



In Principle Project Environmental Monitoring Plan



This In Principle Project Environmental Monitoring Plan (IPPEMP) has been updated in response to Item 1d in the Applicant's further information request (FIR) from An Coimisiún Pleanála (the Commission) received on 1st August 2025.

Item 1d requests the following:

'An Coimisiún Pleanála (herein referred to as the Commission), acknowledges the provision of the 'In Principle Environmental Monitoring Plan' (IPEMP), as part of the submitted application documentation, however, the range of monitoring proposals and language used within that document do not provide sufficient clarity, commitment nor detail of monitoring measures and reporting which the Commission considers to be required for a project of the scale and duration proposed, throughout the construction, operational and decommissioning phases of the proposed development. Drawing on the detail of the further information here sought and submissions made by the prescribed bodies and third parties on this application, the applicant is requested to provide a more comprehensive operational IPEMP for the proposed development. In this regard, the applicant is advised that the revised IPEMP should fully inform the requirements of any future decommissioning plan(s), check the successful and timely implementation of mitigation measures, detect any unexpected impacts requiring additional measures, and justify any adaptive mitigation measures required. The proposed operational monitoring should be provided at appropriate intervals, for appropriate periods, and provide for adequate reporting to the relevant compliance authorities.'

This version of the IPPEMP (Rev 01) supersedes the previous revision (Rev 00) that was included with the CWP Project planning application. In summary, most sections of the IPPEMP have been updated by adding clarity, detail and commitment to the monitoring proposals.

The Applicant notes that cross references within this document to the EIAR and other relevant planning application documents remain relevant and unchanged but should be considered alongside the supporting **EIAR Addendum** and other relevant documents prepared in response to the Commission's FIR.

TABLE OF CONTENTS

1	INTRODUCTION	10
1.1	The CWP Project.....	10
1.2	Purpose of the In-Principle Project Environmental Monitoring Plan	11
1.3	Scope of the IPPEMP	13
1.4	Structure of the IPPEMP	13
2	GENERAL GUIDING PRINCIPLES FOR THE PROPOSED MONITORING	14
3	RESIDUAL EFFECTS	15
4	IN-PRINCIPLE PROPOSALS FOR MONITORING.....	16
4.1	Engineering and design-related monitoring	16
4.2	Marine geology, sediment and coastal processes	16
4.3	Subtidal and intertidal ecology	20
4.4	Fish, Shellfish and Turtle Ecology.....	25
4.5	Marine mammals.....	27
4.6	Underwater noise.....	29
4.7	Ornithology	33
4.8	Offshore bats	38
4.9	Commercial fisheries.....	42
4.10	Shipping and navigation	45
4.11	Marine archaeology and cultural heritage.....	47
4.12	Marine Water Quality	50
5	IN-PRINCIPLE TIMINGS FOR PROPOSED SURVEYS	51
6	REFERENCES	53

List of tables

Table 1-1 Key offshore CWP Project characteristics	10
Table 4-1 In-principle monitoring for marine geology, sediment and coastal processes	18
Table 4-2 In-principle monitoring for subtidal and intertidal ecology	21
Table 4-3 In-principle monitoring for fish, shellfish and turtle ecology	26
Table 4-4 In-principle monitoring for marine mammals	28
Table 4-5 In-principle monitoring for underwater noise	31
Table 4-6 In-principle monitoring for ornithology receptors using offshore and intertidal areas	34
Table 4-7 In-principle monitoring for offshore bats	39
Table 4-8 In-principle monitoring for commercial fisheries	43
Table 4-9 In-principle monitoring for shipping and navigation	46
Table 4-10 In-principle monitoring for marine archaeology and cultural heritage	48
Table 5-1 In-principle timelines for surveys described in this IPPEMP	52

Abbreviations

Abbreviation	Term in full
ACP	An Coimisiún Pleanála
AIS	Automatic Identification System
CEMP	Construction Environmental Management Plan
CWP	Codling Wind Park
DCCA	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)	<p>The offshore transmission assets comprising the OSSs and offshore export cables.</p> <p>The EIAR considers both permanent and temporary works associated with the OfTI.</p>
onshore transmission infrastructure (OTI)	<p>The onshore transmission assets comprising the TJBs, onshore export cables and the onshore substation.</p> <p>The EIAR considers both permanent and temporary works associated with the OTI.</p>
Phase 1 Project	<p>Under the special transition provisions in the Maritime Area Planning Act 2021, as amended (the MAP Act), the Minister for the Department of Environment, Climate and Communications (DECC) has responsibility for assessing and granting a Maritime Area Consent (MAC) for a first phase of offshore wind projects in Ireland. The Phase 1 Projects include Oriel Wind Park, Arklow Bank Wind Park 2, Dublin Array, North Irish Sea Array, Codling Wind Park and Skerd Rocks. A MAC has since been granted by DECC for each of the Phase 1 Projects.</p>
planning application boundary	<p>The area subject to the application for development consent, including all permanent and temporary works for the CWP Project.</p>
Regulatory Authority	<p>An independent governmental body established by legislative Act, in order to set standards in a specific field of activity, or operations and to regulate those activities or operation in the public interest. In the case of the CWP Project the regulatory authorities are An Bord Pleanála (ABP), the coastal planning authorities, the Maritime Area Regulatory Authority, and any other public body specified by ABP for that purpose of discharging a planning condition. Ireland's new Maritime Area Regulatory Authority (MARA) will then be responsible for compliance monitoring and enforcement during construction (including pre-construction surveys), O&M and decommissioning.</p>
transition joint bay (TJB)	<p>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.</p>
wind turbine generator	<p>All the components of a wind turbine, including the tower, nacelle and rotor.</p>

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 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) **Volume 2, Chapter 4 Project Description**.

Table 1-1 Key offshore CWP Project characteristics

Parameter	Characteristic
Capacity	1300 MW
Lease period	45 years
Indicative offshore 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. The purpose of this IPPEMP is to provide a framework which will be developed into a Project Environmental Monitoring Plan (PEMP). It is anticipated that the delivery of the PEMP will be secured through a condition of the planning consent. Detailed monitoring scopes and methodologies will be agreed with the relevant regulatory authorities in consultation with stakeholders as part of the conditions discharge process.
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 Volume 3, Chapters 19 to 32 of the EIAR. Therefore, the onshore components of the CWP Project are not referenced further within this document, apart from where operational and maintenance (O&M) phase monitoring is not detailed in the **CEMP** (see Section 4.7 Ornithology). The Applicant notes that an updated **CEMP** has been provided in response to the Commission's FIR. This document supersedes the **CEMP** submitted with the CWP Project planning application.
6. Due to the long lead in time for the development of offshore wind farms (OWFs) it is not proposed to provide final detailed scopes and methodologies prior to planning approval. However, this IPPEMP reinforces commitments made in the EIAR and will allow refinements to be made based on the appropriate available technology.

