Environmental Impact Assessment Report

Volume 3

Chapter 28 Climate – Carbon Balance Assessment

codling
wind park

Table of contents

28.1 Introduction 9
28.2 Consultation 10
28.3 Legislation and guidance 11
28.4 Impact assessment methodology 14
28.5 Assumptions and limitations 23
28.6 Existing environment 24
28.7 Scope of the assessment 34
28.8 Assessment parameters 35
28.9 Primary mitigation measures 42
28.10 Impact assessment 44
28.11 Cumulative impacts 53
28.12 Transboundary impacts 54
28.13 Inter-relationships 54
28.14 Potential monitoring requirements 55
28.15 Impact assessment summary 55
28.16 Opportunities for further carbon reduction 60
28.17 References 61

List of tables

Table 28-1 Consultation responses relevant to climate 10

Table 28-2 5-Year carbon budgets 2021–2025, 2026–2030 and 2031–2025 (DECC, 2024) 12

Table 28-3 Sectoral Emission Ceiling 2030 (DECC, 2024) 13

Table 28-4 Sources and lifecycle stages for the CWP Project GHG emissions sources and lifecycle stages for the CWP Project's GHG emissions (reproduced from Table 6.2 of PE-ENV-01104 (TII, 2022a)) 16

Table 28-5 GHGA significance matrix 20

Table 28-6 Vulnerability matrix 22

Table 28-7 Data sources 23

Table 28-8 Total national GHG emissions in 2021-2023 26

Table 28-9 30-Year historical weather data for Dublin Airport 1991 to 2010 (Met Éireann, 2023) 27

Table 28-10 Severe weather events that have impacted Dublin City (reproduced from Table 1 DCC, 2019) 29

Table 28-11 Future projections (all Seasons–annual) in proximity to the OTI (Climate Ireland, 2023) (EPA 2020b) 32

Table 28-12 Potential impacts scoped into the assessment 34

Table 28-13 Potential impacts scoped out of the assessment 34

Table 28-14 Design parameters relevant to assessment of climate 37

Table 28-15 Limit of deviation assessment 41

Table 28-16 Primary mitigation measures 42

Table 28-17 CWP project greenhouse gas emissions from all phases 44

Table 28-18 Estimated GHG emissions relative to sectoral budgets and GHG baseline 46

Table 28-19 Sensitivity to climate hazards (with design mitigation in place) 49

Table 28-20 Exposure risk to climate hazards 50

Table 28-21 Vulnerability analysis to climate hazards 52

Table 28-22 Inter-related effects assessment for climate 55

Table 28-23 Summary of potential Impacts and residual effects 57

Abbreviations

Abbreviation	Term in full
AADT	Annual Average Daily Traffic
ABP	An Bord Pleanála
BS	British Standard
CAP	Climate Action Plan
CCAP	Climate Change Action Plan
CCRA	Climate Change Risk assessment
CDP	City / county development plan
CEMP	Construction Environmental Management Plan
CESMM	Civil Engineering Standard Method of Measurement
CO_2	Carbon dioxide
CO_{2eq}	Carbon dioxide equivalent
CWP	Codling Wind Park
CWPL	Codling Wind Park Limited
DCC	Dublin City Council
DECC	Department of the Environment, Climate and Communications
DMRB	Design Manual for Roads and Bridges
DT	Department of Transport
EC	European Commission
EIA	Environmental Impact Assessment
EIA Report	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ESBN	ESB Networks
ETS	Emissions Trading System
EU	European Union
FOS	Fred. Olsen Seawind
FRA	Flood Risk Assessment
GHG	Greenhouse Gas
GHGA	Greenhouse Gas Emissions Assessment
GIS	Geographic Information System
GW	Gigawatt

Abbreviation	Term in full
HDD	Horizontal directional drilling
HDV	Heavy duty vehicles
hr	Hour
IEMA	Institute of Environmental Management and Assessment
IPCC	Intergovernmental Panel on Climate Change
km	Kilometre
kt	Kilotonne
LDV	Light duty vehicle
LoD	Limit of deviation
MSL	Mean sea level
Mt	Million tonnes
MW	Megawatts
NAF	National Adaptation Framework
NECP	National Energy and Climate Plan
NMPF	National Marine Planning Framework
O&M	Operations and maintenance
OSS	Offshore substation structure
OTI	Onshore transmission infrastructure
PAS	Publicly Available Specification
RCP	Representative Concentration Pathway
RSES	Regional Spatial and Economic Strategy
SDZ	Strategic Development Zone
SEAI	Sustainable Energy Authority Ireland
SUDS	Sustainable Urban Drainage System
TII	Transport Infrastructure Ireland
TJB	Transition joint bay
UKHA	United Kingdom Highway Agency
WTG	Wind turbine generator
ZoI	Zone of influence

Definitions

Glossary	Meaning
the Applicant	The developer, Codling Wind Park Limited (CWPL).
asset	Physical elements of a development (e.g., buildings, wind turbines) which may be affected by climate change hazards.
climate and climate change	Climate is defined as the average weather over a period of time, whilst climate change is a significant change to the average weather.
climate change risk assessment	An assessment of the risks to CWP Project assets from climate change hazards.
climate change hazards	This refers to the potential occurrence of climate-related physical events or trends that may cause damage and loss, e.g., increased flooding
Codling Wind Park (CWP) Project	The proposed development as a whole is referred to as the Codling Wind Park (CWP) Project, comprising of the offshore infrastructure, the onshore infrastructure and any associated temporary works.
Codling Wind Park Limited (CWPL)	A joint venture between Fred. Olsen Seawind (FOS) and Électricité de France (EDF) Renewables, established to develop the CWP Project.
Environmental Impact Assessment (EIA)	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.
Environmental Impact Assessment Report (EIAR)	The report prepared by the Applicant to describe the findings of the EIA for the CWP Project.
export cables	The cables, both onshore and offshore, that connect the offshore substations with the onshore substation.
greenhouse gas	A gas in Earth's atmosphere which increases the atmosphere's ability to trap heat, resulting in increased average global temperatures. The most significant greenhouse gases are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).
greenhouse gas assessment	An assessment of the impact of greenhouse gas emissions, associated with a development, on climate. This involves quantification of greenhouse gas emissions during a development's lifecycle.
horizontal directional drilling (HDD)	HDD is a trenchless drilling method used to install cable ducts beneath the ground through which onshore export cables can be pulled. HDD enables the installation of cables beneath obstacles such as roads, waterways, and existing utilities.
landfall	The point at which the offshore export cables are brought onshore and connected to the onshore export cables via the transition joint bays (TJB).
offshore development area	The entire footprint of the offshore infrastructure and associated temporary works that will form the offshore boundary for the development consent application.
offshore export cables	The cables which transport electricity generated by the WTGs from the offshore substations (OSSs) to the landfall.

offshore transmission infrastructure (OfTI)	The offshore transmission assets comprising the OSSs, interconnector cables and offshore export cables. The EIAR considers both permanent and temporary works associated with the OfTI.
offshore substation structure (OSS)	A fixed structure located within the array site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
onshore development area	The entire footprint of the OTI and associated temporary works that will form the onshore boundary for the development consent application.
onshore transmission infrastructure (OTI)	The onshore transmission assets comprising the TJBs, onshore export cables, and the onshore substation. The EIAR considers both permanent and temporary works associated with the OTI.
onshore substation	Site containing electrical equipment to enable connection to the national grid.
onshore substation site	The area within which permanent and temporary works will be undertaken to construction the onshore substation.
onshore substation operational site	The area within the operational site boundary within which operational activities will occur.
operations and maintenance (O&M) activities	Activities (e.g., monitoring, inspections, reactive repairs, planned maintenance) undertaken during the O&M phase of the CWP Project.
O&M phase	This is the period of time during which the CWP project will be operated and maintained.
parameters	Set of parameters by which the CWP Project is defined, and which are used to form the basis of assessments.
planning application boundary	The area subject to the application for development consent, including all permanent and temporary works for the CWP Project.
zone of influence (ZoI)	Spatial extent of potential impacts resulting from the project.

28 CLIMATE

28.1 Introduction

1. Codling Wind Park Limited (hereafter 'the Applicant') is proposing to develop the Codling Wind Park (CWP) Project, a proposed offshore wind farm (OWF) which is located in the Irish Sea approximately 13–22 km off the east coast of Ireland, at County Wicklow.

2. This chapter forms part of the Environmental Impact Assessment Report (EIAR) for the CWP Project. The purpose of the EIAR is to provide the decision-maker, stakeholders, and all interested parties with the environmental information required to develop an informed view of any likely significant effects resulting from the CWP Project, as required by the European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) (the EIA Directive).

3. This EIAR chapter describes the potential impacts of the CWP Project's onshore and offshore transmission infrastructure on climate during the construction, operation and maintenance (O&M) and decommissioning phases.

4. In summary, this EIAR chapter:

   - Details the EIA scoping and consultation process undertaken and sets out the scope of the impact assessment for climate (**Section 28.2**);
   - Identifies the key legislation and guidance relevant to climate, with reference to the latest updates in guidance and approaches (**Section** Error! Reference source not found.);
   - Confirms the study area for the assessment and presents the impact assessment methodology for climate, in terms of greenhouse gas (GHG) emissions and risk to the CWP Project from climate hazards (**Section 28.4**);
   - Identifies any assumptions and limitations encountered in compiling the impact assessment (**Section 28.5**);
   - Describes and characterises the baseline environment for climate, established from desk studies and consultation (**Section 28.6**);
   - Presents the impacts scoped in and out of assessment (**Section 28.7**);
   - Defines the project design parameters for the impact assessment (**Section 28.8**);
   - Describes any embedded mitigation measures relevant to the climate assessment (**Section 28.9**);
   - Presents the assessment of potential impacts on climate in terms of GHG emissions during the construction phase and savings during the O&M phase, and risk to the CWP from climate hazards (**Section 28.10**); and
   - Details any additional mitigation and/or monitoring necessary to prevent, minimise, reduce or offset potentially significant effects identified in the impact assessment (**Section 28.10** and **28.14**).

5. **Section 28.11** describe the approach taken to assessing cumulative effects on climate, where other plans, projects and activities may act cumulatively with the CWP Project.

6. The climate assessment comprises two elements:

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

28.2 Consultation

7. Consultation with statutory and non-statutory organisations is a key part of the EIA process. Consultation with regard to climate has been undertaken to inform the approach to and scope of the assessment.

8. The key elements to date have included EIA scoping, consultation events and meetings with key stakeholders. Any feedback received throughout this process has been considered in preparing the EIAR. EIA consultation is described further in **Chapter 5 EIA Methodology** and full details of consultation undertaken for the CWP Project is presented in the **Public and Stakeholder Consultation Report**, which has been submitted as part of the planning application.

9. **Table 28-1** provides a summary of the key issues raised during the consultation process relevant to climate and details how these issues have been considered in the production of this EIAR chapter.

Table 28-1 Consultation responses relevant to climate

Consultee	Comment	How issues have been addressed
Scoping responses		
Public Consultation Phase 1	Stakeholders are seeking for carbon emissions to be offset and for a carbon neutral or potentially negative project. It was also asked if the payback would be worthwhile from a sustainability perspective given the costs of the project, impact on the environment, energy required for production.	The proposed onshore and offshore infrastructure for the CWP Project, including material types and the approach to installation, is detailed in **Chapter 4 Project Description**. The embodied carbon calculation methodology is described in **Section 28.4**.
Topic specific meetings		
Dublin City Council: Flood Risk Assessment 10th November 2022	The risk to the CWP Project due to flooding required consideration.	**Chapter 20 Hydrology and Hydrogeology** and **Appendix 20.2 Site Specific Flood Risk Assessment (SSFRA)** assess the potential for flood risk in relation to the OTI. **Section 28.10** presents the climate change risk assessment (CCRA), which assesses the vulnerability of the CWP Project to flooding and takes the SSFRA into account. The primary mitigation identified in the SSFRA are given in **Section 28.9.**
Other		
Transition year students of Coláiste Chraobh Abhann in Kilcoole	In relation to the OTI, climate was broadly mentioned by students as	Impacts of the OTI on climate scoped in and out of assessment are discussed in **Section 28.7**,

	needing to be considered in any onshore proposals.	with the methodology for assessing the scoped in impacts given in **Section 28.4**.The impacts and significance of effects are discussed in **Section 28.10**.

28.3 Legislation and guidance

28.3.1 Legislation

10. The legislation that is applicable to the assessment of climate is summarised below. Further detail is provided in **Chapter 2 Policy and Legislative Context**.

- European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment (the EIA Directive);
- European Union (EU) Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law');
- The Planning and Development Act, 2000 (as amended);
- The Planning and Development Regulations, 2001 (as amended);
- Council Directive 2018/2001/EC on the promotion of the use of energy from renewable sources (recast) and amending and subsequently repealing Directives 2001/77/EC, 2003/30/EC and 2009/28/EC;
- Climate Action and Low Carbon Development Act 2015 (Act. No. 46 of 2015); and
- Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (hereafter referred to as the 2021 Climate Act).

11. The Climate Action and Low Carbon Development Act 2015 provided for the establishment of the Climate Change Advisory Council (hereafter referred to as the Advisory Council) with the function to advise and make recommendations on the preparation of the relevant plans and compliance with existing climate obligations. The Advisory Council is to advise and make recommendations on the following:

- The preparation of a Climate Action Plan (CAP);
- The preparation of a national long term climate action strategy;
- The preparation of a national adaptation framework;
- The finalization and revision of a carbon budget, and
- Compliance with any existing obligations of the State under EU law or any international agreements.

12. The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'*. The 2021 Climate Act will *also 'provide for carbon budgets and a sectoral emissions ceiling to apply to different sectors of the economy'*. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the CAP, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister is required to request that each local authority prepares a 'local authority climate action plan' lasting five years and specifying the mitigation measures and the adaptation measures to be adopted by the local authority.

