 – Low	1 - Low

2.2 Construction Phase

2.2.1 Greenhouse Gas Assessment

PE-ENV-01104 (TII, 2022a) recommends the calculation of the construction stage embodied carbon using the TII Online Carbon Tool (TII, 2022b). Embodied carbon refers to the sum of the carbon needed to produce a good or service. It incorporates the energy needed in the mining or processing of raw materials, the manufacturing of products and the delivery of these products to site. The TII Online Carbon Tool (TII, 2022b) has been commissioned by TII to assess GHG emissions associated with road or rail projects using Ireland-specific emission factors and data. Given the nature of the proposed development use of the TII carbon tool is not ideal. However, the approach can be applied to other types of developments to provide a high level assessment prior to detailed design stage.

The TII Carbon Tool (TII, 2022b) uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013). The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction / maintenance phase. The outputs are expressed in terms of tCO_2e (tonnes of carbon dioxide equivalent).

Information on the land clearance were provided by Entrust Ltd for input into the carbon tool. Information on the material quantities, site activities, waste product and construction traffic were assumed based on professional experience of similar developments. This information was used to determine an estimate of the GHG emissions associated with the development. Detailed information regarding the proposed construction materials was not available at the time of this assessment and will be specified at the detailed design stage. Best estimates have been used in this assessment to provide an estimate of the GHGs associated with the proposed development.

2.3 Operational Phase

2.3.1 Climate Change Vulnerability Assessment

The operational phase assessment involves determining the vulnerability of the proposed development to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability.

PE-ENV-01104 (TII, 2022a) states that the CCRA is guided by the principles set out in the overarching best practice guidance documents:

- EU (2021) Technical guidance on the climate proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a); and

- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (IEMA, 2020).

The baseline environment information provided in Section 3.0, future climate change modelling and input from other experts working on the proposed development (i.e. hydrologists) should be used in order to assess the likelihood of a climate risk.

The initial stage of an assessment is to establish a scope and boundary for the assessment taking into account the following criteria:

- **Spatial Boundary:** As per PE-ENV-01104 (TII, 2022a), the study area with respect to the GHGA is Ireland's Climate budget. The study area with respect to the CCRA can be considered the project boundary and its assets. The study area will be influenced by current and future baselines (Section 8.5). This study area is influenced by the input of other experts within the EIAR team;
- **Climate Hazards:** The outcomes of the climate screening i.e. vulnerability assessment and baseline assessment; and
- **Project Receptors:** TII state that the project receptors are the asset categories considered in the climate screening. In addition, any critical connecting infrastructure and significant parts of the surrounding environment e.g. water bodies that should be considered as a part of the indirect, cumulative and in combination impact assessment should also be considered project receptors.

Technical guidance on the climate proofing of infrastructure in the period 2021-2027 (European Commission, 2021a) outlines an approach for undertaking a climate change risk assessment where there is a potentially significant impact on the proposed development due to climate change. The risk assessment assesses the likelihood and consequence of the impact occurring, leading to the evaluation of the significance of the impact. The role of the climate consultant in assessing the likelihood and impact is often to facilitate the climate change risk assessment process with input from the design team or specific specialists such as hydrology.

The climate screening risk assessment or vulnerability assessment is carried out by determining the sensitivity and exposure of the project to climate change. Firstly the project asset categories must be assigned a level of sensitivity to climate hazards irrespective of the project location (example: Sea level rise will affect seaport projects regardless of specific location). PE-ENV-01104 (TII, 2022a) provide the below list of asset categories and climate hazards to be considered. The asset categories will vary for project type and need to be determined on a project by project basis.

- **Asset Categories:** Pavements; drainage; structures; utilities; landscaping; signs, light posts, buildings, and fences.
- **Climate Hazards:** Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog.

The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.

- **High Sensitivity:** The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium Sensitivity:** It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2.

- **Low Sensitivity:** It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

Once the sensitivities have been identified the exposure analysis is undertaken. The exposure analysis involves determining the level of exposure of each climate hazard at the project location irrespective of the project type for example: flooding could be a risk if the project location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High Exposure**: It is almost certain or likely this climate hazard will occur at the project location i.e. might arise once to several times per year. This is an exposure score of 3.
- **Medium Exposure:** It is possible this climate hazard will occur at the project location i.e. might arise a number of times in a decade. This is an exposure score of 2.
- **Low Exposure**: It is unlikely or rare this climate hazard will occur at the project location i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1.

Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability, as shown in Table 4. TII guidance (TII, 2022a) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. The impact from climate change on the proposed development can therefore considered to be not significant. However, where residual medium or high vulnerabilities exist the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks.

2.3.2 Climate and Traffic Emissions

Emissions from road traffic associated with the proposed development have the potential to emit carbon dioxide (CO_2) which will impact climate.

The UK Highways Agency DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency, 2019) contains the following scoping criteria to determine whether a detailed climate assessment is required for a proposed project during the operational stage. If any of the road links impacted by the proposed development meet or exceed the below criteria, then further assessment is required.

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy duty vehicles; and
- A change in daily average speed of more than 20 km/hr.

There are no road links that meet or exceed the criteria for further assessment during the operational phase of the proposed development. As a result, a detailed assessment of traffic related carbon dioxide (CO_2) emissions was not conducted.

3.0 RECEIVING ENVIRONMENT

PE-ENV-01104 (TII, 2022c) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the project for both the current and future baseline.

Ireland declared a climate and biodiversity emergency in May 2019 and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 (European Union, 2018) results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

3.1.1 Greenhouse Gas Emissions

Data published in July 2023 (EPA, 2023) predicts that Ireland exceeded (without the use of flexibilities) its 2022 annual limit set under EU's Effort Sharing Decision (ESD) (EU 2018/842) by 3.72 Mt CO_2eq. When the available flexibilities are taken into account, the limit is exceeded by 1 MtCO_2eq. The sectoral breakdown of 2021 GHG emissions is shown in Table 5. The sector with the highest emissions in 2022 was agriculture at 38.4% of the total, followed by transport at 19.1%. For 2022 total national emissions (excluding LULUCF) were estimated to be 60.76 Mt CO_2eq as shown in Table 5 (EPA, 2023).

The future baseline with respect to the GHGA can be considered in relation to the future climate targets which the assessment results will be compared against. In line with TII (TII, 2022c) and IEMA Guidance (IEMA, 2022) the future baseline is a trajectory towards net zero by 2050, "*whether it* [the project] *contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

The future baseline will be determined by Ireland meeting its targets set out in the CAP23, and future CAPs, alongside binding 2030 EU targets. In order to meet the commitments under the Paris Agreement, the European Union (EU) enacted 'Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013' (hereafter referred to as the Regulation) (European Union, 2018). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture.

Table 5. Total National GHG Emissions in 2022

Sector	2021 Emissions (Mt CO_2e)	2022 Emissions (Mt CO_2e)	% Total 2022 (including LULUCF)	% Change from 2021 to 2022
Agriculture	23.626	23.337	34%	-2.1
Transport	10.978	11.634	17%	6.0
Energy Industries	10.262	10.076	15%	-1.8

Sector	2021 Emissions (Mt CO_2e)	2022 Emissions (Mt CO_2e)	% Total 2022 (including LULUCF)	% Change from 2021 to 2022
Residential	6.992	6.105	9%	-12.7
Manufacturing Combustion	4.614	4.288	6%	-7.1
Industrial Processes	2.475	2.289	3%	-7.5
F-Gases	0.745	0.741	1%	-0.5
Commercial Services	0.765	0.767	1%	0.2
Public Services	0.672	0.659	1%	-1.9
Waste Note 2	0.726	0.867	1%	4.9
LULUFC	7.338	7.305	11%	-0.5
National total excluding LULUFC	**61.955**	**60.764**	**89%**	**-1.9**
National total including LULUFC	**62.293**	**68.069**	**100%**	**-1.8**

Note 1 Reproduced from Latest emissions data on the EPA website (EPA 2023)
Note 2 Waste includes emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste

3.1.2 Climate Change Vulnerability

Impacts as a result of climate change will evolve with a changing future baseline, changes have the potential to include increases in global temperatures and increases in the number of rainfall days per year. Therefore, it is expected that the baseline climate will evolve over time and consideration is needed with respect to this within the design of the proposed development.