1.2.1 Strategic monitoring initiatives

7. The East Coast Phase 1 OWF Projects (North Irish Sea Array (NISA), Oriel Wind Farm, Dublin Array OWF, the CWP Project 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 1 OWF projects have therefore established the 'East Coast Monitoring Group' (ECMG) to facilitate the process.

8. The ECMG are committed to continued collaboration within the group, and with relevant statutory and technical stakeholders, in order to agree and implement strategic monitoring initiatives where appropriate and relevant. The conclusions in the **CEA Report** and in-combination assessments in the NIS and **NIS Addendum** do not require strategic monitoring to be carried out to avoid an Adverse Effect on Site Integrity (AESI) or to inform mitigation. However, it is recognised that it is good practice to do so, in line with ORE monitoring in other jurisdictions. Monitoring initiatives implemented by the East Coast Phase 1 Projects will therefore focus on contributing to the scientific understanding of ORE at a strategic scale within the western Irish Sea, 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.
9. **Where appropriate, the Developer proposes that strategic monitoring may supersede some of the project specific monitoring proposals described in this IPPEMP.**
10. **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 their respective EIARs.**
11. It is anticipated that strategic monitoring will focus on contributing towards the scientific understanding of the key receptors for the Phase 1 Projects, namely birds, marine mammals and bats in the marine environment, to answer key questions at both a development level and a regional level. It is proposed that the key questions to be answered by monitoring are agreed in consultation with regulatory authorities and relevant technical stakeholders, and that monitoring scopes are developed in the context of these questions.
12. The following principles apply to the strategic monitoring initiative:
 - The Developer is committed to working with the ORE sector and key industry stakeholders in Ireland to design and implement an integrated 'fit for purpose' environmental monitoring programme that considers the strategic monitoring of OWF developments in the Irish Sea.
 - The primary objective of the monitoring is to develop the scientific understanding of ORE within the context of the western Irish Sea;
 - The Developer would support agreeing Terms of Reference with the relevant Governmental Departments and stakeholders to provide a clear framework to implement the monitoring of key receptors in the Irish Sea;
 - The Developer would support setting up advisory groups to develop and design the monitoring programmes;
 - The Developer would support designing a programme to allow for implementation of a standardised approach using common indicators and monitoring methods to allow data sharing and comparison and to facilitate results-based decision making;
 - The Developer is committed to consulting and working with stakeholders and scientific organisations including the Marine Institute (MI), National Parks and Wildlife Service (NPWS), BirdWatch Ireland (BWI), Irish Whale and Dolphin Group (IWDG) on the design and scope of environmental monitoring programmes proportionate to respective EIAR processes, and at appropriate spatial and temporal scales using useful and relevant metrics;
 - The Developer would welcome the development of strategic monitoring proposals as part of the development of individual project PEMP.
13. Example questions that may be posed for discussion and agreement to guide monitoring scopes are listed below.
 - To what extent do seabirds avoid rotor blades and turbines at the micro (blade), meso (individual turbine/row) and macro (entire wind farm) scales?

- On reflection that certain survey methodologies, such as Passive Acoustic Monitoring (PAM), provide meaningful data at a regional rather than site specific scale, do construction activities change the presence and distribution of marine mammals at a strategic scale in the short and long term?
14. The Developer is committed to developing the Strategic Monitoring Programme with the Phase 1 Projects post consent, and in consultation with relevant stakeholders.
 15. The **Fisheries Management and Mitigation Strategy (FMMS)** describes strategic monitoring proposed for commercial fisheries receptors, the development of which has commenced in the Phase 1 Project developer group in consultation with the Marine Institute. The Applicant notes that an updated **FMMS** has been provided in response to the Commission's FIR. This document supersedes the **FMMS** submitted with the CWP Project planning application.
 16. Furthermore, the Developer would welcome collaboration with other third parties where this could support the monitoring requirements for the project and the ECMG.

1.3 Scope of the IPPEMP

17. The relevant topics and / or receptor groups that are considered in this plan are listed below, with reference made to the application documentation, and associated appendices. As noted previously, onshore topics are addressed in separate documentation including the **CEMP**. Updates to the EIAR made in response to the Commission's FIR are reported in the **EIAR Addendum**.
 - Marine Geology, Sediments and Coastal Processes (EIAR Volume 3, Chapter 6);
 - Subtidal and Intertidal Ecology (EIAR Volume 3, Chapter 8);
 - Fish, Shellfish and Turtle Ecology (EIAR Volume 3, Chapter 9);
 - Marine Mammals (EIAR Volume 3, Chapter 11);
 - Underwater Noise (EIAR Volume 3, Chapters 9 and 11);
 - Ornithology (EIAR Volume 3, Chapter 10);
 - Offshore Bats (EIAR Volume 3, Chapter 13);
 - Commercial Fisheries (EIAR Volume 3, Chapter 12);
 - Shipping and Navigation (EIAR Volume 3, Chapter 16);
 - Marine Archaeology and Cultural Heritage (EIAR Volume 3, Chapter 14); and
 - Marine Water Quality (EIAR Volume 3, Chapter 7).
18. It is noted that Seascape, Landscape Visual Impact Assessment (SLVIA) is not included within this IPPEMP and nor is airborne noise during the operational period. Both topics, insofar as is relevant, have monitoring proposed as part of the onshore monitoring described within the **CEMP** and/or associated onshore documents. Similarly monitoring of waste and construction management monitoring within the intertidal area is provided for within the CEMP.

1.4 Structure of the IPPEMP

19. 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
 - Section 5: In-Principle timings for proposed surveys

2 GENERAL GUIDING PRINCIPLES FOR THE PROPOSED MONITORING

20. In addition to the strategic principles described previously, the guiding principles for project alone monitoring outlined in this document are as follows:
- An IPPEMP is submitted with the FIR. Any condition requiring the submission of a final PEMP can specify that the PEMP is submitted for agreement to the relevant Regulatory Authority no later 6 months prior to the commencement of the offshore element of the development. The PEMP can set out the measures which the applicant must monitor throughout the lifespan of the construction, operational and decommissioning phases. Post decommissioning monitoring is more appropriately dealt with under the **Rehabilitation Schedule** and Decommissioning Plan.
 - The final PEMP 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 the PEMP should be consistent with the type and scale of the project and the pressures and likely significant effects identified and mitigated in the EIAR.
 - 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 robust data sets, as applicable to the hypothesis being tested.
 - Specifically, the monitoring is intended to reflect consultation feedback and achieve the following objectives:
 - Be targeted to the most sensitive receptors and impacts;
 - Cover construction, operational, and decommissioning phases as relevant to each key receptor;
 - Check successful and timely implementation of mitigation measures;
 - Detect unexpected impacts requiring additional measures;
 - Justify any adaptive management measures required;
 - Provide monitoring at appropriate intervals and periods;
 - Include adequate reporting to relevant regulatory authorities; and
 - Fully inform requirements of future decommissioning plans.

