



Arklow Bank Wind Park 2

Environmental Impact Assessment Report

Volume II, Chapter 20: Air Quality and Climate

Revision	Date	Status	Author	Reviewed by	Approved by
1.0	02/05/2024	Final (External)	GoBe Consultants	GoBe Consultants	Sure Partners Limited

Statement of Authority

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Kaj also has extensive Irish based development management experience in taking solar and offshore wind energy infrastructure through the development cycle; from early conceptual planning stages through to design, construction and operation.

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Glossary

Term	Meaning
Arklow Bank Wind Park 1 (ABWP1)	Arklow Bank Wind Park 1 consists of seven wind turbines, offshore export cable and inter-array cables. Arklow Bank Wind Park 1 has a capacity of 25.2 MW. Arklow Bank Wind Park 1 was constructed in 2003/04 and is owned and operated by Arklow Energy Limited. It remains the first and only operational offshore windfarm in Ireland.
Arklow Bank Wind Park 2 – Offshore Infrastructure	“The Proposed Development”, Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements under the existing Maritime Area Consent.
Arklow Bank Wind Park 2 (ABWP2) (The Project)	<p>Arklow Bank Wind Park 2 (ABWP2) (The Project) is the onshore and offshore infrastructure. This EIAR is being prepared for the Offshore Infrastructure. Consents for the Onshore Grid Infrastructure (Planning Reference 310090) and Operational Maintenance Facility (Planning Reference 211316) has been granted 26 May 2022 and 20 July 2022, respectively.</p> <ul style="list-style-type: none"> Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements to be consented in accordance with the Maritime Area Consent. This is the subject of this EIAR and will be referred to as ‘the Proposed Development’ in the EIAR. Arklow Bank Wind Park 2 Onshore Grid Infrastructure: This relates to the onshore grid infrastructure for which planning permission has been granted. Arklow Bank Wind Park 2 Operations and Maintenance Facility (OMF): This includes the onshore and nearshore infrastructure at the OMF, for which planning permission has been granted. Arklow Bank Wind Park 2 EirGrid Upgrade Works: any non-contestable grid upgrade works, consent to be sought and works to be completed by EirGrid.
Array Area	The Array Area is the area within which the Wind Turbine Generators (WTGs), the Offshore Substation Platforms (OSPs), and associated cables (export, inter- array and interconnector cabling) and foundations will be installed.
Conurbation	An extended urban area, typically consisting of several towns merging with suburbs of a central city.
Competent Authority (CA)	The authority designated as responsible for performing the duties arising from the EIA Directive as amended. For this application, the Competent Authority is An Bord Pleanála (ABP).
Environmental Impact Assessment (EIA)	An Environmental Impact Assessment (EIA) is a statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council (EIA Directive).

Term	Meaning
EirGrid	State-owned electric power transmission system operator (TSO) in Ireland and Transmission Asset Owner (TAO) for the Project's transmission assets.
Landfall	The area in which the offshore export cables make landfall and is the transitional area between the offshore cabling and the onshore cabling.
Maritime Area Consent (MAC)	A consent to occupy a specific part of the maritime area on a non-exclusive basis for the purpose of carrying out a Permitted Maritime Usage strictly in accordance with the conditions attached to the MAC granted 22 December 2022 with reference number 2022-MAC-002.
Mitigation Measure	Measure which would avoid, reduce, or remediate an impact.
Permitted Maritime Usage	The construction and operation of an offshore windfarm and associated infrastructure (including decommissioning and other works required on foot of any permission for such offshore windfarm).
The Application	The full set of documents that will be submitted to An Bord Pleanála in support of the consent.
The Developer	Sure Partners Ltd.

Acronyms

Term	Meaning
AA	Appropriate Assessment
ABP	An Bord Pleanála
ABWP1	Arklow Bank Wind Park 1
ABWP2	Arklow Bank Wind Park 2
CAFE	Clean Air for Europe
CAP	Climate Action Plan
CIA	Cumulative Impact Assessment
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CTV	Crew Transfer Vessel
EA	Environment Agency
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMEP	European Monitoring and Evaluation Programme
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ESR	Effort Sharing Regulation
ETS	Emissions Trading System
EU	European Union
GHG	Greenhouse Gas
GWP	Global Warming Potential

Term	Meaning
HSE	Health and Safety Executive
IEMA	Institute of Environmental Management and Assessment
LULUCF	Land Use, Land Use Change and Forestry
MPDM	Marine Planning and Development Management
NDP	National Development Plan
NISA	North Irish Sea Array
NMPF	National Marine Planning Framework
NMVOG	Non Methane Volatile Organic Compounds
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxide
NRA	National Roads Authority
OGI	Onshore Grid Connection Infrastructure
OMF	Operations and Maintenance Facility
OSP	Offshore Substation Platform
OWF	Offshore Windfarm
PfG	Programme for Government
PM	Particulate Matter
SF ₆	Sulfur hexafluoride
TII	Transport Infrastructure Ireland
UTC	Universal Time Coordinated
WHO	World Health Organisation

Units

Unit	Description
CO _{2eq}	Carbon dioxide equivalent
dB	Decibel (unit used to measure the intensity of sound)
ft	Feet
°C	Degrees Celsius
gCO ₂ /kWh	Grams carbon dioxide per kilowatt hour
GW	Gigawatt (power; equal to one thousand megawatts)
km	Kilometres
kW	Kilowatt (<i>power</i>)
kWh	Kilowatt hour
Mg	Miligram
mm	Millimetre
Mt CO _{2eq}	Million tonnes carbon dioxide equivalent
MW	Megawatt (power; equal to one million watts)
t	Tonnes
mg	Micro grams

20 Air Quality and Climate

20.1 Introduction

20.1.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) presents the assessment of the potential impacts of the Arklow Bank Wind Park 2 (ABWP2) Offshore Infrastructure (hereafter referred to as ‘the Proposed Development’) on air quality and climate. Specifically, this chapter considers the potential impact of the Proposed Development during construction, operational and maintenance, and decommissioning phases.

20.2 Regulatory background

20.2.1.1 Planning policy on renewable energy infrastructure is presented in Volume II, Chapter 2: Policy and Legislation. Planning policy, specifically in relation to air quality and climate, is contained in the National Marine Planning Framework (NMPF) (Department of Housing, Planning and Local Government, 2021). A summary of the policy provisions relevant to air quality and climate are provided in Table 20.1.

Table 20.1: Summary of regulatory background

Publisher	Name of document incl. reference	Key provisions
Statutory		
Planning Policy and Development Control		
Wicklow Climate Action Plan 2024 - 2029	Wicklow Climate Action Plan 2024 – 2029: https://www.wicklow.ie/Living/News-Events/draft-climate-action-plan-2024-2029	<ul style="list-style-type: none"> • Deliver a reduction in greenhouse gas (GHG) emissions of 51% by 2030 • Facilitate the transition of Wicklow County Council’s services and operations to a low carbon resilient future, leading by example and mobilizing engagement county wide. • Aligned with the Government’s National Climate objective which commits to halving GHG emissions by 2030 and reaching net zero by 2050.
NMPF, 2021	National Marine Planning Framework: https://www.gov.ie/pdf/?file=https://assets.gov.ie/139100/f0984c45-5d63-4378-ab65-d7e8c3c34016.pdf#page=null	<p>Air Quality Policy 1 – Proposals that support a reduction in air pollution should be supported, subject to the outcome of statutory environmental assessment processes and subsequent decision by the competent authority, and where they contribute to the policies and objectives of this NMPF. Proposals must demonstrate consideration of their contribution to air pollution, both direct and cumulative. For assessment on air pollution, see Section 20.6.2.</p> <p>Air Quality Policy 2 – Where proposals are likely to result in or facilitate an increase in air pollution, proposals should demonstrate that they will, in order of preference in accordance with legal requirements and standards:</p>

Publisher	Name of document incl. reference	Key provisions
NMPF, 2021	National Marine Planning Framework: https://www.gov.ie/pdf/?file=https://assets.gov.ie/139100/f0984c45-5d63-4378-ab65-d7e8c3c34016.pdf#page=null	<p>A) avoid,</p> <p>b) minimise, or</p> <p>c) mitigate</p> <p>air pollution. For assessment on air pollution, see Section 20.6.2.</p> <hr/> <p>Climate Change Policy 1 – Proposals should demonstrate how they:</p> <ul style="list-style-type: none"> • Avoid contribution to adverse changes to physical features of the coast (see Volume II, Chapter 6: Coastal Processes); • enhance, restore or recreate habitats that provide a flood defence or carbon sequestration ecosystem services where possible <p>Where potential significant adverse impacts upon habitats that provide a flood defence or carbon sequestration ecosystem services are identified, these must be in order of preference and in accordance with legal requirements:</p> <p>a) avoided,</p> <p>b) minimised,</p> <p>c) mitigated,</p> <p>d) if it is not possible to mitigate significant adverse impacts, the reasons for proceeding must be set out.</p>

Publisher	Name of document incl. reference	Key provisions
		<p>This policy should be included as part of statutory environmental assessments where such assessments are required.</p> <p>Climate Change Policy 2 – For the lifetime of the proposal, the following climate change matters must be demonstrated:</p> <ul style="list-style-type: none"> • estimation of likely generation of greenhouse gas emissions, both direct and indirect; • measures to support reductions in greenhouse gas emissions where possible; • likely impact of climate change effects upon the proposal from factors including but not limited to: sea level rise, ocean acidification, changing weather patterns; • measures incorporated to enable adaptation climate change effects; • likely impact upon climate change adaptation measures adopted in the coastal area relevant to the proposal and/or adaptation measures adopted by adjacent activities; • where likely impact upon climate change adaptation measures in the coastal area relevant to the proposal and/or adaptation measures adopted by adjacent activities is identified, these impacts must be in order of preference and in accordance with legal requirements: <ol style="list-style-type: none"> a) avoided, b) minimised, c) mitigated,

Publisher	Name of document incl. reference	Key provisions
European Commission, 2022	REPower European Union (EU) Plan: RePowerEU (eceee.org)	<p>d) if it is not possible to mitigate significant adverse impacts, the reasons for proceeding must be set out.</p> <p>An estimation of GHG emissions for the proposed development is provided in Section 20.10.2.</p>
Government of Ireland, 2020	Programme for Government: 130911_fe93e24e-dfe0-40ff-9934-def2b44b7b52.pdf	<p>In response to the global energy market disruption caused by the Russian invasion of Ukraine, in 2022, the European Commission published the REPowerEU Plan (EC, 2022). The plan is aimed at ending the EU's dependence on Russian fossil fuels, tackling the climate crisis and bringing about energy savings, diversifying energy supplies and accelerating the roll out of renewable energy. The Plan recognises the need to scale up and speed up the roll out of renewable energy projects. The Plan increases the headline 2030 EU target from 40 – 45% renewables.</p>
Government of Ireland, 2023	Climate Action Plan: 94a5673c-163c-476a-921f-7399cdf3c8f5.pdf (www.gov.ie)	<p>In June 2020, the Programme for Government (PfG) included plans to achieve 5-Gigawatt (GW) capacity in offshore wind by 2030 off Ireland's Eastern and Southern coasts.</p> <p>Ireland has committed in its 2023 Climate Action Plan to increase the proportion of electricity generated from renewable energy sources from 80% by 2030, specifically including a target of at least 5 GW of offshore wind by 2030, with an interim target of 50% renewable electricity by 2025.</p>

Publisher	Name of document incl. reference	Key provisions
Government of Ireland, 2024	Climate Action Plan: 70922dc5-1480-4c2e-830e-295afd0b5356.pdf (www.gov.ie)	Ireland proposes to commit to its 2024 Climate Action Plan to increase the proportion of electricity generated from renewable energy sources to 80% by 2030, specifically including a target of at least 5 GW of offshore wind by 2030, with an interim target of 50% renewable electricity by 2025.
The Climate Action Plan (CAP) 2024 is the third annual update to Ireland’s Climate Action Plan. The Plan was approved by Government on 20 December 2023, subject to Strategic Environmental Assessment and Appropriate Assessment.	National Development Plan (NDP) 2018 – 2027: https://www.gov.ie/en/policy-information/07e507-national-development-plan-2018-2027/	National Strategic Outcome 8 of the NDP is to transition to a low-carbon and climate-resilient society. To achieve this, the NDP recognises that Ireland’s ambition must go further than a focus on achieving compliance with international commitments and recognises the importance of achieving a low-carbon, climate-resilient and environmentally sustainable economy and society.
Government of Ireland, 2021	Climate Action and Low Carbon Development (Amendment) Act 2021: https://www.irishstatutebook.ie/eli/2021/act/32/section/15/enacted/en/html	National legally binding path to net-zero emissions no later than 2050 and to a 51% reduction in emissions by 2030.

20.3 Consultation

20.3.1.1 A summary of the key issues raised during consultation activities undertaken to date, specific to air quality and climate is presented in Table 20.2 below, together with how these issues have been considered in the production of this EIAR chapter.

Table 20.2: Summary of consultation relating to air quality and climate

Date	Consultation type	Consultation and key issue raised	Section where provision is addressed
August 2023	Scoping consultation from Health and Safety Executive (HSE)	A Construction Environmental Management Plan should be included in the EIAR which details dust control and mitigation measures	As outlined in Table 20.12, the Proposed Development relates to the construction of offshore infrastructure only. As such, there is no potential for dust impacts.
August 2023	Scoping from HSE	The EIAR should detail the proposed methodology to be used for the disposal of the materials forming the Proposed Development. It suggested that the EIAR should indicate the proposed future use of the development site at the end of the planning permission period.	A Rehabilitation Schedule has been submitted with the application (Volume III, Appendix 4.1: Rehabilitation Schedule). A Waste Management Plan has been submitted with the application as an Annex to Volume III, Appendix 25.1: (Environmental Management Plan).
October/November 2020	Feedback from Public Consultation	The effect of the Proposed Development on reducing Ireland's carbon emissions was highlighted as a benefit by consultees. However, it was also noted that offshore wind was not an effective way to reduce carbon emissions and other examples to reduce carbon emissions were highlighted.	The associated reduction in Green House Gas (GHG) emissions associated with the Proposed Development has been calculated and an assessment on the significance has been provided in Section 20.9.

20.4 Study area

20.4.1.1 The air quality Study Area is the local environment (Arklow Municipal district, County Wicklow) and the climate Study Area is the national environment (Ireland). Effects arising from the potential impacts on air quality are considered to impact on a local level, while impacts on climate are considered to impact on a national level. National and local data has been assessed where relevant/available.

20.4.1.2 Carbon dioxide (CO₂) emissions have a global climate warming effect. This is regardless of their rate of release, location or the weather when they are released into the atmosphere. This is unlike pollutants that affect local air quality where the rate of release, location and prevailing weather, as well as the amount of pollutant, determines the local concentrations and the impact. Local ambient concentrations of CO₂ are not relevant and there are no limits or thresholds that can be applied to particular sources of carbon emissions. Any amount of CO₂ released into the atmosphere will contribute to climate warming, the extent of which is determined by the magnitude of the release. However, in April 2022, the Government of Ireland introduced Ireland's national carbon budget programme. The total emissions allowed under each budget is set out below, as well as the average annual reduction for each 5-year period:

- 2021 – 2025: 295 Mt CO_{2eq}. This represents an average reduction in emissions of 4.8% per annum for the first budget period;
- 2026 – 20230: 200 Mt CO_{2eq}. This represents an average reduction in emissions of 8.3% per annum for the second budget period;
- 20231 – 2035L 151 Mt CO_{2eq}. This represents an average reduction in emissions of 3.5% per annum for the third provisional budget.

20.4.1.3 Although CO₂ emissions are typically expressed as kilogrammes or tonnes per year, there is a cumulative effect of these emissions because CO₂ emissions have a warming effect which lasts for 100 years or more.

20.5 Methodology

20.5.1 Methodology to inform the baseline

Desktop studies

20.5.1.1 Information on the air quality and climate within the air quality and climate study area was collected through a detailed desktop review of existing studies and datasets. These reports are summarised in Table 20.3.

Table 20.3: Summary of key desktop reports and data resources

Title	Source	Year	Author
Air Quality in Ireland 2022 – Key indicators of ambient air quality in 2022	Environmental Protection Agency (EPA)	2022	EPA
Ireland's Final GHG emissions 1990 - 2021	(EPA)	2021	EPA
Air Quality in Ireland 2021 – Key indicators of ambient air quality in 2021	EPA	2021	EPA
Air Quality in Ireland 2020 – Key indicators of Ambient Air Quality	EPA	2020	EPA
Air Quality in Ireland 2019 – Indicators of Air Quality	EPA	2020	EPA
Air Quality Report 2019 - supplemental information	EPA	2020	EPA
30 Year Averages: Rosslare 1978-2007	Met Éireann (met.ie)	2020	Met Eireann
Ireland's Air Pollutant Emissions 2018 (1990-2030)	EPA	2020	EPA
Air Quality in Ireland 2018 – Indicators of Air Quality	EPA	2019	EPA
Air Quality Report 2018 - supplemental information	EPA	2019	EPA
Ireland's Air Pollutant Emissions 2018 (1990-2030)	EPA	2020	EPA

Title	Source	Year	Author
Ireland's Greenhouse Gas Emissions Projections 2019-2040	EPA	2020	EPA
Ireland's Final Greenhouse Gas emissions 1990-2018	EPA	2020	EPA
Ireland's Greenhouse Gas Emissions Projections 2018-2040	EPA	2019	EPA
Air Quality in Ireland 2017 – Indicators of Air Quality	EPA	2018	EPA
Air Quality Report 2017 - supplemental information	EPA	2018	EPA
Climatological Note No.14: A Summary of Climate Averages for Ireland 1981-2010	Met Éireann (met.ie)	2012	Met Éireann

Site specific surveys

20.5.1.2 Given the absence of any likely significant emissions to atmosphere from the Proposed Development during construction, operational and maintenance, and decommissioning (due to the factored-in measures set out in section 20.7.3), coupled with the availability of robust EPA air quality data for rural Ireland, no site-specific baseline surveys have been undertaken. The baseline data presented in this section is derived from the EPA monitoring network and may be taken as representative of the background air quality, in the air quality and climate study areas.

Assessment Criteria

20.5.1.3 In terms of air quality, in May 2008 the European Commission introduced a revised Directive on Ambient Air Quality and Clean Air for Europe (2008/50/EC), known as the CAFE Directive, which has been transposed into Irish Legislation through the revised Air Quality Standards Regulations (Statutory Instrument (S.I). 739/2022). In Ireland, ambient air quality monitoring and assessment is carried out by the EPA in accordance with the requirements of the CAFE Directive.

20.5.1.4 The CAFE Directive and the revised Air Quality Standards Regulations (2022) specify limit values in ambient air for sulphur dioxide (SO₂), lead, benzene, particulate matter (PM₁₀ and PM_{2.5}), carbon monoxide (CO), nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x). These limits are mainly for the protection of human health and are largely based on review of epidemiological studies on the health impacts of these pollutants. In addition, there are limits that apply to the protection of the wider environment (ecosystems and vegetation). These limits are presented in Table 20.4.

Table 20.4: Limit values in ambient air quality (source: S.I. 739/2022)

Pollutant	Criteria	Value
Nitrogen Dioxide	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m ³ NO ₂
	Annual limit for protection of human health	40 µg/ m ³ NO ₂
	Annual limit for protection of vegetation	30 µg/ m ³ NO + NO ₂
Benzene	Annual limit for protection of human health	5 µg/m ³
Carbon Monoxide	Maximum daily 8-hour running mean	10 µg/m ³
Lead	Annual limit for protection of human health	0.5 µg/m ³
Sulphur Dioxide	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350 µg/m ³
	Daily limit for protection of human health - not to be exceeded more than three times/year	125 µg/m ³
	Annual limit for protection of vegetation	20 µg/m ³
Particulate Matter PM ₁₀	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 PM _{2.5}	Annual target value for the protection of human health	20 µg/m ³ PM _{2.5}

20.5.1.5 In addition to the statutory limits for the protection of human health listed in S.I. 739/ 2022, the World Health Organisation (WHO) has published a set of air quality guidelines for the protection of human health.

20.5.1.6 The key publication is the 'WHO Global Air Quality Guidelines' (2021). The WHO guidelines are based on reducing the risk to human health and in some cases the levels differ from the European Union (EU) statutory limits as these limits are based on balancing health risks with technological study feasibility, economic considerations and various other political and social factors in the EU.

The 2021 WHO guidelines are presented in Table 20.5 and illustrate that while the NO₂ levels are analogous to those in S.I. 739/2022 (excluding the tolerance levels for the 1-hour averages), the annual average PM₁₀ and PM_{2.5} levels specified by the WHO are half of the limits specified in the legislation. The WHO note that these are the lowest levels at which total, cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to long-term exposure to PM_{2.5}. The EPA has called for movement towards the adoption of these stricter WHO guidelines as the legal standards across Europe and in Ireland.

Table 20.5: WHO 2021 Air Quality Guidelines

Pollutant	Criteria	Value
Nitrogen Dioxide (NO ₂)	Hourly level for protection of human health	200 µg/m ³ NO ₂
	Annual level for protection of human health	10 µg/m ³ NO ₂
Sulphur Dioxide (SO ₂)	10-minute level for protection of human health	500 µg/m ³
	Daily level for protection of human health	40 µg/m ³

Pollutant	Criteria	Value
Particulate Matter (PM ₁₀)	24-hour level for protection of human health	45 µg/m ³ PM ₁₀
	Annual level for protection of human health	15 µg/m ³ PM ₁₀
Particulate Matter (PM _{2.5})	24-hour level for protection of human health	15 µg/m ³ PM _{2.5}
	Annual level for protection of human health	5 µg/m ³ PM _{2.5}

20.5.1.7 In relation to climate, there is no project specific assessment criteria, but the Proposed Development will be assessed against the targets set out in the Climate Action Plan 2023 and which will be superseded by the Climate Action Plan 2024 (at the time of writing CAP 2024 is awaiting to undergo public consultation). In particular the targets for the acceleration of the renewable electricity generation sector which aim to:

- Accelerate the delivery of utility-scale onshore wind, offshore wind, and solar through a competitive framework;
- At least 5 GW of offshore wind by 2030 (and an additional 2 GW offshore wind for green hydrogen production);
- Complete a revised version of Shaping our Electricity Future to define the required new construction and reinforcement of the electricity transmission and distribution system across the country required to achieve sectoral ceilings and carbon budgets;
- Having regard to the interaction between the planning and grid consenting systems and the overall timeframes for permitting, deliver a streamlined electricity generation grid connection policy and process and remove barriers for installation of renewables and flexible technologies without the need to build new grid, including hybrid (wind/solar/storage) connections and private wires;
- Align the relevant constituent elements of the planning and permitting system to support accelerated renewable energy development, supported by national policy and associated methodologies to inform regional and local planning policies, noting that Development Plans are obliged to set out objectives to facilitate energy infrastructure;
- In line with the emerging EU frameworks, ensure that renewable energy generation projects, and associated infrastructure, will be considered to be in the overriding public interest;
- All relevant public bodies to carry out their functions to support the achievement of the 80% renewable electricity target;
- Develop non-utility scale generation and community projects through actions such as grant funding and enabling such projects to participate in energy markets and flexibility schemes.
- Phase out and end the use of coal and peat in electricity generation;
- Delivery of at least three new transmission grid connections or interconnectors;
- Ensure that 15-20% of electricity system demand is flexible by 2025, increasing to 20-30% by 2030, to reduce peak demand and move to times of high renewable output;
- Deliver a demand side strategy that facilitates zero carbon demand, incentivises low carbon electricity consumption and aligns with the EU energy efficiency requirements, while facilitating electrification targets.

20.5.2 Baseline environment

20.5.2.1 The air quality and climate study area for the assessment of the Proposed Development on climate is the Republic of Ireland. The Proposed Development will be located on and around Arklow Bank, which is located in the Irish Sea off the east coast of the Republic of Ireland. The Array Area is 63.4 km² and is located approximately 6 – 15 km from the shore.

Existing sources in the area

20.5.2.2 Due to the offshore location of the Proposed Development, the typical sources of pollution as would be found with an onshore development, such as road traffic, rail, agriculture, and general dusts are not relevant.

20.5.2.3 Existing sources of pollution in the air quality and climate Study Area include natural atmospheric systems including sea salt aerosol which is a common natural source of dust in coastal areas. The only other source of note includes marine vessels (commercial, fishing and recreational) which operate periodically in the area.

Baseline Air Quality

20.5.2.4 Air quality legislation in Ireland deals with air quality by the means of 'zones' based on population. For Ireland, four zones are defined, and the main areas defined in each zone are:

- Zone A - Dublin Conurbation;
- Zone B - Cork Conurbation;
- Zone C - Other cities and larges towns comprising of Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Letterkenny, Celbridge, Newbridge, Mullingar, Balbriggan, Greystones, Leixlip and Portlaoise; and
- Zone D - Rural Ireland, (i.e. the remainder of the State excluding Zones A, B and C).

20.5.2.5 Arklow and surrounding areas/local environment located within Zone D (Rural Ireland). As such, the Proposed Development lie within EPA Air Quality Zone D (Rural Ireland: the remainder of the State excluding Zones A, B and C.) and is located in the Rural East Air Quality Index Region. The Proposed Development is outside the EPA designations and in the absence of any significant anthropogenic sources of pollution only biogenic or natural sources (e.g. sea salt aerosol) likely prevail in the Array Area. As such, the Array Area would have lower levels of background air pollutants relative to Arklow (i.e. better air quality).

20.5.2.6 The EPA air quality monitoring network for Zone D has been reviewed and suitable representative data is presented to identify the background air quality in the nearshore area of the Proposed Development.

20.5.2.7 Table 20.6 shows the aggregated annual mean value concentrations measured for SO₂, PM₁₀, PM_{2.5}, NO₂, NO_x, CO and Ozone in Zone D for 2019, 2020 and 2021. The table compares the annual mean measured levels with the limit values defined in the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011). The averages are considered representative of 'Rural Ireland' and the shoreside of the Proposed Development.

Table 20.6: Extract of summary data from EPA ambient air monitoring for Zone D in 2019 to 2022

Pollutant	Unit	Annual Mean Concentration in 2019**	Annual Mean Concentration in 2020	Annual Mean Concentration in 2021	Annual Mean Concentration in 2022	Annual Limit for Protection of Human Health
Nitrogen Dioxide (NO ₂)	µg/m ³	5.67	7.6	7.5	7.4	40
Nitrogen Oxide (NO _x)	µg/m ³	7.83	15.9	14.2	14.0	30
Sulphur Dioxide (SO ₂)	µg/m ³⁰	3.1	3.9	4.0	5.0	20

Pollutant	Unit	Annual Mean Concentration in 2019**	Annual Mean Concentration in 2020	Annual Mean Concentration in 2021	Annual Mean Concentration in 2022	Annual Limit for Protection of Human Health
Particulate Matter (PM ₁₀)	µg/m ³	14.25	11.2	11.9	12.7	40
Particulate Matter (PM _{2.5})	µg/m ³	9.29	7.8	8.7	8.4	25
Ozone Concentrations (O ₃)	µg/m ³	64.14	56.09	54.94	61.7	120

** Enniscorthy included in PM₁₀ and PM_{2.5} reporting only for 2019.

20.5.2.8 The existing baseline levels of NO₂, NO_x, SO₂, PM₁₀, PM_{2.5}, and Ozone based on data from the EPA monitoring network are currently below annual ambient air quality limit values in Zone D. Annual mean data for Carbon Monoxide (CO) in Zone D was not available for 2019, 2020 and 2021.

20.5.2.9 The EPA monitoring networks in Zone D includes multiple monitoring locations in rural areas across Ireland. Of these, the active Zone D (Rural East, Small Towns) monitoring station that would be most representative of the Proposed Development's location is Enniscorthy (c.43 km south of Arklow) in County Wexford, in the east southeast of the country.

20.5.2.10 Only PM from this location has been included in the EPA Annual Reports for 2019, 2020 and 2021. A summary of the air quality monitoring data for this location is presented in Table 20.7 which outlines the annual mean concentrations measured for PM₁₀, and PM_{2.5} at Enniscorthy for 2019, 2020, 2021 and 2022. The results from this location are considered representative of the shoreside air quality in terms of particulate matter.

Table 20.7: Annual mean 'particulate matter' data reported from EPA ambient air monitoring site at Enniscorthy 2019, 2020, 2021 and 2022

Pollutant	Unit	Annual Mean Concentration in 2019	Annual Mean Concentration in 2020	Annual Mean Concentration in 2021	Annual Mean Concentration in 2022	Annual Limit for Protection of Human Health	WHO Guidelines
Particulate Matter (PM ₁₀)	µg/m ³	18	15	10	15	40	20
Particulate Matter (PM _{2.5})	µg/m ³	14	12	14	10	25	10

20.5.2.11 In summary, existing baseline levels of pollutants based on the data from both the EPA Zone D averages and for particulate matter at the Enniscorthy monitoring station, are currently below ambient air quality limit values and by extension the levels in the shoreside area of the Proposed Development (including Arklow Town) are also considered to be below the limit values. It is noted that the 2019, 2020 and 2021 PM_{2.5} data in Enniscorthy is above the WHO annual guideline and

the EPA note that the principal source of this pollution is emissions from space heating using solid fuels e.g. peat, coal and wood in residential and commercial properties within this town. These phenomena are likely replicated in Arklow and a similar level of PM_{2.5} is expected in the Arklow area.

Baseline Climate

20.5.2.12 The weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain.

20.5.2.13 Easterly winds are weaker and less frequent and tend to bring cooler weather from the northeast in spring and warmer weather from the southeast in summer. The Proposed Development is situated on Arklow Bank, in the Irish Sea, off the east coast of Ireland.

20.5.2.14 The nearest relevant Met Éireann coastal meteorological station to the Proposed Development is the station at Rosslare, Wexford circa 60 km south of Arklow. The 30-year averages from the station at Rosslare are presented in Table 20.8. This is the most recent 30-year average for Rosslare as the station closed in 2007.

Table 20.8: 30-year average meteorological data from Rosslare (annual values from 1978-2007, source: www.met.ie)

Parameter	30-Year Average
Mean Temperature (°C)	13.1
Mean Relative Humidity at 0900 Universal Time Coordinated (UTC) (%)	84.2
Mean Daily Sunshine Duration (Hours)	4.3
Mean Annual Total Rainfall	905.5
Mean Wind Speed (knots)	11.1

20.5.2.15 In relation to climate adaption, the resilience of the Proposed Development must consider weather events relating to cold weather, wind, rain and events (storms, snow etc.) that may disrupt construction, operational and maintenance and decommissioning. Table 20.9 displays the mean number of days per annum on average across the 30-year average a weather event occurs. Snow lying at 0900 UTC is infrequent occurring on average 1.2 days per annum, posing a low risk to operations. Fog is the most frequent weather event observed at the Rosslare monitoring location during the 30-year average records, occurring on average 33.9 days per annum.

Table 20.9: 30-year average data for weather events at Rosslare (annual values from 1978-2007, source www.met.ie)

Weather (Mean No. of days with...)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Snow or Sleet	1.7	2.3	1.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	6.2
Snow lying at 0900 UTC	0.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2

Weather (Mean No. of days with...)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Hail	1.2	1.0	1.9	1.3	0.8	0.2	0.1	0.1	0.1	0.4	0.7	0.9	8.7
Thunder	0.2	0.1	0.2	0.2	0.7	0.9	0.8	0.6	0.4	0.6	0.3	0.3	5.2
Fog	1.8	2.2	3.6	3.7	2.9	4.1	4.4	3.4	2.8	1.6	1.7	1.7	33.9

Baseline national Greenhouse Gas (GHG) emissions

20.5.2.16 In 2022, the EPA reported (EPA, 2022) that the total national emissions of GHG in Ireland for 2022 are estimated to be 60.76 million tonnes carbon dioxide equivalent (Mt CO_{2eq}), which is 1.9% lower (1.19 Mt CO_{2eq}) than emissions in 2021 and follows a 5.1% increase in emissions reported for 2021. Emissions are 4.6% below pre COVID, 2019 figures.

20.5.2.17 In 2022 sectoral emissions in the Energy Industries sector show a decrease of 1.8% which is attributable to reductions in coal, fuel oil and peat use in electricity generation. There was a substantial increase in natural gas use by 12.6% following an 8.9% decrease the previous year as plants were offline in 2021.

20.5.2.18 In 2022 renewables accounted for 38.6% (an increase from 35.0% in 2021). The use of natural gas increased by 12.6% and is currently the highest usage since 2010, at 48.8% of electricity generated in 2022.

20.5.2.19 Emissions from electricity generation has decreased year-on-year from 2016 to 2020, but 2021 and 2022 has seen an increase in emissions of 1.4 – 1.5 million tonnes compared to 2020. The return to using more carbon intensive fuel along with less renewables and natural gas plant availability has played a big part in changing the trend as well as increasing demand for electricity.

20.5.2.20 Provisional National total emissions for Ireland 2022, including Land Use, Land Use Change and Forestry (LULUCF), decreased by 1.7% to 68.07 Mt CO_{2eq}. Emissions Trading System (ETS) emissions decreased (4.3%) and effort sharing regulation (ESR) emissions decreased (1.1%).

20.5.2.21 Provisional national total emissions including LULUCF for 2022 and latest emissions estimate for 2021 are 137.36 Mt CO_{2eq}, accounting for 46.6% of the first five-year Carbon Budget of 295 Mt CO_{2eq}. This leaves 53.4% of the budget available for the remaining three years. To stay within budget for the first carbon budget period will now require a substantial 12.4% annual emissions reduction from 2023 – 2025. Section 6D – Paragraph 5 of the Climate Action and Low Carbon Development (Amendment) Act 2021 states that non-achievement of the first Carbon Budget would see the excess emissions carried forward into the second budget period and the second Carbon Budget would be reduced by that amount. If this occurs this would make achievement of the second budget substantially more difficult.

20.5.2.22 The EPA estimate emissions to 2040 using two scenarios as follows:

- 'With Existing Measures' - scenario assumes that no additional policies and measures, beyond those already in place by the end of 2020, the cut off point for which the latest national GHG inventory data is available, are implemented; and
- 'With Additional Measures' - scenario assumes implementation of the 'With Existing Measures' scenario in addition to implementation of planned government policies and measures adopted after the end of 2020; including Ireland's 2021 CAP which sets out a major programme of policies and measures to help Ireland achieve its decarbonisation goals.

20.5.2.23 GHG projections published by the EPA for 2021 to 2040, project that 'With Existing Measures', emissions in the Energy Industries sector are projected to decrease by 37.8% between 2020 and 2030 (8.7 Mt CO_{2eq}). The 'With Existing Measures' scenario projects that by 2030 Ireland will be

reaching approximately 70% of electricity consumption from renewable energy, with renewable electricity dominated by wind.

20.5.2.24 'With Additional Measures', emissions from the Energy Industries sector are projected to decrease by 48.9% from 8.7 to 4.5 Mt CO_{2eq} over the period 2020 to 2030, this is an additional 1.0 Mt CO_{2eq} than the 'With Existing Measures' scenario. The 'With Additional Measures' scenario assumes that by 2030 renewable energy generation increases to approximately 80% of electricity consumption (as set out in the CAP 2023). This is mainly a result of further expansion in wind energy (comprising 5 GW offshore). Under 'With Additional Measures' 2 GW of storage is to be in place by 2030, including Turlough Hill pumped storage.

20.5.2.25 Overall, total national GHG emissions are projected to decrease from current levels (EPA, 2021) by 37.8% under the 'With Existing Measures' scenario. Total GHG emissions under the 'With Additional Measures' scenario is estimated to decrease by 48.9% by 2030. Urgent implementation of all climate plans and policies, in addition to further new measures, are needed for Ireland to meet the 51% emissions reduction target and put Ireland on track for net zero by 2050.

Evolving baseline with Climate Change

20.5.2.26 With the evolving baseline climate in Ireland caused by climate change, the following are the changes predicted by Met Éireann (2021) specific to Ireland with relevance to the Proposed Development:

- Rising sea-levels threatening habitable land and particularly coastal infrastructure - globally sea levels have been rising at an average rate of approximately 3 mm per year between 1980 and 2010. For further detail on coastal erosion see Volume II, Chapter 6: Coastal Processes;
- Extreme weather, including more intense storms and rainfall affecting our land, coastline and seas;
- Further pressure on our water resources and food production systems with associated impacts on fluvial and coastal ecosystems; and
- Increased chance and scale of river and coastal flooding.

20.5.2.27 These changes are well established, with the extent of the relative changes having been accurately predicted by the climate scientists for all parts of the country, including the Irish Sea and the east coast (which is particularly vulnerable to increased coastal flooding and erosion). The design of the Proposed Development has accounted for these predicted changes in sea level rise, coastal flooding, extreme weather, etc. to ensure that the Proposed Development remains resilient to these changes over the lifetime of the Proposed Development.

20.5.3 'Do nothing' scenario

20.5.3.1 Annex IV of the Environmental Impact Assessment (EIA) Directive sets out the information required to be included in an EIAR. This includes "a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge". In the event that the Proposed Development does not proceed, an assessment of the future baseline conditions has been carried out and is described within this section.

20.5.3.2 Should the Proposed Development not proceed, conditions relating to air quality and climate within the air quality and climate study area will continue in line with baseline trends, summarised in Section 20.5.2.26. Some improvement in conditions may be experienced due to legislative driven measures and mitigation at source.

20.5.3.3 Should the Proposed Development not proceed, the predicted reductions in GHG emissions associated with this renewable source of electricity generation may not be achieved. The EPA projections for renewable energy in electricity generation and GHG reductions, as outlined in 20.5.2.16 may be compromised and would require other renewable projects to meet these projections to avoid the need for the continued use of carbon based electricity generation.

20.5.4 Data limitations

20.5.4.1 The air quality and climate data provided is the most recent available and considered representative of the air quality and climate Study Area. Data on baseline air quality has been derived from the EPA database and while these stations are not located within the air quality and climate Study Area, the data presented is considered representative of air quality in the air quality and climate Study Area. Climate data provided is based on Met Eireann 30-year averages for the nearest/most comparative station at Rosslare, between 1990 to 2021.

20.5.4.2 It is difficult to assess the scale and significance of any adverse (increased) changes in CO₂ emissions resulting from the Proposed Development in a similar way to other impacts within this EIAR. The effect, the term used to describe an environmental response resulting from an impact or series of impacts, is not possible to assess for individual CO₂ emissions. However, commentary and context to the calculated CO₂ emissions reported is provided with reference to historic and projected national emissions in Ireland.

20.6 Impact assessment methodology

20.6.1 Key parameters for assessment

20.6.1.1 The assessment of significance of effects has been carried out on both of the two discrete Project Design Options detailed in Volume II, Chapter 4: Description of Development. This approach has allowed for a robust and full assessment of the Proposed Development.

20.6.1.2 The two Project Design Options and parameters relevant to each potential impact are detailed in Table 20.10 and Table 20.11.

Table 20.10: Project design parameters and impacts assessed – Project Design Option 1

Potential impact	Phase			Project design option 1
	C	O	D	
Changes in emissions to atmosphere	✓	✓	✓	<p>Construction phase</p> <p><u>Installation and transport of the following:</u></p> <ul style="list-style-type: none"> • Installation of 56 monopile foundations (for Wind Turbine Generators (WTGs)) and 2 x Offshore Substation Platform (OSP) foundations; • Installation of 110-122 km of inter-array cable; • Installation of 35-40 km of export cable; • Installation of 25-28 km of interconnection cables; • Installation of scour and cable protection; and <p><u>Vessel: return trips:</u></p> <ul style="list-style-type: none"> • Maximum of 4,150 vessel return trips across construction period. <p><u>Timescale:</u></p> <ul style="list-style-type: none"> • Offshore construction phase duration up to five years. <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> • Maximum of 1,359 vessel return trips per year. <p><u>Timescale:</u></p> <ul style="list-style-type: none"> • Anticipated operational life up to 36.5 years. <p>Decommissioning phase</p> <ul style="list-style-type: none"> • All structures above the seabed will be removed; • Monopiles will be cut 2 m below sea level; and • Decommissioning will be undertaken in the reverse of construction.

Table 20.11: Project design parameters and impacts assessed - Project Design Option 2

Potential impact	Phase			Project design option 2
	C	O	D	
Changes in emissions to atmosphere	✓	✓	✓	<p>Construction phase</p> <p><u>Installation and transport of the following:</u></p> <ul style="list-style-type: none"> • Installation of 56 monopile foundations (for Wind Turbine Generators (WTGs)) and 2 x Offshore Substation Platform (OSP) foundations; • Installation of 110-122 km of inter-array cable; • Installation of 35-40 km of export cable; • Installation of 25-28 km of interconnection cables; • Installation of scour and cable protection; and <p><u>Vessel: return trips:</u></p> <ul style="list-style-type: none"> • Maximum of 4,150 vessel return trips across construction period. <p><u>Timescale:</u></p> <ul style="list-style-type: none"> • Offshore construction phase duration up to five years. <p>Operational and maintenance phase</p> <ul style="list-style-type: none"> • Maximum of 1,359 vessel return trips per year. <p><u>Timescale:</u></p> <ul style="list-style-type: none"> • Anticipated operational life up to 36.5 years. <p>Decommissioning phase</p> <ul style="list-style-type: none"> • All structures above the seabed will be removed; • Monopiles will be cut 2 m below sea level; and

-
- Decommissioning will be undertaken in the reverse of construction.
-

20.6.2 Impacts scoped out of the assessment

20.6.2.1 On the basis of the baseline environment and the description of development outlined in Volume II, Chapter 4: Description of Development, a number of impacts have been scoped out of the assessment for air quality and climate. These impacts are outlined, together with a justification for scoping them out, in Table 20.12.

Table 20.12: Impacts scoped out of the assessment for air quality and climate

Potential impact	Justification
Potential effects on air quality from construction dust and construction, operational and maintenance and decommissioning emissions.	The assessment of potential impacts on air quality typically addresses the potential for impacts from dust and traffic/plant emissions on nearby sensitive receptors. As the Proposed Development relates to the construction of offshore infrastructure only there is no potential for dust impacts. Furthermore, due to the distance between the Array Area and the shore (minimum 6 km), any potential impacts that might arise from emissions associated with plant or marine vessels are unlikely to give rise to likely significant effects due to the dispersal of emissions. There is unlikely to be potential for significant air quality impacts during the operational and maintenance or decommissioning phases of the Proposed Development. Therefore, the assessment of potential effects on air quality are not included in the scope of the EIAR.

20.7 Methodology for assessing the significance of effects

20.7.1 Overview

20.7.1.1 The air quality and climate impact assessment has followed the methodology set out in Volume II, Chapter 5: EIA Methodology. Specific to the air quality and climate impact assessment, the following guidance documents have also been adhered to:

- Institute of Environmental Management and Assessment (IEMA) ‘Assessing Greenhouse Gas Emissions and Evaluating their Significance’ guidance (2022) has been used in this chapter for the evaluation and significance of GHG emissions from the Project. This guidance is a revision of the first iteration of the guidance released in 2017 (IEMA, 2017).
- National Roads Authority's (NRA) Traffic and Transport Assessment Guidelines (2014);
- Transport Infrastructure Ireland (TII) Guidelines (for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (Rev. 1) (NRA, 2011);
- United Kingdom (UK) Environment Agency (EA) Carbon Calculator for Construction Sites; and
- European Monitoring and Evaluation Programme / European Environment Agency (EMEP / EEA) (2019) Air Pollutant Emission Inventory Guidebook 2019: Technical Guidance to Prepare National Emission Inventories - (Section 1.A.3.d Navigation (shipping)).

20.7.1.2 In addition, the air quality and climate impact assessment has considered the legislative framework as defined by:

- Directive on Ambient Air Quality and Cleaner Air for Europe (2008/50/EC) (CAFE Directive); and
- Air Quality Standards Regulations (S.I. 739/2022).

20.7.1.3 The following aspects were considered in assessing the potential effects that the Proposed Development may have on air quality and climate:

- Construction methods and activities;
- Transport;
- Plant and Machinery;
- Resources and Materials; and
- Indirect sources.

20.7.2 Impact assessment criteria

SENSITIVITY

20.7.2.1 The receptor for the GHG assessment is the global atmosphere and as such, is affected by the global sources of GHGs and is therefore considered to be of 'high' sensitivity to additional emissions.

MAGNITUDE

20.7.2.2 This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume II, Chapter 5: EIA Methodology of the EIAR.

20.7.2.3 The criteria for defining the magnitude in this chapter are outlined in Table 20.13 below.

Table 20.13: Definition of terms relating to the magnitude of an impact

Magnitude	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse)
	Large scale or major improvement or resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial)
Medium	Loss of resource, but not adversely affecting integrity of resource; partial loss of damage to key characteristics, features or elements (Adverse)
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial)
Low	Some measurable change in attributes, quality or vulnerability, minor loss or, alteration to, one (maybe more) key characteristics, features or elements (Adverse)
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial)
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse)
	Very minor benefit to, or positive addition of one or more characteristics, features or elements (Beneficial)

SIGNIFICANCE OF EFFECT

20.7.2.4 The significance of the effect upon air quality and climate is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 20.14. Where a range of significance of effect is presented in Table 20.14, the final assessment for each effect is based upon expert judgement.

20.7.2.5 For the purposes of this assessment, any effects with a significance level of low or less have been concluded to be not significant in EIA terms.

Table 20.14: Significance of effect matrix

			Baseline Environment - Sensitivity			
			High	Medium	Low	Negligible
Description of Impact - Magnitude	Adverse Impact	High	Profound or Very Significant (significant)	Significant	Moderate*	Imperceptible
		Medium	Significant	Moderate*	Slight	Imperceptible
		Low	Moderate*	Slight	Slight	Imperceptible
	Neutral Impact	Negligible	Not Significant	Not Significant	Not Significant	Imperceptible
	Positive Impact	Low	Moderate*	Slight	Slight	Imperceptible
		Medium	Significant	Moderate*	Slight	Imperceptible
		High	Profound or Very Significant (significant)	Significant	Moderate*	Imperceptible

*Moderate levels of effect have the potential, subject to the assessor's professional judgement to be significant or not significant. Moderate will be considered as significant or not significant in EIA terms, depending on the sensitivity and magnitude of change factors evaluated. These evaluations are explained as part of the assessment, where they occur.

20.7.3 Factored in measures

20.7.3.1 The Project Design Options set out in Volume II, Chapter 4: Description of Development include a number of designed-in measures and management measures (or controls) which have been factored into the Proposed Development and are committed to be delivered by the Developer as part of the Proposed Development.

20.7.3.2 These factored-in measures are standard measures applied to offshore wind development, including lighting and marking of the Proposed Development, use of 'soft-starts' for piling operations etc, to reduce the potential for impacts. Factored-in measures relevant to the assessment on air quality and climate are presented in Table 20.15. These measures are

integrated into the description of development and have therefore been considered in the impact assessment (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development. This approach is in line with EPA guidance which states that ‘in an EIAR it may be useful to describe avoidance measures that have been integrated into the proposed proposal’ (EPA, 2022).

Table 20.15: Factored in measures

Factored in measures	Justification
<p>An Environmental Management Plan (EMP) will be implemented (Volume III, Appendix 25.1: Environmental Management Plan)</p>	<p>The EMP and associated annexes set out commitments to environmental management in pre-, during and post-construction phases. These commitments will include measures and commitments relating to energy use:</p> <ul style="list-style-type: none"> • Regular maintenance of plant and equipment used during the construction phase. Technical inspection of vessels and plant to ensure they will perform the most efficiently; • All vessel engines will be properly maintained in line with manufacturers requirements to ensure emissions are minimised; • Implement energy efficiency measures such as fuel efficiency for the duration of the works; • The contractor will be required to measure and record all activity data (fuel use, material use, transport, etc.) to allow for the development of a carbon footprint for the construction phase of the Proposed Development. • Materials with a reduced environmental impact will also be incorporated into the construction design where practicable through re-use of materials or incorporation of recycled materials in place of conventional materials.
<p>The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning permission (if granted) at the same time as any activities the subject of the Foreshore Licence for Site Investigations (FS007339).</p>	<p>The Developer was granted a Foreshore Licence (FS007339) for Site Investigations (associated with the Proposed Development) from the Minister for Housing, Local Government and Heritage in May 2022.</p> <p>The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning permission (if granted) at the same time as any activities the subject of the Foreshore Licence for Site Investigations (FS007339) being carried out.</p> <p>As such there is no temporal overlap between the activities consented in this Foreshore</p>

Factored in measures	Justification
<p>The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning permission (if granted) at the same time as any activities the subject of the Foreshore Licence Application for Site Surveys FS007555 (should a licence be granted) are being carried out.</p>	<p>Licence and the Proposed Development and there will be no potential for cumulative effects.</p> <p>The Developer submitted a Foreshore Licence Application for Site Surveys to the Minister for Housing, Local Government and Heritage in April 2023 (FS007555) and this application is pending determination.</p> <p>The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning permission (if granted) at the same time as any activities the subject of the Foreshore Licence Application for Site Surveys FS007555 (should a licence be granted) are being carried out.</p> <p>As such there is no temporal overlap between the activities proposed in the Foreshore Licence Application and the Proposed Development.</p>

20.8 Assessment of the significance of effects

- 20.8.1.1 The impacts of the construction, operational and maintenance and decommissioning phases of both Project Design Options forming the Proposed Development have been assessed on Climate. The potential impacts arising from the construction, operational and maintenance and decommissioning phases of the Proposed Development are listed in Table 20.10 and Table 20.11, along with the project parameters against which each impact has been assessed.
- 20.8.1.2 A description of the potential effect on Climate caused by emissions to atmosphere is provided below.

20.8.2 Emissions to atmosphere

- 20.8.2.1 The potential for changes in emissions to atmosphere (GHGs) from the Proposed Development have been considered both in terms of direct construction, operational and maintenance and decommissioning phase impacts and the indirect impact during operations from the alterations to the power generation market.

20.9 Assessment of Project Design Option 1 and 2

20.9.1 Impact 1 – Changes in emission to atmosphere

- 20.9.1.1 The changes in emissions to atmosphere (GHGs) from both Project Design Options for the Proposed Development have been considered both in terms of direct construction, operational and maintenance and decommissioning phase impacts and the indirect impact during operations from the alterations to the power generation market.

SENSITIVITY OF THE RECEPTOR

- 20.9.1.2 The atmosphere is deemed to be of high vulnerability, moderate recoverability and high value. The sensitivity of the receptor is therefore, considered to be Medium.

Construction phase

20.9.1.3 Greenhouse gas emissions may arise during the construction phase from the following sources:

- Embodied emissions in site materials relative to other materials. Embodied emissions are the carbon footprint of a material (i.e. the total emissions released throughout the supply chain of the material). This includes the energy required for extraction, processing, operation and disposal of a material.
- Direct emissions from plant machinery/equipment; and
- Transport emissions from vessels importing/exporting material to and from the Proposed Development.

20.9.1.4 These emissions have been estimated using multiple sources where relevant, and the results are presented in Table 20.16.

Table 20.16: Summary of GHG Assessment

Lifecycle Stage	Category	Emissions (tCO ₂ eq)	
		Project Design Option 1	Project Design Option 2
Construction	Turbines & Foundations	638,780	593,728
Construction	Offshore Substation	29,735	29,735
Construction	Cables	184,920	184,920
Construction	Transport	546,716	546,716
Construction	Installation	59,529	59,529
Operation	Operations	185,548	185,777
Decommissioning	Materials	3,004	2,784
Decommissioning	Transport, removal	0	0
Total		1,648,230	1,600,404

20.9.1.5 The results indicate that the primary source of GHG emissions from the construction and manufacture of the Proposed Development is from embodied carbon in construction materials and GHG emissions from transport, noting that transport emissions for decommissioning are 0, in line with the Climate Action Roadmap (Department of Transport, 2023) for net zero transport by 2050.

MAGNITUDE OF THE IMPACT

20.9.1.6 It is predicted that the impacts will affect the receptor, but the magnitude of impact is Low because it is of short-term duration, intermittent and low reversibility.

SIGNIFICANCE OF THE EFFECT

20.9.1.7 Overall, the magnitude of the impact is deemed to be **Low**, and the sensitivity of the receptor is considered to be **Medium**. The effect will, therefore, be of **Slight adverse** significance, which is **not significant** in EIA terms, and also needs to be considered in the context of the life cycle on the Proposed Development where there will be an overall net beneficial impact for climate during operation.

Operational and maintenance phase

Indirect reduction in GHG

TOTAL GHG & PAYBACK PERIOD

20.9.1.8 In order to determine the Projects 'pay back' period - how long into the Projects lifetime the carbon emissions associated with its construction, operation and decommissioning are counterbalanced by the reduced carbon emissions of the electricity it generates, it is necessary to calculate the GHG intensity of the Project.

20.9.1.9 The Projects life cycle emissions at this stage are expected to be approximately, 1,648,230 tCO_{2e} for Project Design Option 1 and 1,600,404 tCO_{2e} for Project Design Option 2, when considering construction, O&M and decommissioning.

20.9.1.10 Due to the lower operational GHG intensity of the Project compared to the Irish grid GHG intensity projections, a net reduction in GHG emissions will be achieved as a result of the Project as offshore wind power is a less GHG intensive form of energy generation than the projected marginal generation in 2029 onwards, which includes a small residual amount of generation using unabated fossil fuels.

20.9.1.11 Based upon the predicted energy generation during its operational and maintenance phase, it will take the project approximately (1) 74 months and (2) 71 months from the start of operation, to 'pay back' the predicted total carbon generation for Construction, O&M and decommissioning. This is based upon the predicted RoI grid intensity over the operational period. It would then deliver annual savings for each of the following years of operation.

MAGNITUDE OF IMPACT

20.9.1.12 The impact is predicted to be of international spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor indirectly. The magnitude is therefore, considered to be High.

SIGNIFICANCE OF EFFECT

20.9.1.13 Overall, the magnitude of the impact is deemed to be **High** and the sensitivity of the receptor is considered to be **Medium**. The indirect effect will, therefore, be of **Major beneficial significance**, which is **significant** in EIA terms and more than offsets the direct carbon emissions reported for the construction and decommissioning phases.

Decommissioning phase

20.9.1.14 During the decommissioning phase, there is no potential for significant climate impacts or release of GHG emissions associated with embodied emissions as they arise during the construction phase only. There is potential for the following:

- Direct emissions from plant machinery/equipment; and
- Transport emissions from vessels and vehicles importing/exporting material to and from the development site(s) at the end of life, to the location of recycling or disposal.

20.9.1.15 It is difficult to be certain what will happen to the material from ABWP2 at decommissioning phase as this will not occur for 36.5 years, by which time the state of available technology may have advanced. Therefore, current UK Government GHG Conversion Factors for Company Reporting (DESNZ, 2024) for the recycling of materials have been included within the GHG Assessment.

20.9.1.16 The indirect effects of reducing the generation of fossil fuel emissions at gas, peat and coal powered plants across the State are associated with the operational phase only and no significant indirect effects for the construction or decommissioning stages are identified.

MAGNITUDE OF IMPACT

20.9.1.17 The impact is predicted to be of international spatial extent, short term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor (i.e. the global atmosphere indirectly). The magnitude is therefore, considered to be Low.

SIGNIFICANCE OF EFFECT

20.9.1.18 Overall, the magnitude of the impact is deemed to be **Low** and the sensitivity of the receptor is considered to be **Medium**. The effect will, therefore, be of **Slight adverse significance**, which is **not significant** in EIA terms and also needs to be considered in the context of the life cycle on the Proposed Development where there will be an overall net beneficial impact for climate during operation.

20.10 Cumulative impacts assessment methodology

20.10.1 Methodology

20.10.1.1 The Cumulative Impact Assessment (CIA) takes into account the impacts associated with the Proposed Development together with other proposed and reasonably foreseeable projects, plans and existing and permitted projects. The projects and plans selected as relevant to the CIA presented within this chapter are based upon the results of a screening exercise (see Volume III, Appendix 3.2: Cumulative Impact Assessment Screening). Each project and plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon, effect-receptor pathways and the spatial/temporal scales involved.

20.10.1.2 A tiered approach is adopted to provide an assessment of the Proposed Development as a whole. The tiering methodology is provided in Volume III, Appendix 3.2: CIA Screening.

20.10.1.3 The global atmosphere is the receptor for the air quality and climate assessment, as such there are no common receptors between this assessment and other disciplines considered in the EIAR. GHG emissions have the potential to contribute to climate change, and therefore the effects are global and cumulative in nature. The IEMA guidance (2022) states that the effects of GHG emissions from specific cumulative projects should therefore not be cumulatively assessed, as there is no basis for selecting which projects to assess cumulatively over any other. The GHG assessment is therefore considered to be inherently cumulative, and no additional consideration of cumulative effects is required.

20.10.1.4 However, as outlined in Volume II, Chapter 1: Introduction, in May 2022, the Developer received planning approval for the onshore grid connection infrastructure (OGI) (Case Reference: 310090). In June 2022, the Developer received planning permission for the OMF (Planning Register Reference: 21/1316). Therefore, in order to complete a GHG assessment of the Project, the OGI, OMF and EirGrid Upgrade Works need to be assessed cumulatively.

20.10.1.5 A description of the significance of cumulative effects upon climate change arising from each identified impact is provided in section 20.10.

20.10.1.6 Due to the commitments made by the Developer in respect of the Foreshore Licence FS007339 and Foreshore Licence Application FS007555 (Table 20.15), FS007339 and FS007555 have been screened out of the cumulative impact assessment.

Table 20.17: List of other projects and plans considered within the cumulative impact assessment

Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Area (km)	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Tier 1							
ABWP2 Onshore Grid Infrastructure (OGI)	Consented	10.2	0	Onshore grid infrastructure located onshore and required for the operation of the Proposed Development	2026 - 2030	2030 - 2066	Potential temporal overlap with the Proposed Development construction, operational and maintenance phases.
APWP2 EirGrid Upgrade Works	Planning	13.56	12.5	Non-contestable grid upgrade works, consent to be sought and works to be completed by EirGrid including upgrading of the Ballybeg- Carrickmines line, a new 220 kV substation at Ballybeg and new stringing works between the Arklow and new proposed substation site.	2026 - 2030	2030 - 2066	Potential temporal overlap with the Proposed Development construction, operational and maintenance phases.
ABWP2 Operations and Maintenance Facility (OMF)	Consented	11.9	4.3	Onshore grid infrastructure located onshore and required for the operation of the Proposed Development	2026 - 2030	2030 - 2066	Potential temporal overlap with the Proposed Development construction, operational and maintenance phases.

20.10.1.7 Table presents the potential impacts, development phase, and the list of projects/ plans with which the two Project Design Options have been cumulatively assessed.

Table 20.18 Cumulative assessment impacts, phases, scenarios, and projects to be considered cumulatively

Potential cumulative impact	Phase			Projects considered cumulatively	Justification for projects considered cumulatively
	C	O	D		
Changes in emission to atmosphere	✓	✓	✓	Project parameters associated with Project Design Option 1 and 2 plus the following projects: Tier 1 <ul style="list-style-type: none"> • ABWP2 OGI; • ABWP2 EirGrid Upgrade works; and • ABWP2 OMF 	Schemes which have the potential to alter the GHG emissions for the Project.

20.10.2 Project Design Option 1 and 2 - Impact 1 - Changes in emission to atmosphere

SENSITIVITY OF THE RECEPTOR

20.10.2.1 The atmosphere is deemed to be of high vulnerability, moderate recoverability and high value. The sensitivity of the receptor is therefore, considered to be Medium as outlined in Section 20.9.1.2.

Construction Phase

MAGNITUDE OF IMPACT

20.10.2.2 It is predicted that the impacts for the Project alone will affect the receptor, but the magnitude of impact is low because it is of short-term duration, intermittent and low reversibility. This is the same for both Project Design Option 1 and 2.

20.10.2.3 When assessed cumulatively with ABWP2 OGI, OMF and EirGrid Upgrade Works the magnitude is considered to be of international spatial extent, short term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor (i.e. the global atmosphere) indirectly. The magnitude is therefore, considered to be Low for both Project Design Options.

SIGNIFICANCE OF EFFECT

20.10.2.4 When assessed cumulatively with ABWP2 OGI, OMF and EirGrid Upgrade Works the magnitude of the impact is deemed to be **Low** and the sensitivity of the receptor is considered to be **Medium**. The effect will, therefore, be of **Slight adverse** significance, which is **not significant** in EIA terms, and also needs to be considered in the context of the life cycle on the Project where there will be an overall net beneficial impact for climate during operation. This is the same as for both Design Option 1 and 2.

Operational and maintenance phase

MAGNITUDE OF IMPACT

20.10.2.5 The impact for the Project alone is predicted to be of international spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor indirectly. The magnitude is therefore, considered to be High. This is the same for both Design Option 1 and 2.

20.10.2.6 When assessed cumulatively with ABWP2 OGI, OMF and EirGrid Upgrade Works the magnitude is considered to be of international spatial extent, short term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor (i.e. the global atmosphere) indirectly. The magnitude is therefore, considered to be Low for both Project Design Options.

SIGNIFICANCE OF EFFECT

20.10.2.7 When assessed cumulatively with ABWP OGI and OMF, the magnitude of the impact is deemed to be **High** and the sensitivity of the receptor is considered to be **Medium**. The indirect effect will, therefore, be of **Major beneficial** significance, which is **significant** in EIA terms and more than offsets the direct carbon losses reported for the construction and decommissioning phases.

Decommissioning Phase

MAGNITUDE OF IMPACT

20.10.2.8 The impact for the Project alone is predicted to be of international spatial extent, short term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor (i.e. the global atmosphere) indirectly. The magnitude is therefore, considered to be Low.

20.10.2.9 When assessed cumulatively with ABWP2 OGI, OMF and EirGrid Upgrade Works the magnitude will remain considered to be Low.

SIGNIFICANCE OF EFFECT

20.10.2.10 When assessed cumulatively with ABWP OGI and OMF, the magnitude of the impact is deemed to be **Low** and the sensitivity of the receptor is considered to be **Medium**. The effect will, therefore, be of **Slight adverse** significance, which is **not significant** in EIA terms and also needs to be considered in the context of the life cycle on the Proposed Development where there will be an overall net beneficial impact for climate during operation.

20.11 Transboundary effects

20.11.1.1 A screening of transboundary impacts has been carried out and has identified that there was potential for significant transboundary effects with regard to air quality and climate from the Proposed Development upon the interests of other states.

20.11.1.2 The changes in national GHG emissions predicted for the Proposed Development and cumulatively with the other offshore renewable projects, will lead to a net reduction in global GHG emissions from electricity generation. This is considered a slight beneficial transboundary impact.

20.12 Summary of effects

20.12.1.1 Information on air quality and climate within the air quality and climate Study Area was collected through desktop review.

20.12.1.2 Table 20.19 and Table 20.20 presents a summary of the potential impacts, mitigation measures and residual effects in respect to air quality and climate. The impacts assessed include direct construction phase GHG emissions and indirect operation phase changes in GHG emissions. Overall, it is concluded that there will be a net beneficial impact to climate arising from the Proposed Development on a local, national and global basis during the construction, operational and maintenance or decommissioning phases.

20.12.1.3 The GHG assessment is considered to be inherently cumulative, and no additional consideration of cumulative effects is required. The changes in emissions of GHG within Ireland from the Proposed Development will result in slight beneficial transboundary impacts.

Table 20.19: Summary of potential environmental impacts, mitigation and monitoring for Project Design Option 1

Description of impact	Phase			Factored-in measures	Magnitude of impact	Sensitivity of Receptors	Significance of effect	Additional measures	Residual effect	Proposed monitoring
	C	O	D							
1. Emissions to atmosphere	✓	✓	✓	An Environmental Management Plan (EMP) will be implemented (Volume III, Appendix 25.1: Environmental Management Plan) Full details of factored-in measures can be found in Section 20.7.3.	C: Low O: Negligible, high D: Low	C: Medium O: Medium D: Medium	C: Slight adverse (not significant in EIA terms) O: Major Beneficial (significant in EIA terms) D: Slight adverse (not significant in EIA terms)	None	C: Slight adverse (not significant in EIA terms) O: Major Beneficial significant in EIA terms D: Slight adverse (not significant in EIA terms)	N/A

Table 20.20: Summary of potential environmental impacts, mitigation and monitoring for Project Design Option 2

Description of impact	Phase			Factored-in measures	Magnitude of impact	Sensitivity of Receptors	Significance of effect	Additional measures	Residual effect	Proposed monitoring
	C	O	D							
1. Emissions to atmosphere	✓	✓	✓	An Environmental Management Plan (EMP) will be implemented (Volume III, Appendix 25.1: Environmental Management Plan) Full details of factored-in measures can be found in Section 20.7.3.	C: Low O: Negligible, high D: Low	C: Medium O: Medium D: Medium	C: Slight adverse (not significant in EIA terms) O: Major Beneficial (significant in EIA terms) D: Slight adverse (not significant in EIA terms)	None	C: Slight adverse (not significant in EIA terms) O: Major Beneficial (significant in EIA terms) D: Slight adverse (not significant in EIA terms)	N/A

20.13 References

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