codling wind park

In Principle Project Environmental Monitoring Plan


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wind park

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Abbreviations

Abbreviation	Term in full
ABP	An Bord Pleanála
AIS	Automatic Identification System
CEMP	Construction Environmental Management Plan
CWP	Codling Wind Park
DCCAE	Department of Communications, Climate Action and Environment
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
FLO	Fisheries Liaison Officer
FMMS	Fisheries Management and Mitigation Strategy
IAC	Inter-array cable
IPPEMP	In Principle Project Environmental Monitoring Plan
kV	Kilovolt
LAT	Lowest astronomical tide
LF	Low frequency
LOD	Limit of Deviation
MAC	Maritime Area Consent
MBES	Multi Beam Echo Sounder
MMMP	Marine mammal Mitigation Protocol
MSO	Marine Survey Office
MW	megawatts
MHW	Mean high water
NPWS	National Parks and Wildlife Services
NRA	Navigational Risk Assessment
OECC	Offshore export cable corridor
OfTI	Offshore transmission infrastructure
OTI	Onshore transmission infrastructure
OWF	Offshore wind farm
O&M	Operations and maintenance
OSS	Offshore substation structure
PAD	Protocol for Archaeological Discoveries

Abbreviation	Term in full
PTS	Permanent threshold shift
SAC	Special Area of Conservation
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
TJB	Transition Joint Bay
UAU	Underwater Archaeology Unit
UXO	Unexploded Ordnance
VHF	Very high frequency
WTG	Wind turbine generator

Definitions

Glossary	Meaning
the Developer	Codling Wind Park Limited (CWPL)
array site	The red line boundary area within which the wind turbine generators (WTGs), inter-array cables (IACs) and the Offshore Substation Structures (OSSs) are proposed.
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.
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.
generating station	Comprising the wind turbine generators (WTGs), inter array cables (IACs) and the interconnector cables.
high water mark (HWM)	The line of high water of ordinary or medium tides of the sea or tidal river or estuary.
inter-array cables (IACs)	The subsea electricity cables between each WTG between and the OSSs.
interconnector cables	The subsea electricity cables between OSSs.
limit of deviation (LoD)	Locational flexibility of permanent and temporary infrastructure is described as a LoD from a specific point or alignment.
Maritime Area Consent (MAC)	A Maritime Area Consent (MAC) provides State authorisation for a prospective developer to undertake a maritime usage and occupy a specified part of the maritime area. A MAC is required to be in place before planning consent can be sought.
Maritime Area Planning (MAP) Act 2021	An Act to regulate the maritime area, to achieve such regulation by means of a National Marine Planning Framework, maritime area consents for the occupation of the maritime area for the purposes of maritime usages that will be undertaken for undefined or relatively long periods of time (including any such usages which also require development permission under the Planning and Development Act 2000) and licences for the occupation of the maritime area for maritime usages that are minor or that will be undertaken for relatively short periods of time.
offshore export cable corridor (OECC)	The area between the array site and the landfall, within which the offshore export cables cable will be installed along with cable protection and other temporary works for construction.
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.

Glossary	Meaning
offshore transmission infrastructure (OfTI)	The offshore transmission assets comprising the OSSs and offshore export cables. The EIAR considers both permanent and temporary works associated with the OfTI.
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.
transition joint bay (TJB)	This is required as part of the OTI and is located at the landfall. It is an underground bay housing a joint which connects the offshore and onshore export cables.

1 INTRODUCTION

1.1 The CWP Project

1. Codling Wind Park Limited (hereafter 'the Developer') is proposing to develop the Codling Wind Park (CWP) Project, which is located in the Irish sea approximately 13–22 km off the east coast of Ireland, at County Wicklow.

2. The Developer is applying for permission for all components of the CWP Project under Section 291 of the Planning and Development Act (PDA) (as inserted by the Maritime Area Planning (MAP) Act 2021). This includes:

   - The generating station, which comprises the wind turbine generators (WTGs), inter array cables (IACs) and interconnector cables;
   - The offshore transmission infrastructure (OfTI), which comprises the offshore substation structures (OSSs) and offshore export cables;
   - The landfall which describes the point at which the offshore export cables are brought onshore; and
   - The onshore transmission infrastructure (OTI) which comprises the onshore export cables, the onshore substation and and network cables to a planned extension to the existing ESB Networks 220 kV substation.

3. Key characteristics of the CWP Project are provided in **Table 1-1** below. A detailed description of the CWP Project is provided in the Environmental Impact Assessment Report (EIAR) **Chapter 4 Project Description**.

Table 1-1 Key offshore CWP Project characteristics

Parameter	Characteristic
Capacity	1300 MW
Lease period	45 years
Indicative construction window	3 years
Anticipated design life from full commissioning	25 years
Number of WTGs	75 (Option A) or 60 (Option B)
Number of OSS	3
Array site area	125 km^2
Offshore Export Cable Corridor (OECC) area	40.1 km^2
Water depth across array site	-28 m to -6 m relative to Lowest Astronomical Tide (LAT)
Number of offshore export cables	3
Length of offshore export cables	146 km
Inter-array cable (IAC) length	139 km (Option A) or 130 km (Option B)
Number of interconnectors (between offshore platforms)	2

Parameter	Characteristic
Length of interconnector cable	8.6 km
WTG rotor diameter	250 m (Option A) or 276 m (Option B)
Hub height above LAT	163 m (Option A) or 176 m (Option B)
Tip height above LAT	288 m (Option A) or 314 m (Option B)
Blade tip clearance above LAT	37.72 m
WTG locations	Specific locations with 100 m Limit of Deviation (LoD) around centre points
WTG foundation type	Monopile
OSS foundation type	Monopile
Height of OSS topside above LAT	55 m

1.2 Purpose of the In Principle Project Environmental Monitoring Plan

4. This **In Principle Project Environmental Monitoring Plan** (IPPEMP) supports the planning application for the CWP Project and sets out the linkages between the impact assessments (as detailed in Chapters 6 to 18 of the EIAR) and the likely monitoring measures required under conditions associated with any permission granted.

