



codling
wind park



Environmental Impact Assessment Report

Volume 4

Appendix 11.1 Cumulative Effects Assessment



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Abbreviations

Abbreviation	Term in Full
CEA	Cumulative Effects Assessment
CWP	Codling Wind Park
EDR	Effective Deterrent Range
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EU	European Union
IAC	Inter-array Cable
MAC	Marine Area Consent
MU	Management Unit
MBES	Multi-Beam Echo Sounder
OECC	Offshore Export Cable Corridor
ORESS	Offshore Renewable Electricity Support Scheme
OWF	Offshore Wind Farm
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SBI	Sub-Bottom Imager
SBP	Sub Bottom Profiler
SSS	Side Scan Sonar
UHRS	Ultra-High Resolution Seismic
USBL	Ultra-Short Base Line
UXO	Unexploded Ordnance
WTG	Wind Turbine Generator

Definitions

Glossary	Meaning
the Applicant	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.
Codling Wind Park Limited (CWPL)	A joint venture between Fred. Olsen Seawind (FOS) and Électricité de France (EDF) Renewables, established to develop the CWP Project.
Environmental Impact Assessment (EIA)	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.
Environmental Impact Assessment Report (EIAR)	The report prepared by the Applicant to describe the findings of the EIA for the CWP Project.
export cables	The cables, both onshore and offshore, that connect the offshore substations with the onshore substation.
inter-array cables (IACs)	The subsea electricity cables between each WTG between and the OSSs.
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.
offshore export cables	The cables which transport electricity generated by the WTGs from the offshore substations (OSSs) to the landfall.
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 infrastructure	The offshore infrastructure, comprising of the WTGs, IACs, OSSs, Interconnector cables, offshore export cables and other associated infrastructure such as cable and scour protection.
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.
planning application boundary	The area subject to the application for development permission, including all permanent and temporary works for the CWP Project.
Strategic Infrastructure Development	Strategic Infrastructure Development includes development which would: - contribute significantly to meeting any of the objectives of the National Planning Framework;

	<ul style="list-style-type: none"> - contribute significantly to meeting any regional spatial and economic strategy for an area; or - have a significant effect on the area of more than one planning authority.
wind turbine generator	All the components of a wind turbine, including the tower, nacelle and rotor.

APPENDIX 11.1 CUMULATIVE EFFECTS ASSESSMENT

1 Introduction

1. Codling Wind Park Limited (hereafter 'the Applicant') 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 Environmental Impact Assessment Report (EIAR) for the CWP Project provides the decision-maker, stakeholders and all interested parties with the environmental information required to develop an informed view of any likely significant effects resulting from the CWP Project, as required by the European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) (the EIA Directive). These provisions are transposed into Irish legislation in Part X of the Planning and Development Act 2000, as amended, and in Part 10 of the Planning and Development Regulations 2001, as amended.
3. A fundamental component of the EIA is to consider and assess the potential for cumulative effects of the project with other projects, plans and activities (hereafter referred to as 'other development').
4. The Environmental Protection Agency (EPA) Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022) defines cumulative effects as:

'The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.'

'While a single activity may itself result in a minor impact, it may, when combined with other impacts (minor or insignificant), result in a cumulative impact that is collectively significant. For example, effects on traffic due to an individual industrial project may be acceptable; however, it may be necessary to assess the cumulative effects taking account of traffic generated by other permitted or planned projects.'

5. This appendix presents the findings of the Cumulative Effects Assessment (CEA) for marine mammals, which considers the residual effects presented in **Chapter 11 Marine Mammals** alongside the potential effects of other proposed and reasonably foreseeable development. Cumulative effects are considered in this document across the construction and operation and maintenance phases of the CWP Project.
6. The detail and scope of the decommissioning works for the CWP Project will be determined by the relevant legislation and guidance at the time of decommissioning. Project alone impacts during the decommissioning phase of the CWP Project are assessed in **Chapter 11 Marine Mammals**. It is anticipated that the impacts will be no greater than those identified for the construction phase, and therefore no separate assessment of cumulative impacts during the decommissioning phase is presented within this CEA.

2 CEA methodology

2.1 Guidance

7. This section summarises the approach to the assessment of cumulative effects for the CWP Project. Further details on the approach to the CEA is provided in **Appendix 5.1 Cumulative Effects Assessment Methodology**.

8. The principal guidance document that has informed the approach to the CEA is the Planning Inspectorate (PINS) for England 'Advice Note 17: Cumulative Effects Assessment' (PINS, 2019), which provides a four-stage process for the assessment of cumulative effects which has been applied here.
9. This guidance has been applied for a number of both OWF and non-OWF projects in the UK, and is considered to provide developers with a structured approach to assessing cumulative effects. The guidance is also regularly applied in Ireland for large scale projects, noting that there is no single, industry standard approach to CEA in Ireland which often varies between projects.
10. In developing the CEA methodology, EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022) and Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission, 1999) has also been considered.

2.2 Consultation

11. No significant issues have been raised during the consultation process with regards Marine Mammals in the context of CEA specifically.

2.3 Identification of 'other development'

12. Stage 1 of the process involved establishing the long list of other development with the potential to result in cumulative effects with the CWP Project. This included all projects that result in a comparative effect that is not intrinsically considered as part of the existing environment and is not limited to other OWF projects.
13. The long list of other developments was then subject to additional screening criteria to establish a short list of other development for each topic. It should be noted that the approach to the CEA attempts to incorporate an appropriate level of pragmatism. Only projects which are well described and sufficiently advanced, with sufficient detail available with which to undertake a meaningful and robust assessment, have been screened into the CEA.
14. In accordance with PINS Advice Note 17, each development considered alongside the CWP Project as part of the CEA has been assigned to a tier, reflecting their current status in the planning and development process.
15. The purpose of the tiered approach is to give consideration to the level of certainty that a cumulative project will be built and therefore contribute to cumulative effects. For example, there can be greater certainty that other development approved and under construction are likely to contribute to cumulative effects, whereas other development at early phases of development (i.e., pre-planning) are less likely to proceed to construction and contribute to cumulative effects. Furthermore, sufficient detail about these projects is unlikely to be available with which to undertake a detailed cumulative assessment.
16. The proposed tiering structure is presented in **Table 1** and described in more detail in **Appendix 5.1 Cumulative Effects Assessment Methodology**. The tiers are listed in descending order of level of detail likely to be available (and, correspondingly, certainty of effects arising).
17. Although Phase 1 Projects (Arklow, Oriel, Codling, NISA, Dublin) do not form a separate Tier, potential cumulative effects for these five projects are considered for each species prior to and in addition to CEA for the broader Tiers.

Table 1 Tiered structure for other development considered for CEA (modified from PINS Advice Note 17 (PINS, 2019))

Tier	Description
Tier 1	<ul style="list-style-type: none"> Under construction; Permitted applications, but not yet implemented; Offshore applications submitted six months or more in advance of the CWP Project planning application, but not yet determined; and Onshore applications submitted six months or more in advance of the CWP Project planning application, but not yet determined.
Tier 2a	<ul style="list-style-type: none"> Offshore projects in receipt of a Maritime Area Consent (MAC) and an ORESS contract.
Tier 2b	<ul style="list-style-type: none"> Offshore projects in receipt of a Maritime Area Consent (MAC); Offshore Projects in the public domain where an EIA scoping report has been issued; and Onshore strategic infrastructure development (SID) Projects in the public domain where an EIA scoping report has been issued.
Tier 3	<ul style="list-style-type: none"> Projects in the public domain where an EIA scoping report has not been issued; and Projects that have been identified in the relevant development plans and programmes, which set the framework for future development consents / approvals, where such development is reasonably likely to come forward.

3 CEA impact screening

18. The first step in the CEA for marine mammals is the identification of which residual impacts assessed for the CWP Project alone have the potential for a cumulative impact with other development (described as 'impact screening'). This screening exercise is set out in **Table 2** below.
19. Only potential impacts assessed in **Chapter 11 Marine Mammals** as above Negligible are included in the CEA (i.e., those assessed as 'imperceptible' are not taken forward as there is no potential for them to contribute to a cumulative effect).
20. In summary, **Table 2** shows that there is the potential for cumulative effects on marine mammals as a result of disturbance.

Table 2 Potential impacts

Impact	Potential for cumulative effect	Rationale
Construction		
Auditory injury (Permanent Threshold Shift (PTS)) from pre-construction surveys	No	Mitigation measures will be put in place to reduce injury risk to marine mammals to negligible levels (as a requirement of European Protected Species legislation) for both the CWP Project alone, and other relevant plans and projects that may produce noise. This requirement is a legal requirement of all relevant jurisdictions.

Impact	Potential for cumulative effect	Rationale
Disturbance from pre-construction surveys	Yes	Potential for cumulative impacts.
Auditory injury (PTS) from Unexploded Ordnance (UXO) clearance	No	Mitigation measures will be put in place to reduce injury risk to marine mammals to negligible levels (as a requirement of European Protected Species legislation) for both the CWP Project alone, and other relevant plans and projects that may produce noise. This requirement is a legal requirement of all relevant jurisdictions.
Disturbance from UXO clearance	Yes	Potential for cumulative impacts.
Auditory injury (PTS) from piling – WTGs	No	Mitigation measures will be put in place to reduce injury risk to marine mammals to negligible levels (as a requirement of European Protected Species legislation) for both the CWP Project alone, and other relevant plans and projects that may produce noise. This requirement is a legal requirement of all relevant jurisdictions.
Disturbance from piling – WTGs	Yes	Potential for cumulative impacts.
Auditory injury (PTS) from piling – onshore substation	No	Mitigation measures will be put in place to reduce injury risk to marine mammals to negligible levels (as a requirement of European Protected Species legislation) for both the CWP Project alone, and other relevant plans and projects that may produce noise. This requirement is a legal requirement of all relevant jurisdictions.
Disturbance from piling – onshore substation	No	Highly localised impact with a negligible magnitude. Primary source of underwater noise disturbance is from pile driving of WTGs which has a full quantitative cumulative assessment provided.
Auditory injury (PTS) from other construction activities	No	Mitigation measures will be put in place to reduce injury risk to marine mammals to negligible levels (as a requirement of European Protected Species legislation) for both the CWP Project alone, and other relevant plans and projects that may produce noise. This requirement is a legal requirement of all relevant jurisdictions.
Disturbance from other construction activities	No	Highly localised impact. Primary source of underwater noise disturbance is from pile driving of WTGs which has a full

Impact	Potential for cumulative effect	Rationale
		quantitative cumulative assessment provided.
Vessel collision	No	Project specific Vessel Management Plans (VMPs) will be put in place to reduce this already low risk of impact for both the CWP Project alone, in compliance with Irish guidance, UK guidance, and in accordance with industry standard practice.
Disturbance from vessels	Yes	Potential for cumulative impacts.
Indirect impacts to prey	No	Negligible magnitude and significance for the CWP Project alone, which is the equivalent of imperceptible.

Operation

Auditory injury (PTS) from operational noise	No	Mitigation measures will be put in place to reduce injury risk to marine mammals to negligible levels (as a requirement of European Protected Species legislation) for both the CWP Project alone, and other relevant plans and projects that may produce noise. This requirement is a legal requirement of all relevant jurisdictions.
Disturbance from operational noise	No	Negligible magnitude from CWP Project alone.
Vessel collision	No	Project specific VMPs will be put in place to reduce this already low risk of impact or both the CWP Project alone, in compliance with Irish guidance, UK guidance, and in accordance with industry standard practice.
Disturbance from vessels	Yes	Potential for cumulative impacts.
Indirect impacts to prey	No	Negligible magnitude from CWP Project alone and significance for the CWP Project alone, which is the equivalent of imperceptible.

Decommissioning

The detail and scope of the decommissioning works for the CWP Project will be determined by the relevant legislation and guidance at the time of decommissioning. Project alone impacts during the decommissioning phase of the CWP Project are assessed in **Chapter 11 Marine Mammals**. It is anticipated that the impacts will be no greater than those identified for the construction phase, and therefore the conclusions remain as per the construction phase, and no separate assessment of cumulative impacts during the decommissioning phase is presented within this CEA.