13. The 2021 Climate Act has set a target of a 51% reduction in the total amount of GHGs over the course of the first two carbon periods, ending 31 December 2030, relative to 2018 annual emissions and also defines the carbon budget as '*the total amount of GHG emissions that are permitted during the budget period'*. The 2021 Climate Act outlined a series of specific actions including:

- To make a strategy to be known as the 'National Long Term Climate Strategy' not less than once in every five-year period with the first to be published for the period 2021 to 2035 and with each subsequent Strategy covering the next three five-year carbon budgets and also include a longer-term perspective of at least 30 years;
- To adopt a system of carbon budgets which will be determined as part of a grouping of three five-year periods calculated on an economy-wide basis, starting with the periods 2021 to 2025, 2026 to 2030, and 2031 to 2035 (**Table 28-2**);
- To introduce a requirement for the Government to adopt "sectoral emission ceilings" for each relevant sector within the limits of each carbon budget;
- To request all local authorities to prepare local authority CAPs for the purpose of contributing to the national climate objective. These plans should contain mitigation and adaptation measures that the local authority intends to adopt;
- Increasing the power of the Advisory Council to recommend the appropriate climate budget and policies;
- Requiring the Minister to set out a roadmap of actions to include sector-specific actions that are required to comply with the carbon budget and sectoral emissions ceiling for the period to which the plan relates; and
- Reporting progress with the CAP on an annual basis, with progress including policies, mitigation measures, and adaptation measures that have been adopted.

14. In relation to carbon budgets, the 2021 Climate Act states 'A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a 'budget period')'. The carbon budget is to be produced for three sequential budget periods, as shown in **Table 28-2**. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for the Environment, Climate and Communications (the Minister for the Environment) shall prepare and submit to the government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period, and different ceilings may apply to different sectors. The sectorial emission ceilings for 2030 are published in the 2024 Climate Action Plan (CAP24) and are shown in **Table 28-3.** The GHG emissions associated with the CWP Project are quantified and compared to the relevant sectoral emission ceilings in **Section 28.10**.

Table 28-2 5-Year carbon budgets 2021–2025, 2026–2030 and 2031–2025 (DECC, 2024)

Sector	Reduction required	2018 Emissions ($MtCO_2eq$)
2021–2025	295 Mt CO_2eq	Reduction in emissions of 4.8% per annum for the first budget period.
2026–2030	200 Mt CO_2eq	Reduction in emissions of 8.3% per annum for the second budget period.
2031–2035	151 Mt CO_2eq	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 28-3 Sectoral Emission Ceiling 2030 (DECC, 2024)

Sector	Baseline ($Mt CO_2eq$)	Carbon budgets ($Mt CO_2eq$)			Indicative emissions % reduction in final year of 2025–2030 period (compared to 2018)
	2018	2021–2025	2026–2030	2030	
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built environment - residential	7	29	23	4	40
Built environment - commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land use, Land-use change and forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP24 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated savings	-	-	26	-5.25	-
Legally binding carbon budgets and 2030 emission reduction targets	**-**	**295**	**200**	**-**	**51**

15. Ireland has expended 47% of its emissions for the first carbon budget period (2021-2025) in the budget's first two years. Under the EPA's projections, emissions in the first two carbon budgetary periods (2021-2025 (295 $MtCO_2eq$) and 2026-2030 (200 $MtCO_2eq$)) are expected to exceed their limits by a margin of 24%-34%, with the sectoral emissions ceilings for both budgetary periods projected to be exceeded in almost all sectors including: electricity; industry; transport; and agriculture. An overshoot in one carbon budgetary period will require an equivalent reduction in the emissions allowed in the following period, making the level of abatement to be reached in the subsequent period more challenging (DECC, 2024). If the exceedance of the 2021-2025 is within the EPA's forecast, the required reduction in the 2026-2030 budget will be 71-100 $MtCO_2eq$ or 14-20 $MtCO_2eq$ per annum each year over the 5 year period of the 2026-2030 carbon budget. The CWP Project alone would contribute back approximately 1.7 Mt of CO_2eq, (at the 2022 carbon intensity) annually (see **Section 28.10.1** for impact assessment).

28.3.2 Policy

16. The overarching planning policy relevant to the CWP Project is described in EIAR **Chapter 2 Policy and Legislative Context**.

17. The assessment of the CWP Project against relevant planning policy is provided in the **Planning Report**. This includes planning policy relevant to the climate assessment.

28.3.3 Guidance

18. The principal guidance and best practice documents used to inform the assessment of potential impacts on climate are summarised below.

19. The assessment has made reference to national guidelines where available, in addition to international standards and guidelines relating to the assessment of GHG emissions and associated climatic impact.

- Transport Infrastructure Ireland (TII) PE-ENV-01104: Climate Guidance for National Rods, Light Rail and Rural Cycleways (offline & Greenways) – Overarching Technical Document (TII, 2022a);
- Transport Infrastructure Ireland (TII) PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document (TII, 2022b);
- Transport Infrastructure Ireland (TII) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2022c);
- Institute of Environmental Management & Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the IEMA 2022 GHG Guidance) (IEMA, 2022);
- IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the IEMA 2020 EIA Guide) (IEMA, 2020a);
- IEMA GHG Management Hierarchy (hereafter referred to as the IEMA 2020 GHG Management Hierarchy) (IEMA, 2020b);
- IEMA Principles Series: Climate Change Mitigation & EIA (IEMA, 2010);
- Publicly Available Specification (PAS) 2080:2023 on Carbon Management in Infrastructure (BSI, 2023): and
- Technical guidance on the climate proofing of infrastructure in the period 2021–2027 (European Commission, 2021a).

20. In addition to specific climate guidance documents, the following guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA, 2022).
- Guidelines for Planning Authorities and An Bord Pleanála (ABP) on carrying out Environmental Impact Assessment (Department of Environment, Community and Local Government, August 2018); and
- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (European Commission 2017); and
- Advice notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003).

28.4 Impact assessment methodology

21. The assessment methodology has been derived with reference to the most appropriate guidance documents (**Section 28.3**) relating to climate, which are referenced where appropriate in the following sections of this chapter.

22. The climate assessment comprises two elements:

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

28.4.1 Greenhouse gas emissions assessment (GHGA)

23. Climate is defined as the average weather over a period of time, whilst climate change is a significant change to the average weather. Climate change is a natural phenomenon but in recent years human activities, through the release of GHGs, have impacted on the climate (IPCC, 2022). The release of anthropogenic GHGs is altering the Earth's atmosphere, resulting in a 'greenhouse effect'. This effect is causing an increase in the atmosphere's heat-trapping abilities, resulting in increased average global temperatures over the past number of decades. The release of carbon dioxide (CO_2) as a result of burning fossil fuels, has been one of the leading factors in the creation of this 'greenhouse effect'. The most significant GHGs are CO_2, methane (CH_4), and nitrous oxide (N_2O).

24. For the purposes of this assessment, the definition outlined in Council Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (European Union, 2009a) for GHGs has been used. In 'Annex V, C. Methodology Point 5' the relevant GHGs are defined as CO_2, CH_4, and N_2O. CO_2 accounted for 60% of total GHG emissions in Ireland in 2021 while CH_4 and N_2O combined accounted for 38%. The main source of CH_4 and N_2O is from the agriculture (~94%) sector (EPA, 2023).

25. GHGs have different efficiencies in retaining solar energy in the atmosphere and different lifetimes in the atmosphere. In order to compare different GHGs, emissions are calculated on the basis of their Global Warming Potential (GWPs) over a 100-year period, giving a measure of their relative heating effect in the atmosphere. The IPCC Sixth Assessment Report (AR6) (IPCC, 2021) sets out the global warming potential for 100-year time period (GWP100) for CO_2 as the basic unit (GWP = 1) whereas methane gas (CH_4) has a global warming potential equivalent to 27-30 units of CO_2 and N_2O has a GWP100 of 273.

26. The assessment set out in PE-ENV-01104 (TII, 2022a) aims to quantify the GHG emissions associated with the CWP Project. The assessment process is guided by the following documents:

    - *Publicly Available Specification (PAS) 2080:2023 on Carbon Management in Infrastructure* (BSI, 2023): this provides a framework that allows all parties involved in the development of an infrastructure project to work together to quantify the project's overall carbon impact.
    - The Institute of Environmental Management and Assessment *Assessing Greenhouse Gas Emissions and Evaluating their significance (2nd Edition)* (IEMA, 2022): lays out the process of assessing GHG emissions to understand their significance in the context of an EIA.

27. TII Guidance PE-ENV-01104 (TII, 2022a) states that: *"activities that account for less than 5% of the total energy usage and/or 5% of the mass balance can be excluded from the assessment scope. E.g., if electricity for operating signage is less than 5% of total electricity used of the project infrastructure, it can be excluded from the assessment scope."*

28. TII Guidance PE-ENV-01104 (TII, 2022a) also outlines the recommended sources of input data and the appraisal methodology for the assessment of impacts for both the construction and operational phases, as outlined in **Table 28-4** (reproduced from Table 6.2 of PE-ENV-01104). The assessment is broken down into stages (construction and operational) and individual assessment techniques for each of these stages.

29. To define the boundary of the assessment, consideration should be given to the temporal boundary and to the systems boundary. The temporal boundary is the time period that the assessment covers: in this case, a project design life of 25 years is considered. The system boundary includes the emission sources of the project and the lifecycle stage in which they arise. The GHG systems boundary for assessment and the lifecycle stages scoped in include preconstruction, products utilised in construction, the construction activities, maintenance of materials during the lifespan of the CWP Project and their use, and the O&M phase.

30. Activities associated with the decommissioning phase are assumed to be largely a reversal of the construction phase activities. An assumption that emissions from this phase are approximately 1.2% of the total offshore wind farm carbon footprint has been made, based on data for an offshore wind farm with steel foundations, published in a report by the University of Edinburgh (Thomson & Harrison, 2015). This study provides useful context for the CWP Project, examining the lifecycle costs and GHG emissions associated with offshore wind energy projects, compiling data from some 18 studies carried out over the period 2009 to 2013.

Table 28-4 Sources and lifecycle stages for the CWP Project GHG emissions sources and lifecycle stages for the CWP Project's GHG emissions (reproduced from Table 6.2 of PE-ENV-01104 (TII, 2022a))

Main stage of a project lifecycle	Sub-stage of lifecycle	Potential sources of GHG emissions (not exhaustive)	Examples of activity data
Construction stage	Product stage: including raw material supply, transport and manufacture.	Embodied GHG emissions associated with the required raw materials.	Material quantities.
	Construction process stage: including transport to / from works site and construction / installation processes.	Activities for organisations conducting construction work.	Fuel / electricity consumption. Construction activity type / duration. Transportation of materials from point of purchase to site, mode / distance. Area of land use change.
	Land use change.	GHG emissions mobilised from vegetation or soil loss during construction.	Type and area of land subject to change of usage.
Operation ('use-stage')	Use of infrastructure by the end-use (road user).	Vehicles using highways infrastructure.	Traffic count / speed by vehicle type for highway links.
	O&M (including repair, replacement and refurbishment).	Energy consumption for infrastructure operation and activities of organisations conducting routine maintenance.	Fuel / electricity consumption. For vehicles, lighting, and plant. Raw material quantities and transport mode / distance. Waste and arisings quantities,

Main stage of a project lifecycle	Sub-stage of lifecycle	Potential sources of GHG emissions (not exhaustive)	Examples of activity data
			transport mode / distance and disposal rate.
	Land use and forestry.	Ongoing land use GHG emissions / sequestration each year.	Type and area of land subject to change in usage. Net change in vegetation.
Opportunities for reduction	GHG emissions potential of recovery, including reuse and recycling GHG emissions potential of benefits and loads of additional functions associated with the study system.	Avoided GHG emissions through substitution of virgin raw materials with those from recovered sources.	Waste and arisings material quantities and recycling / reuse rate.

Embodied construction emissions

31. Embodied carbon refers to GHGs emitted during the manufacture, transport, and use of building materials, together with end-of-life emissions. As part of the CWP Project, construction phase embodied GHG emissions are categorised under the following headings:

- Land clearance activities;
- Transport of excavated material to and from the site;
- Manufacture of materials and transport to the site;
- Construction works (including excavations, construction, water usage, electrical power / fuel usage, personnel travel, and project size); and
- Construction waste products (including transport off site).

32. The embodied construction emissions for the CWP Project were calculated using the online TII Carbon Assessment Tool (TII, 2022d). The TII Online Carbon Tool (V3.0) (TII, 2022d) uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013), UK National Highways Carbon Tool v2.4 and UK Government 2021 Greenhouse Gas Reporting Conversion Factors. The tool aligns with Section 7 of PAS 2080, which was published by the British Standards Institution (BSI), the Construction Leadership Council, and the Green Construction Board in 2023.

33. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction phase. The TII Online Carbon Tool (TII, 2022d) has been commissioned by TII to assess GHG emissions associated with infrastructure projects using Ireland-specific emission factors and data. Emission factors for a variety of materials and activities are employed by the tool, with both road-specific and non-road applications. The goal of the tool is to assist project development as a decision-making tool that drives lower carbon infrastructure and to facilitate the integration of environmental issues into transport infrastructure and general development planning, construction, and operation.

34. Detailed project information, including volumes of materials required for construction and generated during the construction phase, was obtained from the Applicant's engineering team. The CWP Project is expected to have a construction phase that will take place over four years and an operational lifespan of 25 years. The predicted embodied emissions can be averaged over the full construction phase and the lifespan of the CWP Project to give the predicted annual emissions to allow for direct comparison with annual emissions and targets.

35. Emissions have been compared to the electricity, industry, transport, and waste sector carbon budgets (DECC, 2023), which have a ceiling of 3,000 kt CO_2eq, 4,000 kt CO_2eq, 6,000 kt CO_2eq, and 1,000 kt CO_2eq, respectively in 2030. Emissions have also been compared against Ireland's non-ETS 2030 target of 33,381.3 kt CO_{2eq} (as set out in Commission Implementing Decision (EU) 2020/2126 of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council).