3 RESIDUAL EFFECTS

21. 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.
22. For each receptor the residual effects as predicted within the CWP Project are outlined in **Section 4**.
23. The significance of the residual effect should not in its own right necessarily lead to the requirement for monitoring. Irish Guidance¹ notes that *“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 EIS, arising from the EIA”*.
24. The primary focus of the in-principle monitoring described is to:
 - address where there is potential for a significant environmental impact;
 - contribute to the scientific understanding of ORE within the western Irish Sea; and
 - to inform the requirement for, and/or ensure the successful and timely implementation of mitigation measures.
25. Where feasible, project specific and strategic monitoring activities shall align with existing national monitoring programmes to ensure consistency and avoid duplication.

¹ Guidance on Marine Baseline Assessments and Monitoring Activities for Offshore Renewable Energy Projects Parts I and II, DCCA, 2016/18

4 IN-PRINCIPLE PROPOSALS FOR MONITORING

26. The following sections set out the in-principle proposals for monitoring in relation to those topics and / or receptor groups assessed in the EIAR. The in-principle monitoring focuses primarily on the pre-construction, construction, and O&M phases of the CWP Project.
27. Reference is made to decommissioning only where there is certainty at this stage on the monitoring required. As described in the EIAR, a final **Rehabilitation Schedule** will require approval from the statutory consultees prior to the undertaking of decommissioning works. This will reflect discussions held with stakeholders and regulators to determine the exact methodology for decommissioning, taking into account available methods, best practice and likely environmental effects. It is anticipated that monitoring will include a pre-decommissioning survey, followed by 1-2 years following decommissioning; this accords with Irish guidance¹.

4.1 Engineering and design-related monitoring

28. In addition to the environmental survey and monitoring required as conditions of the Development Consent, surveys and studies will be undertaken for the project for engineering and design purposes. Wherever possible the Developer will look to combine surveys for monitoring purposes with those already being carried out for engineering purposes. Further to this, as noted within sections of this **IPPEMP** such as **Section 4.11** (Marine Archaeology and Cultural Heritage) where appropriate and relevant the engineering surveys will incorporate technical specialist (such as archaeological) planning and/or interpretation.
29. 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

30. The EIAR concludes for all assessed impacts a 'minor' or 'negligible minor' effect 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 described in **Section 6.9 of Volume 3, Chapter 6 Marine Geology, Sediment and Coastal Processes** and **Volume 2, Chapter 4 Project Description**, no additional mitigation is required.
31. It is noted that as part of the FIR response the Applicant undertook characterisation validation surveys, which included contaminant analysis. **Appendix 8-B Landfall and Intertidal Survey Report 2025** of the **EIAR Addendum** notes that no meaningful contamination was identified (i.e. all samples were below Irish Levels, and below Cefas Action Level 2). Given the very low likelihood of encountering unidentified areas of contamination, monitoring for contaminated sediments is not proposed.

4.2.2 In-principle monitoring

32. Monitoring relevant to marine geology, sediment and coastal processes should be considered in the context of EIAR **Volume 3, Chapter 6 Marine Geology, Sediment and Coastal Processes** (particularly **Section 6.9**) and **Volume 5, Chapter 33 Summary of Mitigation and Monitoring**.
33. **Chapter 33 Summary of Mitigation and Monitoring** summarises commitments to carrying out a pre-construction geophysical survey, minimum burial depths of cables to avoid risks to other sea users, and implementation of scour protection to mitigate scour around the WTG and OSS foundations.
34. To monitor the effectiveness of mitigation (cable burial, scour protection), and to inform benthic and other ecological surveys and archaeological review, the Developer proposes to undertake both pre and post construction geophysical surveys of the CWP Project offshore development area using appropriate high resolution bathymetric and side-scan equipment. Pre-construction survey information will inform the engineering and final design but also aid the benthic monitoring campaign design (see **Section 4.3**). Post-construction surveys will monitor cable burial depth within the array site and OECC and assess any scour development around the foundations. This will also support a better understanding of the assumptions made in **Volume 3, Chapter 6 Marine Geology, Sediment and Coastal Processes** on scour around installed structures and associated sediment transportation and deposition, which could lead to changes in seabed composition, structure or morphology.
35. Monitoring will include the section of the OECC which overlaps with the South Dublin Bay SAC and Rockabill to Dalkey Island SAC.

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

Potential residual effect	Receptors	Phase	Reason for monitoring	Monitoring	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	<ul style="list-style-type: none"> 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, with further scopes added to support monitoring for other receptors, where required and appropriate. 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. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.
		Post-construction	<ul style="list-style-type: none"> Structural integrity / engineering (scour) Cable burial Monitoring South Dublin Bay SAC and Rockabill to Dalkey Island SAC within the OECC. 	<p>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.</p> <p>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</p>	

Potential residual effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
				<p>will be used to validate the desk based assessment. Further surveys may be required at a frequency to be agreed with the relevant Regulatory Authority as part of developing the PEMP (e.g. 3 years non-consecutive e.g. 1, 3 and 6 years or 1, 5 and 10 years).</p> <p>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 stakeholders.</p>	

4.3 Subtidal and intertidal ecology

4.3.1 Conclusions of the EIAR

36. For all impacts during the construction, O&M and decommissioning phases of the CWP Project, the significance of effects for all subtidal and intertidal ecology receptors are concluded to be 'slight', 'imperceptible' or 'not significant', which is 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

37. Pre-construction and post-construction surveys will 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. This is a commitment made in the EIAR, as described in **Volume 2, Chapter 4 Project Description** and summarised in commitment C01 in **Volume 5, Chapter 33 Summary of Mitigation and Monitoring** of the EIAR (as updated in the **EIAR Addendum**). An observation received from An Taisce requests that further detail should be provided on the Applicant's intentions if evidence of the *Sabellaria spinulosa* organism is discovered near turbines, substations or cabling areas. Detail on this is provided in **Table 4-2**, noting that surveys will be undertaken both before and after construction to inform further design mitigation, and demonstrate that the mitigation has been effective. These surveys will build upon the baseline characterisation surveys, including the data validation surveys conducted in 2025.

38. In addition, the geophysical surveys in the array site and OECC proposed in **Section 4.2** encompass the sensitive habitats associated with sandbanks.

39. **Table 4-2** provides information on the in-principle monitoring for subtidal and intertidal ecology, and focuses on minimising risk of construction impacts and informing mitigation measures described in **Volume 3, Chapter 8 Subtidal and Intertidal Ecology** of the EIAR on:

- Identification and avoidance of Annex I habitats (to inform micro-siting);
- Direct impacts to protected species and habitats (subtidal and intertidal) (to inform micro-siting); and
- Colonisation of hard substrate by non-native invasive species (INNS) (to inform the **Offshore Biosecurity Plan**)².

