



Environmental Impact Assessment Report

Volume 4

Appendix 9.1 Cumulative Effects Assessment





Table of contents

1	Introduction	7
2	CEA methodology	7
3	CEA impact screening	10
4	CEA 'other development' screening.....	12
5	Assessment of cumulative effects	24
6	CEA summary	41
7	References.....	42



List of tables

Table 1 Consultation responses relevant to the CEA for fish, shellfish and turtles	8
Table 2 Tiered structure for other development considered for CEA (modified from PINS Advice Note 17 (PINS, 2019))	10
Table 3 CEA Impact Screening	11
Table 4 Summary of other development screened into the CEA for fish, shellfish and turtle ecology	14
Table 5 Summary table of other developments that overlap spawning and nursery habitats that may form a cumulative effect with CWP Project.....	25

Abbreviations

Abbreviation	Term in Full
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CWP	Codling Wind Park
DHLGH	Department of Housing, Local Government and Heritage
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electromagnetic Fields
EPA	Environmental Protection Agency
EU	European Union
EVMP	Ecological Vessel Management Plan
ICES	International Council for the Exploration of the Seas
IFI	Inland Fisheries Ireland
MI	Marine Institute
OECC	Offshore Export Cable Corridor
SSC	Suspended Sediment Concentration
TTS	Temporary Threshold Shift

Definitions

Glossary	Meaning
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.
offshore development area	The entire footprint of the offshore infrastructure and associated temporary works that will form the offshore boundary for the development consent application.
offshore export cables	The cables which transport electricity generated by the WTGs from the offshore substations (OSSs) to the landfall.
offshore 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.
operations and maintenance (O&M) activities	Activities (e.g., monitoring, inspections, reactive repairs, planned maintenance) undertaken during the O&M phase of the CWP Project.
O&M phase	This is the period of time during which the CWP project will be operated and maintained.

APPENDIX 9.1 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 fish, shellfish and turtle ecology, which considers the residual effects presented in **Chapter 9 Fish, Shellfish and Turtle Ecology** 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 9 Fish, Shellfish and Turtle Ecology**. 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. **Table 1** provides a summary of stakeholder and regulator feedback received during the consultation process that is relevant to the CEA for fish, shellfish and turtle ecology.

Table 1 Consultation responses relevant to the CEA for fish, shellfish and turtles

Consultee	Comment	How issues have been addressed
Scoping responses		
Inland Fisheries Ireland (IFI) 25 January 2021 & 18 June 2021	Inland Fisheries would like to bring the applicant's attention to the potential for migratory species from Northern Ireland to be present, some recent scientific studies tracking seatrout have shown that these fish will migrate from the Northern Irish coast and along the Irish coastline and vice versa. Atlantic salmon have also been shown to migrate through the Irish Sea as part of their route back to or from Northern Irish Rivers. These transboundary species migrations should also be considered in the EIAR.	Transboundary species migrations have been included in within the cumulative effects assessment in Section 5 .
	Cumulative impacts should take cognisance of the Dublin Port Maintenance Dredging Programme & Strategic Infrastructure Projects planned.	Cumulative impacts, including Dublin Port activities, are scoped in under Section 4 , CEA 'other development' screening.
Marine Institute (MI) 3 February 2021	It is the advice of the MI that the scale of effects of the proposed development be considered beyond the footprint of the turbines and the licenced area.	Section 5 outlines the potential impacts which have been assessed at local, regional and national scale.

Consultee	Comment	How issues have been addressed
	The effects of Electromagnetic Fields (EMF) on electro-sensitive species deserve greater consideration. It would be important that the EIAR examined, in depth, the likely effects of the proposed development on a number of possible receptors. These include, shellfish species (crustaceans), elasmobranchs and demersal species.	The potential impact of EMF has been assessed for all potential receptors (shellfish species, elasmobranchs, and demersal species) in Section 5 Assessment of Cumulative Effects .
Topic-specific meetings (summary of minuted discussions)		
IFI 14 September 2021	Additional projects to consider in the CIA are the Arklow Flood Relief Scheme and Arklow Wastewater Treatment Plant projects.	These projects are scoped in under Section 4 , CEA 'other development' screening.