Land use change

36. The land use change associated with the construction phase of the CWP Project was considered for input into the TII Carbon Assessment Tool (TII, 2022d), which considers the loss or gain of carbon sinks. Loss of mixed forest, natural grassland, transitional woodland scrub, and peat bogs has the potential to release GHGs, while increasing the amount of these land use types has the potential to absorb GHGs from the atmosphere.

37. **Chapter 21 Onshore Biodiversity** and **Chapter 23 Landscape and Visual Impact Assessment** of this EIAR have been consulted with respect to land use changes. The existing land use for the onshore elements is previously developed land. There is no significant removal of mixed forest, natural grassland, transitional woodland scrub, agricultural land or peat bogs as a result of the onshore transmission infrastructure (OTI), and therefore the assessment of the climate impact as a result of land use change has been scoped out.

Transport-related emissions

38. Emissions related to the transportation of products / materials and construction equipment from the point of production / storage to the construction site are included within the online carbon tool, as per PE-ENV-01104.

39. PE-ENV-01104 (TII, 2022a) states that road traffic-related emissions' information should be obtained from an Air Quality Practitioner to show future user emissions during operation without the project in place. TII guidance PE-ENV-01106 *'Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document'* (TII, 2022b) outlines the approach for defining the scope of the air quality assessment providing criteria (applying to O&M phase) within Section 4.3.3. PE-ENV-01107 states that road links can be defined as being 'affected' by a proposed development and should be included in the assessment if:

- Road alignment will change by 5 meters (m) or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speed change by 10 kph or more; or
- Peak hour speed will change by 20 kph or more.

40. The potential for operational stage road traffic has been reviewed and a detailed air quality assessment, and therefore climate assessment of operational road traffic emissions has been scoped out as there is no potential for the PE-ENV-01107 criteria to be exceeded.

41. Emissions associated with marine vessels required during the construction phase for the installation of turbine foundations, turbine and offshore substation installation, cable installation, commissioning, project support, and crew transfer are included within the online carbon tool. Emissions associated with marine vessels required during the O&M phase have also been included in the GHG assessment. Details of vessel numbers, the activities for which they are required, and the number of annual round trips are given in **Chapter 4 Project Description.**

O&M emissions

42. In relation to maintenance works, the OTI is unmanned during the O&M phase with the exception of scheduled maintenance. Any GHG emissions associated with this activity will be minimal when compared to emissions saving represented by the overall project, and have therefore been scoped out of the GHG assessment, as per PE-ENV-01104 (TII, 2022a).

28.4.2 Significance criteria for GHGA

43. PE-ENV-01104 (TII, 2022a) outlines the recommended approach for determining the significance of both the construction and O&M phases.

44. PE-ENV-01104 (TII 2022a) states that significance of GHG effects is based on IEMA 2022 GHG Guidance (IEMA, 2022), which is consistent with the terminology used in Figure 3.4 of the EPA Guidelines (2022).

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

46. The IEMA 2022 GHG Guidance also states that "*the significance of a project's emissions should therefore be based on its net impact over its life time, which may be positive, negative or negligible*", to account for the potential for a development to replace existing development or baseline activity with higher GHG emissions.

47. Significance is determined using **Table 28-5** (derived from Table 6.7 of PE-ENV-01104 (TII, 2022a)) along with consideration of the following two factors:

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

48. Regarding the significance criteria given **Table 28-5**, the IEMA 2022 GHG Guidance (IEMA, 2022) states that *"major or moderate adverse effects and beneficial effects are considered to be significant".*

49. Minor adverse and negligible are therefore considered to be not significant in EIA terms.

Table 28-5 GHGA significance matrix

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

50. Ireland's carbon budgets can also be used to contextualise the magnitude of GHG emissions from the project (TII, 2022a). The approach is based on comparing the net project GHG emissions to the relevant carbon budgets (DECC, 2023). Following the publication of the Climate Action Act in 2021, sectoral carbon budgets have been published for comparison with the Net CO_2 project GHG emissions from the CWP Project. The electricity sector emitted approximately 10.5 $MtCO_{2eq}$ in 2018 and has a ceiling of 3 $MtCO_{2eq}$ in 2030, which is a 75% reduction over this period. The transport sector emitted approximately 12 $MtCO_{2eq}$ in 2018 and has a ceiling of 6 $MtCO_{2eq}$ in 2030, which is a 50% reduction over this period. The industry sector emitted approximately 7 $MtCO_{2eq}$ in 2018 and has a ceiling of 4 $MtCO_{2eq}$ in 2030, which is a 57% reduction over this period. The comparison of impacts with these budgets have been compared in **Section 28.10**.

28.4.3 Climate change risk assessment (CCRA)

51. This assessment involves an analysis of the sensitivity and exposure of the development to climate hazards, which together provide a measure of the vulnerability of the CWP Project to hazards as a result of climate change.

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

- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021–2027 (European Commission, 2021a); and
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (IEMA, 2022).

53. The baseline environment information provided in **Section 28.6**, future climate change modelling and input from other experts working on the CWP Project (i.e., hydrologists), has been used in order to assess the vulnerability to climate change.

54. First, an initial screening CCRA based on the O&M phase is carried out, according to the TII guidance PE-ENV-01104. This is carried out by determining the sensitivity of CWP Project assets (i.e., receptors) and their exposure to climate-change hazards.

55. The CWP Project assets must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022a) provides the following list of asset categories and climate hazards to be considered. CWP Project-specific assets have also been included in the CCRA screening:

- **Asset categories** – such as pavements, drainage, structures, utilities, landscaping, signs, light posts, buildings, and fences.
- **Climate hazards** - flooding (coastal, pluvial, fluvial), extreme heat, extreme cold, drought, extreme wind, lightning and hail, fog. Wildfire and landslides were not considered relevant to the CWP Project due to the project location and have been screened out of the assessment.

56. The asset sensitivity is based on a High, Medium or Low rating, with a score of 1 to 3 assigned as per the criteria below. Asset sensitivity takes into account the primary mitigation measures given in **Section 28.9**.

- **High sensitivity**: The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium sensitivity**: It is possible or likely that the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2.
- **Low sensitivity**: It is possible that the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

57. Once the sensitivities have been identified, exposure analysis is undertaken. This involves determining the level of exposure of the CWP Project to each climate hazard. Exposure is assigned a level of High, Medium or Low, as per the below criteria.

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

58. Once the asset sensitivity and climate hazard exposure are categorised, vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability of the CWP Project to climate change hazards, as shown in **Table 28-6**.

28.4.4 Significance criteria for CCRA

59. The assessment of the CWP Project vulnerability to climate change combines the outcomes of the sensitivity and exposure analysis with the aim of identifying the key vulnerabilities and potentially significant climate hazards that could impact the CWP Project. Vulnerability = sensitivity x exposure.

60. The vulnerability assessment takes any primary mitigation into account.

61. **Table 28-6** details the vulnerability matrix: vulnerabilities are scored on a high, medium and low scale. A risk that is low or medium is classed as not significant, while a high risk is classed as a significant risk. TII guidance (TII, 2022a) and the EU Technical Guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment might be needed. The impact of climate change on the proposed development can therefore considered to be not significant.

62. Where residual medium or high vulnerabilities exist, the assessment might need to be progressed to a detailed climate change risk assessment, and further mitigation implemented to reduce risks.

63. An assessment of construction and decommissioning phase CCRA impacts is only required, according to the TII guidance (TII, 2022a), if a detailed CCRA is required.

Table 28-6 Vulnerability matrix

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

64. The screening CCRA, discussed in **Section 28.10**, did not identify any residual medium or high risks to the CWP Project as a result of climate change. Therefore, a detailed CCRA for the construction, O&M, and decommissioning phases was scoped out.

65. While a CCRA for the construction and decommissioning phases was not required, best practice mitigation against climate hazards during these phases is still recommended in **Section 28.10**.

28.4.5 Study area

66. The land uses in the immediate vicinity of the CWP Project onshore development area are predominantly industrial.

67. The study area for impacts on climate in terms of GHG emissions due to the CWP Project differs from other aspects of the EIAR as emissions are compared to sectoral (i.e., electricity, industry, and transport) GHG emissions and Irish GHG emission targets.

68. During the construction phase, the study area focus is on the enabling infrastructure provision that forms the CWP Project, including utility diversions, land take activities, excavation works, road reconfiguration, significant construction materials, and construction traffic emissions. The relevant study area is determined based on the criteria set out in **Section 28.4**. The traffic area covers an area that is concentrated around the south of Dublin Port / Ringsend. This area has a high heavy goods vehicle (HGV) percentage in the baseline traffic due to its industrial nature.

69. During the O&M phase, the study area focus is on GHG emissions associated with the CWP Project, including GHG emissions associated with O&M phase vessel movements, and the GHG savings associated with the production of renewable energy by the CWP Project.

70. The study area for impacts of climate change, such as flooding and the potential increased frequency of storms, on the CWP Project during the O&M phase covers the area within the CWP Project planning application boundary. It also considers proximity to areas that are sensitive to future climate change impacts, such as flooding, which can extend to impact the CWP Project planning application boundary.

28.4.6 Data and information sources

Site-specific surveys

71. All information required to complete the impact assessment was available via a desk-based review. A site-specific flood risk assessment (SSFRA) informed the CWP Project's risk of flooding and primary mitigation measures and is described in **Chapter 20 Hydrology and Hydrogeology** and **Appendix 20.2 Site-Specific Flood Risk Assessment**.

Desk study

72. In addition to the site-specific surveys, a comprehensive desk-based review was undertaken to inform the baseline for climate. Key data sources used to inform the assessment are set out in **Table 28-7**.

Table 28-7 Data sources

Data	Source	Date	Notes
Annual reporting of GHG emissions	EPA	2023	GHGA: establishes existing and future climate baselines.
Long-term meteorological data	Met Éireann	2023	CCRA: historical long-term climate trends - establishes existing climate baseline.
Baseline marine conditions data	Climate Ireland	2023	CCRA: establishes existing baseline for marine conditions, such as wave height, sea level rise, and coastal erosion.
Climate change research and reporting	EPA	2015 2020 2021	CCRA: projections for future climate conditions, establishing future climate baseline.
Future climate predictions	Met Éireann	2020	CCRA: projections for future climate conditions, establishing future climate baseline.

28.5 Assumptions and limitations

73. Limitations were encountered at the pre-development consent design stage in relation to the quantification and sourcing of materials and how these informed the embodied construction carbon. The exact volumes of materials, locations of waste disposal sites, sourcing of products, and technical

specification for materials will be finalised post the development consent stage following a procurement process. In the absence of exact details, the following approach has been taken:

- Quantities for certain materials to be used during construction were unknown at the time of the assessment. However, quantities of the main and most GHG-intensive materials have been included.
- GHG emissions associated with rock required for scour protection have been calculated using the Environment Agency's LIT15604 carbon modelling tool v7.7, utilising the "Capital Materials" under the "Revetment Works – Rock Armour" option, and assuming a 10% replacement of these materials once in the lifetime of the project. All other emissions calculated by the tool are either covered by the vessel movement GHG emissions calculated separately, or are unapplicable to an offshore wind farm.
- Heavy duty vehicle (HDV) and light duty vehicle (LDV) movements generated by the project are described in **Chapter 27 Traffic and Transport.** GHG emissions calculated based on these movements include a 10% contingency for the construction period**,** a 50 km transport distance per trip for material and waste transport by HDV, and a 30 km transport distance per trip for LDV movements. Conservatively, transport of staff assumes that no public transport will be used, no buses provided by the project, and one person per car.
- It was assumed that waste generated during the construction phase (see **Chapter 31 Waste and Resource Management** for more detail) will be handled through recycling, composting, or landfill.
- The origin port for some marine vessel trips was unknown at the time of the assessment, which affects how far the vessels have to travel to the site, and subsequently the amount of emissions released. As the majority of emissions will be released from vessels while at the site during installation, changes to the transit time for marine vessels will have a limited effect in terms of the overall GHG footprint. However, the most likely origin ports known at the time of the assessment were used to derive GHG emissions during vessel transit. It has been assumed that for operational and maintenance activities, the origin port will be Wicklow, although were any other port on the east coast of Ireland to be used, no significantly different impacts would arise.
- Total fuel consumed by construction vessels during the construction phase and by O&M marine vessels over the 25-year O&M period has been calculated based on the duration and number of vessels, as described in **Chapter 4 Project Description**. Operation of the SOV has been assumed as the worst-case scenario.
- The GHG emissions savings associated with the operation of the project are based on a maximum generating capacity of 1300 MW and assume a 45% offshore capacity factor (EirGrid, 2020).
- Activities associated with the decommissioning phase are unknown at this stage of the CWP Project development. An assumption that emissions from this phase are approximately 1.2% of the total offshore wind farm carbon footprint has been made, based on data for an offshore wind farm with steel foundations published in a report by the University of Edinburgh (Thomson & Harrison, 2015), as previously described in **Section 28.4**.

28.6 Existing environment

28.6.1 Sensitive receptors

GHGA

74. The IEMA 2022 GHG Guidance state that GHG emissions are not geographically limited due to the global nature of impacts, rather than directly affecting any specific local receptor.

75. Ireland declared a climate and biodiversity emergency in May 2019, and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation

2018/842, results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations. This ties in with the IEMA 2022 GHG Guidance, which states that the sensitive receptor for GHG emissions is the global atmosphere.

76. The receptor of climate is considered to have high vulnerability and sensitivity with respect to the GHGA, given the severe consequences of global climate change and the cumulative contributions of all GHG emission sources.