40. Where possible, synergies with monitoring commitments made in **Section 4.1** and **4.2** would be explored in interpreting geophysical data. Further to this, all surveys, as proposed, accord with the Guidance on Marine Baseline Ecological Assessments & Monitoring Activities for Offshore Renewable Energy Projects³. This includes a focus on a Before, After, Control, Impact (BACI) design which will be employed to structure the monitoring and provide a mechanism to confirm the need or otherwise for future monitoring and measurement of change. As noted in the guidance, a BACI design should be proportional to the assumed risk. In this context, the in-principle monitoring focusses principally on subtidal reefs, and protected habitats, and does not focus on the broadscale subtidal sediments present within the planning application boundary.

² Prevention and monitoring of non-native invasive species (INNS) is further described in the Offshore Biosecurity (see Appendix A in the updated **CEMP**)

³ Guidance on Marine Baseline Assessments and Monitoring Activities for Offshore Renewable Energy Projects Parts I and II, DCCAE, 2016/18

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

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
Direct impacts to protected species and habitats	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.	Same as the survey described in Table 4-1 above which will be carried out in accordance with Irish Guidance ³ to include a single geophysical (Side Scan Sonar (SSS) or Multi-Beam Echo Sounder (MBES)) survey at a resolution sufficient to map the extent of the habitats present within the construction area and 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, as part of developing the PEMP. Surveys may occur up to 12 months prior to the proposed construction works. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.
Direct impacts to protected species and habitats	Annex I reef	Post-construction (<u>if required based on the results from the pre-construction survey</u>)	The requirement for post-construction monitoring within the CWP Project offshore development area will be dependent on the findings of the pre-construction surveys.	A survey to determine any change in the location, extent and composition 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 will be	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

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
				<p>informed by the results of the pre-construction benthic survey.</p> <p>Where Annex I reef is identified during the baseline survey and cannot be entirely avoided through micro-siting, post-construction survey(s) will be undertaken, at a frequency to be agreed with the relevant Regulatory Authority as part of developing the PEMP (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.</p> <p>Where no Annex I reef is identified by the pre-construction geophysical survey of the proposed works (and associated buffers), a single post-construction survey will be undertaken.</p>	<p>survey works and conducted within the first year post commissioning. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p> <p>If significant changes are observed the potential requirement for further surveys will be agreed with the relevant Regulatory Authority following review of the post-construction survey.</p>
Direct impacts to protected species and habitats	<i>Zostera</i> seagrass and littoral habitats within the intertidal area	Pre and post-construction	Undertake a survey of potential <i>Zostera</i> seagrass presence within the intertidal area.	A survey of the landfall to determine any change in the location or extent of <i>Zostera</i> seagrass prior to construction activities. This is likely to be	Survey programmes and methodologies for the purposes of monitoring shall be submitted to the relevant Regulatory Authority for written

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
				<p>completed as a walkover survey or by drone.</p> <p>Subject to pre-construction survey and avoidance, post-construction monitoring will be agreed.</p>	<p>approval prior to the commencement of any survey works, as part of developing the PEMP.</p> <p>Surveys may occur up to 12 months prior to the proposed construction works.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>
Colonisation of hard substrate by invasive species	Subtidal ecology	O&M	Introduction of hard substrate around WTGs can benefit colonisation of invasive species (Bouma and Lengkeek, 2013).	Monitoring of WTG foundations and the associated risk of non-native species as part of an environmental DNA (eDNA ⁴) monitoring scope (see Section 4.4 (fish and shellfish) for further information).	Survey programmes and methodologies for the purposed monitoring shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement of any survey works, as part of developing the PEMP. These shall be informed

⁴ eDNA can play a central role in surveillance programmes of marine Invasive Alien Species (IAS), especially when carried out as part of a multidisciplinary approach, including both direct capture and indirect detection methods (Marine Invasive Species Ireland (MISI) PROJECT eDNA TOOLKIT).

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
					<p>through reference to the Offshore Biosecurity Plan that accompanies the CEMP.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>

4.4 Fish, Shellfish and Turtle Ecology

4.4.1 Conclusions from the EIAR

41. 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.

4.4.2 In-principle monitoring

42. An observation received from the Loughs Agency suggests that consideration is given to carrying out a thorough baseline survey to monitor migration movements of salmonids and other highly mobile species through an acoustic telemetry programme and hydrodynamic modelling. As noted within the Irish monitoring guidance³ *“Tracking the migration routes of migratory fish generally requires both an investment in technology and international collaboration that may be beyond the scope of individual site projects in the open ocean”*. The guidance goes on to note that in light of this *“it may be more appropriate for individual projects to rely on data from such international research collaborations than attempting to conduct site specific surveys.”* As such the Applicant has drawn on relevant data from research programmes to inform the EIAR, and proposes alternative site-specific methods that are more suited to site specific analysis.
43. **Table 4-3** provides information on the in-principle monitoring for fish, shellfish and turtle ecology, and focuses on developing the scientific understanding of ORE within the context of the western Irish Sea with regards fish, shellfish and turtle ecology for the following pressures;
- Furthering the understanding of responses to direct damage and disturbance, increased SSC and deposition and underwater noise effects on salmonids and other highly mobile species; and
 - Furthering the understanding of responses to direct damage and disturbance, increased SSC and deposition and underwater noise effects on various species.
44. The in-principle monitoring would also satisfy the Loughs Agency’s request to monitor migration movements of salmonids and other highly mobile species.
45. The Developer proposes that to increase the data quality and mitigate the risk of mortality that is associated with invasive methodologies such as telemetry or net surveys, monitoring methods such as eDNA surveys within the array, export cable corridor, and the River Liffey are completed. These surveys would build upon the data validation surveys conducted by the CWP Project in 2025, which validate the characterisation data used for the EIAR and provide an early pre-construction baseline dataset. Whilst the principal focus and reporting would be on migratory species, the eDNA surveys provide information on non-migratory fish and shellfish species present, including prey species such as sandeel, and commercial species such as whelk.
46. Underwater noise monitoring described in **Section 4.6** is also of relevance to fish, shellfish and turtle ecology.

Table 4-3 In-principle monitoring for fish, shellfish and turtle ecology

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
Interaction of direct damage and disturbance, increased SSC and deposition and underwater noise effects.	Salmonids and other highly mobile species	Pre-construction / post-construction	To contribute to the scientific understanding of salmonid and other highly mobile species behaviour within the Irish Sea with regards disturbance during OWF construction.	Baseline survey to monitor presence/absence of migratory fish such as salmonids and other highly mobile species in this area, using eDNA methodologies. Pre- and Post construction monitoring to assess impacts to fish, shellfish and turtle ecology using eDNA methods.	Monitoring survey programmes and detailed 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, as part of developing the PEMP. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.
Interaction of direct damage and disturbance, increased SSC and deposition and underwater noise effects.	Various	Pre-construction /post-construction	To contribute to the scientific understanding of the broader fish assemblage behaviour within the Irish Sea with regards disturbance during OWF construction.		