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 development (presented **Appendix 5.1 Cumulative Effects Assessment Methodology**) 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 developments 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 2** 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).

Table 2 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. • 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. • Onshore 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. • 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

17. The first step in the CEA for fish, shellfish and turtle ecology 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 3**.
18. All potential impacts assessed in **Chapter 9 Fish, Shellfish and Turtle Ecology** are included in the CEA.
19. In summary, **Table 3** shows that there is the potential for cumulative effects on fish, shellfish and turtles as a result of habitat disturbance / loss, noise and vibration, disturbance of the seabed leading to increases in SSC and associated deposition, production of EMF, collision with vessels, accidental pollution and Invasive Non-Native Species (INNS) as set out within **Chapter 9 Fish, Shellfish and Turtle Ecology**.
20. No impacts were screened out of the CEA.

Table 3 CEA Impact Screening

Impact	Potential for cumulative effect	Rationale
Construction		
Impact 1: Temporary seabed habitat disturbance.	Yes	All impacts have the potential to be cumulative as they occur across multiple projects within the Irish Sea.
Impact 2: Noise and vibration.	Yes	
Impact 3: Temporary disturbance of the seabed leading to increases in suspended sediment concentration (SSC) and associated deposition.	Yes	
Impact 4: Collision with vessels.	Yes	
Impact 5: Accidental pollution events.	Yes	
Impact 6: Invasive non-native species.	Yes	
Operation and maintenance		
Impact 1: Long-term habitat loss.	Yes	All impacts have the potential to be cumulative as they occur across multiple projects within the Irish Sea.
Impact 2: Electromagnetic fields (EMF).	Yes	
Impact 3: Operational noise.	Yes	
Impact 4: Temporary disturbance of the seabed including associated increases in SSC and associated deposition.	Yes	
Impact 5: Collision with vessels.	Yes	
Impact 6: Accidental pollution events.	Yes	
Impact 7: Invasive non-native species.	Yes	
Decommissioning		
Impact 1: Temporary seabed habitat disturbance.	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	
Impact 2: Noise and vibration.		

Impact	Potential for cumulative effect	Rationale
Impact 3: Temporary disturbance of the seabed leading to increases in suspended sediment concentration (SSC) and associated deposition.		the CWP Project are assessed in Chapter 9 Fish, Shellfish and Turtle Ecology . 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.
Impact 4: Collision with vessels.		
Impact 5: Accidental pollution events.		
Impact 6: Invasive non-native species.		

4 CEA ‘other development’ screening

21. The second step in the CEA for fish, shellfish and turtle ecology is the identification of other development that may result in cumulative effects for inclusion in the CEA (described as ‘project screening’). This information is set out in **Table 4**, together with a consideration of the relevant details of each development, including the tier (see **Table 2**), proximity to the CWP Project offshore development area and a rationale for including or excluding from the assessment.
22. The other developments 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. In summary, the following other development will be assessed for potential cumulative effects with the CWP Project in relation to fish, shellfish and turtles (**Table 4**). Two projects, Irish Mussel Seed Company Ltd (CEA-2204) and Eirgrid Plc – Rush (CEA-0196), have not been carried forward due to not having overlapping impacts.
 - Wicklow Sea Wind Ltd. - Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)
 - Wicklow County Council - Wicklow Port Dredging (CEA-1355)
 - Sure Partners Limited - Site Investigations at Arklow Bank (CEA-2752)
 - Sure Partners Limited - Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)
 - Sunrise Wind Ltd.- Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)
 - Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)
 - Rockabill Cable Systems Ltd – Survey (CEA-2732)
 - North Irish Sea Array OWF (CEA-0094)
 - North Irish Sea Array (NISA) - Site Investigations (CEA-2738)
 - Dublin Port Company - MP2 Project (CEA-1323)
 - Dublin Port Company - MP2 Project (CEA-1328)
 - Dun Laoghaire Rathdown County Council - Mooring Maintenance (CEA-0198)
 - MaresConnect Electricity Interconnector - Site Investigation (CEA-1359)
 - MaresConnect Electricity Interconnector - Site Investigation (CEA-2749)