5. A separate **Construction Environmental Management Plan** (CEMP) has been prepared and submitted in support of the consent application, to provide information on environmental mitigation and monitoring relating to the onshore components of the CWP Project, which are assessed in Chapters 19 to 32 of the EIAR. Therefore, the onshore components of the CWP Project are not referenced further within this document.

6. The purpose of this IPPEMP is to provide a framework for the final Project Environmental Monitoring Plan (PEMP), which is anticipated to be required under conditions of the planning consent. The PEMP will provide a key mechanism through which the relevant regulatory authorities can be assured that required monitoring activities associated with the construction and operation of the CWP Project will be implemented.

7. The IPPEMP is intended to be a live document which will be updated as project development progresses and will be submitted to the relevant authority for approval, prior to the start of construction, based on further discussions post consent with An Bord Pleanála (ABP) and the relevant regulatory authorities to agree the exact detail (timings, methodologies etc.) of the monitoring that is required.

8. Due to the long lead in time for the development of offshore wind farms it is not desirable or effective to provide final detailed method statements prior to being granted consent. However, agreeing guiding principles reinforces commitments made in the EIAR will allow refinements to be made based on the best available technology. The document will also be updated and submitted prior to the commencement of operation.

1.2.1 Strategic monitoring initiatives

9. The East Coast Phase One offshore wind farm projects (North Irish Sea Array (NISA), Oriel Wind Farm, Dublin Array Offshore Wind Farm, Codling Wind Park and Arklow Bank Wind Park 2) recognise

the potential need for, and benefits of, strategic monitoring initiatives related to the proposed developments for which consents are being sought. In particular, the complex ecology and mobile nature of some marine receptors mean that a joint approach would be of greatest strategic benefit. This joint approach is common and has proven effective across a number of jurisdictions including in Scotland and England. The East Coast Phase One offshore wind farm projects have therefore established the 'East Coast Monitoring Group' (ECMG) to facilitate the process.

10. The ECMG are committed to continued collaboration within the group, and with those relevant statutory and technical stakeholders, in order to agree and implement strategic monitoring initiatives where appropriate and relevant. Monitoring initiatives implemented by the East Coast Phase One projects will be determined by the conclusions of the EIAR process, with a focus on validation and evidence gathering. It is anticipated that the ECMG, alongside those relevant statutory and technical stakeholders, would seek to explore and agree monitoring objectives, methodologies and outcomes via ongoing collaborative engagement following consent of the respective projects. The need for site specific monitoring in addition to strategic monitoring, and an individual project's participation in each monitoring proposal, or their level of contribution to agreed monitoring proposals, will be proportionate to the conclusions of the EIAR process.

1.3 Scope of the IPPEMP

11. The relevant topics and / or receptor groups that are considered in this plan are as follows:

- Marine Geology, Sediments and Coastal Processes (EIAR Chapter 6);
- Subtidal and Intertidal Ecology (EIAR Chapter 8);
- Fish, Shellfish and Turtle Ecology (EIAR Chapter 9);
- Marine Mammals (EIAR Chapter 11);
- Underwater Noise (EIAR Chapters 9 and 11);
- Ornithology (EIAR Chapter 10);
- Offshore Bats (EIAR Chapter 13);
- Commercial Fisheries (EIAR Chapter 12);
- Shipping and Navigation (EIAR Chapter 16); and
- Marine Archaeology and Cultural Heritage (EIAR Chapter 14).

1.4 Structure of the IPPEMP

12. In line with the requirements set out above, the structure of this IPPEMP is as follows:

- Section 1: Introduction
- Section 2: Guiding Principles
- Section 3: Residual Effects
- Section 4: In Principle Proposals for Monitoring

2 GENERAL GUIDING PRINCIPLES FOR THE PROPOSED MONITORING

13. The guiding principles for monitoring and which apply in general to the in-principle monitoring outlined in this document are as follows:

- All consent conditions, which would include those for monitoring, should be necessary, relevant to planning, relevant to the permitted development, enforceable, precise and reasonable in all other respects.
- The design of the monitoring programme should demonstrate robust and practical indicators derived from the initial site surveys, and recognition of the practical challenges of monitoring in extreme marine environments. It should also consider issues such as natural variation which are inherent in any site, it is important that where monitoring protocols are in place they relate to identified thresholds (Guidance on Marine Baseline Ecological Assessments & Monitoring Activities for Offshore Renewable Energy Projects Part 1 & 2, DCCAE, 2018).
- The scope and scale of a monitoring programme should be consistent with the type and scale of the project and the pressures and likely significant effects identified and mitigated in the EIAR, arising from the EIA.
- In line with good practice, monitoring must have a clear purpose in order to provide answers to specific questions (e.g. Glasson et al., 2011; OSPAR, 2008). As such, monitoring proposals should have an identified end date and confirmed outputs, which provide statistically robust data sets, as applicable to the hypothesis being tested.
- Monitoring should be targeted to the most sensitive receptors and impacts.