4 CEA ‘other development’ screening

21. The second step in the CEA for marine mammals is the identification of the other development that may result in cumulative effects for inclusion in the CEA (described as ‘project screening’). This information is set out in Table 3 below, together with a consideration of the relevant details of each development, including the tier (see **Table 1**), proximity to the CWP Project development area and a rationale for including or excluding from the assessment.
22. The other development included in the table below are taken from the long list of other development (presented in **Appendix 5.1 Cumulative Effects Assessment Methodology**). Information gathering for the other development screened in at Stage 2 of the CEA, along with a greater understanding of the potential effects of the CWP Project, has enabled further refinement of the short list.
23. For the potential effects for marine mammals, planned offshore wind farm projects were screened into the assessment based on the extent of the relevant marine mammal reference population area (Management Unit (MU)). For all other planned offshore projects, those occurring in OSPAR Region III: Celtic Seas were screened into the assessment due to the smaller scale nature of the projects compared to large commercial scale offshore wind farms.
24. The long list of projects for the ‘disturbance from construction activities’ impact was screened to remove the following:
 - All projects that are located outside of the relevant species MU;
 - All projects that are already operational / active as they are considered to be existing impacts included within the baseline (this includes all shipping ports, shipping routes and oil and gas pipelines);
 - All projects that are not expected to be constructing between 2023 and 2028 inclusive; and
 - All projects where the timing of construction activities is unknown as it is therefore not possible to undertake a meaningful CEA.
25. In summary, the following other development will be assessed for potential cumulative effects with the CWP Project in relation to marine mammals (for the assessment of disturbance from construction noise):
 - Offshore wind farms in the Celtic and Greater North Seas MU:
 - Most of these were screened out of the short list as they are not expected to construct between 2023 and 2028.
 - 79 were screened into the short list as construction is expected between 2023 and 2028 inclusive.
 - Aggregates projects in the Celtic Seas:
 - None of these were screened into the short-list as they are either operational or no longer operational.
 - Disposal projects in the Celtic Seas:
 - None of these were screened into the short-list as they are either operational, disused or closed.
 - Dumping at sea projects in the Celtic Seas:
 - None of these were screened into the short-list as they are either operational or no longer operational.
 - O&G pipeline projects in the Celtic Seas:

- None of these were screened into the short-list as they are either operational, abandoned / not in use or due to be decommissioned.
- Subsea cable projects in the Celtic Seas:
 - Most of these were screened out of the short-list as they are either operational or disused.
 - Three were screened into the short-list as construction is expected between 2023 and 2028 inclusive.
- O&G infrastructure projects in the Celtic Seas:
 - None of these were screened into the short-list as they are either operational or not in use. One single project was expected to construct in 2023 (PENGUINS FPSO) however this involved surface works only and therefore would have no effect on marine mammals.
- Shipping and port projects in the Celtic Seas:
 - None of these were screened into the short-list as they are all operational.
- Other offshore energy projects in the Celtic Seas:
 - Seven were screened into the short-list as construction is expected between 2023 and 2028 inclusive.
- Aquaculture projects in the Celtic Seas:
 - None of these were screened into the short-list as they are all operational.
- Carbon capture and storage projects in the Celtic Seas:
 - None of these were screened into the short-list as they were either active or had no timeline information available.
- Coastal assets projects in the Celtic Seas:
 - Most of these were screened out of the short-list as they were operational or had no timeline information available.
 - Four were screened into the short-list as construction is expected between 2023 and 2028 inclusive.
- Survey projects in the Celtic Seas:
 - None of these were screened into the short-list as they were all categorised as active / in operation and thus already considered to be part of the baseline or had no timeline information available.

Table 3 Summary of other development screened into the quantitative CEA for disturbance from construction activities for marine mammals (MW = minke whale, CD = common dolphin, RD = Risso's dolphin, HP = harbour porpoise, BND = bottlenose dolphin)

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
Awel y Môr OWF CEA-0007	121	129	1	yes	yes	yes	no	All projects that fall within relevant MU and constructing between 2023–2028 inclusive are screened into the CEA.
Erebus OWF CEA-0044	168	179	1	yes	yes	no	no	
White Cross CEA-0136	205	216	1	yes	yes	no	no	
Atlantic Marine Energy Test Site CEA-0005	303	273	1	yes	yes	no	no	
TwinHub OWF CEA-0125	291	301	1	yes	yes	no	no	
Neart Na Gaoithe OWF CEA-0088	407	410	1	yes	no	no	no	
Berwick Bank OWF CEA-0010	434	439	1	yes	no	no	no	
Inch Cape OWF CEA-0055	432	435	1	yes	no	no	no	
Seagreen Phase 1 OWF	433	429	1	yes	no	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
CEA-0109								
Rampion 2 OWF CEA-0103	437	488	1	yes	no	no	no	
Sheringham Shoal Extension CEA-0116	451	458	1	yes	no	no	no	
Hornsea Project Four OWF CEA-0052	455	467	1	yes	no	no	no	
Dudgeon Extension OWF CEA-0039	460	470	1	yes	no	no	no	
Dogger Bank – Creyke Beck B OWF CEA-2777	510	520	1	yes	no	no	no	
Dogger Bank – Creyke Beck A OWF CEA-2780	515	525	1	yes	no	no	no	
Saint-Brieuc OWF CEA-2782	515	525	1	yes	yes	no	no	
Hornsea Project Three OWF	533	543	1	yes	no	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
CEA-2785								
Dogger Bank – Teesside B (Sofia) OWF CEA-2789	545	555	1	yes	no	no	no	
Courseulles-sur-mer OWF CEA-2791	518	528	1	yes	no	no	no	
Moray West OWF CEA-2792	594	600	1	yes	no	no	no	
Norfolk Vanguard West OWF CEA-2793	574	584	1	yes	no	no	no	
East Anglia Two OWF OWF CEA-2794	536	546	1	yes	no	no	no	
Fécamp OWF CEA-2796	538	550	1	yes	no	no	no	
East Anglia One North OWF CEA-2798	544	554	1	yes	no	no	no	
Norfolk Vanguard East OWF CEA-2809	542	552	1	yes	no	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
East Anglia Three OWF CEA-2810	558	567	1	yes	no	no	no	
Dieppe Le Tréport OWF CEA-2811	573	588	1	yes	no	no	no	
Dogger Bank C – Teesside A CEA-2812	580	590	1	yes	no	no	no	
Green Volt CEA-2815	577	582	1	yes	no	no	no	
Pentland Floating CEA-2821	625	608	1	yes	no	no	no	
Hollandse Kust F CEA-2845	672	680	1	yes	no	no	no	
Hollandse Kust (Zuid) CEA-2859	660	670	1	yes	no	no	no	
Iles d'Yeu et de Noirmoutier CEA-2873	714	815	1	yes	no	no	no	
Borkum Riffgrund 3 CEA-2888	790	796	1	yes	no	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
EnBW He Dreiht CEA-2893	808	902	1	yes	no	no	no	
Gode Wind 3 OWF CEA-2920	845	851	1	yes	no	no	no	
Thor OWF CEA-2932	940	946	1	yes	no	no	no	
Vesterhav Syd OWF CEA-2936	934	940	1	yes	no	no	no	
Vesterhav Nord OWF CEA-2937	961	967	1	yes	no	no	no	
CeltixConnect – Sea Fibre Networks CEA-0226	18	2	1	yes	yes	yes	yes	
Greenlink Interconnector CEA-2076	114	122	1	yes	yes	no	yes	
Morlais Tidal Demonstration Zone CEA-0231	64	75	1	yes	yes	yes	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
Fair Head Tidal Phase 2 CEA2944	229	206	1	yes	yes	no	yes	
Swansea Bay Tidal Lagoon CEA-0248	198	208	1	yes	yes	no	no	
Cardiff Bay Tidal Lagoon CEA-0251	246	258	1	yes	yes	no	no	
West Somerset Tidal Lagoon CEA-0265	254	265	1	yes	yes	no	no	
Dublin Port Company MP2 Project CEA-1323 and 1328	31.6	0	1	yes	yes	yes	yes	
Arklow Waste Water Treatment Plant CEA-1373	31	36	1	yes	yes	yes	yes	
Maintenance dredging River Boyne, Dogheda CEA-2711	67	36	1	yes	yes	yes	yes	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
North Wall Emergency Power Generation Plant CEA-0307	36.5	4	1	yes	yes	yes	yes	
Dublin Array OWF CEA-0037	3	2	2a	yes	yes	yes	yes	
North Irish Sea Array OWF CEA-0094	41	23	2a	yes	yes	yes	yes	
Sceirde Rocks OWF CEA-0107	273	247	2a	yes	yes	no	no	
Mona OWF CEA-0081	125	132	2b	yes	yes	yes	no	
Morgan OWF CEA-0084	140	147	2b	yes	yes	yes	no	
Isle of Man CEA-0061	159	165	2b	yes	yes	yes	no	
Morecambe OWF CEA-0083	152	159	2b	yes	yes	yes	no	
Llŷr 1 OWF CEA-0071	184	180	2b	yes	yes	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
Llyr 2 OWF CEA-0072	185	179	2b	yes	yes	no	no	
Outer Dowsing OWF CEA-0098	450	458	2b	yes	no	no	no	
Morven OWF CEA-0085	490	498	2b	yes	no	no	no	
Dogger Bank South (West) CEA-2971	485	492	2b	yes	no	no	no	
Dogger Bank South (East) CEA-2778	511	518	2b	yes	no	no	no	
North Falls OWF CEA-2784	531	541	2b	yes	no	no	no	
Arklow Bank OWF Phase 2 CEA-0004	10	10	2b	yes	yes	yes	yes	
Oriel OWF CEA-0096	84	62	2b	yes	yes	yes	yes	
Five Estuaries OWF CEA-2797	556	561	2b	yes	no	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
Salamander OWF CEA-	560	569	2b	yes	no	no	no	
Spiorad na Mara OWF CEA-2801	580	555	2b	yes	no	no	no	
Caledonia OWF CEA-2803	580	570	2b	yes	no	no	no	
Dunkerque OWF CEA-2816	587	598	2b	yes	no	no	no	
Stromar OWF CEA-2829	627	616	2b	yes	no	no	no	
Ijmuiden Ver OWF CEA-2830	670	680	2b	yes	no	no	no	
Cenos OWF CEA-2835	567	565	2b	yes	no	no	no	
Ten Noorden van de Wadden	760	770	2b	yes	no	no	no	
N-6.7 OWF CEA-2878	761	770	2b	yes	no	no	no	
N-6.6 OWF CEA-2883	768	778	2b	yes	no	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
Nordsren III vest OWF CEA-2886	798	808	2b	yes	no	no	no	
N-7.2 OWF CEA-2892	787	798	2b	yes	no	no	no	
Arven OWF CEA-2906	829	841	2b	yes	no	no	no	
N-3.6 OWF CEA-2908	827	837	2b	yes	no	no	no	
N-3.5 OWF CEA-2911	830	839	2b	yes	no	no	no	
N-3.8 OWF CEA-2912	831	840	2b	yes	no	no	no	
N-3.7 OWF CEA-2919	845	854	2b	yes	no	no	no	
Shearwater One OWF CEA-0113	288	261	3	yes	no	no	no	
Normandie OWF CEA-2766	480	488	3	yes	no	no	no	
Bellrock OWF CEA-2783	542	547	3	yes	no	no	no	

Development	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)				Rationale
				MW/CD/RD	HP	BND	Seals	
Campion OWF CEA-2804	576	581	3	yes	no	no	no	
Cedar OWF CEA-2807	586	592	3	yes	no	no	no	
Broadshore OWF CEA-2813	602	607	3	yes	no	no	no	
Mares Connect Interconnector CEA-1359	30	9.5	3	yes	yes	yes	yes	
Holyhead Deep Tidal CEA-0233	64	74	3	yes	yes	yes	no	
Deer Sound Tidal CEA-2965	667	677	3	yes	no	no	no	
1x Seismic survey Irish Sea MU	N/A	N/A	3	no	no	Yes	No	
2x Seismic survey Celtic Sea MU	N/A	N/A	3	no	Yes	No	No	
4x Seismic surveys Celtic and Greater North Sea MU	N/A	N/A	3	yes	No	No	No	