- Drogheda Port Company - Maintenance dredging River Boyne, Dogheda (CEA-2712)
- Dublin Port Company - Maintenance Dredging in Dublin Port (CEA-0191)
- Lir Offshore Array Ltd.- Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)
- Hibernian Wind Power - Kilmichael Point survey (CEA-2756)
- Dublin Port Company - Site Investigations (CEA-2727)
- Dublin Port Company - dredge disposal(s) (CEA0206 – 0210)
- Dublin Port Capital Dredging Project (CEA-0192)
- Dublin Array OWF (CEA-0037)
- SSE Renewables - Braymore Point survey (CEA-2742)
- Banba Wind Ltd.- Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)
- Sure Partners Limited - Arklow Bank Wind Park off coast of County Wicklow (CEA-02752)
- Arklow Bank OWF Phase 2 (CEA-0004)
- America Europe Connect Ltd (CEA-0195)
- Dublin Port Company - 3FM Project (CEA-1348)
- Drogheda Port Company – Dumping at sea (CEA-1550)
- Parkwind NV/ESB - Oriel OWF (CEA-0096)
- Mona OWF
- Morgan OWF
- Awel-y-Mor OWF
- Wicklow County Council - Arklow Flood Relief Scheme (CEA-1380)
- Irish Water - Arklow Wastewater Treatment Plant projects (CEA-1373)
- Kish Offshore Wind Limited - Port and harbour activities (including capital and maintenance dredging) and port development (CEA_2979)
- Microsoft Ireland Operations Ltd - Geophysical survey and site investigations (CEA-2989)
- Microsoft Ireland Operations Ltd - Geophysical survey and site investigations (CEA-2991)
- Iarnród Éireann - Geotechnical and Geophysical site investigation survey (CEA-2993)
- Dublin City Council - Environmental survey and ground investigation (CEA-2996)

Table 4 Summary of other development screened into the CEA for fish, shellfish and turtle ecology

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1	Yes	The Foreshore Licence application is to undertake surveys and site investigations to inform development and project design for the proposed site. The surveys will gather further information on: seabed and sub-seabed conditions; geotechnical data on the stability of soils, sediments, clays and gravels to allow the characterisation of the sub-seabed strata to inform design; wind and metocean (wave, current, tide and water levels) information; provide the project team with baseline information on the environmental conditions at the site, including marine ecology, bird, mammals and benthos; provide the project team with information on the archaeological conditions at the site.
Wicklow County Council - Wicklow Port Dredging (CEA-1355)	12.9	14.1	1	Yes	Areas withing Wicklow Port accrete sediment over time, with variability in the rates of sedimentation experienced. The situation over recent years has led to a significant deterioration of the navigational levels, particularly in the approach channel. Wicklow County Council is seeking to establish a long-term sustainable dredging strategy. However, in the meantime, action is required to ensure safe navigation to and from the port can occur. Failure to do this will hinder both trade and safety. Therefore, this application is submitted to facilitate bed-levelling the approach channel to the port and the potential removal of sediments to shoreside location for subsequent management (beneficial use or waste facility).
Sure Partners Limited Site Investigations at Arklow Bank	9	17	1	Yes	Site Investigations to inform the engineering and design of an offshore wind farm at Arklow Bank. The application stated: "The geotechnical activities, which comprise the majority of the works, will commence in June / July 2020, with other survey

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
(CEA-2752)					activities taking place over the following 3-year period". 2020 determination: pursuant.
Sure Partners Limited Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1	Yes	The objectives of the site investigations are to gather sufficient geotechnical information to develop a detailed ground model and to gather refined information on the wind resource.
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1	Yes	Foreshore licence application for site investigation activities to undertake a variety of marine surveys at the proposed site in order to inform the specific location, design and layout of the proposed offshore wind farm and export cable route to shore. The surveys will include geophysical, geotechnical, environmental and metocean campaigns. The site investigation surveys in the proposed Foreshore Licence Application Area will support the development of the proposed Sunrise Offshore Wind Farm.
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1	Yes	The application includes for geophysical surveys (mutli-beam echo sounder, sub bottom profiling, side-scan sonar and magnetometer), geotechnical surveys (cone penetration tests and vibrocores along the potential routes and boreholes at the landfalls) and ecological surveys (fisheries surveys, benthic grab samples, intertidal benthic sampling).
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1	Yes	Pre-installation survey, localised site investigations and installation of a subsea fibre optic cable. Licence valid for 35 years but survey and installation had 5 month programme - planned to commence in April 2019.