Ireland has seen increases in the annual rainfall in the north and west of the country, and small increases or decreases in the south and east, including in the region where the proposed development will be located (EPA, 2021b). The EPA have compiled a list of potential adverse impacts as a result of climate change including the following which may be of relevance to the proposed development (EPA, 2021b):

- More intense storms and rainfall events;
- Increased likelihood and magnitude of river and coastal flooding;
- Water shortages in summer in the east;
- Adverse impacts on water quality; and
- Changes in distribution of plant and animal species.

The EPA's State of the Irish Environment Report (Chapter 2: Climate Change) (EPA, 2020c) notes that projections show that full implementation of additional policies and measures, outlined in the 2019 Climate Action Plan, will result in a reduction in Ireland's total GHG emissions by up to 25 per cent by 2030 compared with 2020 levels. Climate change is not only a future issue in Ireland, as a warming of approximately 0.8°C since 1900 has already occurred. The EPA state that it is critically important for the public sector to show leadership and decarbonise all public transport across bus and rail networks to the lowest carbon alternatives. The report (EPA, 2020c) underlines that the next decade needs to be one of major developments and advances in relation to Ireland's response to climate change in order to achieve these targets and that Ireland must accelerate the rate at which it implements GHG emission reductions. The report states that mid-century mean annual temperatures in Ireland are projected to increase by between 1.0°C and 1.6°C (subject to the emissions trajectory). In addition, heat events are expected to increase by mid-century (EPA, 2020c). While individual storms

are predicted to have more severe winds, the average wind speed has the potential to decrease (EPA, 2020c).

TII's Guidance document PE-ENV-01104 (TII, 2022c) states that for future climate change a moderate to high Representative Concentration Pathways (RCP) should be adopted. RPC4.5 is considered moderate while RPC8.5 is considered high. Representative Concentration Pathways (RCPs) describe different 21st century pathways of GHG emissions depending on the level of climate mitigation action undertaken.

Future climate predictions undertaken by the EPA have been published in 'Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach (EPA 2020d). The future climate was simulated under both Representative Concentration Pathway 4.5 (RCP4.5) (medium-low) and RCP8.5 (high) scenarios. This study indicates that by the middle of this century (2041–2060), mid-century mean annual temperatures are projected to increase by 1 to 1.2°C and 1.3 to 1.6°C for the RCP4.5 and RCP8.5 scenarios, respectively, with the largest increases in the east. Warming will be enhanced at the extremes (i.e. hot days and cold nights), with summer daytime and winter night-time temperatures projected to increase by 1 to 2.4°C. There is a projected substantial decrease of approximately 50%, for the number of frost and ice days. Summer heatwave events are expected to occur more frequently, with the largest increases in the south. In addition, precipitation is expected to become more variable, with substantial projected increases in the occurrence of both dry periods and heavy precipitation events. Climate change also has the potential to impact future energy supply which will rely on renewables such as wind and hydroelectric power. Wind turbines need a specific range of wind speeds to operate within and droughts or low ground water levels may impact hydroelectric energy generating sites. More frequent storms have the potential to damage the communication networks requiring additional investment to create resilience within the network.

The EPA's Critical Infrastructure Vulnerability to Climate Change report (EPA, 2021b) assesses the future performance of Irelands critical infrastructure when climate is considered. With respect to road infrastructure, fluvial flooding and coastal inundation/coastal flooding are considered the key climate change risks with snowstorm and landslides being medium risks. Extreme winds and heatwaves/droughts are considered low risk to road infrastructure. One of the key outputs of the research was a framework that will provide quantitative risk-based decision support for climate change impacts and climate change adaptation analysis for infrastructure.

National Framework for Climate Services (NFCS) was founded in June 2022 to streamline the provision of climate services in Ireland and will be led by Met Éireann. The aim of the NFCS is to enable the co-production, delivery and use of accurate, actionable and accessible climate information and tools to support climate resilience planning and decision making. In addition to the NFCS, further work has been ongoing into climate projects in Ireland through research under the TRANSLATE project. TRANSLATE (Met Éireann, 2023) has been led by climate researchers from University of Galway – Irish Centre for High End Computing (ICHEC), and University College Cork – SFI Research Centre for Energy, Climate and Marine (MaREI), supported by Met Éireann climatologists. TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted models from both CORDEX and CMIP5. Representative Concentration Pathways (RCPs) provide a broad range of possible futures based on assumptions of human activity. The modelled scenarios include for "least" (RCP2.6), "more" (RCP4.5) or "most" (RCP8.5) climate change (refer to Figure 1).