5 Assessment of cumulative effects

5.1 Method – disturbance from construction activities

26. Where a quantitative assessment has been provided for marine mammals in a PEIR or ES chapter, the maximum number of animals disturbed per day presented in the assessment is used in the quantitative cumulative assessment here.
27. For all offshore projects where there is no quantitative assessment available (pre-application stage projects, EU projects or projects with a qualitative assessment only), an indicative number of animals disturbed per day has been calculated as follows¹:
 - For cetaceans:
 - Fixed OWF in the UK and Ireland: 26 km EDR² (impact area of 2,124 km²);
 - Floating OWF in the UK and Ireland: 15 km EDR³ (impact area of 707 km²);
 - Non-UK OWF projects: 15 km EDR⁴ (impact area of 707 km²);
 - Tidal, cable and coastal projects: 5 km EDR (impact area of 79 km²); and
 - SCANS IV block density.
 - For seals:
 - Fixed OWF in the UK and Ireland: 25 km EDR⁵ (impact area of 1,964 km²);
 - Tidal, cable and coastal projects: 5 km EDR (impact area of 79 km²);
 - OWF projects used average at-sea density across the array site + 25 km buffer; and
 - Other projects assumed average density across MU.
28. The potential number of seismic airgun surveys that could be undertaken is unknown. It has therefore been assumed that there could be:
 - One seismic survey occurring per day in the Irish Sea (bottlenose dolphin);
 - Two seismic surveys occurring per day in the Celtic Sea MU (harbour porpoise);
 - Four seismic surveys occurring per day in the Celtic and Greater North Seas MU (minke whale, common dolphin and Risso's dolphin); and
 - No seismic surveys occurring with the seal MU due to the very highly coastal extent of the MU.
29. The daily impacted area from a seismic airgun survey has precautionarily been assumed to be 1,759 km² based on advice provided by JNCC (2023) for harbour porpoise. The density was assumed to be uniform across the MU.
30. There are very high levels of uncertainty associated with all projects that do not yet have a quantitative impact assessment available.
31. Population modelling was conducted for the five Phase 1 Irish OWF projects, to determine if disturbance from piling activities would result in impacts at a population level. Piling schedule 1 assumes monopiles at all five Projects with piling between January 2027 to December 2029 inclusive. Piling schedule 2 assumes monopiles at Arklow, Oriel and Codling, pin-pile jackets at NISA and Dublin

¹ In the absence of quantitative assessments for projects, this approach using EDRs to provide an illustrative assessment in the cumulative assessment is typically adopted in impact assessments across UK projects. This approach is considered preferable to not assessing these projects quantitatively at all.

² Using monopile EDR from JNCC (2010).

³ Using pinpile EDR from JNCC (2010).

⁴ Using mitigated piling EDR from JNCC (2010).

⁵ Using disturbance ranges from Russell et al. (2016).

and piling between January 2027 to March 2031 inclusive. The methods are detailed in **Appendix 11.4 Phase 1 Irish Offshore Wind Farms – Cumulative iPCoD Modelling**.

32. **Important Note:** For the purpose of the Phase 1 Projects iPCoD population modelling, the number of animals disturbed per piling day was shared by each Project to SMRU Consulting, under the agreement that the number disturbed per project was kept anonymised in the reporting and that this data was not shared between Projects. Oriel, Dublin, NISA and Arklow did not at the time of drafting have quantitative assessments available in the public domain. As such, the numbers presented in the CWP Project CEA had to be calculated assuming a 26 km EDR and the relevant SCANS IV density for cetaceans or the average at-sea density at the site for seals. Considering that the CWP Project CEA used calculated numbers of animals disturbed based on the EDRs and Phase 1 iPCoD population modelling used numbers of animals confidentially shared by other developers, the cumulative numbers of animals disturbed are different and should not be compared.

5.2 Conservatism – disturbance from construction activities

33. There are significant levels of precaution / conservatism within this CEA, resulting in the estimated effects being highly precautionary and potentially unrealistic. The main areas of precaution / conservatism in the assessment include:
- The approach of summing across concurrent activities assumes that there is no spatial overlap in the impact footprints between individual activities, which is highly unrealistic considering the proximity of some of the offshore wind farm projects to each other.
 - The exact timing of piling and other construction activities for each development is unknown, therefore it has been assumed that these activities could occur at any point throughout the construction window. This has resulted in piling activities occurring over multiple consecutive years with associated estimated disturbance levels far greater than would occur in reality.
 - The EDRs used are advised for harbour porpoise. No such advice is available for other species and so the same EDRs have been assumed across all species. This is considered conservative since most species show a reduced disturbance response compared to harbour porpoise.
 - The approach to the impact from seismic surveys is highly precautionary and should be considered as an unrealistic worst-case scenario. This is mainly due to the fact that the approach does not take into consideration time when the seismic airguns are not firing within a survey day, or the overlap of impact areas within a day from a single vessel due to the survey line pattern. Airguns are required to be turned off at the end of every survey line as the vessel turns, which can take 2–3 hours per turn and several turns can occur each day. For example, a review of six seismic surveys undertaken across UK waters during 2018 indicated that out of a total of 171 potential survey days airguns were operated for 52% of the time (BEIS 2020). There are no other recommended methods to assess this impact quantitatively.
 - The assumption that all fixed OWF will install pile driven monopile foundations. The project envelope for most of these developments includes options for pin-piles or monopiles. As a worst-case assumption monopiles have been assumed; however, it is likely that a portion of these projects will use jacket foundations with pin-piles, which have a much lower recommended effective deterrence range (15 km instead of 26 km, equating to a 66% smaller area) (JNCC 2020), and will therefore disturb far fewer animals.
34. In light of these layers of conservatism, any conclusions drawn can be considered to be similarly precautionary and conclusions drawn can therefore be considered to be beyond reasonable scientific doubt.

5.3 Construction phase

5.3.1 Cumulative impact 1: Disturbance from pre-construction surveys

35. There is limited data on the responses of marine mammals to pre-construction geophysical surveys conducted for OWFs using equipment such as:
- Multi-Beam Echo Sounder (MBES);
 - Sub-Bottom Imager (SBI);
 - Side Scan Sonar (SSS);
 - Sub Bottom Profiler (SBP) – pinger;
 - Ultra-High resolution seismic (UHRS) – sparker; and
 - Ultra-Short Base Line (USBL) system.
36. Therefore, a disturbance range and number of animals potentially disturbed cannot be quantified here. However, the noise emitted from these sources will be rapidly attenuated with distance from source such that noise levels at which behavioural disturbance would be anticipated to occur will be of small spatial extent. In particular, it is noted that those sources with higher source levels (SBP, URHS), along with the SBI, are highly directional, with noise levels outside of the main beam considerably lower and therefore with limited horizontal propagation of noise levels. While the range and number of animals potentially disturbed is not quantified here for CWP Project alone or cumulatively with other projects, it is expected that any disturbance impact range will be very small, highly localised and highly directional. Therefore, it is expected that the magnitude of disturbance across Projects is **Low**, whereby there may be short-term and / or intermittent and temporary behavioural effects in a small proportion of the population but no change to the population trajectory of any species.
37. As per the project alone assessment, the sensitivity of marine mammals to disturbance from pre-construction surveys is **Very Low to Low**.
38. Therefore, the overall significance of the cumulative impact for Tier 1, Tier 2a, Tier 2b and Tier 3 combined is **Negligible to Minor (not significant)**.

5.3.2 Cumulative impact 2: Disturbance from UXO clearance

39. It is expected that all Projects will use low-order deflagration as the primary UXO clearance method. This aligns with the advice provided in the joint interim position statement⁶ released in 2022 by Department for Business, Energy and Industrial Strategy (BEIS), the Marine Management Organisation (MMO), the Joint Nature Conservation Committee (JNCC), Natural England (NE) the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED), the Department of Agriculture, Environment and Rural Affairs (DAERA), NatureScot, Marine Scotland and Natural Resources Wales.
40. There is no empirical data on marine mammal responses to low-order deflagration UXO clearance. Assuming TTS-onset impact ranges as a proxy for disturbance, the maximum impact range for low-order deflagration is 3.2 km (**Chapter 11 Marine Mammals**) and is predicted to impact <0.01% MU of any marine mammal species at CWP Project alone. It is expected that the detonation of a UXO would elicit a startle response and potentially very short duration behavioural responses and would therefore not be expected to cause widespread and prolonged displacement (JNCC, 2020). Similar levels of impact are expected at other Projects. Given the very small percentage of the MUs predicted to be

⁶ <https://www.gov.uk/government/publications/marine-environment-unexploded-ordnance-clearance-joint-interim-position-statement/marine-environment-unexploded-ordnance-clearance-joint-interim-position-statement>.

impacted per UXO clearance event, and the fact the consequence of the impact is likely to be short-term, intermittent during a UXO clearance campaign, and with temporary behavioural effects that are very unlikely to affect the survival and reproductive rates to the extent that the population trajectory would be altered, disturbance effects associated with low-order UXO clearance even cumulatively across Projects is assessed as **Low** magnitude.

41. As per the project alone assessment, the sensitivity of marine mammals to disturbance from UXO clearance is expected to be **Low**.
42. Therefore, the overall significance of the cumulative impact for Tier 1, Tier 2a, Tier 2b and Tier 3 combined is **Minor (not significant)**.

5.3.3 Cumulative impact 3 Disturbance from construction activities

Harbour porpoise

Phase 1 projects

43. **Appendix 11.4 Phase 1 Irish Offshore Wind Farms – Cumulative iPCoD Modelling** presents the population modelling conducted for the Phase 1 Irish OWF Projects to determine if disturbance from piling activities across the five projects is predicted to result in population level changes. The iPCoD results show that the level of disturbance predicted under either piling schedule 1 or 2 is not sufficient to result in any changes to the harbour porpoise population, since the impacted population is predicted to continue at a stable trajectory at 99.6–99.7% of the size of the unimpacted population.
44. The effect of disturbance from a single piling event is expected to last less than a day, though the disturbance impact across the five projects will occur intermittently across 3–5 years depending on the piling scenario. This is expected to result in short-term and / or intermittent and temporary behavioural effects in a small proportion of the population; however, the population modelling has shown that survival and reproductive rates are very unlikely to be impacted to the extent that the population trajectory would be altered. This is therefore a **Low** magnitude.
45. As per the project alone assessment, the sensitivity of porpoise to pile driving of WTG is **Low**.
46. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

All projects

47. The summary results for the number of porpoise disturbed by Tier is provided in **Table 4**. Detailed information on the number of porpoise disturbed per project per year is provided in **Table 5**.

Tier 1

48. Across all Tier 1 projects between 2023 and 2028, the number of harbour porpoise predicted to be disturbed per day ranges between 183 (0.3% MU) in 2023 to 5,610 (9.0% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 48% of the total in 2027.
49. While there is insufficient information on piling schedules across all projects to undertake a specific population level assessment, it is possible to infer the potential for a population-level effect based on previous theoretical modelling. For example, previous population modelling (using iPCoD) of offshore wind farms in eastern English waters has demonstrated low probabilities of population-level impacts, even when 16 piling operations were modelled over a 12-year period (disturbing up to a total of 34,396 porpoise per day, equating to 15% MU) (Booth et al., 2017). The number of porpoise assumed to be

disturbed by construction across the Tier 1 projects in this CEA is lower than was modelled in Booth et al. (2017). Therefore, with fewer porpoise predicted to be disturbed per day, across fewer years than the previous modelling, the likelihood of population level effects is expected to be very low.