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
Statkraft Ireland - North Irish Sea Array OWF (CEA-0094)	40	23	2a	Yes	Phase 1 project. 30–36 turbines; 500MW; Grounded.
North Irish Sea Array (NISA) Windfarm Limited - Site Investigations for export cable route (CEA-2751)	45	27	1	Yes	Outcome of application not known. However, application stated: It is intention to start in Summer 2020 with surveys staged over subsequent five years.
Dublin Port Company - MP2 Project (CEA-1323)	31.6	0	1	Yes	The MP2 Project is the second major capital development project from Dublin Port's Masterplan 2040, for a 15-year permission for phased development works within existing port lands in the north eastern part of the port estate.
Dublin Port Company - MP2 Project (CEA-1328)	32.1	4	1	Yes	Jetty development.
Dun Laoghaire Rathdown County Council - Mooring Maintenance (CEA-0198)	25.5	0.35	1	Yes	Foreshore Licence application for the provision & maintenance of existing moorings within Dun Laoghaire Harbour. Varied maintenance schedules from annually to every 4–5yrs.
MarescConnect Limited - MaresConnect Electricity Interconnector - Site Investigation	30	9.5	3	Yes	Foreshore license application for marine investigative survey works for the MaresConnect Ltd (MCL) Interconnector.

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
(CEA-1359)					
MaresConnect Limited - MaresConnect Electricity Interconnector - Site Investigation (CEA-2749)	30	9.5	1	Yes	The proposed works include surveys 50 m landward of the high-water mark to overlap with the terrestrial survey works.
Drogheda Port Company - Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1	Yes	2021 to 2029 Maintenance Dredging of the commercial estuary of the River Boyne and seaward approaches at Drogheda Port. Partial reuse of dredged materials with remaining dredged materials to be dumped at sea under an EPA licence.
Dublin Port Company - Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1	Yes	Dublin Port Company (DPC) need to carry out regular maintenance dredging of the navigation channel, basins and berthing pockets in order to maintain their advertised charted depths and hence provide safe navigation for vessels to and from the Port. Maintenance dredging campaigns are required approximately every 18 months but may need to be carried out more regularly as a result of extreme weather events causing excessive siltation in the channel.
Lir Offshore Array Ltd., - Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1	Yes	It should be noted the Foreshore Acts 1933 to 2014 allows for the granting of Investigatory Foreshore Licences inside the 12 Nautical Mile limit and, as such, this application relates only to the area within that jurisdiction. The Site Investigation area is entirely within 12 NM and is composed of two (2) separate turbine sites situated at a distance of c. 16 to 19 km east of the county Louth coastline at the nearest proposed turbine location and extending outwards to a maximum distance of c. 35 km off

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
					the coastline. It is expected this site will comprise of c. 55 floating turbines, with locations spaced evenly over the indicated development area; however, this is subject to change as a result of investigatory surveys and stakeholder engagement.
Hibernian Wind Power - Kilmichael Point (CEA_2756)	25	34.5	1	Yes	Foreshore licence application to undertake surveys and investigations in order to further assess the site and seabed, in order to select an optimum route for the submarine electricity cables required for the development of an offshore wind farm to acquire baseline data to allow cable design and the development of cable installation methodologies, to acquire baseline data to optimise the windfarm layout design and finalise offshore foundation locations, to acquire baseline data on the wind resource and baseline information for environmental studies of the area.
Eirgrid Plc – Rush (CEA-0196)	22.13	20	1	No	Foreshore licence application for an Ireland - UK Submarine Electricity Interconnector.
Dublin Port Company - Site Investigations (CEA-2727)	29	0.2	1	Yes	Foreshore Licence application for geophysical and geotechnical marine based site investigation works, to support the design of new quay walls, jetties, land reclamations and capital dredging at Dublin Port, Co. Dublin. Works were due to be completed by end of 2018 but licence valid until 2021.
Dublin Port Company - dredge disposal (CEA-0206)	30	0.5	1	Yes	Maintenance dredging is required in order to restore the depths with the navigation channels and berths of Dublin Port back to their advertised Chart Datum depths. No expiry.