CCRA

77. TII suggests in PE-ENV-01104 (TII, 2022a) a variety of sensitive receptors (assets) that should be considered, many of which are road scheme specific. This recommended asset list has therefore been tailored to be CWP Project specific. The following assets have therefore been considered:

- Onsite drainage;
- Onsite buildings;
- Onsite access roads;
- Onshore export cables;
- ESBN network cables;
- Wind turbine generators (WTGs)
- WTG foundations
- Offshore export cables
- ESBN network cables
- IACs and interconnector cables; and
- Offshore substation and foundations.

28.6.2 Existing climate baseline

GHGA baseline

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

79. Data published for 2023 (EPA, 2024) estimated Ireland's GHG emissions to be 60.6 million tonnes carbon dioxide equivalent (Mt CO_2eq), which is 2% lower (or 1.35 Mt CO_2eq) than emissions in 2021 (61.96 Mt CO_2eq) and follows a 5.1% increase in emissions reported for 2021 (EPA, 2023). In 2022, emissions in the stationary emissions trading scheme (ETS) sector decreased by 4.3% and emissions under the ESR (Effort Sharing Regulation) decreased by 1.1%. When land use, land-use change and forestry (LULUCF) are included, total national emissions increased by 4%.

80. The sector with the highest emissions in 2022 (excluding LULUCF) was agriculture at 39% of the total, followed by transport at 19%. Decreased emissions in 2022 compared to 2021 were observed in the largest sectors, except for transport and waste. These two sectors showed increases in emissions (7% and 21%, respectively). For 2022, the total national emissions (excluding LULUCF) were estimated to be 60.6 Mt CO_2eq (EPA, 2024), as shown in **Table 28-8**.

Table 28-8 Total national GHG emissions in 2021-2023

Category	2021 Mt CO_2eq	2022 Mt CO_2eq	2023 Mt CO_2eq	Budget (Mt CO_2eq) (2021-2025)	% Budget 2021-2025 used	% Change from 2022 to 2023
Electricity	9.89	9.69	7.56	40	67.9%	-22.0%
Transport	11.09	11.76	11.79	54	64.1%	0.3%
Buildings (Residential)	6.87	5.75	5.35	29	62.0%	-7.1%
Buildings (Commercial and Public)	1.44	1.45	1.41	7	61.4%	-2.6%
Industry	7.09	6.62	6.23	30	66.7%	-5.0%
Agriculture	21.94	21.80	20.78	106	60.9%	-4.6%
Other *Note 1*	1.86	1.93	1.83	9	62.5%	-5.1%
LULUCF	4.63	3.98	5.61	-	-	40.9%
National total excluding LULUFC	60.19	59.00	55.01	-	-	-7%
National total including LULUFC	64.82	62.99	60.62	295	63.9%	-3.8%

Note 1 Other includes Petroleum refining, F-Gases and Waste (emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste)

CCRA baseline

81. The region of the CWP Project has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Dublin Airport is the nearest weather and climate monitoring station to the CWP Project with meteorological data recorded for the 30-year period from 1991 to 2020. The historical regional weather data for Dublin Airport, which is representative of the current climate in the region of the CWP Project, is shown in **Table 28-9**. The OTI is c. 8.5 km southeast of Dublin Airport. The data for the 30-year period from 1991 to 2020 indicates that the wettest months at Dublin Airport were October–November, and the driest month on average was March. June was the warmest month with a mean temperature of 19.5 °Celsius.

82. Met Éireann's 2023 Climate Statement (Met Éireann, 2024) states that 2023's average shaded air temperature in Ireland is provisionally 11.20 °C, which is 1.65 °C above the 1961–1990 long-term average. Previous to this, 2022 was the warmest year on record; however, 2023 was 0.38 °C warmer (see **Plate 28-1**).

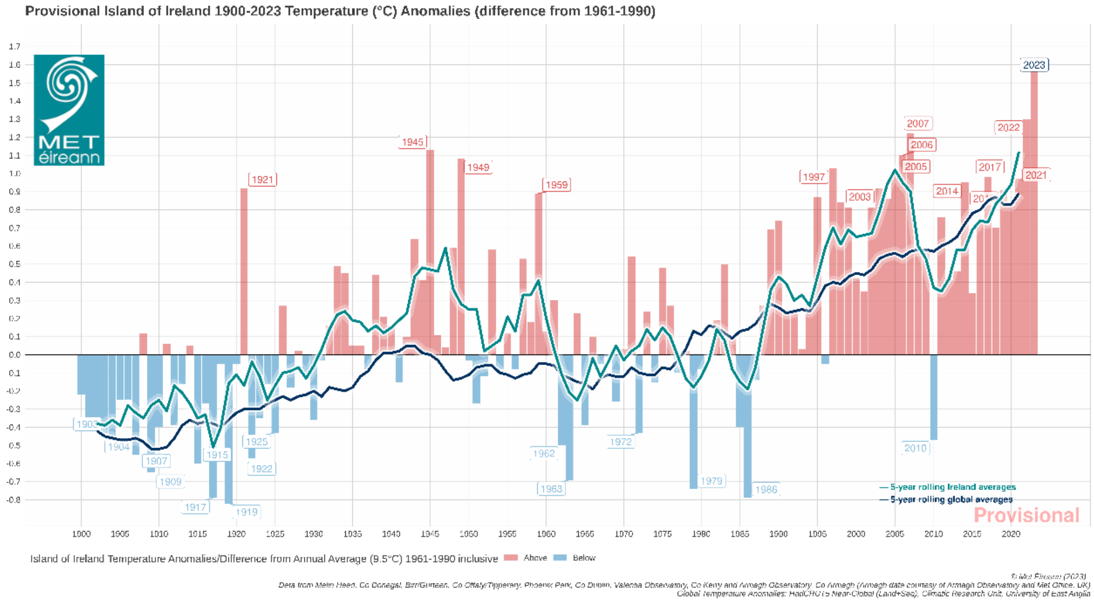

Plate 28-1 1900–2023 Temperature (°C) anomalies (differences from 1961–1990)

Table 28-9 30-Year historical weather data for Dublin Airport 1991 to 2010 (Met Éireann, 2023)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (ºC)													
mean daily max	8.5	10.1	12.3	14.8	17.7	19.5	19.1	16.9	13.6	10.3	8.3	13.3	
mean daily min	2.3	2.2	3	4	6.6	9	11.3	11.2	9.5	7.1	4.3	2.6	6.1
mean temperature	5.2	5.3	6.6	8.2	10.7	13.3	15.4	15.1	13.2	10.4	7.3	5.5	9.7
absolute max.	16.4	16.2	18.6	21.7	23.2	26.4	27.1	27.2	25	20.9	17.5	15.4	27.2
min. maximum	-3.2	-0.6	-0.6	4.2	6.3	10.3	11.8	13.8	9.6	5.2	-1.9	-4.8	-4.8
max. minimum	11.8	11.9	11.9	12.5	14.6	15.8	17.6	18.1	19.1	15.9	12.8	12.9	19.1
absolute min.	-9.5	-7.9	-7.9	-5.6	-3	0.7	3.9	2.4	0.4	-4.7	-8.4	-12.2	-12.2
mean num. of days with air frost	7.1	7.2	5.5	3.9	0.5	0	0	0	0	0.8	3.3	6.7	35
mean num. of days with	15.2	14.3	13.3	10.4	4.2	0.4	0	0.2	0.7	4.9	9.5	13.9	87

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
ground frost													
mean 5cm soil	4	4	5.4	8.5	12.4	15.5	16.7	15.7	13.2	9.6	6.4	4.5	9.7
mean 10cm soil	4.2	4.3	5.4	7.9	11.4	14.6	15.9	15.2	12.9	9.7	6.7	4.8	9.4
mean 20cm soil	4.8	4.9	6	8.4	11.6	14.7	16.1	15.6	13.5	10.5	7.5	5.5	9.9
Relative humidity (%)													
900UTC	87.9	87.9	84.7	79.8	77	76.2	78.6	81.1	84.1	86.5	89.4	88.8	83.5
mean at 1500UTC	81.6	76.9	71.6	68.7	67.8	67.7	69	69.8	71.9	75.8	81.6	83.9	73.9
Sunshine (hours)													
mean daily duration	1.9	2.9	3.7	5.4	6.4	6	5	5	4.4	3.4	2.4	1.7	4
Rainfall (mm)													
mean monthly total	61.8	52.4	51.4	55	57	64	61	73.4	63.3	78.4	82.7	72.1	772.5
greatest daily total	27.1	28.1	35.8	37	42.1	73.9	39.2	68.3	42.1	71.3	62.8	42.4	73.9
mean num. of days with ≥ 0.2mm	17.7	16.1	16.5	15.8	15.3	14.8	16.9	17.1	15.5	17	18.3	18.6	199.6
mean num. of days with ≥ 1.0mm	12.5	11	10.7	11.1	10.5	9.8	11.6	11.8	10.7	11.6	12.5	13.3	137.1
mean num. of days with ≥ 5.0mm	3.8	3.2	3.5	3.5	3.6	3.9	3.8	4.4	4.1	5	5.2	4.8	48.8
Wind (knots)													
mean monthly speed	12.3	12	11.4	10.3	9.9	9.2	9.1	9.2	9.6	10.5	11.2	11.7	10.5
max. gust	80	67	66	54	57	53	49	44	56	69	66	76	80
max. mean 10-	53	48	45	37	39	38	36	32	39	51	42	55	55

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
minute speed													
mean num. of days with gales	2.3	1.4	1	0.2	0.1	0.1	0.1	0	0.2	0.5	0.8	1.2	7.8

83. Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed. A noticeable feature of the recent weather has been an increase in the frequency and severity of storms, with notable events including Storm Darwin in February 2014, Storm Emma in March 2018, and Storm Ophelia in October 2018. The maximum wind gust for Dublin Airport occurred during Storm Ophelia, peaking at 104 km/hr with a 10-minute speed of 70 km/hr.

84. Rainfall events with more rainfall have also been recorded in recent years, including heavy rainfall and flooding in the summer of 2008, severe flooding in November 2009, and heavy rainfall in the Greater Dublin Area on 24 October 2011. The rainfall recorded on 24 October 2011 totalled 66.8 mm over a nine-hour period at Dublin Airport, which has an annual probability of 100 years.

85. DCC discussed major past climate events in its Climate Change Action Plan (DCC, 2019). Events that have occurred since 1986 include heavy rainfall, flooding, strong winds, periods of extreme heat and extreme cold, and heavy snowfall. Storm Darwin in February 2014, Storm Ophelia in October 2017, and Storm Eleanor in January 2018 caused considerable damage to housing and other buildings and felled over 100 trees in Dublin City. **Table 28-10** details historical severe weather events in Dublin City.

Table 28-10 Severe weather events that have impacted Dublin City (reproduced from Table 1 DCC, 2019)

Event type	Date	Description
Hurricane Charlie	August 1986	Pluvial: worst flooding in Dublin in 100 years.
Pluvial & strong winds	February 1990	Heavy rain and consequently flooding, with long periods of strong winds.
Pluvial / fluvial	June 1993	100 mm of rain fell in Dublin and Kildare (more than three times the normal amount).
Extreme temperatures	June–August 1995	Warmest summer on record, with mean air temperatures over two degrees above normal in most places.
Windstorm	December 1997	In the Dublin area there were record gusts of 150 km/h, with maximum 10-minute winds of storm force.
Fluvial	November 2000	250 properties flooded in Dublin and 90.8 mm of rain fell. Significant disruption and damage, especially in the area of the Lower Tolka catchment.
Coastal	February 2002	Second highest tide ever recorded. This caused sea defences to be overtopped. 1,250 properties flooded in Dublin, with €60m worth of damage.
Fluvial	November 2002	Similar to the 2000 flood, 80 mm of rain fell in Dublin. This led to high river levels in the River Tolka, which caused extensive flooding along the catchment.

Event type	Date	Description
Extreme temperatures	Summer 2006	Warmest summer on record since 1995.
Pluvial	August–September 2008	North City: 42.9 mm of rain fell in two hours, which was a 1-in-100-year event. 19 areas of North Dublin had severe flooding, many of which had no previous history of such flooding. Over 150 residential properties were inundated, as well as commercial premises, public buildings, major roadways, etc.
Pluvial	July 2009	This was a 1-in-50-year event. Several areas within the Dublin City Council boundary were affected. One of the worst affected areas was Donnycarney in North Dublin. Reports of spot flooding in Raheny, Clontarf, Drumcondra, Finglas, Sandymount, Cabra, Finglas, and Glendhu Park in Ashtown.
Extreme cold	December 2010	Casement Aerodrome's temperature plummeted to -15.7 °C on Christmas Day, the lowest temperature ever recorded in Dublin.
Pluvial / fluvial	October 2011	This was between a 1-in-50 and a 1-in-100-year event across the majority of Dublin. 1,100 properties were flooded, 318 road flooding incidents occurred, 1,200 electricity customers had no power supply in the City Centre, with a fatality in the City as a result.
Coastal	January 2014	The highest tide ever recorded, at 3.014 metres ODM recorded at Alexandra Basin. Four buildings flooded.
Storm Darwin	February 2014	A 1-in-20-year event, with gusts of 100–110 km/h in Dublin. Considerable damage to housing and other buildings. 8,000 ha of forests damaged.
Storm Ophelia	October 2017	First storm to come from a southerly direction, with damaging gusts of 120–150 km/h. 100 large trees blown over in Dublin City.
The Beast from the East and Storm Emma	February–March 2018	Met Éireann issued its first Status Red warning on record for snow. Closure of all schools in the City, many businesses affected, water and power restrictions or outages.
Extreme temperatures	Summer 2018	Temperatures reached 28°C, with above-average sunshine and heat wave conditions. Water restrictions were in place for the country for the majority of the summer.
Storms Ali and Bronagh	September 2018	Storm Ali brought widespread, disruptive wind, which led to the delay or cancellation of most flights to and from Dublin Airport. Storm Bronagh passed over the east of Ireland bringing heavy rain.