50. More recently, the iPCoD model was used to explore noise management in the Southern North Sea SAC for harbour porpoise (Brown et al., 2023). This study provided a wide range of iPCoD simulations including disturbance to harbour porpoise over a 10-year period at the scale of the North Sea MU. One of the most extreme disturbance scenarios assumed a seasonally variable base-level daily disturbance of c. 3,500–7,000 porpoise throughout the MU, in addition to disturbance at up to twice the Southern North Sea SAC seasonal disturbance thresholds (up to c. 16,000 porpoise disturbed per day in summer, averaging c. 8,000 disturbed across the season). Even at these persistently high disturbance levels, the predicted declines were low, generally $\leq 5\%$ after 10 years of disturbance, and in each case, the population remained at a stable size once piling disturbance ended, indicating no long-term effect on the population trajectory (it is important to note here that iPCoD does not allow for density dependence and as such the population cannot increase back to baseline levels after disturbance has ceased).
51. Similarly, the DEPONS model has been used to predict the potential population-level effects of cumulative OWF construction in the North Sea. Nabe-Nielsen et al. (2018) showed that the North Sea porpoise population was unlikely to be significantly impacted by the construction of 60 wind farms each with 65 turbines resulting in 3,900 disturbance days between 2011–2020, unless impact ranges were assumed to be much larger (exceeding 50 km) than that indicated by existing studies. Even at these extreme disturbance scenarios, the modelled North Sea population showed a quick recovery to baseline size (within 6–7 years) despite up to a 20% decline in population size.
52. While cumulative population modelling has not been specifically conducted here for the Tier 1 projects due to insufficient information being available to do so in a quantitatively robust manner, results from previous large-scale cumulative population modelling studies show that persistent (i.e., 10+ years) high levels of disturbance, which are higher per day and / or over longer timescales than assumed in this CEA, are unlikely to result in long-term population decline. Further, these previous modelling studies have shown that, even under extreme scenarios, the North Sea population is expected to recover quickly from any short-term decline. While these modelling scenarios were conducted for the North Sea, the results are comparable to potential impacts to other stable harbour porpoise populations such as the Celtic and Irish Sea MU.
53. The level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.
54. As per the project alone assessment, the sensitivity of porpoise to pile driving (and other construction activities) is **Low**.
55. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a

56. Across all Tier 1 and 2a projects between 2023 and 2028, the number of harbour porpoise predicted to be disturbed per day ranges between 183 (0.3% MU) in 2023 to 6,166 (9.9% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 43% of the total in 2027.
57. While cumulative population modelling has not been specifically conducted here for the Tier 1 projects due to insufficient information being available to do so in a quantitatively robust manner, the results

from the relevant Tier 2a projects, combined with results from previous large-scale cumulative population modelling studies show that persistent (i.e., 10+ years) high levels of disturbance, which are higher per day and / or over longer timescales than assumed in this CEA, are unlikely to result in long-term population decline. Further, these previous modelling studies have shown that, even under extreme scenarios, the North Sea population is expected to recover quickly from any short-term decline. While these modelling scenarios were conducted for the North Sea, the results are comparable to potential impacts to other stable harbour porpoise populations such as the Celtic and Irish Sea MU.

58. The level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.
59. As per the project alone assessment, the sensitivity of porpoise to pile driving (and other construction activities) is **Low**.
60. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b

61. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of harbour porpoise predicted to be disturbed per day ranges between 183 (0.3% MU) in 2023 to 9,134 (14.6% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 29% of the total in 2027.
62. While cumulative population modelling has not been specifically conducted here for Tier 1 projects, and some of the Tier 2b projects due to insufficient information being available to do so in a quantitatively robust manner, the results from the relevant Tier 2a and Tier 2b projects, combined with results from previous large-scale cumulative population modelling studies show that persistent (i.e., 10+ years) high levels of disturbance, which are higher per day and / or over longer timescales than assumed in this CEA, are unlikely to result in long-term population decline. Further, these previous modelling studies have shown that, even under extreme scenarios, the North Sea population is expected to recover quickly from any short-term decline. While these modelling scenarios were conducted for the North Sea, the results are comparable to potential impacts to other stable harbour porpoise populations such as the Celtic and Irish Sea MU.
63. The level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.
64. As per the project alone assessment, the sensitivity of porpoise to pile driving (and other construction activities) is **Low**.
65. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

66. Across all Tier 1, 2a and 2b and 3 projects between 2023 and 2028, the number of harbour porpoise predicted to be disturbed per day ranges between 1,169 (1.9% MU) in 2023 to 10,172 (16.3% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP

Project contributes 26% of the total in 2027. This assumes piling at eight OWFs, construction of two tidal projects, three coastal asset projects and one cable project and two seismic airgun surveys occurring at the same time within the MU. This is extremely unlikely to occur.

67. While cumulative population modelling has not been specifically conducted here for Tier 1 projects, some of the Tier 2b projects and the majority of Tier 3 projects due to insufficient information being available to do so in a quantitatively robust manner, the results from the relevant Tier 2a and Tier 2b projects, combined with results from previous large-scale cumulative population modelling studies show that persistent (i.e., 10+ years) high levels of disturbance, which are higher per day and / or over longer timescales than assumed in this CEA, are unlikely to result in long-term population decline. Further, these previous modelling studies have shown that, even under extreme scenarios, the North Sea population is expected to recover quickly from any short-term decline. While these modelling scenarios were conducted for the North Sea, the results are comparable to potential impacts to other stable harbour porpoise populations such as the Celtic and Irish Sea MU.
68. The level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.
69. As per the project alone assessment, the sensitivity of porpoise to pile driving (and other construction activities) is **Low**.
70. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Table 4 Summary results for the number of harbour porpoise disturbed by construction noise across different Tiers in the CEA

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total porpoise disturbed	183	277	892	2,961	5,610	309
% MU (62,517)	0.3%	0.4%	1.4%	4.7%	9.0%	0.5%
Contribution of CWP Project to total	0%	0%	0%	0%	48%	0%
Tier 1 and Tier 2a projects						
Total porpoise disturbed	183	277	892	3,517	6,166	1,460
% MU (62,517)	0.3%	0.4%	1.4%	5.6%	9.9%	2.3%
Contribution of CWP Project to total	0	0	0	0	43%	0
Tier 1 and Tier 2a and 2b projects						
Total porpoise disturbed	183	1,393	2,008	5,912	9,134	5,836
% MU (62,517)	0.3%	2.2%	3.2%	9.5%	14.6%	9.3%
Contribution of CWP Project to total	0%	0%	0%	0%	29%	0%
Tier 1 and Tier 2 and Tier 3 projects						
Total porpoise disturbed	1,169	2,414	3,029	6,950	10,172	6,839
% MU (62,517)	1.9%	3.9%	4.8%	11.1%	16.3%	10.9%

Contribution of CWP Project to total	0%	0%	0%	0%	26%	0%
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Table 5 Detailed results for the number of harbour porpoise disturbed by construction noise in the CEA

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	ES					2667	
Awel y Môr	1	OWF	ES				275	275	275
Erebus Floating Wind Demo	1	Floating	ES				1967	1967	
White Cross	1	Floating	ES			649	649	649	
TwinHub	1	Floating	15 km EDR		11	11			
Greenlink Interconnector	1	Cable	5 km EDR	17	17				
Fair Head Phase 2	1	Tidal	5 km EDR	12	12	12			
Swansea Bay Tidal Lagoon	1	Tidal	5 km EDR	1					
Cardiff Bay Tidal Lagoon	1	Tidal	5 km EDR	1	1	1	1		
Atlantic Marine Energy Test Site	1	Floating	15 km EDR		150	150			
Saint-Brieuc	1	OWF	15 km EDR	49					
CeltixConnect – Sea Fibre	1	Cable	5 km EDR	17	17	17	17		
West Anglesey Demo Zone	1	Tidal	5 km EDR	17	17				
West Somerset Tidal Lagoon	1	Tidal	5 km EDR	1	1	1	1	1	
Dublin Port Company MP2	1	Coastal	5 km EDR	17					
Arklow Waste Water Treatment	1	Coastal	5 km EDR	17	17	17	17	17	17
Maintenance dredging River Boyne, Dogheda	1	Coastal	5 km EDR	17	17	17	17	17	17
North Wall Emergency Power Generation Plant	1	Coastal	5 km EDR	17	17	17	17	17	
Dublin Array	2a	OWF	26 km EDR	Not piling until 2029					
North Irish Sea Array	2a	OWF	26 km EDR						595
Sceirde Rocks	2a	OWF	26 km EDR				556	556	556
Arklow Bank	2b	OWF	26 km EDR						595
Oriel	2b	OWF	26 km EDR					595	
Mona	2b	OWF	PEIR						429
Morgan	2b	OWF	PEIR						979
Morecambe	2b	OWF	PEIR				1279	1279	1279
Isle of Man	2b	OWF	26 km EDR		1094	1094	1094	1094	1094
Llŷr 1	2b	Floating	15 km EDR		11	11	11		

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Llyr 2	2b	Floating	15 km EDR		11	11	11		
Mares Connect	3	Cable	5 km EDR		35	35	35	35	
Holyhead Deep	3	Tidal	5 km EDR				17	17	17
1x seismic airgun survey	3	Seismic	1,759 km ²	493	493	493	493	493	493
1x seismic airgun survey	3	Seismic	1,759 km ²	493	493	493	493	493	493

Bottlenose dolphin

Phase 1 projects

71. **Appendix 11.4 Phase 1 Irish Offshore Wind Farms – Cumulative iPCoD Modelling** presents the population modelling conducted for the Phase 1 Irish OWF Projects to determine if disturbance from piling activities across the five projects is predicted to result in population level changes. Under both piling schedule 1 or 2, when using Project specific disturbance numbers obtained using the dose-response function, the mean impacted population size decreases slightly from the mean unimpacted population size initially in response to piling, after which it continues on the same, stable trajectory at 95–96% of the mean unimpacted population size. Under both piling schedule 1 or 2, when using Project specific disturbance numbers obtained using the level B harassment threshold, the mean impacted population size decreases very slightly from the mean unimpacted population size initially in response to piling, after which it continues on the same, stable trajectory at 98% of the mean unimpacted population size.
72. It is noted that iPCoD does not currently allow for a density-dependent response, and as such there is no way for the impacted population to increase in size after the piling disturbance. The impacted population does, however, continue on a stable trajectory in the long-term.
73. The effect of disturbance from a single piling event is expected to last less than a day, though the disturbance impact across the five projects will occur intermittently across 3–5 years depending on the piling scenario. This is expected to result in short-term and / or intermittent and temporary behavioural effects in a small proportion of the population; however, the population modelling has shown that survival and reproductive rates are very unlikely to be impacted to the extent that the population trajectory would be altered in the long term. This is therefore a **Low** magnitude.
74. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving of WTGs is **Low**.
75. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

All projects

76. Four OWF projects with a quantitative impact assessment available used the SCANS III densities or similar in their respective assessments, which are in no way comparable to the SCANS IV Irish Sea population abundance and density estimates used for the CWP Project. To attempt to make the assessments more comparable, two approaches have been presented here:
- The SCANS IV block density results for the CWP Project have been used along with calculated disturbance numbers assuming the SCANS IV block density with an assumed population size of 8,326 in the Irish Sea MU.
 - The SCANS III block density results for the CWP Project (assuming a 26 km EDR) have been used along with disturbance numbers presented in ES/PEIR assessments where available or

calculated using the SCANS III block density, with an assumed population size of 293 in the Irish Sea MU.

77. The following section presents the results from approach 1 first, followed by the results from approach 2.

All projects – SCANS IV density and MU

78. The summary results for the number of bottlenose dolphins disturbed by Tier is provided in **Table 6**. Detailed information on the number of bottlenose dolphins disturbed per project per year is provided in **Table 7**.

Tier 1

79. Across all Tier 1 projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 58 (0.7% MU) in 2028 to 575 (6.9% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 87% of the total in 2027. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
80. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
81. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a

82. Across all Tier 1 and 2a projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 72 (0.9% MU) in 2025 to 575 (6.9% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 87% of the total in 2027. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
83. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
84. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b

85. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 94 (1.1% MU) in 2025 to 1,118 (13.4% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 45% of the total in 2027. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime

reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.

86. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
87. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

88. Across all Tier 1, 2 and 3 projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 419 (5.0% MU) in 2023 to 1,465 (17.6% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 68% of the total in 2027.
89. The total number of animals disturbed is almost entirely driven by the predictions of disturbance at the CWP Project, which, as shown in the project-alone population modelling, is not expected to result in a change in the population trajectory over the long-term. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
90. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
91. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Table 6 Summary results for the number of bottlenose dolphins disturbed by construction noise across different tiers in the CEA – using SCANS IV density estimates

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total dolphins disturbed	108	90	72	94	575	58
% MU (8,326)	1.3%	1.1%	0.9%	1.1%	6.9%	0.7%
Contribution of CWP Project to total	0	0	0	0	87%	0
Tier 1 and Tier 2a projects						
Total dolphins disturbed	108	90	72	94	575	557
% MU (8,326)	1.3%	1.1%	0.9%	1.1%	6.9%	6.7%
Contribution of CWP Project to total	0	0	0	0	87%	0
Tier 1 and Tier 2a and 2b projects						
Total dolphins disturbed	108	112	94	138	1118	1144
% MU (8,326)	1.3%	1.3%	1.1%	1.7%	13.4%	13.7%
Contribution of CWP Project to total	0	0	0	0	0%	0
Tier 1 and Tier 2 and Tier 3 projects						
Total dolphins disturbed	419	441	423	485	1465	1473

% MU (8,326)	5.0%	5.3%	5.1%	5.8%	17.6%	17.7%
Contribution of CWP Project to total	0	0	0	0	34%	0

Table 7 Detailed results for the number of bottlenose dolphins disturbed by construction noise in the CEA – where the densities are calculated, there is indication which SCANS IV block densities were used

Project	Tier	Type	Density	Method	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	SCANS IV CS-E	26 km EDR					499 ⁷	
Awel y Môr	1	OWF	SCANS IV CS-E	26 km EDR				22	22	22
CeltixConnect – Sea Fibre	1	Cable	SCANS IV CS-D	5 km EDR	18	18	18	18		
West Anglesey Demo Zone	1	Tidal	SCANS IV CS-D	5 km EDR	18	18				
Dublin Port Company MP2	1	Coastal	SCANS IV CS-D	5 km EDR	18					
Arklow Waste Water Treatment	1	Coastal	SCANS IV CS-D	5 km EDR	18	18	18	18	18	18
Maintenance dredging River Boyne, Dogheda	1	Coastal	SCANS IV CS-D	5 km EDR	18	18	18	18	18	18
North Wall Emergency Power Generation Plant	1	Coastal	SCANS IV CS-D	5 km EDR	18	18	18	18	18	
Dublin Array	2a	OWF	N/A	26 km EDR	Not piling until 2029					
North Irish Sea Array	2a	OWF	SCANS IV CS-D	26 km EDR						499
Mona	2b	OWF	SCANS IV CS-E	5 km EDR						22
Morgan	2b	OWF	SCANS IV CS-E	5 km EDR						22
Morecambe	2b	OWF	SCANS IV CS-E	5 km EDR				22	22	22
Arklow Bank	2b	OWF	SCANS IV CS-D	26 km EDR						499
Oriel	2b	OWF	SCANS IV CS-D	26 km EDR					499	

⁷ Note: the estimate for Codling here is based on a 26 km EDR approach to match the other projects. This understates the number of dolphins impacted compared to the inherently conservative dose-response approach but makes assessment across the projects more comparable as they assume the same approach. The 26 km EDR approach is recognised as an appropriate and acceptable method for CEA and as such it is considered robust.

Project	Tier	Type	Density	Method	2023	2024	2025	2026	2027	2028
Isle of Man	2b	OWF	SCANS IV CS-E	26 km EDR		22	22	22	22	22
Mares Connect	3	Cable	SCANS IV CS-D	5 km EDR		18	18	18	18	
Holyhead Deep	3	Tidal	SCANS IV CS-D	5 km EDR				18	18	18
1x seismic airgun survey	3	Seismic	SCANS IV CS-D & E	1,759 km ²	311	311	311	311	311	311

All projects – SCANS III density and MU

92. The summary results for the number of bottlenose dolphins disturbed by tier are provided in **Table 8**. Detailed information on the number of bottlenose dolphins disturbed per project per year is provided in **Table 9**.

Tier 1

93. Across all Tier 1 projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 4 (1.4% MU) in 2025 to 43 (14.7% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 40% of the total in 2027. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
94. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
95. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a

96. Across all Tier 1 and 2a projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 4 (1.4% MU) in 2025 to 43 (14.7% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 40% of the total in 2027. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
97. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
98. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b

99. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 4 (1.4% MU) in 2025 to 83 (28.3% MU) in 2028, with up to 60 (20.5% MU) in 2027 when the CWP project is piling (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 28% of the total in 2027. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
100. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
101. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

102. Across all Tier 1, 2a and 2b and 3 projects between 2023 and 2028, the number of bottlenose dolphins predicted to be disturbed per day ranges between 16 (5.5% MU) in 2024 to 95 (32.4% MU) in 2028, with up to 73 (24.9% MU) in 2027 when the CWP project is piling (assuming projects construct on the same day with no overlap of impacted areas). The CWP Project contributes 23% of the total in 2027. The Project Alone population modelling has shown that even if 24.74% of the MU are impacted, this leads to no significant change in the population size, and the population remains on a stable trajectory in the long-term. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
103. As per the project alone assessment, the sensitivity of bottlenose dolphins to pile driving (and other construction activities) is **Low**.
104. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Table 8 Summary results for the number of bottlenose dolphins disturbed by construction noise across different tiers in the CEA – using SCANS III density estimates

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total dolphins disturbed	6	5	4	27	43	25
% MU (293)	2.0%	1.7%	1.4%	9.2%	14.7%	8.5%
Contribution of CWP Project to total	0	0	0	0	40%	0
Tier 1 and Tier 2a projects						
Total dolphins disturbed	6	5	4	27	43	42
% MU (293)	2.0%	1.7%	1.4%	9.2%	14.7%	14.3%
Contribution of CWP Project to total	0	0	0	0	40%	0
Tier 1 and Tier 2a and 2b projects						

Total dolphins disturbed	6	5	4	27	60	83
% MU (293)	2.0%	1.7%	1.4%	9.2%	20.5%	28.3%
Contribution of CWP Project to total	0	0	0	0	28%	0

Tier 1 and Tier 2a and 2b and Tier 3 projects

Total dolphins disturbed	17	17	16	40	73	95
% MU (293)	5.8%	5.8%	5.5%	13.7%	24.9%	32.4%
Contribution of CWP Project to total	0	0	0	0	23%	0

Table 9 Detailed results for the number of bottlenose dolphins disturbed by construction noise in the CEA – where the densities are calculated, there is indication which SCANS III block densities were used

Project	Tier	Type	Source	Method	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	SCANS III E	26 km EDR					17	
Awel y Môr	1	OWF	ES					23	23	23
CeltixConnect – Sea Fibre	1	Cable	SCANS III E	5 km EDR	1	1	1	1		
West Anglesey Demo Zone	1	Tidal	SCANS III E	5 km EDR	1	1				
Dublin Port Company MP2	1	Coastal	SCANS III E	5 km EDR	1					
Arklow Waste Water Treatment	1	Coastal	SCANS III E	5 km EDR	1	1	1	1	1	1
Maintenance dredging River Boyne, Dogheda	1	Coastal	SCANS III E	5 km EDR	1	1	1	1	1	1
North Wall Emergency Power Generation Plant	1	Coastal	SCANS III E	5 km EDR	1	1	1	1	1	
Dublin Array	2a	OWF	N/A	26 km EDR	Not piling until 2029					
North Irish Sea Array	2a	OWF	SCANS III E	26 km EDR						17
Mona	2b	OWF	PEIR							13
Morgan	2b	OWF	PEIR							11
Morecambe	2b	OWF	PEIR					0	0	0
Arklow Bank	2b	OWF	SCANS III E	26 km EDR						17
Oriel	2b	OWF	SCANS III E	26 km EDR					17	

Project	Tier	Type	Source	Method	2023	2024	2025	2026	2027	2028
Isle of Man	2b	OWF	SCANS III F	26 km EDR		0	0	0	0	0
Mares Connect	3	Cable	SCANS III E	5 km EDR		1	1	1	1	
Holyhead Deep	3	Tidal	SCANS III E	5 km EDR				1	1	1
1x seismic airgun survey	3	Seismic	SCANS III E & F	1,759 km ²	11	11	11	11	11	11

Common dolphin

Phase 1 projects

105. Population modelling was not conducted for common dolphins.

All projects

106. In total, 98 offshore projects were screened into the common dolphin CEA including the CWP Project. Of these, 59 offshore projects were assigned a predicted disturbance of zero common dolphins since either the Project alone assessment screened out common dolphins or Projects were located within a SCANS IV block with a common dolphin density estimate of zero. This left 39 offshore projects with non-zero disturbance considered here (including CWP Project).
107. The summary results for the number of common dolphins disturbed by Tier is provided in **Table 10**. Detailed information on the number of common dolphins disturbed per project per year is provided in **Table 11**.

Tier 1

108. Across all Tier 1 projects between 2023 and 2028, the number of common dolphins predicted to be disturbed per day ranges between 493 (0.5% MU) in 2023 to 3,166 (1.4% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 16% of the total in 2027. The number of common dolphins predicted to be disturbed is primarily driven by the high predictions at Erebus (65.3% contribution).
109. What is important to consider here is the residency of animals within the impacted area, and the likelihood that they will remain in the impacted area long-term to obtain high levels of repeated disturbance over time. Based on tag and genetic data, common dolphins are generally considered to be wide-ranging, capable of travelling large distances (e.g., Evans 1982; Natoli et al., 2006; Genov et al., 2012). Therefore, it is highly unlikely that they would remain in the impacted area over a sufficient number of days for any disturbance effect to result in changes to vital rates. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
110. As per the project alone assessment, the sensitivity of common dolphins to pile driving (and other construction activities) is **Low**.
111. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a

112. Across all Tier 1 and 2a projects between 2023 and 2028, the number of common dolphins predicted to be disturbed per day ranges between 493 (0.5% MU) in 2023 to 4,389 (4.3% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 12% of the total in 2027. The number of common dolphins predicted to be disturbed is primarily driven by the high predictions at Erebus (47% contribution).
113. Given what is known on common dolphin ranging behaviour, it is highly unlikely that they would remain in the impacted area over a sufficient number of days for any disturbance effect to result in changes to vital rates. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
114. As per the project alone assessment, the sensitivity of common dolphins to pile driving (and other construction activities) is **Low**.
115. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b

116. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of common dolphins predicted to be disturbed per day ranges between 493 (0.5% MU) in 2023 to 5,164 (5.0% MU) in 2026 (assuming projects construct on the same day with no overlap of impacted areas). In 2027 when CWP Project is piling, the total number is 4,469 common dolphins (4.4% MU) and CWP Project contributes 11% of the total in 2027. The number of common dolphins predicted to be disturbed in 2027 is primarily driven by the high predictions at Erebus (46% contribution).
117. Given what is known on common dolphin ranging behaviour, it is highly unlikely that they would remain in the impacted area over a sufficient number of days for any disturbance effect to result in changes to vital rates. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
118. As per the project alone assessment, the sensitivity of common dolphins to pile driving (and other construction activities) is **Low**.
119. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

120. Across all Tier 1, 2a and 2b and 3 projects between 2023 and 2028, the number of common dolphins predicted to be disturbed per day ranges between 695 (0.7% MU) in 2023 to 5,370 (5.2% MU) in 2026 (assuming projects construct on the same day with no overlap of impacted areas). In 2027 when CWP Project is piling, the total number is 4,675 common dolphins (11% MU) and CWP Project contributes 11% of the total in 2027. The number of common dolphins predicted to be disturbed in 2027 is primarily driven by the high predictions at Erebus (44% contribution).
121. Given what is known on common dolphin ranging behaviour, it is highly unlikely that they would remain in the impacted area over a sufficient number of days for any disturbance effect to result in changes to vital rates. Temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although likely not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.

122. As per the project alone assessment, the sensitivity of common dolphins to pile driving (and other construction activities) is **Low**.

123. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Table 10 Summary results for the number of common dolphins disturbed by construction noise across different Tiers in the CEA

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total dolphins disturbed	493	1,105	1,082	2,743	3,166	523
% MU (102,656)	0.5%	1.1%	1.1%	2.7%	3.1%	0.5%
Contribution of CWP Project to total	0	0	0	0	16%	0
Tier 1 and Tier 2a projects						
Total dolphins disturbed	493	1,105	1,082	3,966	4,389	1,804
% MU (102,656)	0.5%	1.1%	1.1%	3.9%	4.3%	1.8%
Contribution of CWP Project to total	0	0	0	0	12%	0
Tier 1 and Tier 2a and 2b projects						
Total dolphins disturbed	493	2,293	2,280	5,164	4,469	2,427
% MU (102,656)	0.5%	2.2%	2.2%	5.0%	4.4%	2.4%
Contribution of CWP Project to total	0	0	0	0	11%	0
Tier 1 and Tier 2a and 2b and Tier 3 projects						
Total dolphins disturbed	695	2,497	2,484	5,370	4,675	2,659
% MU (102,656)	0.7%	2.4%	2.4%	5.2%	4.6%	2.6%
Contribution of CWP Project to total	0	0	0	0	11%	0

Table 11 Detailed results for the number of common dolphins disturbed by construction noise in the CEA

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	ES					509	
Awel y Môr	1	OWF	ES				17	17	17
Erebus Floating Wind Demo	1	Floating	ES				2067	2067	
White Cross	1	Floating	ES			1	1	1	
Rampion 2	1	OWF	ES				506	506	506
Pentland Floating	1	Floating	ES		8	8	8		
TwinHub	1	Tidal	5 km EDR		594	594			
Greenlink Interconnector	1	Cable	5 km EDR	12	12				

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Fair Head Phase 2	1	Tidal	5 km EDR	1	1	1			
Swansea Bay Tidal Lagoon	1	Tidal	5 km EDR	66					
Cardiff Bay Tidal Lagoon	1	Tidal	5 km EDR	66	66	66	66		
Saint-Brieuc	1	OWF	15 km EDR	258					
Courseulles-sur-mer	1	OWF	15 km EDR	10	10				
Fécamp	1	OWF	15 km EDR	10					
Dieppe Le Tréport	1	OWF	15 km EDR		10	10	10		
Iles d'Yeu et de Noirmoutier	1	OWF	15 km EDR		334	334			
CeltixConnect – Sea Fibre	1	Cable	5 km EDR	2	2	2	2		
West Anglesey Demo Zone	1	Tidal	5 km EDR	2	2				
West Somerset Tidal Lagoon	1	Tidal	5 km EDR	66	66	66	66	66	
Dublin Array	2a	OWF	26 km EDR	No piling until 2029					
North Irish Sea Array	2a	OWF	26 km EDR						58
Sceirde Rocks	2a	OWF	26 km EDR				1223	1223	1223
Mona	2b	OWF	PEIR						109
Morgan	2b	OWF	PEIR						100
Arklow Bank	2b	OWF	26 km EDR						58
Oriel	2b	OWF	26 km EDR					58	
Llŷr 1	2b	Floating	15 km EDR		594	594	594		
Llŷr 2	2b	Floating	15 km EDR		594	594	594		
Spiorad na Mara	2b	OWF	26 km EDR						356
Dunkerque	2b	OWF	15 km EDR			10	10	10	
Nordsren III vest	2b	OWF	15 km EDR					12	
Shearwater One	3	Floating	15 km EDR						38
Parc eolien pose au large de la Normadie (AO4)	3	OWF	15 km EDR	10	10	10	10	10	
Mares Connect	3	Cable	5 km EDR		2	2	2	2	
Holyhead Deep	3	Tidal	5 km EDR				2	2	2
1x seismic airgun survey	3	Seismic	1,759 km ²	48	48	48	48	48	48
1x seismic airgun survey	3	Seismic	1,759 km ²	48	48	48	48	48	48
1x seismic airgun survey	3	Seismic	1,759 km ²	48	48	48	48	48	48
1x seismic airgun survey	3	Seismic	1,759 km ²	48	48	48	48	48	48

Risso's dolphin

Phase 1 projects

124. Population modelling was not conducted for Risso's dolphins.

All Projects

125. In total, 98 offshore projects were screened into the Risso's dolphin CEA including CWP Project. Of these, 71 offshore projects were assigned a predicted disturbance of zero Risso's dolphins since either the Project alone assessment screened out Risso's dolphins or Projects were located within a SCANS IV block with a Risso's dolphin density estimate of zero. This left 27 offshore projects with non-zero disturbance considered here (including CWP Project).
126. The summary results for the number of Risso's dolphins disturbed by Tier is provided in **Table 12**. Detailed information on the number of Risso's dolphins disturbed per project per year is provided in **Table 13**.

Tier 1

127. Across all Tier 1 projects between 2023 and 2028, the number of Risso's dolphins predicted to be disturbed per day ranges between zero in 2023 to 166 (1.4% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 54% of the total in 2027.
128. The predicted extent of the cumulative disturbance is to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
129. As per the project alone assessment, the sensitivity of Risso's dolphins to pile driving (and other construction activities) is **Low**.
130. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a

131. Across all Tier 1 and 2a projects between 2023 and 2028, the number of Risso's dolphins predicted to be disturbed per day ranges between zero in 2023 to 166 (1.4% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 54% of the total in 2027.
132. The predicted extent of the cumulative disturbance is to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
133. As per the project alone assessment, the sensitivity of Risso's dolphins to pile driving (and other construction activities) is **Low**.
134. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b

135. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of Risso's dolphins predicted to be disturbed per day ranges between zero in 2023 to 554 (4.5% MU) in 2028 (assuming projects construct on the same day with no overlap of impacted areas). In 2027 when CWP Project is piling, the total number is 248 Risso's dolphins (2.0% MU) and CWP Project contributes 36% of the total in 2027.
136. The predicted extent of the cumulative disturbance is to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
137. As per the project alone assessment, the sensitivity of Risso's dolphins to pile driving (and other construction activities) is **Low**.
138. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

139. Across all Tier 1, 2a and 2b and 3 projects between 2023 and 2028, the number of Risso's dolphins predicted to be disturbed per day ranges between 19 (0.2% MU) in 2023 to 599 (4.9% MU) in 2028 (assuming projects construct on the same day with no overlap of impacted areas). In 2027 when CWP Project is piling, the total number is 291 Risso's dolphins (2.4% MU) and CWP Project contributes 31% of the total in 2027.
140. The predicted extent of the cumulative disturbance is to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
141. As per the project alone assessment, the sensitivity of Risso's dolphins to pile driving (and other construction activities) is **Low**.
142. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Table 12 Summary results for the number of Risso's dolphins disturbed by construction noise across different tiers in the CEA

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total dolphins disturbed	0	81	81	122	166	65
% MU (12,262)	0.0%	0.7%	0.7%	1.0%	1.4%	0.5%
Contribution of CWP Project to total	0	0	0	0	54%	0
Tier 1 and Tier 2a projects						
Total dolphins disturbed	0	81	81	122	166	70
% MU (12,262)	0.0%	0.7%	0.7%	1.0%	1.4%	0.6%

Contribution of CWP Project to total	0	0	0	0	54%	0
Tier 1 and Tier 2a and 2b projects						
Total dolphins disturbed	0	189	189	257	248	554
% MU (12,262)	0.0%	1.5%	1.5%	2.1%	2.0%	4.5%
Contribution of CWP Project to total	0	0	0	0	36%	0
Tier 1 and Tier 2a and 2b and Tier 3 projects						
Total dolphins disturbed	19	232	232	300	291	599
% MU (12,262)	0.2%	1.9%	1.9%	2.4%	2.4%	4.9%
Contribution of CWP Project to total	0	0	0	0	31%	0

Table 13 Detailed results for the number of Risso's dolphins disturbed by construction noise in the CEA

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	ES					89	
Awel y Môr	1	OWF	ES				65	65	65
Green Volt	1	Floating	ES					12	
Pentland Floating	1	Floating	ES		57	57	57		
TwinHub	1	Tidal	5 km EDR		4	4			
Atlantic Marine Energy Test Site	1	Floating	15 km EDR		19	19			
Iles d'Yeu et de Noirmoutier	1	OWF	15 km EDR		1	1			
Dublin Array	2a	OWF	26 km EDR	Not piling until 2029					
North Irish Sea Array	2a	OWF	26 km EDR						5
Mona	2b	OWF	PEIR						190
Morgan	2b	OWF	PEIR						174
Arklow Bank	2b	OWF	26 km EDR						5
Oriel	2b	OWF	26 km EDR					5	
Llyr 1	2b	Floating	15 km EDR		4	4	4		
Llyr 2	2b	Floating	15 km EDR		4	4	4		
Spiorad na Mara	2b	Floating	15 km EDR						61
Caledonia	2b	OWF	26 km EDR				27	27	27
Stromar	2b	Floating	15 km EDR						27
Arven	2b	Floating	15 km EDR		50	50	50	50	
N-3.6	2b	OWF	15 km EDR		50	50	50		
Shearwater One	3	Floating	15 km EDR						2

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Broadshore	3	Floating	15 km EDR		27	27	27	27	27
Deer Sound	3	Floating	15 km EDR	3					
1x seismic airgun survey	3	Seismic	1,759 km ²	4	4	4	4	4	4
1x seismic airgun survey	3	Seismic	1,759 km ²	4	4	4	4	4	4
1x seismic airgun survey	3	Seismic	1,759 km ²	4	4	4	4	4	4
1x seismic airgun survey	3	Seismic	1,759 km ²	4	4	4	4	4	4

Minke whale

Phase 1 projects

143. Population modelling was not conducted for minke whales.

All projects

144. In total, 98 offshore projects were screened into the minke whale CEA including the CWP Project. Of these, 26 offshore projects were assigned a predicted disturbance of zero minke whales since either the Project alone assessment screened out minke whales or Projects were located within a SCANS IV block with a minke whale density estimate of zero. This left 72 offshore projects with non-zero disturbance considered here (including CWP Project).
145. The summary results for the number of minke whales disturbed by Tier is provided in **Table 14**. Detailed information on the number of minke whales disturbed per project per year is provided in **Table 15**.

Tier 1

146. Across all Tier 1 projects between 2023 and 2028, the number of minke whales predicted to be disturbed per day ranges between 116 (0.6% MU) in 2028 to 554 (2.8% MU) in 2024 (assuming projects construct on the same day with no overlap of impacted areas). In 2027 when CWP Project is piling, the total number is 548 minke whales (2.7% MU) and CWP Project contributes 24% of the total in 2027.
147. The predicted extent of the cumulative disturbance is still to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. It is important to note that minke whale densities are higher in the summer when the SCANS surveys are conducted, and significantly fewer minke whales will be present to be disturbed outside of the key summer months. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
148. As per the project alone assessment, the sensitivity of minke whales to pile driving is **Low**.
149. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a

150. Across all Tier 1 and 2a projects between 2023 and 2028, the number of minke whales predicted to be disturbed per day ranges between 358 (1.8% MU) in 2025 to 765 (3.8% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 18% of the total in 2027.
151. The predicted extent of the cumulative disturbance is still to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. It is important to note that minke whale densities are higher in the summer when the SCANS surveys are conducted, and significantly fewer minke whales will be present to be disturbed outside of the key summer months. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
152. As per the project alone assessment, the sensitivity of minke whales to pile driving is **Low**.
153. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b

154. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of minke whales predicted to be disturbed per day ranges between 656 (3.3% MU) in 2023 to 994 (4.9% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 13% of the total in 2027.
155. The predicted extent of the cumulative disturbance is still to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. It is important to note that minke whale densities are higher in the summer when the SCANS surveys are conducted, and significantly fewer minke whales will be present to be disturbed outside of the key summer months. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.
156. As per the project alone assessment, the sensitivity of minke whales to pile driving is **Low**.
157. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

158. Across all Tier 1, 2a and 2b and 3 projects between 2023 and 2028, the number of minke whales predicted to be disturbed per day ranges between 753 (3.7% MU) in 2023 to 1,160 (5.8% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 12% of the total in 2027.
159. The predicted extent of the cumulative disturbance is still to a low proportion of the MU, with short-term behavioural changes expected from each disturbance event an individual is exposed to, with the overall disturbance effect occurring across the OWF over several years. It is important to note that minke whale densities are higher in the summer when the SCANS surveys are conducted, and significantly fewer minke whales will be present to be disturbed outside of the key summer months. The temporary changes in behaviour and / or distribution of individuals may be at a scale that could result in potential reductions to lifetime reproductive success to some individuals, although not enough to affect the population trajectory over a generational scale. The magnitude is therefore **Medium**.