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
Dublin Port Company - dredge disposal (CEA-0207)	30	0.5	1	Yes	Maintenance dredging is required in order to restore the depths within the navigation channel, basins and berths of Dublin Port back to their advertised Chart Datum depths.
Dublin Port Company - dredge disposal (CEA-0208)	30	0.5	1	Yes	The works proposed in the Dublin Harbour Capital Dredging Project comprise a number of elements: • Deepening the navigation channel between North Wall Quay Extension and the Western Oil Jetty, including riverside Berth 35; • Deepening of Alexandra Basin East and deepening/widening of berths; • Deepening of the Oil Basin and widening of berths; • Deepening of the Ferryport Basin; • Deepening of riverside Berth 52; • Widening the South Port (Berths 42–47) berths; and • Removal of ridge between the navigation channel and the Poolbeg Oil Jetty (Berth 48).
Dublin Port Company - dredge disposal (CEA-0209)	30	0.5	1	Yes	The application is for the disposal of a maximum of 4,000,000 tonnes of dredge material (consisting of a mixture of sediments predominately silt sand mix) from maintenance dredging from Dublin Port fairway, basins and berths.
Dublin Port Company - dredge disposal (CEA-0210)	30	0.5	1	Yes	The proposed capital dredging activities form an integral part of Dublin Port Company's MP2 Project (ABP-304888-19). The MP2 Project complements the Alexandra Basin Redevelopment (ABR) Project (29N.PA0034), which is currently under construction, in providing capacity for growth in the Roll On Roll Off (Ro-Ro) and Load On Load Off (Lo-Lo) modes on the north side of the port and at its eastern end in addition to providing suitable infrastructure for increasing numbers of ferry passengers. No expiry date.

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1	Yes	Foreshore application in respect of Capital Dredging at various locations around Dublin Port.
RWE Renewables - Dublin Array OWF (CEA-0037)	2.7	0	2a	Yes	Phase 1 Project. 45–61 turbines; 600MW-900MW; Grounded.
SSE Renewables - Braymore Point (CEA-2742)	53	27	1	Yes	Wind farm now called Setanta. OWF surveys and investigations. Geophysical, Geotechnical and Environmental Site Investigation works.
Banba Wind Ltd. - Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1	Yes	Foreshore licence application for site investigation activities to undertake a variety of marine surveys in the Foreshore Licence Application Area in order to inform the specific location, design and layout of the proposed offshore wind farm and export cable route to shore. The surveys will include geophysical, geotechnical, environmental, metocean campaigns. The objectives of the site investigations and marine surveys is to determine detailed site conditions including seafloor geology, metocean conditions and environmental characteristics. The survey results will inform the planning and design of a proposed wind farm.
Sure Partners Limited - Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1	Yes	The submitted licence application is in respect of site surveys at the Foreshore Licence Area as part of an ongoing survey schedule for Arklow Bank Wind Park to maintain up to date baseline information for the site.

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
Sure Partners Limited - Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b	Yes	Phase 1 project. 100 turbines; 800MW; Grounded.
America Europe Connect Ltd (CEA-0195)	41	10	1	Yes	Geophysical survey and localised site investigations for a subsea fibre optic cable. Donabate, Dublin.
Dublin Port Company - 3FM Project (CEA-1348)	32.6	0	1	Yes	<p>The 3FM Project is the third and final Strategic Infrastructure Development (SID) Project needed to deliver the capacity objectives of the Dublin Port Masterplan 2040. The project is intended to provide the additional infrastructure for freight required in the unitised modes (Ro-Ro and Lo-Lo).</p> <p>Key components of this project will include:</p> <ul style="list-style-type: none"> • Southern port access road (SPAR) • RoRo terminal • Waterside turning circle • Container terminal • Provision for utilities • Maritime village
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3	Yes	Release of the material through the hull of the vessel while the vessel is in motion.