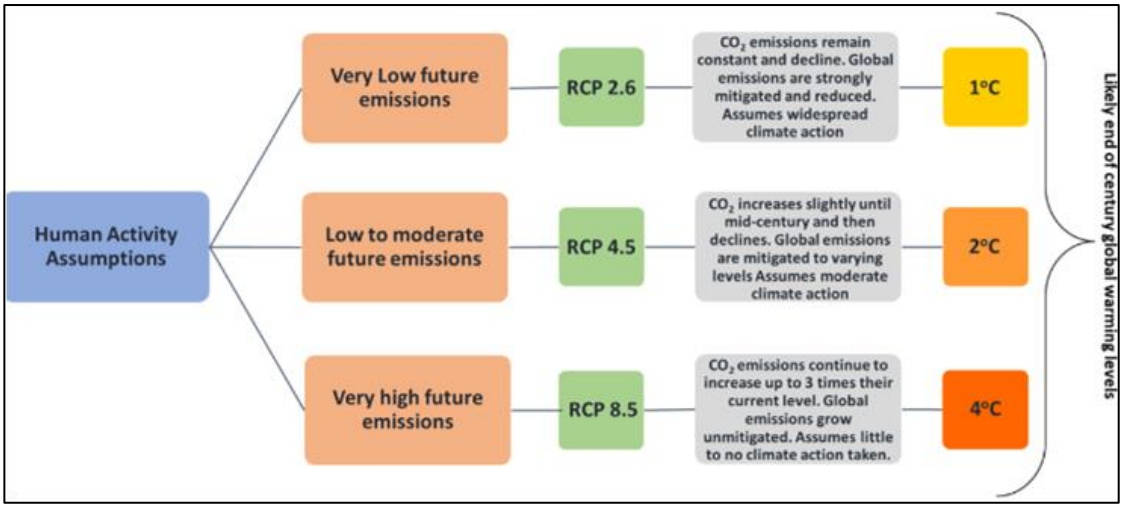

Figure 1. Representative Concentration Pathways associated emission levels

Source: TRANSLATE project storymap (Met Éireann 2023)

TRANSLATE (Met Éireann, 2023) provides the first standardised and bias-corrected national climate projections for Ireland to aid climate risk decision making across multiple sectors (for example, transport, energy, water), by providing information on how Ireland's climate could change as global temperatures increase to 1.5˚C ,2˚C, 2.5˚C, 3˚C or 4˚C. Projections broadly agree with previous projections for Ireland. Ireland's climate is dominated by the Atlantic Meridional Overturning Circulation (AMOC), a large system of ocean currents – including the Gulf Stream – characterised by a northward flow of warm water and a southward flow of cold water. Due to the AMOC, Ireland does not suffer from the extremes of temperature experienced by other countries at a similar latitude. Recent studies have projected that the AMOC could decline by 30 – 40 % by 2100, resulting in cooler North Atlantic Sea surface temperatures (SST)s (Met Éireann, 2023). Met Éireann projects that Ireland will nevertheless continue to warm, although the AMOC cooling influence may lead to reduced warming compared with continental Europe. AMOC weakening is also expected to lead to additional sea level rise around Ireland. With climate change Ireland's temperature and rainfall will undergo more and more significant changes e.g. on average summer temperature could increase by more than 2°C, summer rainfall could decrease by 9% while winter rainfall could increase by 24% (see Figure 9.2). Future projects also include a 10-fold increase in the frequency of summer nights (values > 15°C) by the end of the century, a decrease in the frequency of cold winter nights and an increase in the number of heatwaves. A heatwave in Ireland is defined as a period of 5 consecutive days where the daily maximum temperature is greater than 25°C.

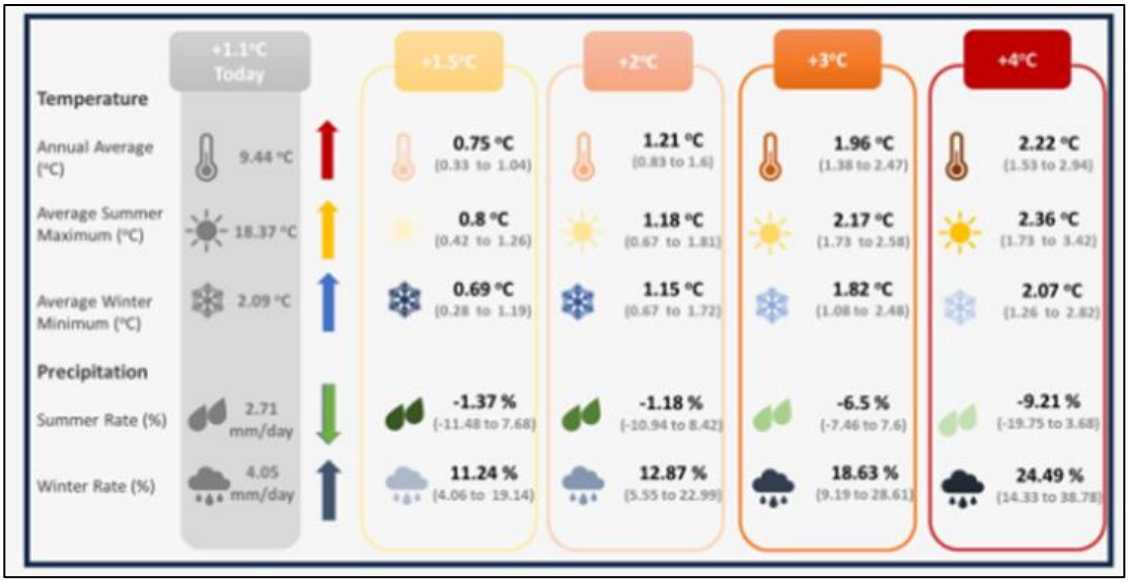

Figure 2. Change of climate variables for Ireland for different Global warming thresholds

Source: TRANSLATE project storymap (Met Éireann 2023)

4.0 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

4.1 Do Nothing Scenario

Under the Do Nothing Scenario no construction works associated with the proposed development will take place and the site will remain as it currently is. The climate baseline will continue to develop in line with the identified trends (see Section 3.0). This scenario is considered neutral in relation to climate.

4.2 Construction Phase

4.2.1 Greenhouse Gas Assessment

There is the potential for greenhouse gas emissions to atmosphere during the construction of the development. The embodied carbon associated with the construction of the proposed development has been calculated. This calculation was based on the TII Carbon Tool. The proposed development is estimated to result in total construction phase GHG emissions of 3,598 tonnes embodied CO_2e. This is equivalent to 0.002% of the 2030 Industrial sector budget or 0.0002% of Ireland's total national 2022 GHG emissions (excluding LULUCF) when annualised over the project lifespan (assumed 25 years). The significance of this impact is given in Section 4.3.1 after the operational stage has been taken into account, as the impact of GHG emissions from the project as a whole should be considered

4.2.2 Climate Change Risk Assessment

Examples of potential climate impacts are included in Annex D (Climate proofing and environmental impact assessment) of the technical guidance on the climate proofing of infrastructure (European Commission, 2021a). Potential impacts to the proposed development as a result climate change include:

- Flood risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding;

- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather;
- Reduced temperatures resulting in ice or snow;
- Geotechnical impacts; and
- Major Storm Damage – including wind damage.

Each of these potential risks are considered with respect to the operational phase of the proposed development as detailed in Section 4.3.1. During the construction phase no assessment is required; however, consideration will be given to the project's vulnerability to climate impacts. During construction, the Contractor will be required to mitigate against the effects of extreme rainfall / flooding through site risk assessments and method statements.

The Contractor will also be required to mitigate against the effects of extreme wind / storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction.

During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

4.3 Operational Phase

4.3.1 Greenhouse Gas Assessment

IMEA significance (IEMA 2022) states that where the fundamental reason for a proposed project is to combat climate change (e.g. a wind farm) and this beneficial effect drives the project need, then it is likely to be significant. As the proposed development is considered a Strategic Infrastructure Development and will enable for existing Erigrid substation to be connected to a separately proposed battery energy storage system (BESS). The function of the BESS is to provide fast frequency capacity to the grid whilst reducing the need for conventional back up generation, and will increase Ireland's system non-synchronous (SNSP) limit (curtailment of non-synchronous renewable sources, which provide more electricity at some times more than others) to 95% by 2030 (IIEA, 2023). Considering the significance criteria set out in PE-ENV-01104 (TII, 2022) and Table 3, the proposed project, as enabling infrastructure for renewable energy sources, aligns with Ireland's GHG trajectory to net zero by 2050 as per TII Guidance (TII 2022).

The impact of the GHG emissions associated with the lifetime of the Proposed Development is therefore considered to be long-term and neutral impact to climate.

There is the potential for increased traffic volumes to impact climate during the operational phase. However, traffic related impacts have been screened out of this assessment as per the criteria in Section 2.3.2. Impacts to climate as a result of traffic emissions are considered neutral.

4.3.2 Climate Change Risk Assessment

In order to determine the vulnerability of the proposed development to climate change the sensitivity and exposure of the development to various climate hazards must first be determined. The following climate hazards have been considered in the context of

the proposed development: flooding (coastal, pluvial, fluvial), extreme heat, extreme cold, wildfire, drought, extreme wind, lightning, hail, landslides and fog.

The sensitivity of the proposed development to the above climate hazards is assessed irrespective of the project location. Table 6 details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the proposed development to each of the climate hazards is determined, this is the likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the proposed development to each of the climate hazards as per Table 4. The results of the vulnerability assessment are detailed in Table 6.

Table 6. Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (Coastal, Pluvial, Fluvial)	1 (Low)	2 (Medium)	2 (Low)
Extreme Heat	1 (Low)	1 (Low)	1 (Low)
Extreme Cold	1 (Low)	1 (Low)	1 (Low)
Wildfire	1 (Low)	1 (Low)	1 (Low)
Drought	1 (Low)	1 (Low)	1 (Low)
Extreme Wind	1 (Low)	1 (Low)	1 (Low)
Lightning & Hail	1 (Low)	1 (Low)	1 (Low)
Landslides	1 (Low)	1 (Low)	1 (Low)
Fog	1 (Low)	1 (Low)	1 (Low)

The proposed development has at most low vulnerabilities to the identified climate hazards. A site-specific Flood Risk Assessment has been submitted to accompany this application, as prepared by IE Consulting Ltd, states that the proposed development site falls within Zone C and therefore flooding is not considered a significant risk. The finished ground levels within the site range from 16.00m OD (Malin) within the western area of the site to 12.00m OD (Malin) within the eastern area of the site. These proposed finished ground levels are significantly elevated above the predictive 0.1% AEP + CC (1 in 1000 year + climate change) NCFHM coastal/tidal flood level.

Due to the underground nature of the infrastructure, the majority of climate hazards are not a risk.

5.0 MITIGATION MEASURES

This section outlines the measures that will be employed in order to reduce GHG emissions from the project and the impact of a changing climate on the project and receiving environment in such a manner as to minimise the effects on the environment.

5.1 Construction Phase

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.
- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.
- Waste materials will be re-used on site where possible and where re-use is not possible on-site they will be sent off-site for recycling, re-use or recovery.
- Sourcing materials locally where possible to reduce transport related CO_2 emissions.

5.2 Operational Phase

No mitigation is proposed for the operational phase as no significant impacts are predicted.

6.0 RESIDUAL EFFECTS OF THE PROPOSED DEVELOPMENT

The impact to climate as a result of a proposed development must be assessed as a whole for all phases. The proposed development will result in some impacts to climate through the release of GHGs. TII state that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*". The proposed development has proposed some best practice mitigation measures and is committing to reducing climate impacts where feasible. As the proposed development is providing storage for renewable energy, its impact of GHG emissions from the proposed project align with Ireland's GHG trajectory to net zero by 2050 as per TII Guidance (TII 2022).

As per the assessment criteria in Table 3 the impact of the proposed development in relation to GHG emissions is considered ***long-term*** and ***neutral***.

In relation to climate change vulnerability, it has been assessed that there are no significant risks to the proposed development as a result of climate change.

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