4.5 Marine mammals

4.5.1 Conclusions from the EIAR

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

4.5.2 In-principle monitoring

48. Based on the predicted impacts in the EIAR, it is concluded that no specific monitoring is required beyond the primary mitigation measures described in EIAR **Volume 3, Chapter 10 Marine mammals**, and in the **Marine Mammal Mitigation Protocol (MMMP)**. The Applicant notes that an updated **MMMP** has been provided in response to the Commission's FIR. This document supersedes the **MMMP** submitted with the CWP Project planning application.

49. The updated **MMMP** specifically addresses monitoring of mitigation measures which are spatially limited to the marine mammal pre-piling monitored zone of 1000m, with complementary use of PAM.

50. The in-principle monitoring for marine mammals described in **Table 4-4** therefore focuses on developing the scientific understanding of ORE within the context of the western Irish Sea with regards marine mammals for the following pressures:

- Furthering the understanding of dolphin and harbour porpoise responses to pile driving;
- Furthering the understanding of minke whale responses to pile driving; and
- Landfall survey to monitor usage of landfall by seals.

51. Monitoring of underwater noise during pile driving to further the scientific understanding of underwater noise modelling predictions is described in the updated **MMMP** and in **Section 4.6** below.

52. The monitoring described in **Table 4-4** accords with Irish monitoring guidance³. Some of the monitoring can be carried out concurrently with the seabird surveys described in **Section 4.7**.

Table 4-4 In-principle monitoring for marine mammals

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
Disturbance effects on marine mammals	Seals	Pre-construction/ Construction	To contribute to the scientific understanding of seal behaviour within the Irish Sea with regards disturbance during construction within the intertidal zone of South Dublin Bay.	Haul out surveys at landfall to record the use of the site by seals. Survey to be undertaken in accordance with the baseline characterisation surveys completed to support the EIAR and EIAR Addendum . It is proposed that surveys would be carried out during the breeding season (August-November for grey seals and June-August for harbour seals), and during moult (December-March for grey seals and August-September for harbour seals).	Detailed 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, as part of developing the PEMP. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.
Disturbance effects on marine mammals	Cetaceans	Pre-construction/ Construction	To contribute to the scientific understanding of cetacean behaviour within the Irish Sea with regards disturbance during OWF construction.	Digital Aerial Surveys (DAS) along pre-determined track-lines and distance sampling, including use of high definition cameras and concurrent with seabird surveys. Survey proposed to be undertaken in accordance with the baseline characterisation surveys to the planning application. Further contextual information could also be provided through collection of eDNA samples (see Table 4-2).	Final 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, as part of developing the PEMP. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.

4.6 Underwater noise

4.6.1 Conclusions from the EIAR

53. An underwater noise (UWN) assessment was undertaken and presented as an appendix to **Volume 3, Chapter 9 Fish, Shellfish and Turtle Ecology** and **Chapter 11 Marine Mammals** of the EIAR. An update to the UWN assessment in response to the Commission's FIR is reported in **Appendix 9-C Underwater Noise Modelling Assessment** of the **EIAR Addendum**.
54. 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.
55. For marine mammals, maximum ranges were predicted for the Low Frequency (LF) and Very High Frequency (VHF) cetacean groups from Permanent Threshold Shift (PTS). For fish, the largest recoverable injury ranges (203 dB SEL_{cum}) were predicted to be for a stationary receptor, reducing for a fleeing receptor.
56. 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.
57. UXO clearance has also been considered at the site, and for the expected UXO clearance noise, there is a risk of PTS 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.
58. In response to the Commission's FIR (see **Section 2.10** of the **FIR Response Document**), the Developer has updated certain elements of the marine mammal assessment (see **Section 11** of the **EIAR Addendum**), in which the Developer has committed to the implementation of noise mitigation. Specifically:
- The Applicant commits to a limit on underwater noise of 169 dB L_{E,p,ss,05} at 750m for WTG and OSS piling activities; and
 - The Applicant commits to Noise Abatement Systems in the event of high order UXO clearance.

4.6.2 In-principle monitoring

59. **Table 4-5** provides information on the in-principle monitoring of underwater noise, and focuses on developing the scientific understanding of ORE within the context of the western Irish Sea with regards fish, shellfish and turtle ecology and marine mammals for the following pressures:
- Furthering the understanding of predictive underwater noise modelling used to inform future impact assessments; and
 - Furthering the understanding of the reduction of noise at 750 m from individual piling events as described in the updated **MMMP**.
60. Monitoring would include measurements of noise generated by the installation of the first four piled foundations, which will be reported to the Regulatory Authority.

61. Noise measurements would be made in line with National Physical Laboratory (NPL) Good Practice Guide 133 for underwater noise measurement (Robinson et al., 2014). The updated **MMMP** will be used to mitigate underwater noise effects on marine mammals.
62. Underwater noise data would 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.
63. The Marine Institute recommends a pre-construction baseline is established and then to monitor the relevant ecosystem components during and after construction has been completed, as per their submission and observations in response to the CWP Project planning application. It is noted an SEAI-funded project entitled 'Underwater noise monitoring baseline assessment for the roll-out of offshore renewable energy' seeks the establishment of a national acoustic baseline (SEAI, 2024), and this is anticipated to inform the understanding of the project specific baseline.

Table 4-5 In-principle monitoring 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 and to further the understanding of predictive underwater noise modelling used to inform assessment within the Irish Sea.	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, as part of developing the PEMP. Monitoring will include <i>inter alia</i> comparison of modelled SPL _{peak} and SEL _{cum} PTS and TTS contours for each functional hearing group, modelled SEL _{ss} contours of relevance, and the relevant threshold to inform Good Environmental Status with regards the Marine Strategy Framework Directive. The comparative analysis will contribute to the scientific understanding of ORE within the western Irish Sea region. The developer proposes that the results of the initial noise measurements be provided to the relevant Regulatory Authority within three months of the installation of the first four piled foundations. In addition to the above monitoring reporting, it is proposed that compliance monitoring and reporting to the relevant Regulatory Authority will be ongoing during construction by the Developer (see the updated CEMP).
Underwater noise propagation	Marine Ecology	Construction	To further the understanding of the effectiveness of the reduction of noise at 750 m from individual	Compare the measured data, from the first few monopiles, with commitment to an effective reduction of noise at 750 m.	As part of the overall underwater noise monitoring commitment, monitoring will focus on contributing to the scientific understanding of the effective reduction of noise at 750 m within the western Irish Sea.