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1	No	Shellfish production.
Oriel Windfarm Ltd (CEA-2755)	84	62	2b	Yes	Located off the coast of County Louth.
Mona OWF (CEA-0081)	125	132	1	Yes	Located in the east Irish Sea with up to 96 turbines.
Morgan OWF (CEA-0084)	140	147	1	Yes	Located in the Irish Sea, approximately 37 km from the northwest coast of England and 22 km from the Isle of Man with up to 96 turbines.
Awel-y-Mor OWF (CEA-0007)	121	129	1	Yes	Located approximately 10.5 km off the Welsh coast in the Irish Sea, with a maximum total area of 78 km ² and up to 50 turbines.
Wicklow County Council - Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1	Yes	Various improvement to the Arklow town flood defences.
Irish Water - Arklow Wastewater Treatment Plant projects. (CEA-1373)	31	36	1	Yes	Improvements to the Arklow wastewater treatment plan.
Kish Offshore Wind Limited (CEA-2979)	23	1	3	Yes	ORE Operations and Maintenance facility. 60–70m pontoon; access gangway; demolition of existing RoRo ramp and part removal of existing fender structure.

Project Title	Distance from the array site (km)	Distance from the export cable corridor (km)	Tier	Included in the CEA (Yes / No)	Rationale
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1	Yes	Geophysical survey and site investigations for a proposed subsea fibre optic cable having a landfall in Portmarnock, County Dublin to evaluate options for the route traversing the Irish Sea to Abergele, Wales.
Microsoft Ireland Operations Ltd - Geophysical survey and site investigations (CEA-2991)	30	0	1	Yes	Geophysical survey and site investigations for a proposed subsea fibre optic cable having a landfall in Dublin Port, County Dublin and to evaluate options for the route traversing Dublin Bay, across the Irish Sea to Anglesey, Wales.
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1	Yes	A Geotechnical Investigation (GI) and Geophysical site investigation surveys to inform design options for the proposed East Coast Rail Infrastructure Protection Projects (ECRIPP). The purpose of ECRIPP is to implement protection measures to at risk sections of the Dublin to Wexford railway line from the effects of climate change and coastal erosion.
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1	Yes	Environmental survey and ground investigation works in order to inform the design of proposed Point Bridge and Tom Clarke Widening Project.

5 Assessment of cumulative effects

5.1 Construction phase

5.1.1 Cumulative Impact 1: Temporary seabed habitat disturbance

24. As described in the impact assessment for the CWP Project alone, the effect of temporary habitat disturbance and loss has the potential to impact mobile fish species with overlapping spawning and nursery grounds in the area, mobile fish and turtle species without spawning or nursery grounds, and shellfish.
25. The cumulative temporary seabed habitat disturbance from all aforementioned projects has the potential to increase the overall temporary loss and disturbance to the habitats of the receptors in the Irish Sea.
26. The CWP Project offshore development area is approximately 168 km², with the area of temporary habitat loss / disturbance calculated at approximately 7.4 km², which is approximately 4.4 % of the of the offshore development area. This area impacts 0.11 % of the largest overlapping spawning and nursery ground (whiting; *Merlangius merlangus*), and the project-alone significance was determined to be **not significant**.
27. The following species with known spawning and nursery habitat do not have overlap with the CWP offshore development area and therefore have no potential for a cumulative impact:
 - Thornback ray (*Raja clavata*);
 - Spotted ray (*Raja montagui*); and
 - Sandeel (*Ammodytes sp.*).
28. Species with spawning and nursery habitat impacted by CWP are listed in **Table 5**, along with the other projects that may impact that habitat. Only other OWF developments have been included in the table as they will have similar impact scales; however, all screened in projects are considered with the CEA assessment.
29. The following specie(s), while overlapped by CWP, do not share an overlap with any other projects and therefore have no potential for a cumulative impact:
 - European sprat (*Sprattus sprattus*).