160. As per the project alone assessment, the sensitivity of minke whales to pile driving is **Low**.

161. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

Table 14 Summary results for the number of minke whales disturbed by construction noise across different Tiers in the CEA

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total whales disturbed	508	554	358	440	548	116
% MU (20,118)	2.5%	2.8%	1.8%	2.2%	2.7%	0.6%
Contribution of CWP Project to total	0	0	0	0	24%	0
Tier 1 and Tier 2a projects						
Total whales disturbed	508	554	358	657	765	362
% MU (20,118)	2.5%	2.8%	1.8%	3.3%	3.8%	1.8%
Contribution of CWP Project to total	0	0	0	0	18%	0
Tier 1 and Tier 2a and 2b projects						
Total whales disturbed	656	751	714	837	994	865
% MU (20,118)	3.3%	3.7%	3.5%	4.2%	4.9%	4.3%
Contribution of CWP Project to total	0	0	0	0	13%	0
Tier 1 and Tier 2a and 2b and Tier 3 projects						
Total whales disturbed	753	916	879	1,003	1,160	1,070
% MU (20,118)	3.7%	4.6%	4.4%	5.0%	5.8%	5.3%
Contribution of CWP Project to total	0	0	0	0	12%	0

Table 15 Detailed results for the number of minke whales disturbed by construction noise in the CEA

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	ES					134	
Awel y Môr	1	OWF	ES				36	36	36
Erebus Floating Wind Demo	1	Floating	ES				55	55	
White Cross	1	Floating	ES			61	61	61	
Neart Na Gaoithe	1	OWF	ES	85	85				
Berwick Bank	1	OWF	ES		132	132	132	132	
Inch Cape	1	OWF	ES	158	158				
Seagreen Phase 1	1	OWF	ES	94					
Rampion 2	1	OWF	ES				6	6	6
Sheringham Shoal Extension	1	OWF	ES	21	21	21	21		

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Hornsea Project Four	1	OWF	ES	46	46	46	46	46	
Dudgeon Extension	1	OWF	ES				21	21	21
Dogger Bank – Creyke Beck B	1	OWF	ES	12	12				
Dogger Bank – Creyke Beck A	1	OWF	ES	12					
Hornsea Project Three	1	OWF	ES					51	51
Dogger Bank – Teesside B (Sofia)	1	OWF	ES	8	8	8	8		
Moray West	1	OWF	ES	29	29	29			
Dogger Bank C – Teesside A	1	OWF	ES	8	8	8	8		
Green Volt	1	Floating	ES					2	
Pentland Floating	1	Floating	ES		40	40	40		
TwinHub	1	Tidal	5 km EDR		6	6			
Greenlink Interconnector	1	Cable	5 km EDR	1	1				
Fair Head Phase 2	1	Tidal	5 km EDR	1	1	1			
Swansea Bay Tidal Lagoon	1	Tidal	5 km EDR	1					
Cardiff Bay Tidal Lagoon	1	Tidal	5 km EDR	1	1	1	1		
Saint-Brieuc	1	OWF	15 km EDR	2					
Hollandse Kust F	1	OWF	15 km EDR	11					
Hollandse Kust (Zuid)	1	OWF	15 km EDR	11					
CeltixConnect – Sea Fibre	1	Cable	5 km EDR	1	1	1	1		
West Anglesey Demo Zone	1	Tidal	5 km EDR	1	1				
West Somerset Tidal Lagoon	1	Tidal	5 km EDR	1	1	1	1	1	
Dublin Port Company MP2	1	Coastal	5 km EDR	1					
Arklow Waste Water Treatment	1	Coastal	5 km EDR	1	1	1	1	1	1
Maintenance dredging River Boyne, Dogheda	1	Coastal	5 km EDR	1	1	1	1	1	1
North Wall Emergency Power Generation Plant	1	Coastal	5 km EDR	1	1	1	1	1	
Dublin Array	2a	OWF	26 km EDR	Not piling until 2029					
North Irish Sea Array	2a	OWF	26 km EDR						29
Sceirde Rocks	2a	Floating	15 km EDR				217	217	217
Mona	2b	OWF	PEIR						105
Morgan	2b	OWF	PEIR						96
Morecambe	2b	OWF	PEIR				1	1	1

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Outer Dowsing	2b	OWF	PEIR				22	22	22
North Falls	2b	OWF	PEIR			70	70	70	70
Dogger Bank South (West)	2b	OWF	PEIR	148	148				
Dogger Bank South (East)	2b	OWF	PEIR			148			
Arklow Bank	2b	OWF	26 km EDR						29
Oriel	2b	OWF	26 km EDR					29	
Isle of Man	2b	OWF	26 km EDR		19	19	19	19	19
Llyr 1	2b	Floating	15 km EDR		6	6	6		
Llyr 2	2b	Floating	15 km EDR		6	6	6		
Morven	2b	OWF	26 km EDR			89			
Salamander	2b	Floating	15 km EDR				30	30	30
Spiorad na Mara	2b	OWF	26 km EDR						63
Caledonia	2b	OWF	26 km EDR				8	8	8
Stromar	2b	Floating	15 km EDR						8
Cenos	2b	Floating	15 km EDR					30	30
Arven	2b	Floating	15 km EDR		9	9	9	9	
IJmuiden Ver	2b	OWF	15 km EDR						11
Ten Noorden van de Wadden	2b	OWF	15 km EDR					11	11
N-3.6	2b	OWF	15 km EDR		9	9	9		
Campion	3	Floating	15 km EDR		30	30	30	30	30
Cedar	3	Floating	15 km EDR						30
Broadshore	3	Floating	15 km EDR		8	8	8	8	8
Bellrock	3	Floating	15 km EDR		30	30	30	30	30
Shearwater One	3	Floating	15 km EDR						10
Mares Connect	3	Cable	5 km EDR		1	1	1	1	
Holyhead Deep	3	Tidal	5 km EDR				1	1	1
Deer Sound	3	Tidal	5 km EDR	1					
1x seismic airgun survey	3	Seismic	1,759 km ²	24	24	24	24	24	24
1x seismic airgun survey	3	Seismic	1,759 km ²	24	24	24	24	24	24
1x seismic airgun survey	3	Seismic	1,759 km ²	24	24	24	24	24	24
1x seismic airgun survey	3	Seismic	1,759 km ²	24	24	24	24	24	24

Harbour seal

Phase 1 projects

162. **Appendix 11.4** presents the population modelling conducted for the Phase 1 Irish OWF Projects to determine if disturbance from piling activities across the five projects is predicted to result in population level changes. The iPCoD results show that the level of disturbance predicted under either piling schedule 1 or 2 is not sufficient to result in any changes to the harbour seal population, since the impacted population is predicted to continue at a stable trajectory and at exactly the same size of the unimpacted population.
163. The effect of disturbance from a single piling event is expected to last less than a day, though the disturbance impact across the five projects will occur intermittently across 3–5 years depending on the piling scenario. This is expected to result in short-term and / or intermittent and temporary behavioural effects in a small proportion of the population; however, the population modelling has shown that survival and reproductive rates are very unlikely to be impacted to the extent that the population trajectory would be altered. This is therefore a **Low** magnitude.
164. As per the project alone assessment, the sensitivity of harbour seals to pile driving of WTG is **Low**.
165. Therefore, the overall significance of the cumulative impact is **Minor (not significant)**.

All projects

166. None of the offshore projects screened into the harbour seal CEA have a quantitative impact assessment for seals available. Including projects with no quantitative impact assessment currently available is highly precautionary as there is little confidence in the data presented given the assumptions that have had to be made to calculate indicative numbers of seals disturbed by each project.
167. The summary results for the number of harbour seals disturbed by Tier 1 is provided in **Table 16**. Detailed information on the number of harbour seals disturbed per project per year is provided in **Table 17**. Overall, the number of harbour seals predicted to be disturbed by each offshore project is generally low. This is because most projects are located in areas with relatively low expected harbour seal at-sea usage. The exception is the Oriel OWF which is located near to the high-density areas around the Strangford Lough and Murlough SACs in Northern Ireland (**Table 17**).

Tier 1

168. Across all Tier 1 projects between 2023 and 2028, the number of harbour seals predicted to be disturbed per day ranges between five (0.4%) MU in 2028 to 14 (1.0% MU) in 2023, 2024 and 2025 (assuming projects construct on the same day with no overlap of impacted areas). In 2027 when CWP Project is piling, the total predicted number of harbour seals disturbed is 11 (0.8% MU), CWP Project contributes 55% of the total in 2027.
169. The level of disturbance predicted to occur within the harbour seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour but survival and reproductive rates are very unlikely to be impacted to the extent that the population trajectory would be altered. This is therefore a **Low** magnitude. As per the project alone assessment, the sensitivity of harbour seals to pile driving (and other construction activities) is **Low**. Therefore, the overall significance of the cumulative impact to harbour seals is **Minor (not significant)**.

Tier 1 and 2a

170. Across all Tier 1 and 2a projects between 2023 and 2028, the number of harbour seals predicted to be disturbed per day ranges between five (0.4%) MU in 2026 to 122 (8.9% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). In 2027 when CWP Project is piling, the total predicted number of harbour seals disturbed is 11 (0.8% MU), CWP Project contributes 55% of the total in 2027.
171. The level of disturbance predicted to occur within the harbour seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour but survival and reproductive rates are very unlikely to be impacted to the extent that the population trajectory would be altered. This is therefore a **Low** magnitude. As per the project alone assessment, the sensitivity of harbour seals to pile driving (and other construction activities) is **Low**. Therefore, the overall significance of the cumulative impact to harbour seals is **Minor (not significant)**.

Tier 1 and 2a and 2b

172. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of harbour seals predicted to be disturbed per day ranges between six (0.4%) MU in 2026 to 291 (21.3% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 2% of the total in 2027. The number of harbour seals predicted to be disturbed is almost entirely driven by the high predictions at Oriel (96% contribution).
173. *Note: It is important to note that the number of animals calculated to be disturbed by Oriel is highly conservative since it assumes impact to all harbour seals within a 25 km EDR of a pile. In reality it is expected that only a portion of those animals present in the impacted area would respond; however, there are insufficient information to calculate a dose-response estimate at Oriel.*
174. The level of disturbance predicted to occur within the seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals but will not result in a change to the population trajectory. This is therefore a **Medium** magnitude. As per the project alone assessment, the sensitivity of harbour seals to pile driving (and other construction activities) is **Low**. Therefore, the overall significance of the cumulative impact to harbour seals is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

175. Across all Tier 1, 2a and 2b and 3 projects between 2023 and 2028, the number of harbour seals predicted to be disturbed per day ranges between seven (0.5%) MU in 2026 to 292 (21.4% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 2% of the total in 2027. This assumes piling at two OWFs, construction of three coastal asset projects and one cable project occurring at the same time within the MU. The number of harbour seals predicted to be disturbed is almost entirely driven by the higher predictions at Oriel (96% contribution).
176. *Note: It is important to note that the number of animals calculated to be disturbed by Oriel is highly conservative since it assumes impact to all harbour seals within a 25 km EDR of a pile. In reality it is expected that only a portion of those animals present in the impacted area would respond; however, there are insufficient information to calculate a dose-response estimate at Oriel.*
177. The level of disturbance predicted to occur within the seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals but will not result in a change to the population trajectory. This is therefore a **Medium** magnitude. As per the project alone

assessment, the sensitivity of harbour seals to pile driving (and other construction activities) is **Low**. Therefore, the overall significance of the cumulative impact to harbour seals is **Minor (not significant)**.

Table 16 Summary results for the number of harbour seals disturbed by construction noise across different Tiers in the CEA

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total harbour seals disturbed	14	14	14	6	11	5
% MU (1,365)	1.0%	1.0%	1.0%	0.4%	0.8%	0.4%
Contribution of CWP Project to total	0	0	0	0	55%	0
Tier 1 and Tier 2a projects						
Total harbour seals disturbed	14	14	14	6	11	122
% MU (1,365)	1.0%	1.0%	1.0%	0.4%	0.8%	8.9%
Contribution of CWP Project to total	0	0	0	0	55%	0
Tier 1 and Tier 2a and 2b projects						
Total harbour seals disturbed	14	14	14	6	291	124
% MU (1,365)	1.0%	1.0%	1.0%	0.4%	21.3%	9.1%
Contribution of CWP Project to total	0	0	0	0	2%	0
Tier 1 and Tier 2a and 2b and Tier 3 projects						
Total harbour seals disturbed	14	15	15	7	292	124
% MU (1,365)	1.0%	1.1%	1.1%	0.5%	21.4%	9.1%
Contribution of CWP Project to total	0	0	0	0	2%	0

Table 17 Detailed results for the number of harbour seals disturbed by construction noise in the CEA

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	ES					6	
CeltixConnect – Sea Fibre	1	Cable	5 km EDR	1	1	1	1		
Greenlink Interconnector	1	Cable	5 km EDR	0	0				
Fair Head Phase 2	1	Tidal	5 km EDR	8	8	8			
Dublin Port Company MP2	1	Coastal	5 km EDR	0					
Arklow Waste Water Treatment	1	Coastal	5 km EDR	0	0	0	0	0	0
Maintenance dredging River Boyne, Dogheda	1	Coastal	5 km EDR	5	5	5	5	5	5
North Wall Emergency Power Generation Plant	1	Coastal	5 km EDR	0	0	0	0	0	
Dublin Array	2a	OWF	25 km EDR	Not piling until 2029					

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
North Irish Sea Array	2a	OWF	25 km EDR						117
Arklow Bank	2b	OWF	25 km EDR						2
Oriel	2b	OWF	25 km EDR					280	
Mares Connect	3	Cable	5 km EDR		1	1	1	1	

Grey seal

Phase 1 projects

178. **Appendix 11.4** presents the population modelling conducted for the Phase 1 Irish OWF Projects to determine if disturbance from piling activities across the five projects is predicted to result in population level changes. The iPCoD results show that the level of disturbance predicted under either piling schedule 1 or 2 is not sufficient to result in any changes to the grey seal population, since the impacted population is predicted to continue at an increasing trajectory and at exactly the same size of the unimpacted population.
179. The effect of disturbance from a single piling event is expected to last less than a day, though the disturbance impact across the five projects will occur intermittently across 3–5 years depending on the piling scenario. This is expected to result in short-term and / or intermittent and temporary behavioural effects in a small proportion of the population; however, the population modelling has shown that survival and reproductive rates are very unlikely to be impacted to the extent that the population trajectory would be altered. This is therefore a **Low** magnitude.
180. As per the project alone assessment, the sensitivity of grey seals to pile driving of WTG is **Very Low**.
181. Therefore, the overall significance of the cumulative impact is **Negligible (not significant)**.

All projects

182. None of the offshore projects screened into the grey seal CEA have a quantitative impact assessment for seals available. Including projects with no quantitative impact assessment currently available is highly precautionary as there is little confidence in the data presented given the assumptions that have had to be made to calculate indicative numbers of seals disturbed by each project.
183. The summary results for the number of grey seals disturbed by Tier is provided in **Table 18**. Detailed information on the number of grey seals disturbed per project per year is provided in **Table 19**.

Tier 1

184. Across all Tier 1 projects between 2023 and 2028, the number of grey seals predicted to be disturbed per day ranges between 11 (0.5%) MU in 2028 to 407 (6.9% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 97% of the total in 2027.
185. The level of disturbance predicted to occur within the seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. This has been shown for the Project Alone iPCoD modelling. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.

186. As per the project alone assessment, the sensitivity of grey seals to pile driving and other construction activities is **Very Low**.

187. Therefore, the overall significance of the cumulative impact to grey seals is **Minor (not significant)**.

Tier 1 and 2a

188. Across all Tier 1 and 2a projects between 2023 and 2028, the number of grey seals predicted to be disturbed per day ranges between 28 (0.5%) MU in 2026 to 499 (8.2% MU) in 2027, with up to 407 (6.7% MU) in 2027 when CWP Project is piling (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 97% of the total in 2027.

189. The level of disturbance predicted to occur within the seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. This has been shown for the Project Alone iPCoD modelling. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.

190. As per the project alone assessment, the sensitivity of grey seals to pile driving and other construction activities is **Very Low**.

191. Therefore, the overall significance of the cumulative impact to grey seals is **Minor (not significant)**.

Tier 1 and 2a and 2b

192. Across all Tier 1 and 2a and 2b projects between 2023 and 2028, the number of grey seals predicted to be disturbed per day ranges between 28 (0.5%) MU in 2026 to 824 (13.6% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 48% of the total in 2027.

193. The level of disturbance predicted to occur within the seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. There is not expected to be any effect on the favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.

194. As per the project alone assessment, the sensitivity of grey seals to pile driving and other construction activities is **Very Low**.

195. Therefore, the overall significance of the cumulative impact to grey seals is **Minor (not significant)**.

Tier 1 and 2a and 2b and 3

196. Across all Tier 1, 2a and 2b and 3 projects between 2023 and 2028, the number of grey seals predicted to be disturbed per day ranges between 49 (0.8%) MU in 2026 to 845 (14.0% MU) in 2027 (assuming projects construct on the same day with no overlap of impacted areas). CWP Project contributes 47% of the total in 2027. This assumes piling at two OWFs, construction of three coastal asset projects and one cable project occurring at the same time within the MU.

197. The level of disturbance predicted to occur within the seal MU between 2023 and 2028 is expected to result in temporary changes in behaviour and / or distribution of individuals at a scale that could result in potential reductions to lifetime reproductive success to some individuals although not enough to affect the population trajectory over a generational scale. There is not expected to be any effect on the

favourable conservation status and / or the long-term viability of the population. This is therefore a **Medium** magnitude.

198. As per the project alone assessment, the sensitivity of grey seals to pile driving and other construction activities is **Very Low**.
199. Therefore, the overall significance of the cumulative impact to grey seals is **Minor (not significant)**.

Table 18 Summary results for the number of grey seals disturbed by construction noise across different Tiers in the CEA

Results	2023	2024	2025	2026	2027	2028
Tier 1 projects						
Total grey seals disturbed	105	68	65	28	407	11
% MU (6,056)	1.7%	1.1%	1.1%	0.5%	6.7%	0.2%
Contribution of CWP Project to total	0	0	0	0	97%	0
Tier 1 and Tier 2a projects						
Total grey seals disturbed	105	68	65	28	407	499
% MU (6,056)	1.7%	1.1%	1.1%	0.5%	6.7%	8.2%
Contribution of CWP Project to total	0	0	0	0	97%	0
Tier 1 and Tier 2a and 2b projects						
Total grey seals disturbed	105	68	65	28	824	699
% MU (6,056)	1.7%	1.1%	1.1%	0.5%	13.6%	11.5%
Contribution of CWP Project to total	0	0	0	0	48%	0
Tier 1 and Tier 2a and 2b and Tier 3 projects						
Total grey seals disturbed	105	89	86	49	845	699
% MU (6,056)	1.7%	1.5%	1.4%	0.8%	14.0%	11.5%
Contribution of CWP Project to total	0	0	0	0	47%	0

Table 19 Detailed results for the number of grey seals disturbed by construction noise in the CEA

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
Codling Wind Park Project	-	OWF	ES					394	
CeltixConnect – Sea Fibre	1	Cable	5 km EDR	15	15	15	15		
Greenlink Interconnector	1	Cable	5 km EDR	3	3				
Fair Head Phase 2	1	Tidal	5 km EDR	37	37	37			
Dublin Port Company MP2	1	Coastal	5 km EDR	37					
Arklow Waste Water Treatment	1	Coastal	5 km EDR	1	1	1	1	1	1
Maintenance dredging River Boyne, Dogheda	1	Coastal	5 km EDR	10	10	10	10	10	10

Project	Tier	Type	Source	2023	2024	2025	2026	2027	2028
North Wall Emergency Power Generation Plant	1	Coastal	5 km EDR	2	2	2	2	2	
Dublin Array	2	OWF	25 km EDR	Not piling until 2029					
North Irish Sea Array	2	OWF	25 km EDR						488
Arklow Bank	2	OWF	25 km EDR						200
Oriel	2	OWF	25 km EDR					417	
Mares Connect	3	Cable	5 km EDR		21	21	21	21	

5.3.4 Cumulative impact 4: Disturbance from vessel activity during construction

200. It is extremely difficult to reliably quantify the level of increased disturbance to marine mammals resulting from increased vessel activity on a cumulative basis, given the large degree of temporal and spatial variation in vessel movements between projects and regions, coupled with the spatial and temporal variation in marine mammal movements across the region.
201. Although some OWF vessels (such as crew transport and supply vessels) may transit the wind farm at higher speeds, they often travel in repeated / predictable routes within the site. Many other vessels (e.g., jack-up vessels and pilot or attending vessels) travel more slowly within the wind farm site or spend long periods of time jacked-up, at anchor (minimising movement and acoustic signature from engines) or using dynamic positioning systems (minimising movement, although still generating noise). Unfortunately, there are very few species specific studies covering these vessel types that capture vessel movement patterns as well as their acoustic signatures and the corresponding response of marine mammals.
202. Vessel routes to and from offshore windfarms and other offshore projects will, for the majority, use existing vessel routes for pre-existing vessel traffic which marine mammals will be accustomed to. They may also have become habituated to the volume of regular vessel movements and therefore the additional risk is predominantly confined to construction sites. The vessel movements for offshore wind farms are likely to be limited and slow, resulting in less risk of disturbance to marine mammal receptors. In addition, most projects are likely to adopt VMPs (or comply with exiting Marine Wildlife Watching Codes) to minimise any potential effects on marine mammals, as this is considered standard mitigation across the offshore wind industry and complies directly with the relevant Irish guidance for managing vessel interactions with marine mammals.
203. Seismic surveys do not use existing vessel routes, so may risk adding vessel presence to novel areas; however, these are slow-moving and operate their own mitigation measures to protect marine mammals (while mitigating for PTS the mitigation measures will also reduce disturbance impacts). Therefore, increases in disturbance from vessels from offshore projects are likely to be small in relation to current and ongoing levels of shipping.
204. The cumulative impact of increased disturbance from vessels is predicted to be of local spatial extent, medium-term duration (vessel presence is expected throughout the construction phase), intermittent (vessel activity will not be constant) and reversible (disturbance effects are temporary). Therefore, the magnitude of vessel disturbance is considered to be **Low**, indicating that the potential is for short-term and / or intermittent behavioural effects, with survival and reproductive rates very unlikely to be impacted to the extent that the population trajectory would be altered. It is anticipated that any animals displaced from the area will return once vessels leave.

205. The sensitivity of all marine mammals to disturbance from vessel activity was assessed as **Low**.
206. Therefore, significance of the impact is assessed as **Minor (Not significant)**.

5.4 O&M phase

5.4.1 Cumulative impact 5: Disturbance from vessel activity during O&M

207. The cumulative impact from O&M vessel activity is assumed to be the same as during the construction phase. While the duration of impact is longer, the number of vessels expected on site during the O&M phase will be less than during construction. Additionally, vessel movements for offshore wind farms are likely to be limited and slow, resulting in less risk of disturbance to marine mammal receptors. In addition, most projects are likely to adopt VMPs (or comply with existing Marine Wildlife Watching Codes) to minimise any potential effects on marine mammals.
208. The cumulative impact of increased disturbance from vessels is predicted to be of local spatial extent, long-term duration (vessel presence is expected throughout the lifespan of a windfarm), intermittent (vessel activity will not be constant) and reversible (disturbance effects are temporary). Therefore, the magnitude of vessel disturbance is considered to be **Low**, indicating that the potential is for short-term and / or intermittent behavioural effects, with survival and reproductive rates very unlikely to be impacted to the extent that the population trajectory would be altered. It is anticipated that any animals displaced from the area will return once vessels leave.
209. The sensitivity of all marine mammals to disturbance from vessel activity was assessed as **Low**.
210. Therefore, significance of the impact is assessed as **Minor (Not significant)**.

6 CEA summary

211. This CEA, which supports **Chapter 11 Marine Mammals** has assessed the potential cumulative effects on marine mammals from the construction and operation and maintenance phases of the CWP Project alongside other development.
212. In summary, the CEA for marine mammals does not identify any significant cumulative effects resulting from the CWP Project alongside other development.

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