3 RESIDUAL EFFECTS

14. The EIA predicts the residual effect to a species or features taking into account:

- Linkages using the source > pathway > receptor model;
- Primary / Additional mitigation;
- Sensitivity of the receptor;
- Magnitude of the impact; and
- Ecological / economic importance.

15. For each receptor the residual effects as predicted within the CWP Project are outlined in **Section 4**.

16. The significance of the residual effect should not in its own right necessarily lead to the requirement for monitoring. Monitoring should be targeted to address where there is potential for a significant environmental impact.

4 IN-PRINCIPLE PROPOSALS FOR MONITORING

17. The following sections set out the in-principle proposals for monitoring in relation to those topics and / or receptor groups assessed in the EIAR.

4.1 Engineering and design-related monitoring

18. In addition to the environmental survey and monitoring required as conditions of the Development Consent, additional studies will be undertaken for the project for engineering and design purposes. Some of these will overlap with the conditioned monitoring and wherever possible the Developer will look to combine surveys for monitoring purposes with those already being carried out for engineering purposes.

19. Examples of these surveys are:

- Geophysical;
- Geotechnical;
- Unexploded ordnance (UXO) survey and clearance; and
- Cable burial survey.

4.2 Marine geology, sediment and coastal processes

4.2.1 Conclusions of the EIAR

20. The EIAR concludes for all assessed impacts a minor or negligible minor effect is predicted for all marine geology, sediments and coastal processes receptors, which is not significant in EIA terms. Where flexibility in the proposed design exists there is no other scenario which would lead to a more significant effect. Beyond the primary mitigation measures implemented within the project design, no additional mitigation is required.

4.2.2 In-principle monitoring

21. The Developer would propose to undertake both pre and post construction surveys of the CWP offshore development area using appropriate high resolution bathymetric and side-scan equipment to fulfil conditions under the development consent. Pre-construction survey information would help inform the engineering and final design, but to also aid the benthic monitoring campaign design, see **Section 4.3**. Post-construction surveys will monitor cable burial depth and assess any scour development.

22. Monitoring will include the section of the OECC which overlaps with the South Dublin Bay SAC and Rockabill to Dalkey Island SAC.

23. **Table 4-1** provides information on the monitoring requirements for marine geology, sediment and coastal processes. The proposed monitoring and detailed methodologies will be discussed and agreed with the relevant Regulatory Authority in consultation with the relevant Statutory Nature Conservation Body (SNCB) prior to construction commencing.

Table 4-1 In-principle monitoring proposed for marine geology, sediment and coastal processes

Potential residual effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Scour around installed structures and associated sediment transportation and deposition leading to changes in seabed composition, structure, or morphology	Wider seabed, its morphology and underlying geology	Pre-construction	• Engineering and design purposes • Inform benthic and other related ecological surveys and monitoring requirements	A single survey within the agreed array site and OECC using full sea floor coverage swath bathymetry undertaken to IHO S44 ed5 Order 1a standard and side-scan surveys. To include a 500 m buffer area around the site of each works. The 'site of each works' being the area within the planning application boundary which is actually taken forwards to construction noting that it is possible that certain areas within the planning application boundary may not be developed.	The scope of surveys and their programmes and methodologies for the purposes of monitoring shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of any survey works.
		Post-construction	• Structural integrity / engineering (scour) • Cable burial • Monitoring South Dublin Bay SAC and Rockabill to Dalkey Island SAC	A single survey within the agreed array and cable corridor survey areas using full sea floor coverage swath bathymetry surveys undertaken to IHO S44 ed5 Order 1a standard and side scan sonar surveys around appropriate samples of infrastructure to assess any changes in seabed topography. For this purpose the undertaker will, prior to the first such survey, submit a desk based assessment (which takes account of all factors which influence scour) to identify the sample of WTGs with greatest potential for scour. The survey will be used to validate the desk based assessment. Further surveys may be	

Potential residual effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
				required at a frequency to be agreed with the relevant Regulatory Authority (e.g. 3 years non-consecutive e.g. 1, 3 and 6 years or 1, 5 and 10 years). The quantity of WTGs subject to monitoring will be confirmed following the completion of detailed design studies and in consultation with the relevant Regulatory Authority and SNCBs.	

4.3 Subtidal and intertidal ecology

4.3.1 Conclusions of the EIAR

24. The EIAR concludes for all assessed impacts a slight, imperceptible or not significant effect is predicted for all subtidal and intertidal ecology receptors, which is not significant in EIA terms.

25. The assessment of impacts on subtidal and intertidal ecology as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms. Based on the predicted impacts it is concluded that no specific monitoring is required.

4.3.2 In-principle monitoring

26. Pre-construction and post-construction surveys would be targeted to areas where construction activities are planned and where there is deemed to be potential for Annex I reef, such as Rockabill to Dalkey Island SAC.

27. The proposed monitoring will be discussed and agreed with the relevant Regulatory Authority in consultation with the relevant SNCB. Where possible, synergies with monitoring commitments made in **Sections 4.1**and **4.2** would be explored in interpreting geophysical data.

28. **Table 4-2** provides information on the monitoring proposals for subtidal and intertidal ecology.