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
			piling events within the western Irish Sea		

4.7 Ornithology

4.7.1 Conclusions from the EIAR

64. Project only and cumulative impacts on ornithological receptors as a result of the construction, O&M 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

65. It is recognised that the assessments make use of site-specific flight height data for the assessment of collision risk and apply assumptions on displacement drawn from other regional precedence. As such The Developer proposes to undertake monitoring to contribute to the scientific understanding of bird behaviour within the Irish Sea.
66. **Table 4-6** provides information on the in-principle monitoring for ornithology. Monitoring for onshore ornithology, including interaction with the CDL dolphin in the river Liffey during the construction phase is described within the CEMP and associated documents. **Table 4-6** captures operational phase monitoring for both onshore and offshore ornithology.
67. For offshore and intertidal areas the proposed monitoring focusses on developing the scientific understanding of ORE within the context of the western Irish Sea with regards key areas and ornithological receptors. This includes the intertidal and Liffey areas, given the potential for interaction with European designated sites. Offshore, in accordance with the Irish guidance¹, the primary focus is on displacement and macro avoidance, and building on the extensive scientifically robust dataset collated during the application and post application phase. Surveys will, generally, seek to replicate the validation surveys, notably the DAS and boat based bird surveys which have provided robust site-specific flight height distribution data and distribution data upon which the assessments have been based.
68. With regards intertidal monitoring, it is noted that the Applicant has introduced mitigation measures in the form of a seasonal restriction for over wintering, and a further timing restriction to reduce disturbance to roosting terns. These measures are robust, reflective of best practice and, given the precedence of the same measures within other marine licences in the same area, remove any reasonable scientific doubt as to the effectiveness of them. As such the primary objective will be to contribute towards the scientific understanding of bird behaviour within the intertidal area. Notwithstanding this, the Commission has requested the developer to “produce and implement an adaptive monitoring and management plan to ensure mitigation measures are effective” (despite not having cited any basis for doubt as to the effectiveness of measures proposed). Accordingly, as noted within **Table 4-6**, it is proposed that the results will be reported to the Regulatory Authority at appropriate frequencies such that in the unlikely event of adaptive measures being required they can be agreed and implemented in a timely manner.

Table 4-6 In-principle monitoring for ornithology receptors using offshore and intertidal areas

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
Disturbance	Ornithology	Construction	To contribute to the scientific understanding of bird behaviour within the Irish Sea with regards disturbance within the intertidal area(s).	Monitoring of intertidal construction phase disturbance responses within the South Dublin Bay OECC landfall area, to be undertaken by ECoW, outwith the seasonal restriction on works within the intertidal, which is described within the CEMP.	<p>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, as part of developing the PEMP.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>
Collision and displacement	Seabirds	O&M	To contribute to the scientific understanding of bird behaviour within the Irish Sea with regards flight height, collision and displacement.	<p>Use of autonomous monitoring, stereoscopic camera systems, to contribute to scientific understanding of collision avoidance in the western Irish Sea.</p> <p>Use of GPS tagging of KI to contribute to Irish Sea understanding of KI behaviour with regards flight height, collision and displacement in the western Irish Sea.</p> <p>Use of GPS tagging of Guillemot to contribute to Irish Sea understanding of Guillemot behaviour with regards</p>	<p>The detailed scope of monitoring surveys, their programmes and methodologies shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement, as part of developing the PEMP.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
				displacement in the western Irish Sea.	
Displacement	Seabirds	Pre-construction & O&M	To contribute to the scientific understanding of bird displacement in a broader Irish Sea bird assemblage context	Use of direct observation (DAS) of the array area and appropriate buffer to contribute to scientific understanding of bird displacement.	<p>The detailed scope of monitoring surveys, their programmes and methodologies shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement, as part of developing the PEMP.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>
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.	<p>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 occupancy by sand martin has been established.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
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.	<p>Tern monitoring on the CDL and ESB mooring dolphins in the river Liffey 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 then be conducted during one visit in late June / early July, to 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).</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p> <p>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</p>

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
					<p>may predate on terns from both colonies, retro fitting measures will be needed. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p> <p>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 Volume 4, Appendix 10.10 Black Guillemot Survey 2023 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.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>

4.8 Offshore bats

4.8.1 Conclusions from the EIAR

69. The assessment of impacts on offshore bats as a result of the construction, O&M 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. However, following the receipt of the Commission's FIR, the Developer proposes to carry out monitoring as requested. In principle monitoring is described below and in **Table 4-7**.

4.8.2 In-principle monitoring

70. It is proposed that monitoring for offshore bats will be carried out during operational years 1 to 3 in line with onshore wind farm monitoring requirements. At the end of each year a report of the findings will be produced and submitted to the relevant Regulatory Authority for review. The data will be gathered at regular intervals and analysed. If at any point the data shows that more than 10 individual bats are noted as having been within the array site within a 24 hour period, this will be reported to the Regulatory Authorities for further discussion on appropriateness of any adaptive management required.

71. The aim of monitoring is to investigate bat activity in the array area to inform any mitigation requirements.

72. **Table 4-7** describes the in-principle monitoring for offshore bats. The in-principle monitoring will be discussed and agreed with the relevant Regulatory Authority in consultation with relevant stakeholders.

Table 4-7 In-principle monitoring 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; this is in lieu of ECoWs present on all construction vessels. 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. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.
		Post-construction	Though considered unlikely, it is possible that	Should any bats be seen resting or otherwise stopping on the vessels or WTGs the ECoW (with	Guides on how to identify the different bats will also be

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
			bats will roost on the vessels or the WTGs.	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. Data will be made available to other OWF developers to overcome data gaps associated with bat migratory routes between Ireland and the UK.	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. Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.
		Post-construction	Contribute to scientific understanding of <ul style="list-style-type: none"> • Collision/barotrauma effects; • Displacement due to lighting; and • To inform adaptive management if required. 	Automated bat detectors will be installed on turbines and offshore substation structures. The monitoring technology will be agreed with the Regulatory authorities in consultation with relevant stakeholders closer to the time of construction. The detectors will be subject to a maintenance check at least once a year, prior to April (the start of the bat season) with annual replacement of microphones. Data will be automatically uploaded via an	The final scope of monitoring surveys, their programmes and methodologies shall be submitted to the relevant Regulatory Authority for written approval prior to the commencement. Results of the surveys shall be reported to the Regulatory Authority. The frequency and

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
				onsite server to enable automated analysis and manual verification if any potential bat passes are identified, and the results will be reported annually to the relevant Regulatory Authority.	method of reporting shall be agreed as part of developing the PEMP.
		Decommissioning	Though considered to be of low likelihood, it is possible that bats will roost on the WTG or OSS infrastructure.	As bats will have had a minimum of 25 years to find roosting opportunities within the offshore 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.	Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.

4.9 Commercial fisheries

4.9.1 Conclusions from the EIAR

73. 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.
74. All remaining impacts on commercial fisheries as a result of the construction, O&M and decommissioning phases of the CWP Project are predicted to be not significant in EIA terms.
75. While there are no residual significant (fleet level) impacts predicted, the Developer has chosen to implement a **FMMS**, updated in response to the Commission's FIR. The updated **FMMS** includes a co-existence strategy and measures to further mitigate the effect, including, where appropriate, cooperation agreements and associated payments.
76. Additionally, the Developer have appointed and will retain a Fisheries Liaison Officer (FLO), Offshore Fisheries Liaison Officer (OFLO) and Fishing Industry Representative, 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.
77. In addition, the Developer will undertake a dedicated pre- and post-construction monitoring programme to determine changes in CPUE of whelk within the array site. This approach will help build stakeholder confidence and ensure that any unexpected barriers to co-existence are identified early and addressed. Should monitoring or engagement demonstrate that fishing methods face operational challenges within the wind farm layout during the O&M phase, the Developer is committed to working with affected fishers to explore practical solutions. These may include support for gear reconfiguration, adaptations in operational protocols, or wider collaboration to help futureproof the fleet as the offshore renewable energy sector evolves.
78. 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

79. 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). Fish and shellfish surveys, including the commitment to undertake eDNA monitoring in lieu of invasive or destructive telemetry and demersal trawl surveys, are provided in **Section 4.4**.
80. **Table 4-8** provides the in-principle monitoring for commercial fisheries, primarily to test the key assessments and assumptions in **Volume 3, Chapter 12 Commercial Fisheries** of the EIAR:
 - Loss of grounds or restricted access to fishing grounds within the OECC during construction for whelk, crab and lobster fisheries;
 - Loss of grounds or restricted access to fishing grounds within the array site during O&M for whelk fisheries; and
 - Potential for gear snagging during O&M for all fisheries in all areas.

Table 4-8 In-principle monitoring 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, evidence based 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 Developer, 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, as part of developing the PEMP. Pre and post construction monitoring of fisheries activity, which includes both dedicated surveys, 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

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring proposal	Details
					<p>between the project and fishing activities.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>
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 (see surveys described in Table 4-2 and Table 4-3).	<p>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, as part of developing the PEMP.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>

4.10 Shipping and navigation

4.10.1 Conclusions from the EIAR

81. The assessment of impacts on shipping and navigation as a result of the construction, O&M 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 additional specific monitoring is required (outside of that assumed as embedded mitigation i.e., cable protection monitoring).

4.10.2 In-principle monitoring

82. The Developer proposes to carry out monitoring to demonstrate compliance with the guidance published by the An Roinn Iompair (Department of Transport) on Marine Navigational Safety & Emergency Response Risk of Offshore Renewable Energy Installations (OREI). This guidance 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 (see *inter alia* the **Navigation Safety Plan** submitted with the planning application, and **Appendix 16-A IRCG Safety Justification** of the **EIAR Addendum**) to be assessed based on the changes to vessel traffic movements compared to that estimated in the Navigational Risk Assessment (NRA).
83. It is noted that the Department of Transport and Irish Coastguard submit a request that hydrography surveys of the array site and OECC be undertaken at regular intervals on a pre-established periodicity during the life of the development and post-construction on cable route(s). These surveys are provided for within **Section 4.2** of this document, under marine geology, sediment and coastal processes.
84. **Table 4-9** provides the proposed monitoring for shipping and navigation.

Table 4-9 In-principle monitoring for shipping and navigation.

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	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 project 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).	Construction monitoring shall include vessel traffic monitoring by AIS, with reporting to be agreed with 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		Traffic will continue to be monitored by the project marine coordination centre, which will incorporate the use of AIS data. 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 obtain realistic information on their experiences in different conditions.	

4.11 Marine archaeology and cultural heritage

4.11.1 Conclusions from the EIAR

85. The assessment of impacts on marine archaeology and cultural heritage as a result of the construction, O&M 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; however, in accordance with the **Marine Archaeology Management Plan (MAMP)** and Protocol for Archaeological Discoveries (PAD), surveys undertaken for the project will be subject to archaeological review, the outcomes of which will be reported to the Regulatory Authority.

4.11.2 In-principle monitoring

86. The **MAMP**, submitted with the Applicant's FIR Response and approved by the UAU, provides a framework for further archaeological investigations for the CWP Project and the in-principle monitoring referred to here should be read in conjunction with the **MAMP**. The PAD will be implemented as best practice to ensure that The Developer is prepared for unexpected discoveries of archaeological material and that these are addressed in a timely and appropriate manner.
87. **Table 4-10** describes the in principle monitoring for marine archaeology and cultural heritage, which will be informed by the following principles presented in Section 5.4 of the **MAMP**:
- For all aspects of investigations, the Applicant will adhere to applicable standards and guidance, for example *Marine Geophysics: Data Acquisition, Processing and Interpretation Guidance Notes* (2nd edition) (Historic England 2025) and *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector* (Gribble & Leather 2011), and the following Irish guidance documents:
 - Framework and Principles for the Protection of the Archaeological Heritage (Department of Arts, Heritage, Gaeltacht and the Islands, 1999);
 - Policy and Guidelines on Archaeological Excavation (Department of Arts, Heritage, Gaeltacht and the Islands, 1999);
 - Conserving Ireland's Maritime Heritage, Proposing Policies and Priorities for the National Heritage (The Heritage Council, 2006);
 - Guidelines for the Authors of Reports on Archaeological Excavations (National Monuments Service, 2006);
 - Standards for the care and treatment of archaeological objects from excavations (National Museum of Ireland, 2022);
 - Advice to the Public on Use of Metal Detection Devices and their Impact on Our Archaeological Heritage (Department of Arts, Heritage and the Gaeltacht & National Museum of Ireland); and
 - Advice to the Public on Ireland's Underwater Archaeological Heritage (Department of Housing, Local Government and Heritage, 2022).
 - Where appropriate, the Applicant will allow for archaeological involvement in the planning, acquisition and review of geophysical and geotechnical surveys, should they be undertaken.
 - Should any surveys be carried out primarily for archaeological purposes, the specification should be prepared by a suitably qualified archaeologist or marine geophysicist/geoarchaeologist. In addition, the survey should be carried out by a survey company with appropriate archaeological expertise and including geophysicists / geoarchaeologist with appropriate archaeological expertise on board, if required.

Table 4-10 In-principle monitoring for marine archaeology and cultural heritage

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
Direct physical disturbance	Palaeogeography	Pre-Construction / Construction	Targeted geoarchaeological work may aid in refining the interpretation of the palaeogeographic features and therefore help determine the archaeological potential of the area.	Archaeological monitoring shall be undertaken in advance of works for seabed preparation, foundation installation and scour protection installation, offshore export cable – landfall installation punch out, offshore export cable – offshore installation, inter-array and interconnector cable installation. The archaeological watching brief will 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. Any geotechnical logs from within the study area will be made available for geoarchaeological assessment by a suitably qualified archaeological contractor.	A MAMP to provide a practical framework to mitigate and respond to residual or unexpected marine archaeology discoveries. The geophysical surveys shall be licenced under the National Monuments Acts 1930-2014. A Dive Survey Licence (Section 3 1987 National Monuments Act) and Detection Device consent (Section 2 1987 National Monuments Act) shall be required. Any dive surveys required in connection with proposed geophysical surveys or other works shall also be licenced (Section 3 1987 National Monuments Act). Any dive survey shall be accompanied by a handheld metal detection survey which shall also be licenced (Section 2 1987 National Monuments Act). All archaeological diving shall comply with the Health and Safety Authority's Safety,
	A2 Anomalies			Where geophysical surveys are undertaken in advance of the development, such as a UXO survey that requires magnetometer data, the data will be assessed by a suitably qualified archaeological	