86. Sea-level rise and coastal erosion are also potential impacts of climate change. Sea level rise occurs as sea ice continues to decline and as seawater expands when it warms. Estimates show that globally, the average sea level has risen approximately 160 mm since 1902, at a rate of approximately 1.4 mm per year, but the most recent estimates derived from satellite measurements for the period 2006–2015 indicate a rise of 3.6 mm per year) (Walther, 2020b). Sea-level rise is expected to contribute to coastal erosion, and Dublin County's coastline is particularly exposed to coastal flooding and erosion. Erosion rates exceed 3 m per year during severe extreme events (Flood, 2012).

87. Observations of wave height, direction, length, frequency, and swell are relevant for monitoring changes in the marine environment, such as winds, storms, and extreme events. Knowledge of the sea state and how it is changing are also vital for ocean energy development, coastal erosion, and storm-related flooding, among others. Increasing wave heights have been observed over the last 70 years in the North Atlantic with typical winter season trends of increases of up to 20 cm per decade (Walther, 2020a).

28.6.3 Predicted future baseline

GHGA future baseline

88. The future baseline with respect to the GHGA can be considered against future targets, which CWP Project GHG emissions will be compared against. In line with TII guidance (TII, 2022a) and IEMA 2022 GHG Guidance (IEMA, 2022) the future baseline is a trajectory of reducing GHG emissions towards net zero by 2050.

89. The future baseline will be determined by Ireland meeting its targets set out in the CAP24, and future CAPs, alongside binding 2030 EU targets. In order to meet the commitments under the Paris Agreement, the European Union (EU) enacted 'Regulation (EU) 2018/842 on binding annual GHG emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013' (hereafter referred to as the Regulation) (European Union 2018). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors, amounting to 42% and 30%, respectively, by 2030 compared to 2005. The ETS is an EU-wide scheme that regulates the GHG emissions of larger industrial emitters, including electricity generation, cement manufacturing, and heavy industry. The non-ETS sector includes all domestic GHG emitters that do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings, and agriculture.

CCRA future baseline

90. Impacts as a result of climate change involve increases in global temperatures, increases in the number of rainfall days and storms per year, and changes in wind speeds. Therefore, it is expected that the baseline climate will evolve over time and consideration is needed with respect to this within the CWP Project as it proceeds through detailed design, as per the European Commission *Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021–2027* (European Commission, 2021a).

91. The EPA have compiled a list of potential adverse impacts (EPA, 2021a) as a result of climate change, including the following, which may be of relevance to the CWP Project:

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

92. The EPA's *State of the Irish Environment Report (Chapter 2: Climate Change)* (EPA, 2020a) notes that projections show that full implementation of additional policies and measures, outlined in the 2019 Climate Action Plan (DECC, 2019), will result in a reduction in Ireland's total GHG emissions by up to 25% by 2030 compared with 2020 levels. Climate change is not only a future issue in Ireland, as warming of approximately 0.8 °C since 1900 has already occurred. The report (EPA, 2020a) underlines

that the next decade needs to be one of major developments and advances in relation to Ireland's response to climate change in order to achieve these targets, and that Ireland must accelerate the rate at which it implements GHG emission reductions.

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

94. Climate Ireland (2023) has a future projections tool that facilities the viewing of observation data and future predicted modelling scenarios, RCP4.5 and RCP8.5, in a web-based GIS format. Future projections using the tool for the area in proximity to the OTI (projections are only available for mainland Ireland), are shown in **Table 28-11**. These projections are based on EPA modelling in Research 339 (EPA, 2020b).

Table 28-11 Future projections (all Seasons–annual) in proximity to the OTI (Climate Ireland, 2023) (EPA 2020b)

Climate factor	Projection for 2041–2060 (change relative to 1981–2000)	
	RCP4.5	RCP8.5
Projected change in average temperature at 2 m (°C)	1.2°C	1.6°C
Heatwaves - Projected change in the number of heatwave events (periods of at least three consecutive days on which maximum temperatures exceed > 95% of the normal monthly distribution)	2-4	4-6
Dry periods - Projected change in the number of dry periods (%), defined as at least five consecutive days on which daily precipitation is less than 1 mm	14.7%	15.7%
Precipitation - Projected percentage (%) change in average levels of precipitation	-1.9%	3.5%
Wet days - Projected change (%) in the number of days with rainfall > 20 mm	4.8%	4.8%
Frost days. Projected change (%) in the number of days when minimum temperatures are < 0°C	-48.7%	-64.7%
Ice days - Projected change (%) in the number of days when maximum temperatures are < 0°C	-72.5%	-86.7%

Climate factor	Projection for 2041–2060 (change relative to 1981–2000)	
	RCP4.5	RCP8.5
Snowfall - Projected change (%) in snowfall	-62%	-72.6%
Wind speed - Projected change (%) in wind speed at 10 m	-2%	-2.1%
Wind energy - Projected change (%) in wind energy resource at 120 m elevation (onshore)	-5%	-6%

Precipitation

95. The EPA-sponsored research project *Ensemble of regional climate model projections for Ireland (Report No. 159)* (EPA, 2015b) has projected significant decreases in mean annual, spring, and summer precipitation amounts with extended dry periods. The decreases are largest for summer, with reductions ranging from 0% to 13% and from 3% to 20% for the medium-to-low and high emission scenarios, respectively. Conversely, increases in heavy precipitation of up to 20% are projected to occur during the winter and autumn months. The number of extended dry periods is projected to have increased substantially by mid-century during autumn and summer.

Wind

96. In relation to storms, the report indicates that the overall number of North Atlantic cyclones is projected to decrease by 10%, coinciding with a decrease in average mean sea-level pressure of 1.5 hectopascals (hPa) for all seasons by mid-century. Wind energy is also predicted to decrease for spring, summer, and autumn, with a projected increase in winter. A projected increase in extreme storm activity is expected to adversely affect the future wind energy supply.

97. The EPA's *Critical Infrastructure Vulnerability to Climate Change* report (EPA, 2021c) assesses the future performance of Ireland's critical infrastructure when climate is considered. With respect to wind farm infrastructure, changes in wind speed variability are considered the main risk. Extreme wind events are projected to increase in future, while the frequency of extreme low wind speeds is also projected to increase in future. Both types of event are likely to reduce overall wind energy resources.

Temperature

98. Future climate predictions developed by Met Éireann have been published in 'Ireland's Climate: the road ahead' (Met Éireann, 2013) based on four scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5), with a focus on RCP4.5 (medium-low) and RCP8.5 (high) scenarios. These are named with reference to a range of radiative forcing values for the year 2100, i.e., 2.6, 4.5, 6.0 and 8.5 W/m^2 (watts per square metre), respectively. In terms of mean temperatures, it is predicted that increases of between 1 °C and 3 °C will occur under RCP4.5, rising to 2 °C–4 °C under RCP8.5. Warm extremes are expected to rise by 2 °C–3 °C (RCP4.5), but by up to 5 °C under RCP8.5.

Wave height

99. The study also projects mean annual percentage change in 10-m wind speed for the RCP4.5 and RCP8.5 scenarios, which will consequently affect swell generation for the Irish wave climate. The projections show a slight reduction in the 10-m wind speed of 1–2.7% for the RCP4.5 scenario and 1.6–3.3% for the RCP8.5 scenario. All seasons show a projected decrease in mean 10-m wind speed. The decreases are largest for summer under the RCP8.5 scenario, ranging from 2% to 5.4%.

Sea level rise

100. In terms of sea level rise, the Intergovernmental Panel on Climate Change (IPCC) *Special Report on the Ocean and Cryosphere in a Changing Climate* (IPCC, 2019) projects a worst-case scenario of global mean sea level rise of 1.1 m by 2100 under RCP 8.5. Recent research in Ireland projects a mean sea level rise of 0.45 m under RCP4.5 and 0.81 m under RCP8.5 (Paranunzio et al., 2022).

28.7 Scope of the assessment

101. An EIA Scoping Report for the OTI was published on the 6 May 2021, and offshore infrastructure was published on 6 January 2021. The Scoping Report was uploaded to the CWP Project website and shared with regulators, prescribed bodies, and other relevant consultees, inviting them to provide relevant information and to comment on the proposed approach being adopted by the Applicant in relation to the offshore and onshore elements of the EIA.

102. Based on responses to the Scoping Report, further consultation, and refinement of the CWP Project design, potential impacts on the climate that were scoped into the assessment are listed below in **Table 28-12**.

Table 28-12 Potential impacts scoped into the assessment

Impact No.	Description of impact
Impact 1	GHGA - GHG emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)
Impact 2	CCRA – CWP Project OTI and offshore infrastructure vulnerability to climate change (construction, O&M, and decommissioning phases)

103. On refinement of the CWP Project design, potential impacts on the climate that were scoped out of the assessment are listed below in **Table 28-13**.

Table 28-13 Potential impacts scoped out of the assessment

Description of impact	Justification for scoping out
GHG emissions impact on climate due to O&M emissions associated with the OTI	Refer to **Section 28.4** for details

28.8 Assessment parameters

28.8.1 Background

104. Complex, large-scale infrastructure projects with a terrestrial and marine interface such as the CWP Project, are consented and constructed over extended timeframes. The ability to adapt to changing supply chain, policy or environmental conditions and to make use of the best available information to feed into project design, promotes environmentally sound and sustainable development. This ultimately reduces project development costs and therefore electricity costs for consumers and reduces CO_2 emissions.

105. In this regard the approach to the design development of the CWP Project has sought to introduce flexibility where required, among other things, to enable the best available technology to be constructed and to respond to dynamic maritime conditions, whilst at the same time to specify project boundaries, project components and project parameters wherever possible, whilst having regard to known environmental constraints.

106. **Chapter 4 Project Description** describes the design approach that has been taken for each component of the CWP Project. Wherever possible, the location and detailed parameters of the CWP Project components are identified and described in full within the EIAR. However, for the reasons outlined above, certain design decisions and installation methods will be confirmed post-consent, requiring a degree of flexibility in the planning consent.

107. Where necessary, flexibility is sought in terms of:

- Up to two options for certain permanent infrastructure details and layouts, such as the WTG layouts.
- Dimensional flexibility; described as a limited parameter range, i.e., upper and lower values for a given detail such as cable length.
- Locational flexibility of permanent infrastructure; described as limit of deviation (LoD) from a specific point or alignment.

108. The CWP Project had to procure an opinion from An Bord Pleanála to confirm that it was appropriate that this application be made and determined before certain details of the development were confirmed. An Bord Pleanála issued that opinion on 25 March 2024 (as amended in May 2024) and it confirms that the CWP Project could make an application for permission before the details of certain permanent infrastructure, described in **Section 4.3** of **Chapter 4 Project Description**, are confirmed.

109. In addition, the application for permission relies on the standard flexibility for the final choice of installation methods and O&M activities.

110. Notwithstanding the flexibility in design and methods, the EIAR identifies, describes, and assesses all of the likely significant impacts of the CWP Project on the environment.

28.8.2 Options and dimensional flexibility

111. Where the application for permission seeks options or dimensional flexibility for infrastructure or installation methods, the impacts on the environment are assessed using a representative scenario approach. A “representative scenario” is a combination of options and dimensional flexibility that has been selected in this EIAR chapter to represent all of the likely significant effects of the project on the environment. Sometimes, several representative scenarios will have to be considered to ensure that all impacts are identified, described, and assessed.

112. For the climate impacts of offshore infrastructure, this analysis is presented in **Appendix 28.1**, which identifies one or more representative scenario for each impact with supporting text to demonstrate that no other scenarios would give rise to new or materially different effects; taking into consideration the potential impact of other scenarios on the magnitude of the impact or the sensitivity of the receptor(s) being considered. **Table 28-14** below presents a summarised version of **Appendix 28.1** and describes the representative scenarios on which the construction and O&M phase climate (offshore) assessment has been based. Where options exist for each receptor and potential impact, the table identifies the representative scenario and provides a justification for this

113. For the OTI, the infrastructure design and installation techniques with potential to give rise to climate impacts have been confirmed in the planning application and consequently the assessment is confined to a single scenario for all construction and O&M phase impacts

28.8.3 Limit of deviation

114. Where the application for permission seeks locational flexibility for infrastructure, the impacts on the environment are assessed using a LoD, which is the furthest distance at which a specified element of the CWP Project can be constructed.

115. This chapter assesses the specific preferred location for permanent infrastructure. However, **Appendix 28.1** provides further analysis to determine if the proposed LoD for permanent infrastructure may give rise to any new or materially different effects, taking into consideration the potential impact of the proposed LoD on the magnitude of the impact.

116. For climate impacts, this analysis is summarised in **Table 28-15** which confirms that the LoDs for the permanent infrastructure relevant to climate will not give rise to any new or materially different effects. The LoDs are therefore not considered further within this assessment.

Table 28-14 Design parameters relevant to assessment of climate

Impact	Representative scenario details	Value	Notes / assumptions
Construction			
Impact 1: GHGA - GHG emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)	Permanent infrastructure		This impact relates to the GHGA emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases). The level of GHG emissions generated are primarily associated with the maximum excavation area, size of WTG rotor blades, no. of WTGs, and materials used in the OTI, and offshore infrastructure construction phase. **Generating station** WTG Option A (75 WTGs and 250 m rotor blade) forms the representative scenario as this is the greatest number of WTGs and monopile foundations, therefore resulting in higher embodied carbon emissions. **Offshore substation structures** WTG Option A (75 WTGs and 250 m rotor blade) forms the representative scenario as this is the greatest number of WTGs and monopile foundations, therefore resulting in higher embodied carbon emissions. **Onshore transmission infrastructure** The open cut at landfall, the tunnel installation for the onshore export cable, the onshore substation, and open cut/HDD for the ESBN network cables form the only construction scenario for the assessment of the OTI.
	Generating station - Grout volume per monopile (m^3) (WTG Option A)	25	
	Generating station - Steel per monopile (tonnes) (WTG Option A)	1,019	
	Generating station - Steel per transition piece (tonnes) (WTG Option A)	591	
	Generating station - Quantity of steel per tower (tonnes) (WTG Option A)	1,175	
	Generating station - Total monopile grout volume (m^3) (WTG Option A)	1,875	
	Generating station - Total monopile steel (tonnes) (WTG Option A)	76,425	
	Generating station - Total transition piece steel (tonnes) (WTG Option A)	44,325	

Impact	Representative scenario details	Value	Notes / assumptions
	Generating station - Total tower steel (tonnes) (WTG Option A)	88,125	**Summary of representative scenario** For Impact 1, the representative scenario is formed by WTG Option A for both the generating station and the offshore substation structures. This represents the greatest level of GHG emissions generated (from material use, no. of WTGs installed, and excavated material). No other scenario would introduce new impacts or a materially different significance of effect. There is only one fixed construction scenario for the assessment of the OTI.
	Offshore substation structures - Grout volume per monopile (m^3) (WTG Option A)	25	
	Offshore substation structures - Total monopile grout volume (m^3) (WTG Option A)	75	
	Installation methods and effects		
	Estimated excavation volume (m^3) – landfall, onshore export cable, onshore substation and ESBN network cables	91,357	
Operations and maintenance			
Impact 1: GHGA emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)	Generating station – maximum export capacity (MW)	1300	Both the 250 m rotor and 276 m rotor are capable of producing the target 1300 MW MEC. There is therefore no materially different significance of effect between the two options. Both WTG Option A and Option B m are capable of producing the target 1300 MW MEC. There is therefore no materially different significance of effect between the two options. **Summary of representative scenario** All WTG options are capable of producing the target 1300 MW MEC. There is therefore no materially different significance of effect among any of the options.

Impact	Representative scenario details	Value	Notes / assumptions
Impact 2: CCRA – CWP Project OTI and offshore infrastructure vulnerability to climate change (construction, O&M, and decommissioning phases)	No project variations affect the climate change vulnerability of the CWP Project in terms of its permanent onshore and offshore infrastructure. The CWP Project assets that may be impacted by climate change hazards, and which have been assessed as part of the CCRA, detailed in **Section 28.4** and **Section 28.10**, are the same regardless of permanent onshore and offshore infrastructure variations.		
Decommissioning			
Impact 1: GHGA emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)	**Onshore transmission infrastructure** It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, it is assumed that all OTI will be removed where practical to do so. In this regard, for the purposes of an assessment scenario for decommissioning impacts, the following assumptions have been made: • The TJBs and onshore export cables (including the cable ducting) shall be completely removed. • The landfall cable ducts and associated cables shall be completely removed. • The underground tunnel, within which the onshore export cables will be installed, shall be left in situ and may be re-used for the same or another purpose. • The onshore substation buildings and electrical infrastructure shall be completely removed. • The reclaimed land, substation platform, perimeter structures, and the new access bridge at the onshore substation site will remain in situ and may re-used for the same or another purpose. • The ESBN network cables (including the cable ducting) shall be completely removed. The general sequence for decommissioning is likely to include: • Dismantling and removal of electrical equipment; • Removal of ducting and cabling, where practical to do so; • Removal and demolition of buildings, fences, and services equipment; and • Reinstatement and landscaping works.		

Impact	Representative scenario details	Value	Notes / assumptions
	Closer to the time of decommissioning, it may be decided that removal of certain infrastructure, such as the TJBs, landfall cable ducts and associated cables, onshore export cables, and ESBN networks cables, would lead to a greater environmental impact than leaving the components in situ. In this case it may be preferable not to remove these components at the end of their operational life. The final requirements for decommissioning of the OTI, including landfall infrastructure, will be agreed at the time with the relevant statutory consultees. It is anticipated that for the purposes of an assessment scenario, the impacts will be no greater than those identified for the construction phase.		
	Offshore infrastructure It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, it is assumed that all offshore infrastructure will be removed where practical to do so. In this regard, for the purposes of a representative scenario for decommissioning impacts, the following assumptions have been made: • The WTGs and OSS topsides shall be completely removed. • Following WTG and OSS topside decommissioning and removal, the monopile foundations will be cut below the seabed level to a depth that will ensure the remaining foundation is unlikely to become exposed. This is likely to be approximately one metre below the seabed, although the exact depth will depend upon the seabed conditions and site characteristics at the time of decommissioning. • All cables and associated cable protection in the offshore environment shall be wholly removed. It is likely that equipment similar to that which will be used to install the cables might be used to reverse the burial process and expose them. Therefore, the area of seabed impacted during the removal of the cables is anticipated to be the same as the area impacted during the installation of the cables. • Generally, decommissioning is anticipated to be a reversal of the construction and installation process for the CWP Project and the assumptions around the number of vessels on site and vessel round trips is therefore the same as described for the construction phase of the offshore components. Given the above, it is anticipated that for the purposes of a representative scenario, the impacts will be no greater than those identified for the construction phase.		

Table 28-15 Limit of deviation assessment

Project component	Limit of deviation	LoD impact summary
WTGs / OSSs	100m from the centre point of each WTG and OSS location is proposed to allow for small adjustments to be made to the structure locations.	No potential for new or materially different effects
IACs / interconnector cables	100 m either side of the preferred alignment of each IAC and interconnector cable is proposed to allow for small adjustments to be made to the cable alignments.	No potential for new or materially different effects
Offshore export cables	The offshore export cable corridor (OECC)	No potential for new or materially different effects
TJBs	0.5 m either side (i.e., east / west) of the preferred TJB location	No potential for new or materially different effects.
Landfall cable ducts	Defined LoD boundary (see **Chapter 4 Project Description**)	No potential for new or materially different effects.
Location of onshore substation revetment perimeter structure	Defined LoD for sheet piling at toe of the revetement	No potential for new or materially different effects.

28.9 Primary mitigation measures

117. Throughout the evolution of the CWP Project, measures have been adopted as part of the evolution of the project design and approach to construction to avoid or otherwise reduce adverse impacts on the environment. These mitigation measures are referred to as ‘primary mitigation’. They are an inherent part of the CWP Project and are effectively ‘built in’ to the impact assessment.

118. Primary mitigation measures relevant to the assessment of climate are set out in **Table 28-16**. Where additional mitigation measures are proposed, these are detailed in the impact assessment (**Section 28.10**). Additional mitigation includes measures that are not incorporated into the design of the CWP Project and require further activity to secure the required outcome of avoiding or reducing impact significance.

Table 28-16 Primary mitigation measures

Project element	Description
Onshore infrastructure	CCRA (flood risk): The risk of coastal flooding was reviewed for the onshore substation site. The predicted coastal flood level during a 0.1% (1000-yr) coastal flood event is 3.34m OD as part of the Eastern Catchment Flood Risk Assessment and Management (CFRAM) study in the vicinity of the site. The proposed finished floor level of the onshore substation site accounts for: • A tidal climate change allowance (increase in sea level) of 1.0m (High End Future Scenario (HEFS)), which complies with Section 4.9 of the DCC Strategic Flood Risk Assessment (SFRA). This also accounts for the onshore substation as a ‘Critical’ or ‘extremely vulnerable’ development. • A 300 mm freeboard, which complies with Table 4-2, Ground Levels, Floor Levels and Building of the DCC SFRA and which sets out recommended minimum finished floor levels for different scenarios. On this basis, the proposed finished floor level of the substation site was a minimum of 4.64m OD (0.1% AEP HEFS + 300mm freeboard). The minimum site level for the onshore substation site, will grade upwards from +4.64 mOD to a typical site platform level of +5.00 mOD. This will allow for local drainage gradients on site. An assessment of wave action was undertaken for the onshore substation site, resulting in a conservative allowance of 0.6 m. This resulted in the combi-wall capping beam and revetment at the perimeter of the onshore substation site being provided at a level of +5.24mOD. With a level of +5.24mOD, the overall total freeboard to the capping beam above the 0.1% AEP HEFS flood level is 0.9m (4.34mOD + 0.9m= 5.24mOD). This is described in detail in **Chapter 20 Hydrology and Hydrogeology** and **Appendix 20.2 SSFRA**.
	CCRA (flood risk):

Project element	Description
	For the O&M phase, the onshore substation will incorporate a sustainable drainage system (SuDS) to manage storm water. This is described in detail in **Onshore Substation Site Drainage and Water Supply Report,** submitted with the planning application.
	CCRA (extreme temperature risk): The OTI will be designed in accordance with the applicable design standards, which will take into account extreme temperature ranges.
	CCRA (lightning risk): For the O&M phase, lightning rods will be provided on top of each of the buildings at the onshore substation. These will protect the buildings from potential lightning strikes during the operational and maintenance phase.
Wind turbine generators (WTGs)	CCRA (wind risk): The WTGs will be designed to withstand severe wind loads in accordance with the applicable standards. A monitoring and control system in each wind turbine will enable it to reduce load or cease operation in response to high wind speeds.
	CCRA (lightning risk): Lightning protection systems are embedded into the design of the OSSs and all WTG models under consideration and, in the event of a fire occurring at the turbines or OSSs, there will be measures in place to reduce the risk of personnel injury or to the environment. These measures would include: 1. The incorporation of fire detection / alarm systems on the turbines and OSSs. 2. The OSSs will be installed with fire suppression equipment. 3. The implementation of emergency response procedures for each phase of the project.
WTG and OSS foundations	CCRA (coastal erosion risk (inc. seabed erosion)): Scour protection is required to ensure that erosion of the seabed around the monopile foundation does not affect the stability or integrity of the structure. Scour around foundations is mitigated by the use of scour protection measures, described in **Chapter 4 Project Description**.

28.10 Impact assessment

28.10.1 Impact 1: GHGA–GHG emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)

Receptor sensitivity

119. The sensitivity of the receptor is described in **Section 28.6**. The receptor of climate is considered to have high vulnerability and sensitivity with respect to the GHGA, given the severe consequences of global climate change and the cumulative contributions of all GHG emission sources.

Magnitude of impact

120. There is the potential for the release of a number of GHGs into the atmosphere during the construction, O&M, and decommissioning phases of the CWP Project, i.e., over its lifecycle. The total unmitigated GHG emissions over the lifetime of the CWP Project are summarised i**n Table 28-17** and compared against the relevant sectoral emissions ceiling in **Table 28-3**.

Table 28-17 CWP project greenhouse gas emissions from all phases

Activity		tCO_2eq Emissions	% Of Total	Relevant sector	Emissions annualised over lifespan as % of sector budget
Onshore	Pre-construction	10	0.003%	Industry	0.00001%
	Embodied carbon – materials	10,850	3%	Industry	0.01%
	Construction activities - transport	2,104	0.5%	Transport	0.001%
	Construction activities - excavation	701	0.2%	Industry	0.001%
	Construction activities - fuel use	5,288	1%	Electricity	0.01%
	Construction activities - water use	2	0.0003%	Industry	0.000002%
	Construction activities - worker travel	407	0.1%	Transport	0.0003%
	Construction phase waste	178	0.04%	Waste	0.0007%
Offshore	Embodied carbon - materials	54,062	11%	Industry	0.05%
	Construction activities - vessels	1,540	0.4%	Transport	0.001%
	O&M activities - vessels	314,134	81%	Transport	0.2%
Decommissioning		902	0.2%	Industry	0.001%
Total GHG emissions (pre-O&M savings)		**390,177 (or 15,607 annualised)**			
Total GHG savings from operation (25-year lifespan)		-42,534,180 (-1,707,367 annually)			
Total GHG savings (over 25-year lifespan, minus CWP Project emissions)		**-42,144,003 (or -1,311,190 annualised)**			

121. The CWP Project is estimated to result in total GHG emissions of 390,177 tonnes CO_2eq from the construction, O&M, and decommissioning phases. As shown in **Table 28-17**, the assessment indicates that the key sources of GHG emissions are associated with onshore and offshore construction materials (concrete, steel, and quarried rock for scour protection are the biggest sources) and fuel use by vessels over the 25-year O&M phase.

122. Embodied carbon emissions associated with decommissioning of the proposed development have been assumed to account for 1.2% of the total GHG emissions associated with the CWP Project. This equates to 902 tonnes CO_2eq.

123. The predicted GHG emissions (as shown in **Table 28-17**) can be averaged over the full construction phase and the lifespan of the proposed development to give the predicted annual emissions to allow for direct comparison with national annual emissions and targets.

124. In **Table 28-18**, GHG emissions have been compared against the carbon budget for the electricity, transport, industry, and waste sectors in 2030 (DECC, 2023), against Ireland's total GHG emissions in 2022 and against Ireland's EU 2030 target of a 30% reduction in non-ETS sector emissions based on 2005 levels (33 Mt CO_2eq) (set out in Regulation EU 2018/842 of the European Parliament and of the Council).

125. The estimated total construction, O&M, and decommissioning phase GHG emissions (total GHG emissions pre-O&M savings), when annualised over the 25-year CWP Project lifespan (as shown in **Table 28-17**), are equivalent to 0.03% of Ireland's total GHG emissions in 2022 and 0.05% of Ireland's non-ETS 2030 emissions target. The estimated GHG emissions associated with fuel use during the construction phase are equivalent to 0.01% of the 2030 electricity budget, while the total GHG emissions associated with transport-related activities are 0.2% of the 2030 transport budget, construction waste GHG emissions are 0.001% of the waste budget, and industry-related activities are 0.07% of the 2030 industry budget (DECC, 2023).

126. The 1300 MW from the array site will generate 5,124,600 MWh of renewable energy annually, assuming a 45% offshore capacity factor (EirGrid, 2020). The most recent (2022) figure, at the time of this assessment, for carbon intensity of electricity in Ireland is 332 gCO_2eq/kWh (SEAI, 2023). Based on this carbon intensity, the total annual GHG emission savings of the CWP Project will amount to approximately 1,707,367 tonnes of CO_2eq, at the 2022 carbon intensity, which is equivalent to 56.7% of the total carbon budget for the electricity sector in 2030 (DECC, 2023) and 5.2% of Ireland's non-ETS 2030 emissions target. When the GHG emissions from the construction, O&M, and decommissioning phases are removed, the annualised (over the 25-year lifespan) emission savings total 1,311,190 tonnes of CO_2eq, equivalent to 2% of Ireland's total GHG emissions in 2022, 4% of Ireland's non-ETS 2030 emissions target, and 43.7% of the total carbon budget for the electricity sector in 2030 (**Table 28-18**), i.e., the CWP Project has the potential to reduce Ireland's CO_2e emissions by these percentages.

Table 28-18 Estimated GHG emissions relative to sectoral budgets and GHG baseline

Target/sectoral budget	(tCO_2e)	Annualised (50-year lifespan) proposed development GHG emissions	% of Relevant target / budget
Total GHG emissions (pre-O&M savings)			
Ireland's 2022 total GHG emissions (existing baseline)	60,605,000	Total GHG emissions (pre-O&M Savings)	0.03%
Non-ETS 2030 target	33,000,000	Total GHG emissions (pre-O&M Savings)	0.05%
2030 sectoral budget (industry sector)	4,000,000	Total industry emissions	0.07%
2030 sectoral budget (transport sector)	6,000,000	Total transport emissions	0.2%
2030 sectoral budget (electricity sector)	3,000,000	Total electricity emissions	0.01%
2030 sectoral budget (waste sector)	1,000,000	Total waste emissions	0.001%
Total GHG savings (over 25-year lifespan, minus CWP Project emissions)			
Ireland's 2022 total GHG emissions (existing baseline)	60,605,000	Total GHG savings	2%
Non-ETS 2030 target	33,000,000	Total GHG savings	4%
2030 sectoral budget (electricity sector)	3,000,000	Total GHG savings	43.7%

127. The CWP Project will assist in the CAP 2024 goal of producing up to 80% renewables for the grid and “at least 5 GW” of offshore wind capacity, which is one of the key targets identified in Section 12 of the Climate Action Plan 2024. 13,725 GWh of energy was generated from wind in 2023 (Wind Energy Ireland, 2023). The CWP Project, with a maximum generation capacity of 1.3 GW and assuming a capacity factor of 0.45, could generate 5,125 GWh annually. This potential 5,125 GWh of annual energy production by CWP represents 37% of Ireland's total current renewable electricity generation in 2023 and would therefore constitute a significant source of additional renewable energy for Ireland once operational.

128. CWP will constitute up to 1.3GW of “at least 5 GW” offshore wind capacity and will abate Ireland’s greenhouse gas emissions by approximately 1.7 Mt CO_2eq for every year of operation. Ireland’s carbon budget for electricity between 2026 and 2030 is 20 Mt CO_2eq total and that budget cannot be achieved unless there is early delivery of a significant volume of the installed capacity targets required by the Climate Action Plan. Section 12 of the Climate Action Plan 2024 (Table 12.5) demonstrates the urgent need for Ireland to limit GHG emissions to no more than 50 Mt CO_2eq from electricity generation between 2022 and 2030. That requires emissions from electricity to drop from the current figure of 10 Mt CO_2eq per year to an average of 4 Mt CO_2eq per year between 2025 and 2030. The Climate Action Plan 2024 recognises the connection of 5 GW of offshore wind capacity by 2030 as a key action. The CWP Project alone is modelled to reduce emissions by approximately 1.7 Mt CO_2eq per year of operation. These emissions savings, in just one year of operation, represent 7% of the 2026 - 2030 20 Mt CO_2eq electricity sector budget.

Significance of the effect

129. The significance of the effect of GHG emissions on climate is assessed for the total GHG emissions across all project stages, taking into account the overall emissions savings that would also then be achieved when the CWP Project is operational.

130. The significance of effect of GHG emissions is determined using the criteria in the TII guidance PE-ENV-01104 (TII, 2022a), set out in **Table 28-5**, considering the following two factors:

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

131. The CWP Project will significantly assist in the CAP 2024 goal of producing up to 80% renewables for the grid and "at least 5 GW" of offshore wind energy. CAP24 has a clear purpose, which is to ensure Ireland achieves its net carbon zero target for 2050. This is identified as the national climate objective in section 3 of the Climate Action and Low Carbon Development Act 2015 (as amended by the Climate Action and Low Carbon Development (Amendment) Act 2021) as follows:

132. "3. (1) The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy…"

133. CAP24 also states that *"rapid and significant reductions in GHG emissions are required if we are to meet the 2015 Paris Agreement Goals"*.

134. The CWP Project will make a significant contribution, both annually and over its lifetime, to Ireland meeting its legal obligations under EU climate law to achieve the net carbon zero target for 2050, as demonstrated by its GHG emissions savings potential in the previous section Magnitude of Impact.

135. Considering the significance criteria set out in PE-ENV-01104 (TII 2022a) and **Section 29.4,** the impact of GHG emissions from the proposed project aligns with Ireland's GHG trajectory to net zero by 2050 as per TII Guidance (TII). This is therefore considered a "beneficial" effect according to PE-ENV-01104 (TII 2022a), where a *"project's net GHG impacts are below zero and cause a reduction in atmosphere GHG concentration, the project has gone well beyond existing and emerging policy requirements and is well 'ahead of the curve' for Ireland's trajectory towards net zero, and provides a positive climate impact".* This equates to a direct, positive, long-term and significant effect on climate, according to the EPA guidelines (EPA, 2022), which is significant in EIA terms.

136. While the overall significance of effect is a positive, due to the GHG savings associated with the renewable energy generated by the CWP Project, GHG emissions associated primarily with the construction phase can be mitigated. This additional mitigation is discussed below.

Additional mitigation

137. The Traffic Management Plan (**Appendix 27.2** of EIAR **Chapter 27 Traffic and Transport**) contains the control measures and monitoring procedures for managing the potential traffic and transport impacts of constructing the CWP Project. The TMP, alongside the CEMP, includes the following measures that seek to minimise the CWP Project's impact on climate due to GHG emissions from construction phase traffic:

- Implement a policy which prevents idling of vehicles both on and off site, including HGV holding sites;
- Construction phase traffic shall be monitored to ensure construction vehicles are using the designated haul routes. All plant and machinery will be maintained and serviced regularly;

- Efficient scheduling of deliveries will be undertaken to minimise emissions; and
- Construction vehicles shall conform to the latest EU emissions standards and where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirement date for the new standard. This will ensure that emissions on haul routes are minimised

138. During the O&M phase of the CWP Project, the works on site will be limited to inspections, repairs and maintenance. Although the intensity of activity will be only a small fraction of the O&M phase, all employees and contractors that are on site will ensure that machinery used is properly maintained and is switched off when not in use to avoid unnecessary exhaust emissions from maintenance machinery / traffic.

Residual effect

139. In accordance with the EPA Guidelines (EPA, 2022), the residual significance of effect of the CWP Project GHG emissions on climate are direct, positive, long-term and significant, which is significant in EIA terms.

28.10.2 Impact 2: CCRA – CWP Project OTI and offshore infrastructure vulnerability to climate change (construction, O&M, and decommissioning phases)

Construction phase

140. Examples of potential climate impacts during construction are included in *Annex D (Climate Proofing and Environmental Impact Assessment)* of the *Technical Guidance on the Climate Proofing of Infrastructure* (European Commission, 2021a). Potential impacts of climate change on the CWP Project include:

- Flood risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding;
- Increased temperatures potentially causing drought and prolonged periods of hot weather;
- Reduced temperatures resulting in ice or snow;
- Geotechnical impacts; and
- Major storm damage, including wind damage.

141. During the construction phase, consideration will be given to the project's vulnerability to climate impacts by the appointed contractor(s). During construction, the appointed contractor(s) will be required to mitigate against the effects of extreme rainfall / flooding through site risk assessments and method statements. The appointed contractor(s) will also be required to mitigate against the effects of extreme wind / storms and temperature extremes through site risk assessments and method statements. Temperatures can affect the performance of some materials; this will require consideration during construction. All materials used during construction will be accompanied by certified datasheets that will set out the limiting operating temperatures.

O&M phase

142. A screening climate change risk assessment has been conducted for potentially significant impacts on both the CWP Project OTI and offshore infrastructure associated with climate change during the O&M phase, in line with the *Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027* (European Commission, 2021a) and PE-ENV-01104 (TII, 2022d). The screening CCRA involves an analysis of the sensitivity and exposure of the development to climate hazards, which together

provide a measure of the vulnerability of the CWP Project to hazards as a results of climate change using the framework set out in **Section 28.4**.

143. The following climate hazards have been considered in the context of the CWP Project O&M phase: flooding (coastal, pluvial, fluvial), extreme heat, extreme cold, wildfire, drought, extreme wind, lightning, hail, landslides, fog, wave height, and coastal erosion. Wildfire and landslides were not considered relevant to the CWP Project due to the project location and have been screened out of the assessment.

Receptor sensitivity

144. The sensitivity of receptors, i.e., elements of the CWP Project, considered vulnerable to climate change is given in **Table 28-19**. The sensitivity is assessed with primary design mitigation in place, which is described in **Section 28.9** and **Table 28-16**.

Table 28-19 Sensitivity to climate hazards (with design mitigation in place)

Sensitive receptors (project assets)	Sensitivity to climate hazards (design mitigation in place)								
	Flooding (coastal, pluvial or fluvial)	Extreme heat	Extreme cold	Drought	Wind	Fog	Lightning & hail	Wave height	Coastal erosion
Onshore									
Onsite drainage at the onshore substation	1	1	1	1	1	1	1	1	1
Onsite access roads at the onshore substation	1	1	1	1	1	1	1	1	1
Onshore substation buildings	1	1	1	1	1	1	1	1	1
Onshore export cables	1	1	1	1	1	1	1	1	1
ESBN network cables	1	1	1	1	1	1	1	1	1
Offshore									
Wind turbine generators (WTGs)	1	1	1	1	1	1	1	1	1
WTG foundations	1	1	1	1	1	1	1	1	1
Offshore export cables	1	1	1	1	1	1	1	1	1

IACs and interconnector cables	1	1	1	1	1	1	1	1	1
Offshore substation and foundations	1	1	1	1	1	1	1	1	1

Exposure

145. Once the sensitivity has been established, the exposure of the CWP Project to each of the climate hazards is determined, and the likelihood of the climate hazard occurring at the project location is also scored on a scale of high (3), medium (2) and low (1). The CWP Project's onshore and offshore exposure risk to each climate hazard is presented in **Table 28-20**. This exposure risk is then combined with the sensitivities provided in **Table 28-19** to produce a final vulnerability.

Table 28-20 Exposure risk to climate hazards

Climate hazard exposure	Exposure risk to climate variable (considering the site location)								
	Flooding (coastal, pluvial or fluvial)	Extreme heat	Extreme cold	Drought	Wind	Fog	Lightning & hail	Wave height	Coastal erosion
Onshore									
Onsite drainage at the onshore substation	2	2	2	1	1	1	1	1	1
Onsite access roads at the onshore substation	2	2	2	1	1	1	1	1	1
Onshore substation buildings	2	2	2	1	1	1	1	1	1
Onshore export cables	2	2	2	1	1	1	1	1	1
ESBN network cables	1	2	2	1	1	1	1	2	2
Offshore									
Wind turbine generators (WTGs)	1	2	2	1	2	1	2	2	2
WTG foundations	1	2	2	1	1	1	1	2	2

Climate hazard exposure	Exposure risk to climate variable (considering the site location)								
	Flooding (coastal, pluvial or fluvial)	Extreme heat	Extreme cold	Drought	Wind	Fog	Lightning & hail	Wave height	Coastal erosion
Offshore export cables	1	2	2	1	1	1	1	2	2
IACs and interconnector cables	1	2	2	1	1	1	1	2	2
Offshore substation and foundations	1	2	2	1	2	1	2	2	2

Significance of effect

146. Based on the combination of receptor sensitivity and exposure risk to climate hazards, the vulnerability of the CWP Project to climate change risk is no greater than low (**Table 28-21).**

Table 28-21 Vulnerability analysis to climate hazards

Risk to Assets	Vulnerability analysis								
	Flooding (coastal, pluvial or fluvial)	Extreme heat	Extreme cold	Drought	Wind	Fog	Lightning & hail	Wave height	Coastal erosion
Onshore									
Onsite drainage at the onshore substation	2 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)
Onsite access roads at the onshore substation	2 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)
Onshore substation buildings	2 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)
Onshore export cables	2 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)
ESBN network cables	1 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	2 (Low risk)	2 (Low risk)
Offshore									
Wind turbine generators (WTGs)	1 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	2 (Low risk)	1 (Low risk)	2 (Low risk)	2 (Low risk)	2 (Low risk)
WTG Foundations	1 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	2 (Low risk)	2 (Low risk)
Offshore export cables	1 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	2 (Low risk)	2 (Low risk)
IACs and interconnector cables	1 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	1 (Low risk)	2 (Low risk)	2 (Low risk)
Offshore substation and foundations	1 (Low risk)	2 (Low risk)	2 (Low risk)	1 (Low risk)	2 (Low risk)	1 (Low risk)	2 (Low risk)	2 (Low risk)	2 (Low risk)

147. Wind turbines are vulnerable to extreme storms because the maximum wind speeds in those storms can exceed the design limits of wind turbines – the likelihood of such events occurring will be increased with future climate change. With the application of the primary mitigation measures described in **Table**

28-16 to ensure that additional wind loading due to climate change is considered, the sensitivity is considered low, and the vulnerability is also low.

148. In terms of lightning risk, with the application of the primary mitigation measures described in **Table 28-16** to ensure additional lightning protection, the sensitivity is considered low, and the vulnerability is also low.

149. In terms of coastal erosion risk, with the application of the primary mitigation measures described in **Table 28-16** to ensure additional scour protection for the WTG and OSS foundations from the effects of seabed erosion, the sensitivity is considered low, and the vulnerability is also low.

150. In terms of flood risk, with the application of the primary mitigation measures described in **Table 28-16** to ensure flood risk protection for the OTI, the sensitivity is considered low, and the vulnerability is also low. As the flood risk is tidal, mitigation through land raising will have no impact on neighbouring developments at Poolbeg and there is no additional vulnerability with respect to flooding.

151. In terms of extreme temperatures, with the application of the primary mitigation measures described in **Table 28-16** to ensure additional temperature loading and increased durability to protect against the effects of freeze / thaw action, the sensitivity to extreme heat and cold is considered low, and the vulnerability is also low.

152. There is no additional vulnerability with respect to all climate hazards when design mitigation has been put in place in order to alleviate this known vulnerability to future climate change risk. With design mitigation in place, there are no significant risks to the project as a result of climate change. In accordance with the EPA Guidelines (EPA, 2022), the significance of the effect of the impacts on the project as a result of climate change are direct, long-term, negative and imperceptible, which is not significant in EIA terms.

Additional mitigation

153. No additional mitigation beyond the primary mitigation measures outlined in **Section 28.9** is proposed.

Residual effect

154. In accordance with the EPA Guidelines (EPA, 2022), the residual significance of the effect of the impacts on the project as a result of climate change are direct, negative, long-term and imperceptible, which is not significant in EIA terms.

Decommissioning phase

155. During the decommissioning phase, consideration will be given to the project's vulnerability to climate impacts by the Contractor. During decommissioning, the Contractor will be required to mitigate against the effects of extreme rainfall / flooding through site risk assessments and method statements. The Contractor will also be required to mitigate against the effects of extreme wind / storms, temperature extremes through site risk assessments and method statements.

28.11 Cumulative impacts

156. A fundamental component of the EIA is to consider and assess the potential for cumulative effects of the CWP Project with other projects, plans and activities (hereafter referred to as 'other development').

157. With respect to the requirement for a cumulative assessment PE-ENV-01104 (TII, 2022a) states that *"for GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable."*

158. However, by presenting the GHG impact of a project in the context of its alignment to Ireland's trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland's ability to meet its national carbon reduction target. Therefore, the assessment approach is considered to be inherently cumulative.

159. A standalone cumulative effects assessment (CEA) has therefore not been provided.

28.12 Transboundary impacts

160. The IEMA 2022 GHG Guidance state that GHG emissions are not geographically limited due to the global nature of impacts rather than directly affecting any specific local receptor.

161. GHG emissions from the CWP Project have the potential to impact the global climate. The receptor of the climate is considered to have high vulnerability and sensitivity with respect to the CCRA, given the severe consequences of global climate change and the cumulative contributions of all GHG emission sources.

162. The CWP Project will assist in the CAP 2023 goal of producing up to 80% renewables for the grid and "at least 5 GW" of offshore wind, and decreasing CO_2 emissions.

163. Considering the significance criteria set out in PE-ENV-01104 (TII 2022a) and **Section 28.4**, the impact of GHG emissions from the CWP Project aligns with Ireland's GHG trajectory to net zero by 2050 as per TII Guidance (TII). In accordance with the EPA Guidelines (EPA, 2022), this is therefore considered a direct, positive, long-term and significant impact to the global climate, which is significant in EIA terms.

28.13 Inter-relationships

164. The inter-related effects assessment considers the potential for all relevant effects across multiple topics to interact, spatially and temporally, to create inter-related effects on a receptor group. This includes incorporating the findings of the individual assessment chapters to describe potential additional effects that may be of greater significance when compared to individual effects acting on a receptor group.

165. The term 'receptor group' is used to highlight the fact that the proposed approach to the inter-relationships assessment has not assessed every individual receptor considered in this chapter, but instead focuses on groups of receptors that may be sensitive to inter-related effects.

166. **Chapter 5 EIA Methodology** provides a matrix to show at a broad level where across the EIAR interactions between effects on different receptor groups have been identified.

167. The potential inter-related effects that could arise in relation to climate are presented in **Table 28-22**.

Table 28-22 Inter-related effects assessment for climate

Impact / receptor	Related chapter	Assessment
Impact 1: GHGA: GHG emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)	Chapter 27 Traffic and Transport	The GHG emissions associated with construction phase traffic have the potential to impact climate. Construction traffic is discussed in **Chapter 27 Traffic and Transport** and has been included in the GHG assessment, the findings of which are presented in **Section 28.10**.
Impact 2: CCRA – CWP Project OTI and offshore infrastructure vulnerability to climate change (construction, O&M, and decommissioning phases)	Chapter 20 Hydrology and Hydrogeology	Climate change has the potential to impact the CWP infrastructure via extreme weather events. **Appendix 20.2 SSFRA** assesses the potential for flood risk in relation to the OTI and the outputs used to mitigate the risk through project design. The flood risk to CWP is therefore considered not significant in EIA terms.

28.14 Potential monitoring requirements

168. It is concluded that no specific monitoring is required in relation to Climate.

28.15 Impact assessment summary

169. This chapter of the EIAR has assessed the potential environmental impacts on the climate from the construction, O&M, and decommissioning phases of the CWP Project. Where significant impacts have been identified, additional mitigation has been considered and incorporated into the assessment.

170. This section, including **Table 28-23**, summarises the impact assessment undertaken and confirms the significance of any residual effects, following the application of additional mitigation.

28.15.1 GHGA

171. The impact of GHG emissions during the construction, O&M, and decommissioning phases on climate was assessed in line with TII guidance PE-ENV-01104 (TII, 2022a) and IEMA 2022 GHG Guidance (IEMA, 2022), which states that the significance of the impact of GHG emissions was based on the CWP Project's net impact over its lifetime (**Section 28.10)**.

172. The GHG assessment considered the GHG emissions arising from embodied carbon in materials, onshore and marine transportation, water usage, fuel usage, site excavation, waste disposal, and the carbon savings from the operation of the CWP Project.

173. The 1.3 GW from the array site will generate 5,125 GWh annually, which will amount to annual GHG emission savings of approximately 1.7 Mt CO_2eq at the 2022 carbon intensity, which is equivalent to 56.7% of the total carbon budget for the electricity sector in 2030 (DECC, 2023). When the GHG emissions from the construction, O&M, and decommissioning phases are removed, the annualised emission savings total 1.3 Mt CO_2eq, equivalent to 43.7% of the total carbon budget for the electricity sector in 2030 (DECC, 2023).

174. The CWP Project will significantly assist in the CAP24 goal of producing up to 80% renewables for the grid and the key actions of installing "at least 5 GW" of offshore wind energy. CAP24 states that *"rapid and significant reductions in GHG emissions are required if we are to meet the 2015 Paris Agreement Goals"*. The CWP Project, through its GHG emissions savings potential, will make a significant contribution both annually and over its lifetime to Ireland meeting its legal obligations under EU climate law to achieve the net carbon zero target for 2050. Additionally, Ireland's carbon budget for electricity between 2026 and 2030 of 20 Mt CO_2eq total cannot be achieved unless there is early delivery of a significant volume of the installed offshore wind capacity targets required by CAP24. The CWP Project should therefore be considered an essential installation in aiding Ireland's legal climate compliance and combatting the national climate emergency.

175. The impact of GHG emissions from the CWP Project aligns with Ireland's GHG trajectory to net zero by 2050. This is therefore considered a "beneficial" effect according to PE-ENV-01104 (TII 2022a), where a *"project's net GHG impacts are below zero and cause a reduction in atmosphere GHG concentration, the project has gone well beyond existing and emerging policy requirements and is well 'ahead of the curve' for Ireland's trajectory towards net zero, and provides a positive climate impact".* This equates to a direct, positive, long-term and significant effect on climate, according to the EPA guidelines (EPA, 2022), which is significant in EIA terms.

28.15.2 CCRA

176. The vulnerability of the CWP Project to climate change was assessed by the CCRA, in line with TII guidance PE-ENV-01104 (TII, 2022a), European Commission *Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021–2027* (European Commission, 2021a) and IEMA guidance *Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition)* (IEMA, 2022). This involved an analysis of the sensitivity and exposure of the CWP Project to climate hazards which together provide a measure of vulnerability.

177. Sensitive elements of the CWP Project included onshore drainage, access roads, buildings, underground utilities, and offshore turbines, foundations, and cables. Climate hazards included flooding (coastal, pluvial or fluvial), extreme temperatures, drought, wind, fog, lightning, waves, and coastal erosion.

178. Mitigation measures for sensitive elements, such as flood protection and SuDS, wind turbine design and control during high winds, lightning protection measures and scour protection for turbine foundations, have been incorporated into the design and the vulnerability analysis of the CWP Project.

179. Having taken these into account, this results in a worst-case low vulnerability to flooding and wind. In accordance with the EPA Guidelines (EPA, 2022), and with the design mitigation in place, the significance of effect of the impacts on the CWP Project as a result of climate change are direct, negative, long-term and imperceptible, which is not significant in EIA terms.

Table 28-23 Summary of potential Impacts and residual effects

Potential Impact	Receptor	Receptor sensitivity	Magnitude of impact	Significance of effect	Additional mitigation	Residual effect
Construction						
Impact 1: GHGA: GHG emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)	Climate	High	Magnitude of GHG emissions savings was calculated for all phases as 1,311,190 tCO_2eq (annualised over project lifespan), equivalent to 2% of Ireland's total GHG emissions in 2022, 4% of Ireland's non-ETS 2030 emissions target, and 43.7% of the total carbon budget for the electricity sector in 2030.	GHGA significance was assessed for all phases over project lifetime. Overall effect is positive, long-term and significant.	Carbon reduction measures are proposed in Section 28.10.	The construction phase will have an impact in terms of GHG emissions. However, when viewed in the overall context of the CWP Project and the emission savings achieved once it is operational, the significance of the residual effect of the CWP Project is considered direct, positive, long-term and significant.

Potential Impact	Receptor	Receptor sensitivity	Magnitude of impact	Significance of effect	Additional mitigation	Residual effect
Operation and Maintenance						
Impact 1: GHGA emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases)	Climate	High	Magnitude of GHG emissions savings calculated for all phases as 1,311,190 tCO_2eq (annualised over project lifespan), equivalent to 2% of Ireland's total GHG emissions in 2022, 4% of Ireland's non-ETS 2030 emissions target, and 43.7% of the total carbon budget for the electricity sector in 2030.	GHGA significance was assessed for all phase over project lifetime. Overall effect is direct, positive, long-term and significant.	Carbon reduction measures are proposed in Section 28.10.	Some GHG emissions are associated with maintenance of the CWP Project. However, when viewed in the overall context of the project and the emission savings achieved once it is operational, the significance of the residual effect of the CWP Project is considered positive, long-term and significant.
Impact 2: CCRA – CWP Project OTI and offshore infrastructure vulnerability to climate change (construction, O&M, and decommissioning phases	Climate	High	Low vulnerability to all climate change hazards assessed.	Direct, negative, long-term and imperceptible (not significant).	No additional measures proposed.	Direct, negative, long-term and imperceptible (not significant).

Potential Impact	Receptor	Receptor sensitivity	Magnitude of impact	Significance of effect	Additional mitigation	Residual effect
Decommissioning						
Impact 1: GHGA emissions associated with the OTI and offshore infrastructure throughout the CWP Project's lifecycle (construction, O&M, and decommissioning phases	Climate	High	Magnitude of GHG emissions savings calculated for all phases as 1,311,190 tCO_2eq (annualised over project lifespan), equivalent to 2% of Ireland's total GHG emissions in 2022, 4% of Ireland's non-ETS 2030 emissions target, and 43.7% of the total carbon budget for the electricity sector in 2030.	GHGA significance was assessed for all phase over project lifetime. Overall effect is direct, positive, long-term and significant.	No additional measures proposed.	Post-mitigation, the significance of the residual effect is direct, positive, long-term and significant.

28.16 Opportunities for further carbon reduction

180. Opportunities for the reduction of carbon from the CWP Project during the construction, O&M, and decommissioning phase have been set out below:

- The Applicant shall procure carbon-intensive materials in accordance with the EU's Carbon Border Adjustment Mechanism (CBAM), which promotes the sourcing of materials with reduced carbon content.
- The Applicant (specifically Fred. Olsen Seawind) is part of a group of offshore wind farm developers partnering with the Carbon Trust to make future offshore wind more sustainable. They will work in collaboration with the Carbon Trust as part of the new Offshore Wind Sustainability Joint Industry Programme to develop the first industry-backed methodology and guidance to measure and address the carbon emissions associated with offshore wind farms throughout their lifecycle, including emissions from the manufacturing of materials and installation of wind farms. The programme officially kicks off in January 2023 with the methodology expected to be released for use across the industry by 2025.
- With respect to the O&M phase, the O&M strategy will aim to adopt, where possible, a condition-based approach to O&M to minimise offshore transfers and the associated costs and carbon emissions. Condition-based maintenance (CBM) is a maintenance strategy that monitors the actual condition of an asset to decide what maintenance needs to be undertaken. This can reduce the need for unnecessary visits (and hence, carbon emissions) to perform repetitive, planned maintenance. Currently, WTG maintenance is predominantly scheduled; there is an opportunity to convert certain scheduled tasks to condition-based tasks (e.g., bolt torquing) through the combination of sensor data and advanced data analytics, which can be performed remotely from shore. CBM dictates that maintenance should only be performed when certain indicators show signs of decreasing performance or upcoming failure. Checking a machine for these indicators may include visual inspection and scheduled tests, and the remote, onshore analysis of data gathered by sensors on the assets.
- The use of low-carbon-emitting vessels shall be promoted to reduce the carbon footprint of the project where possible.

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