Table 4-2 In-principle monitoring proposed for subtidal and intertidal ecology

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Temporary habitat loss	Annex I reef	Pre-construction	The benthic habitats within the CWP Project offshore development area exist in a highly hydrodynamic area and as such sand sediments are mobile. Pre-construction surveys will be conducted to ensure accurate routing of cables and siting of WTGs to avoid as far as practicable areas of sensitive reef habitats.	A single geophysical (Side Scan Sonar (SSS) or Multi-Beam Echo Sounder (MBES)) survey at a resolution sufficient to identify potential Annex I reef. In areas where potential Annex I reef is identified from the review of the geophysical data, further survey, e.g. drop-down video will be deployed to confirm presence, extent and elevation.	Survey programmes and methodologies for the purposes of monitoring shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of any survey works. Surveys may occur up to 12 months prior to the proposed construction works.
Long term habitat loss	Annex I reef	Post-construction	The requirement for post-construction monitoring will be dependent on the findings of the pre-construction surveys.	A survey to determine any change in the location, extent and composition of any benthic habitats of conservation, ecological and / or economic importance, constituting Annex 1 reef habitats identified in the pre-construction survey in the parts of the planning application boundary in which construction works were carried out. The survey design must be informed by the results of the pre-construction benthic survey. Where Annex I reef is identified during the baseline survey and cannot be entirely avoided through micrositing, post-construction survey(s) will be undertaken, at a frequency to be agreed with the relevant	If required, survey programmes and methodologies for the purposes of monitoring shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of any survey works and conducted within the first year post commissioning. If significant changes are observed the potential requirement for further surveys will be agreed with the relevant Regulatory

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
				Regulatory Authority (e.g. 3 years non-consecutive e.g. 1, 3 and 6 years or 1, 5 and 10 years). If evidence of recovery is available and agreed with the relevant Regulatory Authority, monitoring will cease. Surveys will specifically target those reefs identified in the baseline survey to check their condition. Where no Annex I reef is identified by the pre-construction geophysical survey of the proposed works (and associated buffers), no further post-construction surveys will be undertaken.	Authority following review of the post-construction survey.

4.4 Fish, shellfish and turtle ecology

4.4.1 Conclusions from the EIAR

29. The assessment of impacts on fish, shellfish and turtle ecology as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms. Had there been specific species (where a significant impact was found, a bespoke monitoring survey to quantify the impact could have been proposed, however, in the absence of significant impacts, or particular species on which to focus bespoke monitoring surveys, there is considered to be limited merit in generic monitoring.

4.4.2 In-principle monitoring

30. Underwater noise monitoring (**Section 4.6**) is of relevance to fish, shellfish and turtle ecology.

4.5 Marine mammals

4.5.1 Conclusions from the EIAR

31. The assessment of impacts on marine mammals as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms.

4.5.2 In-principle monitoring

32. Based on the predicted impacts it is concluded that no specific monitoring is required. There are however several monitoring options that could be considered by the project to address some of the key assumptions in the EIAR. These could include, for example:

- Monitoring of underwater noise during pile driving – to verify the underwater noise modelling predictions (see **Section 4.6** for more details);
- Monitoring of dolphin responses to pile driving; and
- Monitoring of minke whale responses to pile driving.

33. Underwater noise monitoring (**Section 4.6**) is of relevance to marine mammals.

34. **Table 4-3** shows the in-principle monitoring proposed for marine mammals. The proposed monitoring will be discussed and agreed with the relevant Regulatory Authority in consultation with the relevant Statutory Nature Conservation Body (SNCB) prior to construction.

35. The CWP Project is committed to participating in the 'East Coast Monitoring Group' (ECMG), to discuss and agree potential strategic monitoring initiatives in relation to marine mammals. The need for strategic monitoring, and the level of participation by individual projects, will be determined by the conclusions of the EIA process, in consultation with statutory and technical stakeholders, and with a focus on validation and evidence gathering.

Table 4-3 In-principle monitoring proposed for marine mammals

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Disturbance effects on marine mammals	Harbour Porpoise Minke Whale	Construction	Ensure best practice is followed to minimise risk of injury or death to marine mammals. Monitoring Rockabill to Dalkey Island SAC.	The Developer will follow the relevant guidelines at the time in relation to a strategic approach to construction and monitoring in development of a Marine Mammal Mitigation Protocol (MMMP). The particulars of deployment will be determined subsequent to appointment of the contractor in the pre-construction stage and with consideration of best available techniques at that time.	The Developer will submit a MMMP with the planning application. A final MMMP will be submitted prior to construction.

4.6 Underwater noise

4.6.1 Conclusions from the EIAR

36. An underwater noise (UWN) assessment was undertaken and presented as an appendix to **Chapter 9 Fish, Shellfish and Turtle Ecology** and **Chapter 11 Marine Mammals** in the EIAR.

37. Modelling for WTG foundation impact piling has been undertaken at four representative locations covering proposed WTG locations at the extents of the array site. Noise sources other than piling were considered, including cable laying, dredging, drilling, rock placement, vessel movements, and operational WTG noise.

38. For marine mammals, maximum ranges were predicted for the Low Frequency (LF) and Very High Frequency (VHF) cetacean groups with Permanent Threshold Shift (PTS) ranges out to maximum ranges of 9.5 km and 4.7 km respectively. For fish, the largest recoverable injury ranges (203 dB SEL_{cum}) were predicted to be 3.8 km for a stationary receptor, reducing to less than 100 m for a fleeing receptor.

39. The predicted noise levels for the other construction noise sources and during WTG operation are well below those predicted for impact piling noise. The risk of any potentially injurious effects to fish or marine mammals from these sources are expected to be minimal as the noise emissions from these are close to, or below, the appropriate injury criteria even when very close to the source of the noise.

40. UXO clearance has also been considered at the site, and for the expected UXO clearance noise, there is a risk of PTS up to 12 km from the largest, 525 kg, UXO device considered, using the unweighted SPL_{peak} criteria for VHF cetaceans. However, this is likely to be highly precautionary as the impact range is based on a worst-case criterion and calculation methodology that does not account for any smoothing of the pulse over long ranges, which would reduce the pulse peak and other characteristics of the sound that cause injury.

4.6.2 In-principle monitoring

41. Monitoring would include measurements of noise generated by the installation of the first few piled foundations.

42. Noise measurements will be made in line with National Physical Laboratory (NPL) Good Practice Guide 133 for underwater noise measurement (Robinson et al., 2014). Deployment for noise measurement and full specifications will be provided in the final monitoring plan. A MMMP provided with the planning application will be used to mitigate underwater noise effects on marine mammals.

43. Underwater noise data will be recorded in a format that allows comparison with the EIAR underwater noise modelling with analysis using un-weighted metrics, such as peak sound pressure level, sound exposure level and peak to peak pressure level. All conclusions and discussions will be made in relation to the un-weighted metrics.

Table 4-4 In-principle monitoring proposed for underwater noise

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Injury / disturbance to marine ecology	Marine Ecology	Construction	In line with best practice	Compare the measured data, from the first few monopiles, with predictions for received levels, source levels that were made in the UWN assessment. A Sound Exposure Level plot based on the noise modelling in the UWN will be produced and agreed with the relevant Regulatory Authority prior to construction to allow comparison of the UWN predictions and measured data during construction.	Underwater noise monitoring survey programmes and methodologies for the purposes of monitoring shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of any survey works. The results of the initial noise measurements must be provided to the relevant Regulatory Authority within three months of the installation of the first few piled foundations.

4.7 Ornithology

4.7.1 Conclusions from the EIAR

44. Project only and cumulative impacts on ornithological receptors as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms. Based on the assessed impacts it is concluded that no specific monitoring is required.

4.7.2 In-principle monitoring

45. There are however several monitoring options that could be considered by the project to address some of the key assumptions in the environmental impact assessment report. For offshore and intertidal areas, these could include, for example:

- Monitoring of intertidal construction phase disturbance responses within the South Dublin Bay OECC landfall area;
- Seabird colony monitoring for key sites and receptors including colony size counts, breeding productivity monitoring and / or prey species provisioned to chicks to provide information in relation to population trends, demographic parameters and prey species; and
- Seabird tracking from key sites to further inform connectivity to, or avoidance of, the operational CWP array site.

46. For onshore and estuarine / Liffey areas, these could include, for example:

- Monitoring of construction phase disturbance responses within the onshore development area and estuarine areas within the Liffey;
- Onshore colony monitoring for key sites and receptors including colony size counts, breeding productivity monitoring and / or prey species provisioned to chicks to provide information in relation to population trends, breeding successes, demographic parameters and potential avian prey species;
- Population size, breeding success and potential avian predator usage, at the substation site.
- Monitoring during the period when chicks are fledging and may leave the colony platform (typically July–mid-August) for tern chicks in close proximity to the site.

47. Any proposed monitoring will be discussed and agreed with the relevant Regulatory Authority in consultation with NPWS.

48. The CWP Project is committed to participating in the 'East Coast Monitoring Group' (ECMG), to discuss and agree potential strategic monitoring initiatives in relation to offshore ornithology. The need for strategic monitoring, and the level of participation by individual projects, will be determined by the conclusions of the EIAR process, in consultation with statutory and technical stakeholders, and with a focus on validation and evidence gathering.

Table 4-5 In-principle monitoring proposed for ornithology receptors using offshore and intertidal areas

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Disturbance	Ornithology	Construction	Assess predicted effects against observed responses.	Monitoring of intertidal construction phase disturbance responses within the South Dublin Bay OECC landfall area.	The scope of monitoring surveys, their programmes and methodologies shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of construction.
Changes in population trends	Seabird Colony & Prey Species	O&M	Provide information in relation to population trends, demographic parameters and prey species.	Seabird colony monitoring for key sites and receptors including colony size counts, breeding productivity monitoring and / or prey species provisioned to chicks.	The scope of monitoring surveys, their programmes and methodologies shall be submitted to the relevant Regulatory Authority for written approval prior to their commencement.
Loss of site connectivity	Seabird	O&M	To inform connectivity to, or avoidance of, the operational CWP array site.	Seabird tracking from key sites.	
Disturbance	Ornithological receptors using onshore areas and estuarine areas within the Liffey	Construction	To monitor any possible sources for impacts for the duration of the construction programme.	A suitably qualified and experienced Ecological Clerk of Works (ECoW) will be appointed by the Contractor.	The ECoW will oversee all construction works and monitor any possible sources for impacts for the duration of the construction programme. The ECoW will guarantee the construction phase of the proposed development will be undertaken in strict agreement with mitigation measures herein (which will also be prescribed within the CEMP) and will have the power to stop works in case any activities / works are not compliant.