Table 5 Summary table of other developments that overlap spawning and nursery habitats that may form a cumulative effect with CWP Project

Species	Coull et al. (1998)				Ellis et al. (2012)				Ireland's Marine Atlas	
	Spawning (High intensity)	Spawning (Low intensity)	Spawning (Undetermined intensity)	Nursery	Spawning (High intensity)	Spawning (Low intensity)	Nursery (High intensity)	Nursery (Low intensity)	Spawn	Nursery
Norway lobster (<i>Homarus Gammarus</i>)			NISA, Dublin Array, Mona, Morgan	NISA, Dublin Array, Mona, Morgan					Oriel	
Tope shark (<i>Galeorhinus galeus</i>)								NISA, Dublin Array, Arklow Bank, Oriel, Mona, Morgan, Awel-y-Mor		
Haddock (<i>Melanogrammus aeglefinus</i>)				Dublin Array, NISA, Oriel, Morgan					NISA, Dublin Array, Oriel	Dublin Array, NISA, Oriel

Species	Coull et al. (1998)				Ellis et al. (2012)				Ireland's Marine Atlas	
Whiting (<i>Merlangius merlangus</i>)	Dublin Array	NISA, Dublin Array, Oriel, Mona, Morgan		Dublin Array, NISA, Oriel, Awel-y-Mor		NISA, Dublin Array, Oriel, Mona, Morgan, Awel-y-Mor	NISA, Dublin Array, Oriel, Mona, Morgan, Awel-y-Mor	Arklow Bank, Mona, Morgan	Dublin Array, NISA, Oriel, Mona, Morgan, Awel-y-Mor	Oriel
European plaice (<i>Pleuronectes platessa</i>)		Dublin Array, NISA, Oriel, Mona, Morgan		Oriel, Awel-y-Mor	NISA, Dublin Array, Oriel, Mona, Morgan, Awel-y-Mor	NISA, Dublin Array, Oriel, Mona, Morgan, Awel-y-Mor		Dublin Array, NISA, Oriel, Mona, Morgan, Awel-y-Mor		
Atlantic mackerel (<i>Scomber scombrus</i>)						NISA, Dublin Array, Oriel, Mona, Morgan, Awel-y-Mor		Oriel, Mona, Morgan		NISA, Dublin Array, Arklow Bank, Oriel, Mona, Morgan, Awel-y-Mor
Atlantic horse mackerel						Mona, Morgan				NISA, Dublin Array, Arklow

Species	Coull et al. (1998)				Ellis et al. (2012)				Ireland's Marine Atlas	
(<i>Trachurus trachurus</i>)										Bank, Oriel, Mona, Morgan, Awel-y-Mor
Lemon sole (<i>Microstomus kitt</i>)				NISA, Dublin Array, Arklow Bank, Oriel, Mona, Morgan						
Common sole (<i>Solea solea</i>)		Oriel, Mona, Morgan			Mona, Morgan, Awel-y-Mor	Oriel, Mona, Morgan	Mona, Morgan, Awel-y-Mor	Morgan		
Atlantic cod (<i>Gadus morhua</i>)	Dublin Array	NISA, Dublin Array, Oriel, Mona, Morgan		NISA, Dublin Array, Oriel	Mona, Morgan, Awel-y-Mor	NISA, Dublin Array, Oriel, Mona, Morgan	NISA, Dublin Array, Oriel, Mona, Morgan, Awel-y-Mor	Arklow Bank, Mona, Morgan	Dublin Array, NISA, Oriel, Mona, Awel-y-Mor	NISA, Dublin Array, Arklow Bank, Oriel, Mona, Morgan, Awel-y-Mor

Species	Coull et al. (1998)				Ellis et al. (2012)				Ireland's Marine Atlas	
Anglerfish (<i>Lophius piscatorius</i>)								NISA, