7 Air Quality and Climate

7.1 Introduction

This chapter describes the likely effects of the proposed development on ambient air quality and climate during its construction, operational and decommissioning phases. Mitigation measures are also detailed that minimise effects on air quality and climate, where required.

The proposed development (encompassing the onshore elements in Ireland only) will comprise:

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

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

Converter Station – a converter station situated close to the existing Eirgrid 220kV Great Island substation in Wexford;

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

Converter Station Construction Compound: temporary compound for the construction of the converter station and tail station at Great Island.

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

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

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

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

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

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

A detailed description of the proposed development, including design, operation and decommissioning of the proposed development is provided in **Chapter 3** whilst **Chapter 4** describes the general activities associated with the construction of the proposed development.

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

7.2 Assessment Methodology

7.2.1 Air Quality

Air quality assessments are concerned with the presence of airborne pollutants in the atmosphere. The likely significant effects of the proposed development on air quality have been assessed by considering the background concentrations of pollutants in the atmosphere and the potential for construction, operation and decommissioning phase effects associated with the proposed development.

This assessment has also been undertaken with regard to the requirements of the Transport Infrastructure Ireland (TII), (formerly the National Roads Authority (NRA) document *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes, 2011* (TII, 2011).

These guidelines are appropriate for the assessment as the primary sources of emissions to air will be construction activities and traffic. The proposed development will affect traffic volumes in its vicinity during the construction and operational phases. There will be no routine process emissions to air during the operational phase. In the absence of process emissions, this guidance is the most appropriate guidance due to its semi quantitative approach to determine the likelihood of a significant effect. The guidelines also address climate effects.

The effect of the proposed development on air quality is assessed for both the construction and operational phases by considering the following parameters which are relevant to the proposed development:

- The pollutant background concentrations;
- Emissions from road traffic; and
- The potential for construction dust.

Predicted concentrations associated with the proposed development are then compared to the relevant limit values which are described in detail in **Section 7.2.2** to determine likely significant effects. Consideration is also given to proposed new emission sources on site (i.e. a generator).

7.2.2 Climate

The emissions from the construction and operational phases of the proposed development have been assessed in the context of Ireland's annual greenhouse gas emissions and carbon reduction obligations, and the carbon intensity of electricity generation in Ireland. Indirect effects on climate and the vulnerability of the project to climate change effects is also addressed.

7.2.3 Guidance and Legislation

7.2.3.1 Air Quality

To reduce the risk of poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values are set for the protection of human health and ecosystems.

On 12th April 2011, the *Air Quality Standards (AQS) Regulations 2011* (S.I. No. 180 of 2011) (Irish Government, 2011) came into force and transposed EU *Directive 2008/50/EC* (EC, 2008) of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe into Irish law. The purpose of the AQS Regulations is to:

- establish limit values and alert thresholds for concentrations of certain pollutants;
- to provide for the assessment of certain pollutants using methods and criteria common to other European Member States;
- to ensure that adequate information on certain pollutant concentrations is obtained and made publicly available; and
- to provide for the maintenance and improvement of ambient air quality where necessary.

The limit values established under the AQS Regulations relevant to this assessment are included in **Table 7.1**.

Table 7.1: Limit values in the AQS Regulations

Pollutant	Limit value for the protection of:	Averaging period	Limit value ($\mu g/m^3$)	Basis of application of limit value	Limit value attainment date[1]
NO_2	Human Health	1-hour	200	≤ 18 exceedances p.a. (99.79%ile)	1 January 2010
		Calendar year	40	Annual mean	1 January 2010
NO_x	Vegetation	Calendar year	30	Annual mean	1 January 2010
PM_{10}	Human Health	24-hours	50	≤ 35 exceedances p.a. (90%ile)	1 January 2005

[1] CAFE Directive 2008/50/EC- ambient air quality and cleaner air for Europe

Pollutant	Limit value for the protection of:	Averaging period	Limit value (μg/m³)	Basis of application of limit value	Limit value attainment date[1]
		Calendar year	40	Annual mean	1 January 2005
$PM_{2.5}$	Human Health	Calendar year	25	Annual mean	1 January 2015
		3 year average	20	Annual mean	1 January 2015
		3 year average	18 Note 1	Annual mean	1 January 2015
SO_2	Human Health	1-hour	350	≤ 24 exceedances	1 January 2015
	Ecosystems	Calendar year	20	Annual mean	1 January 2001

Note 1: Reduction to be attained where possible in 2020, determined on the basis of the value of exposure indicator in 2010.

There are no national or EU limits for dust deposition. However, the *TA Luft Technical Instructions on Air Quality* (TA Luft, 2002) provide a guideline for the rate of dust deposition of 350 mg/m²/day averaged over one year. The Environmental Protection Agency (EPA) concurs that this guideline may be applied, although applied as a 30-day average, in its document *Environmental Management in the Extractive Industry (Non-Scheduled Minerals)* (EPA, 2006).

7.2.3.2 Climate

In October 2014, the European Council reached political agreement on headline greenhouse gas emissions reduction targets in the context of the *2030 Climate and Energy Framework* (EC, 2014). An overall EU reduction of at least 40% in greenhouse gas emissions by 2030 compared to 1990 levels is to be delivered collectively by the EU.

EU greenhouse gas emission reduction targets and reduction obligations for Ireland are split into two broad categories. The first category covers the large energy and power (i.e. energy intensive) industry which have their emissions controlled under the EU Emissions Trading Scheme (ETS). The second category deals with the non-Emissions Trading Scheme (non-ETS) sectors such as agriculture, transport, residential, commercial, waste and non-energy intensive industry. The proposed development will operate within the non-ETS sector.

Ireland's 2030 target is to achieve a 30% reduction of non-Emissions Trading Scheme sector emissions on 2005 levels with annual binding limits set for each year over the period 2021-2030[2].

The *Climate Action and Low-Carbon Development National Policy Position* (Department of Communications, Climate Action and Environment (DCCAE),

[2] EPA (2018). Press release: http://www.epa.ie/newsandevents/news/pressreleases2018/name,64049,en.html [Accessed: 16 January 2019]

2013) for Ireland was published in 2013. The Position provides a high-level policy direction for the adoption and implementation by Government of plans to enable the State to move to a low carbon economy by 2050.

The *Climate Action and Low Carbon Development Act* (Irish Government, 2015) was published by government in January 2015. The Act sets out the national objective of transitioning to a low carbon, climate resilient and environmentally sustainable economy in the period up to 2050. The act provides for the preparation of National Mitigation Plans and Sectoral Plans which will specify policies to reduce greenhouse gas emissions for each sector. The first *National Mitigation Plan* (DCCAE, 2017) was published in July 2017 by the DCCAE. The Plan is designed to be a whole-of-Government approach to tackling greenhouse gas emissions, particularly, in the key sectors i.e. electricity generation, the built environment, transport and agriculture.

The *Climate Action Plan 2019 to Tackle Climate Breakdown* was published and sets out the actions the Government intends to take to address climate breakdown across sectors such as electricity, transport, built environment, industry and agriculture. This comes after the Irish Government declared a climate emergency in May 2019.

7.2.4 Impact Assessment Methodology

7.2.4.1 Design Manual for Roads and Bridges (DMRB) Guidelines

The *UK Highways Agency, Design Manual for Roads and Bridges (DMRB)* Volume III, Section 3, Part 1 Air Quality provides a Screening Method (Version :1.03c) spreadsheet (DMRB, 2007) which is used to calculate annual average concentrations of NO_x, NO_2 and PM_{10} at selected receptors. The spreadsheet method computes concentrations of pollutants based on factors including:

- Location and distance of sensitive receptors to road;
- Traffic volumes, Annual Average Daily Traffic (AADT), and percentage of Heavy Goods Vehicles (HGVs)/Light Goods Vehicles (LGVs) based on ‘do nothing’ (DN) and ‘do-something’ (DS) AADTs for the opening year and design year;
- Average speed of traffic;
- Traffic composition, including Heavy Goods Vehicle (HGV) percentages;
- Road type; and
- Background pollutant concentrations.

7.2.4.2 Transport Infrastructure Ireland (TII) Guidelines

Construction – Dust

As stated in the TII Guidance it is:

‘*very difficult to accurately quantify dust emissions arising from construction activities*’. ‘*A semi quantitative approach is recommended to determine the* *likelihood of a significant impact, which should be combined with an assessment of the proposed mitigation measures'.*

The semi-quantitative assessment methodology outlined in **Table 7.2** is used to assess the effect of dust during the construction phase.

TII guidance states that dust emissions from construction sites can lead to elevated PM_{10} concentrations and can cause soiling of properties, as well as effects on vegetation such as reduction in light required for photosynthesis and an increase in leaf temperature due to changed surface optical properties. The effect of dust emissions during the construction phase is assessed by estimating the area over which there is a risk of significant effects, in line with the TII guidance.

Table 7.2: Assessment criteria for the effect of dust emissions from construction activities with standard mitigation in place

Source		Potential distance for Significant Effects (Distance from Source)		
Scale	Description	Soiling	PM_{10}[3]	Vegetation Effects
Major	Large construction sites, with high use of haul routes	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50m	15m	15m
Minor	Minor construction sites, with limited use of haul routes	25m	10m	10m

Construction - NOx

In accordance with Section 4.2.6 of the TII guidelines, referred to above, emissions from construction vehicles should be assessed where construction traffic results in a significant (>10%) increase in AADT flows near sensitive receptors in.

Significance criteria outlined in **Table 7.3**, **Table 7.4** and **Table 7.5** are used to assess the effect of the construction traffic on worst-case sensitive receptors. **Table 7.3** presents descriptors for magnitude of change due to the scheme. **Tables 7.4 and 7.5** sets out the impact descriptors, taking account of the impact magnitude, the absolute concentration of pollutants and how they relate to the air quality standards or limits. In **Tables 7.4 and 7.5**, "increase with scheme" is the circumstance when the scheme will result in an increase in the concentration of pollutants. "Decrease with scheme" is the circumstance when the scheme will result in a decrease in the concentration of pollutants. **Table 7.4** should be read as follows: if the project being assessed will result in an increase in Annual Mean NO_2 or PM_{10} concentration of between 2 and 4μg/m^3, **Table 7.3** defines this as a "medium" magnitude of change. If this medium magnitude increase in pollutant concentration results in the total concentration of that pollutant plus the background level being above the Air Quality Objective or Limit value, **Table 7.4** defines this as a "moderate

[3] Significance based on the PM_{10} Limit Values specified in SI No. 180 of 2011, which allows 35 daily exceedances/year of 50 μg/m^3

adverse" impact. If the medium magnitude increase results in the total concentration being "below" (30⩽36 µg/m^3 of NO_2 or PM_{10}) (18.75⩽22.5 µg/m^3 of $PM_{2.5}$) the Air Quality Objective or Limit value, **Table 7.4** defines this as a "slight adverse" impact.