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Disturbance	Tern colonies using estuarine areas within the Liffey	Construction	To monitor any possible sources for impacts for the duration of the construction programme.	Tern monitoring and response	Monitoring of the tern colonies response will be carried out to a structured plan throughout breeding season to enable response to disturbance events (enabling or restricting works subject to response observed).
Disturbance / loss of population (fledglings)	Tern colonies / fledglings using estuarine areas within the Liffey	Construction	To monitor during the period when chicks are fledging and may leave the colony platform (typically July–mid-Aug) for tern chicks in close proximity to the site.	Special measures during tern fledging period	During the period when chicks are fledging and may leave the colony platform (typically July – mid Aug) they may move to shoreline areas to seek dry perches and there is risk of tern chicks entering the site and adults defending chicks on or close to site by attacking personnel. The potential loss of chicks through exclusion of adults or through injury on site is apparent and during this period a trained ecologist should be on hand to locate and capture chicks in close proximity to the site, and relocate them to suitable safe areas to avoid these issues.
Sand martin wall	Sand martin	O&M	To assess the use of sand martin wall and breeding success.	Following construction of the onshore substation and the installation of the sand martin wall, a suitably qualified and experienced ornithologist, appointed by the operator of the substation area will monitor the sand martin wall to determine usage and breeding success.	Monitoring will broadly follow the survey methodology set out in Gilbert et al., (1998). Two visits will be made in May and June, observing the entrances of the wall from a suitable location and distance, to not cause disturbance. Apparent occupied nests will be noted during the first visit in May and will be confirmed if active or not during the second visit in June. This monitoring will remain for the first 5 years, post construction to ensure

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
					occupancy by sand martin has been established.
Population size, breeding success and potential avian predator usage, at the substation site.	Ornithological receptors using estuarine areas within the Liffey	O&M	To determine population size, breeding success and potential avian predator usage, at the substation site.	Following construction of the onshore substation a suitably qualified and experienced ornithologist, appointed by the operator of the substation area will monitor the common and Arctic tern colonies as well as the black guillemots nest boxes to determine population size, breeding success and potential avian predator usage, at the substation site.	Tern monitoring on the CDL and ESB mooring dolphins will follow the methods outlined in Walsh et al., (1995). Tern population census will occur on a weekly basis from 1 May to mid June, to determine occupancy and breeding status using suitable vantage points. These visits will look at breeding behaviour and record a count of individuals and apparently occupied nests (AONs). A productivity survey will them be conducted during one visit in late June / early July, the determine approximate numbers of chicks per pair. It is proposed to conduct this monitoring over a five-year period post construction and provide the collected data to relevant parties (such as the NPWS and BirdWatch Ireland).
					A survey of avian predator usage on constructed buildings, will be conducted in conjunction with tern monitoring. Timed surveys from a suitable vantage will be conducted over the survey period of breeding terns (1 May to late July). Should a building or structure be found to provide suitable perching or nesting opportunities for an avian predator, which may predate on terns from both colonies, retro fitting measures will be needed.

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
					Black guillemot monitoring at the onshore substation site will involve a re-survey of the estuarine / Liffey study area and the installed nest boxes, to determine population and occupancy. The monitoring will follow the methodology set out in **Appendix 10.10 (Black Guillemot Survey 2023)** of **Chapter 10 Ornithology** of the EIAR. This monitoring will remain for the first 3 years, post construction to ensure occupancy of nest boxes by black guillemot has been established.

4.8 Offshore bats

4.8.1 Conclusions from the EIAR

49. The assessment of impacts on offshore bats as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant. Based on the assessed impacts it is concluded that no specific monitoring is required.

4.8.2 In-principle monitoring

50. Based on the predicted impacts it is concluded that no specific monitoring is required however additional monitoring during and following the construction phase will be undertaken to capture additional data as to how bats use the area and inform mitigation measures such as adaptive management if appropriate. Where possible the offshore platforms including the OSSs, or vessels will be used for bat monitoring within the array site during the migration seasons, to be agreed within the final Project Environmental Monitoring Plan.

51. **Table 4-6** shows the in-principle monitoring for offshore bats. The proposed monitoring will be discussed and agreed with the relevant Regulatory Authority in consultation with NPWS.

52. The proposed development is committed to participating in the 'East Coast Monitoring Group' (ECMG), to discuss and agree potential strategic monitoring initiatives in relation to offshore bats. The need for strategic monitoring, and the level of participation by individual projects, will be determined by the conclusions of the EIAR process, in consultation with statutory and technical stakeholders, and with a focus on validation and evidence gathering.

Table 4-6 In-principle monitoring proposed for offshore bats

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Disturbance of roosting / resting bats during migration or foraging offshore	Foraging / Migratory Bats	Construction	Though considered to be of low likelihood, it is possible that bats will roost on the vessels, the WTG or associated infrastructure during construction.	An appropriately experienced Ecological Clerk of Works (ECoW) will be available throughout the construction phase for both offshore and onshore ensuring appropriate bat expertise will be available if required.	Guides on how to identify the different bats, with life size photos, will also be available to the construction personnel to aid with identification of any bats which are seen. If bats are seen this will be logged, with the date, location and weather conditions recorded to aid future research into bat movements within the area.
		Post-construction	Though considered unlikely, it is possible that bats will roost on the vessels or the WTGs.	Should any bats be seen resting or otherwise stopping on the vessels or WTGs the appointed ECoW (with appropriate bat expertise) or the bat conservation helpline will be contacted for advice. Where possible the offshore platforms including the OSSs, or vessels will be used for bat monitoring within the array site during the migration seasons.	Guides on how to identify the different bats will also be available to aid with identification of any bats which are seen. If bats are seen this will be logged, with the date, location and weather conditions recorded to aid future research into bat movements within the area.
		Decommissioning	Though considered to be of low likelihood, it is possible that bats will	As bats will have had a minimum of 25 years to find roosting opportunities within the offshore infrastructure,	