Potential effect	Receptors	Phase	Reason for monitoring	Monitoring	Details
				<p>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.</p>	<p>Health and Welfare at Work (Diving) Regulations 2018/2019.</p> <p>Results of the surveys shall be reported to the Regulatory Authority. The frequency and method of reporting shall be agreed as part of developing the PEMP.</p>
	Intertidal Heritage Assets			<p>At the proposed OECC approach to landfall (covering the intertidal zone, up to MHW), a targeted archaeological walkover survey will be 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.</p> <p>Furthermore, a metal detection survey, including excavation of identified targets will be undertaken to identify any material of archaeological potential located along the proposed landfall.</p>	

4.12 Marine Water Quality

4.12.1 Conclusions from the EIAR

88. Modelling was undertaken to identify the greatest extent of potential sediment plumes dispersion, level of dispersion above background levels (mg/L) and accumulated level of deposited material. The modelling identified that the greatest direction and distance of dispersion of disturbed material. Modelling showed significant difference between tidal excursion distances during spring and neap tides.
89. **Volume 3, Chapter 7 Marine Water Quality** concluded that residual effects on offshore waters (>1 NM) and Water Framework Directive (WFD) waterbodies (<1 NM) varied from 'slight' to 'not significant', which is not significant in EIA terms. Monitoring is therefore not recommended.
90. It is of note that specific monitoring of the landfall works areas is proposed within the **CEMP** (see Table 5-1 and commitment C53), which is associated with implementation of the cofferdam, and groundwater and contamination management. That compliance monitoring is not repeated within this document but should be read in conjunction with the in-principle monitoring described here.

4.12.2 In principle monitoring

91. Through their observations, the Marine Institute have advised baseline data establishment and ongoing monitoring for water and sediment quality, and that this should comprise a national monitoring scheme which aligns with national monitoring schemes. The Developer is unable to deliver a national scheme unilaterally but is willing to consider alignment with any future scheme. Beyond this commitment, as there are no significant effects anticipated, there is no monitoring proposed specifically for marine water quality, beyond the commitments made within the **CEMP**.

5 IN-PRINCIPLE TIMINGS FOR PROPOSED SURVEYS

92. The FIR received from the Commission requested further detail with regards appropriate intervals for operational monitoring, at appropriate periods, and for the provision of adequate reporting to the relevant compliance authorities. The Applicant has considered this request, and the associated request for further detail with regards decommissioning, and also construction phase monitoring.
93. At this stage it is not possible to provide a detailed reporting timeline, due to the varied reporting timescales with each proposed monitoring method, and the need for consultation with relevant stakeholders on the PEMP and associated detailed monitoring methodologies. The Applicant proposes that the frequency and method of reporting shall be agreed as part of the development of the PEMP. A key consideration will be that the reporting takes place within adequate timescales to inform final design and mitigation measures in the limited circumstances where the EIA or AA is dependent on adaptive mitigation.
94. In addition to the above monitoring reporting, it is proposed that compliance monitoring and reporting to the relevant Regulatory Authority will be ongoing during construction by the Developer, as described in **Section 4** of the updated **CEMP**.
95. The proposed survey schedule during the construction, O&M and decommissioning is presented in **Table 5-1** below, and provides a summary of receptor, foci, method and rationale as described in **Section 4** of this IPPEMP. This schedule should be considered draft and subject to change in consultation with the relevant regulatory authorities.

Table 5-1 In-principle timelines for surveys described in this IPPEMP

				Project timeline years																				
				-2	-1	1	2	3	4	5	6	7	8	9	10	11	12-31	32	33	34				
Project phase				Pre-construction																				
				Construction (onshore only = blue)																				
				Operation																				
				Decommissioning																				
Consultation with stakeholders to develop and agree PEMP (green = consultation, orange = procurement)																								
Receptors	Method summary*	Survey timing/window	Rationale summary																					
Coastal processes/sediment quality	Geophysical survey Provided for in CEMP	n/a Apr-Sept	Inform mitigation Inform mitigation																					
Benthos	Walkover or drone	Apr-Sept	Scientific understanding																					
	Geophysical survey and DDV	May-Sept	Inform mitigation																					
	eDNA	Informed by biosecurity plan	Inform mitigation																					
Fish/shellfish/reptiles	eDNA	May-Sept	Scientific understanding																					
Marine mammals	DAS	Monthly	Scientific understanding																					
	ECoW monitoring (CEMP)	Apr - Sept	Scientific understanding																					
Underwater noise	Hydrophones	During monopile installation	Scientific understanding																					
Ornithology	DAS	Monthly	Scientific understanding																					
	ECoW monitoring (CEMP)	Apr - Sept	Scientific understanding																					
	Camera	Continuous	Scientific understanding																					
	Tagging	Breeding season	Scientific understanding																					
	Tagging	Breeding season	Scientific understanding																					
Offshore bats	See Table 4-6 of IPPEMP	Breeding season	Scientific understanding																					
	Bat detectors	Continuous	Inform mitigation																					
Marine Archaeology	ECoW monitoring (CEMP)	Quarterly	Inform mitigation																					
	Archaeological Clerk of Works	Continuous	Inform mitigation																					
Fisheries	Potting survey	March-May	Inform mitigation																					
Shipping and navigation	AIS	Continuous	Inform mitigation																					

* Detailed methodologies and technologies will be agreed as part of the development of the PEMP, in consultation with regulators and relevant stakeholders

6 REFERENCES

96. Bouma S. & Lengkeek W. (2013). Benthic Communities on Hard Substrates within the first Dutch Offshore Wind Farm (OWEZ). Available at [NFM41_07_059-068_Bouma.pdf](#). Accessed January 2025.
97. Cefas. (2012). Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Cefas contract report: ME5403 – Module 15.
98. 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.
99. 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.
100. Department of Transport (2024). Draft Marine Navigational Safety & Emergency Response Risk of Offshore Renewable Energy Installations (OREI).
101. Glasson J, Therivel R, Chadwick A. 2011. Introduction to Environmental Impact Assessment. 4th edition. The Natural and Built Environment Series.
102. JNAPC (2006). Code of Practice for Seabed Development. York, Joint Nautical Archaeology Policy Committee.
103. 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.
104. 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, ISSN 1368-6550.
105. SEAI (2024) Sustainable Energy Authority of Ireland National Energy RD&D Funding Programme 2024 Call Document. Available at <https://www.seai.ie/sites/default/files/seai-research/research-funding/research-development-and-demonstration-fund/SEAI-RDD-Call-Document.pdf>. Accessed January 2025.