Table 7.3: Definition of impact magnitude for changes in ambient pollutant concentrations

Magnitude of Change	Annual Mean NO_2/PM_{10}	No. days with PM_{10} greater than 50 ug/m^3	Annual Mean $PM_{2.5}$
Large	Increase/decrease ≥ 4µg/m^3	Increase/decrease >4 days	Increase/decrease ≥2.5 µg/m^3
Medium	Increase/decrease 2-<4µg/m^3	Increase/decrease 3 or 4 days	Increase/decrease 1.25 -<2.5µg/m^3
Small	Increase/decrease 0.4-<2µg/m^3	Increase/decrease 1 or 2 days	Increase/decrease 0.25-<1.25µg/m^3
Imperceptible	Increase/decrease <0.4µg/m^3	Increase/decrease <1 day	Increase/decrease <0.25µg/m^3

Table 7.4: Air quality effect descriptors for changes to annual mean nitrogen dioxide and PM_{10} and $PM_{2.5}$ concentrations at a receptor

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration[4]		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m^3 of NO_2 or PM_{10}) (≥25µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36≤40 µg/m^3 of NO_2 or PM_{10}) (22.5≤25µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30≤36 µg/m^3 of NO_2 or PM_{10}) (18.75≤22.5 µg/m^3 of $PM_{2.5}$)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µg/m^3 of NO_2 or PM_{10}) (<18.75µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value Without Scheme (≥40 µg/m^3 of NO_2 or PM_{10}) (≥25µg/m^3 of $PM_{2.5}$)	Sight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value Without Scheme (36-<40 µg/m^3 of	Sight Beneficial	Moderate Beneficial	Moderate Beneficial

[4] Where the impact magnitude is imperceptible, then the impact description is negligible.

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration[4]		
	Small	Medium	Large
NO_2 or PM_{10}) (22.5-<25µg/m^3 of $PM_{2.5}$)			
Below Objective/Limit Value Without Scheme (30-<36 µg/m^3 of NO_2 or PM_{10}) (18.75-<22.5 µg/m^3 of $PM_{2.5}$)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value Without Scheme (<30 µg/m^3 of NO_2 or PM_{10}) (<18.75µg/m3 of $PM_{2.5}$)	Negligible	Negligible	Slight Beneficial

Table 7.5: Air quality effect descriptors for changes to number of days with PM_{10} concentration greater than 50 µg/m^3 at a receptor

Absolute Concentration in Relation to Objective/Limit Value	Changes in Concentration		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (32-<35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (26-<32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value Without Scheme (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value Without Scheme (32-<35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value Without Scheme (26-<32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value Without Scheme (<26 days)	Negligible	Negligible	Slight Beneficial

Operation

There will be no process emissions from the routine operation of the proposed development. The only routine operational emissions will be from the traffic generated and from the once-per-year 8-hour test run of the standby generator. In the absence of process emissions, the TII Guidelines,

Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (TII, 2011), are the most relevant guidance. The TII guidelines specify that the changes in pollutant concentrations alongside roads with a significant change in traffic should be assessed. It states that receptors should be considered at all road links where a greater than 5% change in flows or speeds is predicted for the "Do-Something" option.

7.3 Baseline Conditions

7.3.1 National Air Quality

In 2019, the EPA reported that emissions of nitrogen oxides (NO_x) decreased by 38.% between 1990 and 2017, (EPA 2019a). The transport sector, which mainly consists of road transport, is the principal source of NO_x emissions, contributing approximately 41 per cent of the total in 2017. Road transport saw a decline in emissions of 12.7 kt, or 25.4 per cent, between 2008 and 2017 due to the economic recession and improvements in vehicle technologies.

Power stations accounted for 7.5% of NOx emissions (8.12kt) in 2017.

The EPA reported the emissions of sulphur dioxide, SO_2 in 2017 were 13.2kt, of which power generation was responsible for 29.4% (3.88kt). The EPA did not separate out the contribution by power stations to annual $PM_{2.5}$ emissions, which were 11.9kt in 2017. Power generation and industry contributed 17.7% (2.1kt).

7.3.2 Local Air Quality

The EPA *Air Quality in Ireland 2018* (EPA, 2019b) describes the air quality zoning adopted in Ireland under the Air Quality Standards Regulations, 2011 as follows:

- Zone A (Dublin Conurbation);
- Zone B (Cork Conurbation);
- Zone C (16 Cities and Towns with population greater than 15,000); and
- Zone D (Rural Ireland: areas not in Zones A, B and C).

The area in which the proposed development is located is in Zone D. Consequently, the EPA's monitoring data for Zone D are the relevant background air quality data for the proposed development.

The annual mean background concentration levels of NO_x, NO_2, $PM_{2.5}$ and PM_{10} from EPA monitoring undertaken during 2016 to 2018 (EPA, 2018, 2019b and 2017) are presented in **Table 7.6**. Concentrations of each pollutant, recorded in Zone D, are averaged to represent typical background levels. Average concentrations were obtained from all stations where data is captured for at least 90% of the time. This is in accordance with Directive 2008/50/EC which specifies that any site used for assessment purposes must comply with 90% data capture.

Table 7.6: Annual mean background pollutant concentrations for Zone D

Background Values	Annual Average NO_x (µg/m³)	Annual Average NO_2 (µg/m³)	Annual Average PM_{10} (µg/m³)	Annual Average $PM_{2.5}$ (µg/m³)	Annual Average SO_2 (µg/m³)	Hourly Max SO_2 (µg/m³)
2016	10.0	6.3	13.1	9.0		
2017	5.7	4.4	9.9	7.4		
2018	6.7	4.7	11.8	9.4	2.6	16
Average	**7.5**	**5.1**	**11.6**	**8.6**		
Limit	**30**	**40**	**40**	**20**	**20**	**350**

It can be seen from Table 7.6 that the average concentration of the monitored pollutants in Zone D, in the three years for which the data is presented, is well below the air Quality Standard limits.

7.3.3 Climate

7.3.3.1 Macro-Climate

In October 2019, the EPA released the report *Ireland's Provisional Greenhouse Gas Emissions 1990-2018* (EPA, 2019c). This report stated that total national greenhouse gas emissions in 2018 were estimated to be 60.507 million tonnes carbon dioxide equivalent (Mt CO_{2eq}). This is 0.2% lower (0.144 Mt CO_{2eq}) than emissions in 2017. Ireland's greenhouse gas emissions for non-ETS sectors were estimated to be 44.97 Mt $CO_{2\,eq}$ in 2018. This is 5.17 Mt $CO_{2\,eq}$ greater than the EU target for Ireland for the non-emission trading scheme sector. The greenhouse gas emissions from energy industries were 10.37 Mt $CO_{2\,eq}$, which represents a 11.7% drop on the 2017 level.

According to the SEAI, the carbon intensity of electricity generation in Ireland in 2018 was 375 gCO_2/kWh, which is a 13.6% reduction in the emission intensity of power generation, from the 2017 figure of 436g CO_2/kWh. Without renewable generation, the carbon intensity of electricity generation would have been over 500 gCO_2/kWh.

The EPA Report *Ireland's Greenhouse Gas Emission Projections 2018-2040* (EPA, 2019d) projects total greenhouse gas emissions and non-ETS sector emissions (Mt CO_2 eq.) to 2040. **Table 7.7** presents the projections.

Current projections by the EPA indicate that Ireland will exceed its greenhouse gas emissions reduction targets of 80% reduction on the 2005 level by 2040 for the electricity, building and transport sectors.

Table 7.7: Projected Emissions for the Non-ETS Sector and Total Emissions (EPA, 2019c)

Projections (with existing measures) Note 2	Year	Non-ETS Sector Only (Mt CO_2 eq.)	Total (Mt CO_2eq)
	2020	44.57	61.53

	2025	44.26	63.81
	2030	43.99	64.33
	2035	43.39	61.32
	2040	42.81	60.74
Projections (with additional measures) Note 3	2020	43.98	60.53
	2025	43.05	61.43
	2030	41.08	54.56
	2035	39.50	55.20
	2040	37.90	55.07

Note 2: With Existing Measures scenario assumes that no additional policies and measures, beyond those already in place by the end of 2017, are implemented. (EPA, 2019c)

Note 3: With Additional Measures scenario assumes implementation of the existing measures and planned policies and measures, as set out in the National Renewable Energy Action Plan (NREAP), the National Energy Efficiency Action Plan (NEEAP) and the National Development Plan 2018 - 2027 (EPA, 2019c).

7.3.3.2 Micro-Climate

The nearest representative Met Éireann synoptic meteorological station to the proposed development is at Johnstown Castle, County Wexford. All climate data cited below is taken from the 3-year averages reported for 2017, 2016 and 2015 for the Johnstown Castle meteorological station (www.met.ie).

- The annual mean temperature is 10.2°C.
- The annual mean rainfall is 1,007mm.
- The annual mean wind speed is 4.5m/s (8.8 knots).

7.4 Potential Effects

7.4.1 Do-Nothing Scenario

Under the ‘do nothing’ scenario, the baseline environment, as set out in **Section 7.3**, would remain the same with none of the predicted effects occurring. Renewable electricity generation is likely to continue to increase, and in the absence of additional international interconnection, current levels of curtailment will increase, limiting the benefit of additional renewable generation coming onto the grid in Ireland.

7.4.2 Construction Phase

7.4.2.1 Dust

Chapter 4 *Construction Strategy* provides a description of the proposed strategy and methods of construction for the proposed development.

Dust emissions are likely to arise from the following activities:

- Site excavation and earthworks;
- Trenching;
- Stockpiling of materials;
- Handling of construction materials;
- Construction traffic movements; and
- Landscaping.

During the construction phase, the potential for significant dust emissions will only arise in respect of works in dry weather and during such activities the levels of dust are likely to be small. Dust may be raised by wind from dry surfaces and temporary stockpiles.

In general, any additional airborne concentrations of particulate matter arising from construction would be small and very local to the construction sites (minimising human exposure). Particles generated by most construction activities tend to be larger than 10µm in diameter, and are too large to enter the human lung.

The construction phase of the proposed development is of a moderate scale, based on the greatest level of construction activity along the proposed development. This has the potential to result in soiling effects within 50m and PM_{10} and vegetation effects within 15m of the works post mitigation, as indicated by **Table 7.2.**

Several sensitive receptors, primarily residential receptors, are located along the route of the onshore cables. The closest of these is located approximately one metre from the edge of the proposed works area.

There is therefore potential for soiling, PM_{10} and vegetation effects arising from construction activities along the onshore cable route. With the implementation of the standard mitigation measures outlined in **Section 7.5.1**, a short term, slight negative effect is predicted for the duration of the cable works in the immediate vicinity. The impacts on biodiversity due to the construction phase are addressed in **Chapter 9**, *Biodiversity*, **Section 9.4.2**.

7.4.2.2 Construction Air Quality

Air emissions from the exhausts of construction plant, machinery and haulage trucks will also be slightly elevated during construction.

The annual mean NO_2 in Zone D, presented in **Table 7.6** above, is 12.5% of the air quality standard limit for NO_2 of 40 µg/m^3, which has been determined for the protection of human health. Short term increases in this concentration, which could arise during the construction phase, are not expected to result in an exceedance of the annual limit and are not expected to be significant.

The max 1-hour level of SO_2 in Zone D, presented in **Table 7.6** above, is 4.5% of the air quality standard limit 1-hour for SO_2 of 350 µg/m^3 (not to be exceeded for more than 24 1-hour periods) which has been determined for the protection of human health.

Short term increases in this concentration, which could arise during the construction phase, are not expected to result in an exceedance of the 1-hour limit and are not expected to be significant.

The annual mean PM_{10} in Zone D, presented in **Table 7.6** above, is 29% of the air quality standard limit for PM_{10} of 40 µg/m^3, which has been determined for the protection of human health. Short term increases in this concentration, which could arise during the construction phase, are not expected to result in an exceedance of the annual limit and are not expected to be significant.

The 3-year mean $PM_{2.5}$ in Zone D, presented in **Table 7.6** above, is 43% of the air quality standard limit for $PM_{2.5}$ of 20 µg/m^3, which has been determined for the protection of human health. Short term increases in this concentration, which could arise during the construction phase, when averaged over 3 years, are not expected to result, in an exceedance of the annual mean limit and are not expected to be significant.

No odour emissions are predicted from the proposed construction works.

7.4.2.3 Construction Traffic

As outlined in Section 7.2.3.2, emissions from construction vehicles are assessed where construction traffic results in a significant (>10%) increase in AADT (annual average daily traffic) flows near sensitive receptors.

The traffic increase during the construction phase will not exceed 10% on any existing roads for any prolonged period. It will exceed 10% for periods of short duration; however, AADT measures traffic volumes over the entire year, and when these increases over the construction and diversion periods (typically 10-day) are considered over a full year, the average will be well below the significance criterion of 10%, in accordance with the TII Guidelines. A short term, imperceptible effect on air quality is predicted.

Traffic increases of greater than 10% are predicted, for short periods of time, at the following locations, as documented in **Section 6.5.1** of **Chapter 6**:

- R733 North of Horeswood Nurseries and the new N25 interchange south of New Ross
- Local road between Horeswood Nurseries and Great island
- Local road between Templars Inn and Baginbun.

The predicted increases in air pollutants associated with this increased traffic will be negligible. For the R733, increases in nitrogen dioxide will be 1.51 per cent of the limit values, and increases in PM_{10} will be 0.28 per cent of the limit values. For the local road between Horeswood Nurseries and Great Island, the increase in nitrogen dioxide will be 0.6 per cent of the limit values, and the increase in PM_{10} will be 0.1 percent of the limit values. For the local road between Templars Inn and Baginbun the increase in nitrogen dioxide will be 0.09 per cent of the limit values, and the increase in PM_{10} will be 0.01 per cent of the limit values.

7.4.2.4 Climate

As stated above, the traffic increase during the construction phase will not exceed 10% on any existing roads for any prolonged period. There will be short-term changes in traffic volumes on local roads during temporary (typically 10-day) diversions, but the changes in AADT will be well below the significance criterion of 10%, identified in the TII Guidelines. Consequently, given the scale of the proposed works, and their temporary nature, CO_2 emissions predicted to arise during the construction phase of the proposed development are not expected to be significant, and a short term, imperceptible negative effect on climate is predicted.

7.4.2.5 Indirect Effects

Biodiversity

A potential interaction between air quality and climate effects and biodiversity during the construction and decommissioning phases of the proposed development has been identified. Dust generated during the construction and decommissioning works has the potential to affect habitats along the onshore cable route and close to the converter station and tail station. Emissions to air such as NOx and SO_2 from construction equipment, and the consequential impact on air quality, has the potential to have a negative impact on biodiversity.

The annual mean NO_x in Zone D, presented in **Table 7.6** above, is 25% of the air quality standard limit for NO_x of 30 μg/m^3, which has been determined for the protection of vegetation. Short term increases to this concentration, which could arise during the construction phase, are not expected to result in an exceedance of the annual limit and are not predicted to be significant.

The annual mean SO_2 in Zone D, presented in **Table 7.6** above, is 13% of the air quality standard limit for SO_2 of 20 μg/m^3, which has been determined for the protection of vegetation. Short term increases to this concentration, which could arise during the construction phase, are not expected to result in an exceedance of the annual limit and are not expected to be significant.

Human Health

A potential interaction between air quality and population and human health during the construction and decommissioning phases of the proposed development is identified. Emissions to air of NO_2, SO_2 and particulates from construction equipment or traffic, and the consequential impact on air quality, has the potential to have a negative impact on human health. However, as explained in **Section 7.4.2.2** above, the existing background levels of the relevant pollutants are significantly below the air quality standards. The short term increases to the background levels due to the emissions to air from construction equipment and traffic are not expected result in exceedances of the air quality standards, which are determined for the protection of human health. Consequently, a significant effect on human health is not expected.

7.4.3 Operational Phase

7.4.3.1 Air Quality

There will be no routine process emissions to air from the operation of the proposed development. The only potentially significant source of emissions to air from the operation of the proposed development will be the standby diesel generator. This will be a 2 Mega Volt Amp (MVA) unit. In normal circumstances, the generator will only run for eight hours a year, as part of its routine maintenance. Emissions from the generator will be NOx, SO_2, PM_{10} and $PM_{2.5}$. As demonstrated in **Section 7.4.2.2** above, the background concentrations of these parameters in Zone D are significantly below the respective air quality standard limits. The 8-hour test run of the generator, once per year, is not expected to cause an exceedance of any of the air quality standards or to have a significant negative effect on air quality.

As outlined in **Section 7.2.3.2**, emissions from operational vehicles are assessed where traffic results in a significant (>5%) increase in AADT flows near sensitive receptors.

Traffic levels during the operational phase will be minimal, as detailed in **Chapter 6** *Traffic and Transportation*. As no increase in traffic >5% is likely to be generated during the operational phase of the proposed development, a short term, imperceptible effect on air quality is predicted.

7.4.3.2 Climate

Potential Negative Effects

There will be no combustion processes and no routine emissions of greenhouse gases from the proposed development. Direct negative operational effects on climate will arise from the combustion of diesel, a fossil fuel, in the proposed standby diesel generator. In normal circumstances, the generator will only run for eight hours a year, as part of its routine maintenance. The greenhouse gas emission from the 8-hour operation of the generator will be very minor and result in a long term, imperceptible effect on climate.

Sulphur hexafluoride (SF_6) gas will be used at two locations in the converter station – 22kg in a 220kV circuit breaker (located outdoors within the converter station switchyard), and approximately 140kg in a 220kV gas insulated switchgear circuit breaker bay and associated gas insulated busbar (located indoors within the tail station gas insulated switchgear room). At the converter station, there may also be an SF_6 gas cylinder in storage, containing 13kg of gas.

SF_6 is an extremely potent greenhouse gas, with a global warming potential of 23,000 times that of carbon dioxide when compared over a 100-year period. Strict controls will be established to ensure best industry practice in the management, reporting, monitoring and controls of the gas, as outlined in **Section 7.6.1.2** below.

Potential Positive Effects

In **Chapter 16**, *Material Assets*, **Section 16.4.3**, Eirgrid reported that 707GWh of wind energy was despatched down (i.e. available but could be used by the system) in 2018. This was a 220% increase on the 2017 dispatched down figure. If Greenlink had been available in 2018, assuming 90% of the 707GWh, which was dispatched down, could have be exported to the Great Britain or to the Europe mainland via Great Britain. This would have displaced fossil fuel generation there and (assuming a carbon intensity in the fossil fuel generation being displaced of 500 gCO_2/kWh) circa 318,000 tonnes of global CO_2 emissions would have been avoided. As the amount of renewable generation increases, the amount which will have to be dispatched down will increase, in the absence of Greenlink.

According to SEAI, renewables made up 33.2 % of electricity generation in 2018, up from 28.9% in 2017 (SEAI (2018), SEAI (2019)). The carbon intensity of electricity generated fell from 437gCO_2/kWh in 2017 to 375 gCO_2/kWh in 2018. Total electrical generation in 2018 was 30,896GWh, up from 30,667GWh in 2017. If Greenlink had been available, it may have been possible to replace some of the 23,800GWh non-renewable generation by renewable energy generated in the UK or Europe. This would have saved 1.75 million tonnes of carbon emissions in 2018 (assuming a carbon intensity of 500 gCO_2/kWh and Greenlink importing electricity for 80% of the time).

The design life of the converter station is 40 years. As indicated in **Section 3.6.17**, in **Chapter 3**, *Proposed Development,* if feasible, the equipment would be refurbished, and the design life would be extended. Making the following the assumptions:

- the life of Greenlink is 40 years,
- the carbon intensity of fossil fuel generation in Ireland decreases uniformly from 500 gCO_2/kWh to 250 gCO_2/kWh over 40 years,
- Greenlink operates to avoid fossil fuel generation 90% of the time,

Greenlink has the potential to save circa 59 million tonnes of CO_2 emissions over its 40-year life.

7.4.3.3 Indirect Effects – Air Quality

The proposed project will help decarbonise power generation and support the growth and integration of low-carbon energy. For example, the total emissions of NO_x, SO_2 and $PM_{2.5}$ from power generation in Ireland in 2017 were 8.12kt, 3.88kt and 2.1kt, respectively. The total power generation by renewables in 2017 was 8877GWh. If Greenlink had been available in 2017, some of the 21,790GWh non-renewable power generation could have been replaced by importing renewable power generated in the UK or Europe, which would have saved circa 1.6kt of NO_x emissions, circa 0.75kt of SO_2 emissions and circa 0.4kt of $PM_{2.5}$ emissions (assuming Greenlink was available to import renewable generation 90% of the time). This reduction in the emissions of pollutants would have improved air quality, which in turn will have a beneficial effect on human health.

7.4.3.4 Indirect Effects - Biodiversity

The beneficial effect of the operation of the proposed development on air quality and climate has the potential to have a long-term beneficial effect on biodiversity. The operation of Greenlink will support renewable generation. The emissions of pollutants and carbon dioxide from fossil fuel power generation will be reduced, as explained above.

The reduction in greenhouse gas emissions which will occur if Greenlink is operating as outlined above, will help slow down climate change.

The reduced emissions of pollutants and greenhouse gases, with Greenlink in operation, will have a beneficial effect on the biodiversity. **Chapter 9** *Biodiversity* presents an evaluation of these potential effects.

7.4.4 Decommissioning

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

The decommissioning activities have the potential to generate dust, but the intensity and duration of the activities will be less than that associated with construction activities. Similarly, any NO_x, NO_2, SO_2 and particulates generated by decommissioning activities will be less than those associated with construction activities. With the implementation of the decommissioning-phase mitigation measures outlined in **Section 7.6** below, no significant adverse effects are predicted.

7.5 Vulnerability to Climate Change

According to the EPA (EPA 2020), climate change is expected to lead the following adverse effects:

- sea level rise,
- more intense storms and rainfall events,
- increased likelihood and magnitude of river and coastal flooding and
- water shortages in summer in the east
- adverse impacts on water quality
- changes in distribution of plant and animal species
- effects on fisheries sensitive to changes in temperature

A flood risk assessment was prepared for the proposed development. The flood risk assessment is in **Appendix 13.1**. The flood risk assessment had regard to sea level rise, intense rainfall events and the risk of river and coastal flooding. The flood risk assessment determined that the converter station site is well above the level at which there would be a risk of river or sea flooding.

The access road to the converter station is potentially at risk of a 0.2%AEP (annual exceedance probability) flood event at high tide, if there is a failure of the existing flood defences. Once constructed, the cables will be underground and not vulnerable to flooding. The car park on the Baginbun Beach access road is well above the level, which would be vulnerable to flooding due to rising sea levels.

The converter station and tail station buildings and installations have been designed to current European and international best practice design codes for structures of this type. Increased storm intensity is not expected to have a significant negative impact on the structural integrity. The surface water drainage for the converter station site has been designed to comply with the Irish Building Regulations and current European best practice design codes. Current best practice includes an allowance for increased rainfall intensity over existing levels due to climate change. Increased rainfall and storm intensity are not expected to have a significant negative impact on the drainage.

The water requirement in the proposed development, once operational, will be minimal. There will be no process water required and the two permanent staff will require a very small quantity. Consequently, the proposed development will not be vulnerable to water shortages or water quality deterioration due to climate change.

Climate change impacts on species and fisheries will have no effect on Greenlink.

7.6 Mitigation Measures and Monitoring

7.6.1 Mitigation

7.6.1.1 Construction Phase

Dust emissions will occur during construction, although the prevailing weather, the extent of the works and the distance from sensitive receptors will determine the extent of the effects. The focus of the control procedures will therefore be to reduce the generation of airborne material.

'Standard mitigation' measures will be implemented, as per guidance presented in the TII document *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* (TII, 2011). These mitigation measures were taken into account when carrying out the assessment of potential effects in **Section 7.4**. These will include the following:

- Spraying of exposed earthwork activities, stockpiles and site haul roads during dry weather;
- Provision of wheel washes at each construction compound;
- Covering of stockpiles;
- Control of vehicle speeds, speed restrictions and vehicle access; and
- Sweeping of hard surface roads.

In addition, the following measures will be implemented. These measures are based on best practice as outlined in the British Research Establishment (BRE) document *Controlling particles, vapour and noise pollution from construction sites* (BRE, 2003) and the Institute of Air Quality Management (IAQM) document *Guidance on the assessment of dust from demolition and construction* (IAQM, 2016).

- Exhaust emissions from vehicles operating within the working areas, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor through regular servicing of machinery;
- During dry periods when dust generation is likely or during windy periods, working areas and vehicles delivering material with dust forming potential will also be sprayed with water, as appropriate;
- Areas where materials will be handled and stockpiled will be designed to minimise their exposure to wind – all temporary stockpiles will be kept to the minimum practicable height with gentle slopes;
- There shall be no long-term stockpiling within the working areas and storage time will be minimised;
- Material drop heights from plant to plant or from plant to stockpile will be minimised;
- Dust screens will be implemented at locations where there is the potential for air quality effects during the construction phase; and
- Truck loads will be covered when carrying material likely to generate dust.

Employee awareness is also an important way that dust may be controlled on any site. Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected. Further details on employee training is provided in the Construction Environmental Management Plan (CEMP) for the proposed development, which is presented in **Appendix 4.1**.

The following mitigation measures will be implemented during the construction phase of the development to minimise CO_2 emissions:

- A Construction Traffic Management Plan has been prepared and will be submitted along with this planning application. **Chapter 6** *Traffic and Transportation* provides information on the Construction Traffic Management Plan, which will be implemented in full. This will minimise congestion and encourage car sharing and the use of public transport, where practicable;
- Materials will be handled efficiently on site to minimise the waiting time for loading and unloading, thereby reducing potential emissions;
- Engines will be turned off when machinery is not in use; and
- The regular maintenance of plant and equipment will be carried out.

7.6.1.2 Operational Phase

As no significant negative air quality or climate effects are predicted to occur during the operational phase, the only mitigation measures that are proposed are those relating to the control and management of SF6 gas, as follows:

- When SF_6 is used on site, all relevant EPA and HSA requirements will be complied with in the construction, operation, maintenance and decommissioning of the facility.
- SF_6 procedures within the tail station will be in compliance with EirGrid's specification.
- Loss of pressure alarms will be fitted for all SF_6-filled switchgear for both the tail and converter station.
- An SF_6 leak detection system will be located in the tail station gas insulated switchgear room which on detection alerts the operators.
- The converter station installation will comply with IEC 60480 (Guidelines for the checking and treatment of sulphur hexafluoride (SF_6) taken from electrical equipment and specification for its re-use), and IEC 62271-4 (High-voltage switchgear and control gear – Part 4: Handling procedures for sulphur hexafluoride (SF_6) and its mixtures).
- SF_6 gas management, handling, testing and controls will be as defined within the O&M manual that will be developed by the EPC contractor and respective equipment/ SF6 supplier. In addition, post commissioning, the service and maintenance contractor will continue with the procedures of SF_6 management as defined in the O&M manual.
- In the tail station, management of SF_6 containment, handling, testing and controls will be in accordance with EirGrid's standard specification. No routine topping-up is envisaged.
- SF_6 will not be stored in the tail station's substation rooms and is likely to be stored off-site.
- For the converter station, SF_6 reserve cylinders will be controlled and maintained.

7.6.1.3 Decommissioning Phase

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

7.6.2 Monitoring

7.6.2.1 Construction Phase

Dust deposition monitoring will be conducted at locations near the proposed development. At a minimum, monitoring will be carried out at the nearest sensitive receptors to the proposed converter station site and landfall site, as the works at these areas will be of a larger scale than those along the onshore pipeline route.

Monitoring will be carried out using the Bergerhoff method (TA Luft, 2002), i.e. analysis of dust collecting jars left on-site (German Standard VDI 2119, 1972). The TA Luft dust deposition limit values of 350 $mg/m^2/day$ (averaged over one year) will be applied as a 30-day average.

Should an exceedance of the TA Luft limit occur during the construction phase or a complaint be received in relation to dust levels, additional mitigation measures, for example more regular spraying of water, will be implemented.

The dust deposition limits will be used to determine potential occurrences of dust nuisance associated with the proposed construction works. Should the limit values be approaching an exceedance during the construction works, the contractor will be required to determine the cause .

All potential causes for the high levels of dust will be analysed, should they arise. These will include the construction works taking place, potential off-site sources and meteorological conditions. Should the construction works taking place be identified as the primary cause of the high level, the contractor will ensure that the mitigation measures listed above are improved upon. Should high dust levels continue to occur following these improvements, the contractor will provide alternative mitigation measures and/or will modify the construction works taking place.

7.6.2.2 Operational Phase

As no significant negative air quality or climate effects are predicted to occur during the operational phase, no monitoring measures are required.

7.6.2.3 Decommissioning Phase

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

7.7 Residual Effects

7.7.1 Construction and Decommissioning Phases

Following the implementation of the mitigation measures committed to in this chapter, no significant negative residual effects on air quality or climate are envisaged during the construction or decommissioning phases. Negative residual effects are predicted to be short term and slight.

7.7.2 Operational Phase

No significant negative residual effects on air quality or climate are envisaged during the operational phase.

The beneficial effect, of the reduction in greenhouse gas emissions and other emissions to air from fossil fuel power generation, is a significant positive residual effect of the operation of the overall project.

7.8 Cumulative and Transboundary Effects

7.8.1 Cumulative Effects

7.8.1.1 All Elements of Greenlink

The proposed development forms part of the Greenlink project, which also includes offshore elements, and works in the United Kingdom. The only potential for negative cumulative or interactive negative effects on air quality with the wider project will be during construction at the landfall site near Baginbun Beach. This is the only location where another element of the project is close by. The HDD at Baginbun is scheduled to be undertaken from January to March 2022. The offshore works are scheduled to be undertaken from April to November 2022. There will be minimal time overlap between the two activities. Consequently, there is not expected to be a cumulative interproject effect on air quality during construction.

The greenhouse gas emissions of the construction of the entire Greenlink project are not expected to be significant relative to global greenhouse gas emissions, as the construction activities will be small scale and of relatively short duration.

The beneficial cumulative effects on air quality and climate of the operation of the entire Greenlink project are assessed in **Section 7.4.2** above. There are not expected to be significant negative impacts on air quality and climate due to the operation of Greenlink.

Demolition of the elements of Greenlink will involve similar activities to the construction activities, but on a smaller scale. There are not expected to be significant negative impacts on air quality and climate due to the demolition of Greenlink.

7.8.1.2 Cumulative Effects with Other Projects

Two permitted projects have been identified which are of sufficient scale to have the potential to give rise to cumulative effects on air quality and climate. These are the Great Island – Kilkenny 110kV Line Uprate Project and the Great Island Energy Storage System.

The construction of the Great Island – Kilkenny 110kV Line Uprate Project may overlap with the construction of the proposed development. The Great Island – Kilkenny 110kV Line Uprate Project will extend 49km northwards from Great Island. Construction activities associated with this project at Great Island will be relatively small scale. Similarly, the construction activities associated with the Great Island Energy Storage project will be small scale. Given the low background levels of pollutants, it is expected that any increase in pollutant concentrations at Great Island due to the simultaneous construction of the three projects will not cause an exceedance of air quality standards.

Construction of all three projects will generate greenhouse gases. These are not expected to be significant relative to global greenhouse gas emissions, as the construction activities will be small scale and of relatively short duration.

In operation, both the Great Island Energy Storage project and Greenlink will support renewable generation. The Environment Report for the Energy Storage project suggests that the energy storage project will have a storage capacity of circa 500GWh. Renewable electricity, which otherwise might be curtailed, could be stored and dispatched later. Consequently, there will be a cumulative beneficial effect on air quality, for the reasons discussed in **Section 7.4.3** above, and a reduction in greenhouse gases, as a result of the operation of the two projects.

7.8.2 Transboundary Effects

Considering the nature and location of the proposed development as described in **Chapter 3** and **Chapter 4** no adverse transboundary effects are predicted. The beneficial effect, of the reduction in greenhouse gas emissions and other emissions to air from fossil fuel power generation, is a significant positive transboundary effect of the operation of the overall project.

7.9 Impact Assessment Summary

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
Population	Elevated air emissions during construction	• Spraying of exposed earthwork activities, stockpiles and site haul roads during dry weather; • Provision of wheel washes at exit points; • Covering of stockpiles; • Control of vehicle speeds, speed restrictions and vehicle access; and • Sweeping of hard surface roads. • Exhaust emissions from vehicles operating within the working areas, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor through regular servicing of machinery; • During dry periods when dust generation is likely or during windy periods, working areas and vehicles delivering material with dust forming potential will also be sprayed with water, as appropriate; • Areas where materials will be handled and stockpiled will be designed to minimise their exposure to wind - all stockpiles shall be kept to the minimum practicable height with gentle slopes; • There shall be no long-term stockpiling within the working areas and storage time will be minimised; • Material drop heights from plant to plant or from plant to stockpile will be minimised;	• Dust deposition monitoring will be conducted at locations near the proposed development. At a minimum, monitoring will be carried out at the nearest sensitive receptors to the proposed converter station site and landfall site, as the works at these areas will be of a larger scale than those along the onshore pipeline route.	None

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
		• Dust screens will be implemented at locations where there is the potential for air quality effects during the construction phase; and • Truck loads will be covered when carrying material likely to generate dust. • Materials will be handled efficiently on site to minimise the waiting time for loading and unloading, thereby reducing potential emissions; • Engines will be turned off when machinery is not in use; and • The regular maintenance of plant and equipment will be carried out. • Implementation of the Construction Traffic Management Plan		
Vegetation	Elevated air emissions during construction phase	See above	See above	None
Air Quality, Biodiversity, Population and Human Health	Significant long-term beneficial indirect effect due to reduction in emissions from fossil fuel generation	None	None	Significant long-term beneficial indirect effect due to reduction in emissions from fossil fuel generation
Climate	Significant long-term beneficial	None	None	Significant long-term beneficial effect on

Receptor	Potential Effects	Mitigation	Monitoring	Residual Effects
	effect on climate due to reduction in greenhouse gas emissions from fossil fuel generation			climate due to reduction in greenhouse gas emissions from fossil fuel generation

7.10 Conclusion

Following the implementation of the mitigation measures committed to in this chapter, no significant negative residual effects on air quality or climate are envisaged during the construction, operation or decommissioning phases.

The beneficial effect, of the reduction in greenhouse gas emissions and other emissions to air from fossil fuel power generation, is a significant positive residual effect of the operation of the overall project.

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