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
			roost on the WTG or OSS infrastructure.	should any gaps, expansion joints, or other crevices be present these will be noted and infrared cameras (or similar) used to check for evidence of potential bat roosting. Any such features will be dismantled carefully, by hand where possible, to ensure that if there are bats roosting within the structures (considered highly unlikely at this time) any risks to them are minimised. An appropriately experience ecologist would be available for contact regarding any bats found resting during this phase.	

4.9 Commercial fisheries

4.9.1 Conclusions from the EIAR

53. The assessment of the loss of grounds or restricted access to fishing grounds during construction of the OECC impacts on the whelk, crab and lobster potting fleets and will be of Moderate (adverse) significance, which is considered to be significant in EIA terms.

54. The assessment concludes remaining impacts on commercial fisheries as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms.

55. While there are no residual significant (fleet level) impacts predicted, the CWP Project has chosen to implement a Fisheries Management and Mitigation Strategy (FMMS). The FMMS includes a co-existence strategy and measures to further mitigate the effect, including, where appropriate, cooperation agreements and associated payments.

56. Additionally, the CWP Project have appointed and will retain a Fisheries Liaison Officer (FLO), Offshore Fisheries Liaison Officer (OFLO) and Fishing Industry Representative (FIR), acknowledging that utilising local fishermen's expertise in fishing practices and vessels can reduce interactions between fishing activities and the works associated with the CWP Project.

57. Marine Notices (MN) and other navigational warnings will be circulated as early as possible to inform stakeholders of the position, nature and timing of any works and if there are advisory safety zones or advisory clearance distances around the works.

4.9.2 In-principle monitoring

58. Consultation with Marine Institute during the EIAR process recommended a well-designed pre- and post-construction fish and shellfish survey, along with fisheries consultation (including regional and national fisheries forums).

59. CWP Project are committed to undertake pre and post construction monitoring of whelk populations.

60. **Table 4-7** provides the in-principle monitoring for commercial fisheries. Monitoring programmes will be agreed post consent with the relevant statutory consultees. This is line with advice regarding collection of data for fish (DCCAE, 2018).

Table 4-7 In-principle monitoring proposed for commercial fisheries

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Loss of grounds or restricted access to fishing grounds within the OECC	Whelk, crab and lobster fisheries	Construction	The potential moderate loss of ability to carry on fishing activities during the construction phase, noting that vessels are likely to be requested to relocate potting gear from the OECC to accommodate the construction process.	Application of an FMMS which includes a co-existence strategy and measures to further mitigate the effect, including, where appropriate, cooperation agreements and associated payments. With respect to any cooperation agreements and associated payments, an evidence based procedure will be followed.	An FMMS has been prepared by the CWP Project, in consultation with local fishing interests and other interests as appropriate.
Loss of grounds or restricted access to fishing grounds within the array site	Whelk fishery	Post-construction	Consultation with the fishing industry has repeatedly raised high concern surrounding active fishing within the operational array site due to tidal strengths and the level of drift experienced during hauling of gear.	Gear trials to assess practicality of potting activity within the operational array site. This could include alterations to normal gear configurations, such as number of pots per string and / or direction the gear is set with respect to WTG locations. Monitoring of catch rates within the array site, including a control site outside the array site. Pre and post construction monitoring of whelk populations.	Methodologies for the purposes of monitoring shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of any gear trials. Pre and post construction monitoring of fisheries activity, which includes both dedicated survey, as well as monitoring existing data sources for period of five years from SFPA, including landing stats, VMS/plotter and AIS data verify the potential for coexistence between the project and fishing activities

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Potential for gear snagging	All fisheries	Post-construction	The inter-array cables and offshore export cables and associated cable protection, together with any structures (and associated scour protection) on the seabed or in the water column represent potential snagging points for fishing gear and could lead to damage to, or loss of, fishing gear.	Post-lay and burial inspection surveys will be undertaken after the cables are installed into the seabed to assess the seabed status and, where appropriate and practicable, rectification works would be undertaken.	Programmes and methodologies for the purposes of monitoring shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of any post construction post-lay and burial inspection survey works.

4.10 Shipping and navigation

4.10.1 Conclusions from the EIAR

61. The assessment of impacts on shipping and navigation as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms.

4.10.2 In-principle monitoring

62. Based on the predicted impacts it is concluded that no additional specific monitoring is required (outside of that assumed as embedded mitigation i.e., cable protection monitoring).

63. However, recent guidance published by the An Roinn Iompair (Department of Transport) on Marine Navigational Safety & Emergency Response Risk of Offshore Renewable Energy Installations (OREI) requires OREI operators to monitor and review the impact their activities have on the safety of navigation during the construction and operation phases. The potential need for vessel traffic monitoring via AIS during and following the completion of construction will be discussed with the Marine Survey Office (MSO) prior to the start of construction. This would allow the effectiveness of the mitigation measures being deployed to be assessed based on the changes to vessel traffic movements compared to that estimated in the Navigational Risk Assessment (NRA).

64. **Table 4-8** provides the proposed monitoring plan for shipping and navigation.

Table 4-8 In-principle monitoring plan for shipping and navigation.

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Increased collision risk	Fishing and recreational vessels	Construction	The main purpose of vessel traffic monitoring is to ensure the Navigational Risk Assessment (NRA) for the project is accurate for the construction and operation phase; that the predictions made in the NRA with regards to the traffic patterns are accurate, and to ensure the mitigation measures are effective and remain fit for purpose.	During construction project vessel movements will be managed via a dedicated marine coordination centre. Construction monitoring shall include vessel traffic monitoring by Automatic Identification System (AIS), including the provision of reports on the results of that monitoring periodically as requested by the Marine Survey Office (MSO).	Post-construction vessel traffic monitoring using AIS will be undertaken for a maximum of 28 days, although not necessarily consecutive, and will take account of seasonal variation of traffic patterns over a year. This will be done at a suitable time as agreed with the relevant Regulatory Authority and MSO following the commencement of commercial operation.
Effects on the levels of marine traffic across the project	Marine traffic	Post-construction		The traffic assessment should incorporate the use of AIS data and where practical, feedback should also be sought from shipping companies, ship Masters, fishing vessel skippers, and recreational sailors / users who regularly operate in and around different OREI sites to get realistic information on their experiences in different conditions.	

4.11 Marine archaeology and cultural heritage

4.11.1 Conclusions from the EIAR

65. The assessment of impacts on marine archaeology and cultural heritage as a result of the construction, operation and maintenance and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms.

4.11.2 In-principle monitoring

66. Based on the predicted impacts it is concluded that no specific monitoring is required; however, in accordance with the PAD surveys undertaken for the project will be subject to archaeological review, the outcomes of which will be reported to the relevant authority.

67. **Table 4-9** provides the proposed monitoring plan for marine archaeology and cultural heritage.

Table 4-9 In-principle monitoring plan for marine archaeology and cultural heritage

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Direct physical disturbance	Palaeogeography	Pre-Construction / Construction	Targeted geoarchaeological work may aid in refining the interpretation of these features, and therefore help determine the archaeological potential of the area.	The archaeological contractor be consulted to advise on potential samples to be acquired for archaeological purposes, particularly from the fine-grained deposits 75015, and other identified units of archaeological interest identified within the data. It is also recommended that any geotechnical logs from within the study area be made available for geoarchaeological assessment by a suitably qualified archaeological contractor.	The PAD is a system for reporting and investigating unexpected archaeological discoveries encountered during the different phases of the Project, with a Retained Archaeologist providing guidance and advising industry staff on the implementation of the PAD. The PAD also makes provision for the implementation of temporary exclusion zones around areas of possible archaeological interest, for prompt archaeological advice, and, if necessary, for archaeological inspection of
	A2 Anomalies			Where geophysical surveys may be undertaken in advance of the development, such as a UXO survey that requires magnetometer data, it is recommended that the data will be assessed by a suitably qualified archaeological contractor. This will allow the identification of any additional ferrous features of archaeological potential within the CWP Project, as well as to confirm the presence of ferrous material at the location of features identified during this assessment, particularly around identified wreck sites and debris fields.	
	Intertidal Heritage Assets			It is recommended, that at the proposed OECC approach to landfall (covering the	

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
				intertidal zone, up to MHW), a targeted archaeological walkover survey is undertaken along the final cable alignment within the cable corridor. This will enable the identification of any further cultural heritage receptors with surface expression along the proposed OECC approach to landfall. Furthermore, a metal detection survey, including excavation of identified targets is recommended to identify any material of archaeological potential located along the proposed landfall.	important features prior to further activities in the vicinity. The PAD provides a mechanism to comply with the Irish legislation, including notification to the Underwater Archaeology Unit (UAU), and accords with the Code of Practice for Seabed Developers (JNAPC, 2006)

5 REFERENCES

68. Cefas. (2012). Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Cefas contract report: ME5403 – Module 15.

69. Department of Communications, Climate Action & Environment. (2018). Guidance on Marine Baseline Ecological Assessments & Monitoring Activities for Offshore Renewable Energy Projects Part 1 & 2. Available at https://www.gov.ie/en/publication/3d6efb-guidance-documents-for-offshore-renewable-energy-developers/. Accessed February 2024.

70. Department of Housing, Local Government and Heritage. (2018). Ireland 2040 Our Plan (NPF). Available at https://www.gov.ie/en/publication/daa56-national-planning-framework-ireland-2040-our-plan-npf-2018/. Accessed February 2024.

71. Department of Transport (2024). Draft Marine Navigational Safety & Emergency Response Risk of Offshore Renewable Energy Installations (OREI).

72. Glasson J, Therivel R, Chadwick A. 2011. Introduction to Environmental Impact Assessment. 4th edition. The Natural and Built Environment Series.

73. JNAPC (2006). Code of Practice for Seabed Development. York, Joint Nautical Archaeology Policy Committee.

74. OSPAR. 2008. Guidance on Environmental Considerations for Offshore Wind Farm Development. Available at: https://www.ospar.org/work-areas/eiha/offshore-renewables. Accessed March 2024.

75. Robinson S P, Lepper P A, Hazelwood R A (2014). Good practice guide for underwater noise measurement. National Measurement Office, Marine Scotland, The Crown Estate. NPL Good Practice Guide No. 133, ISSNL 1368-6550.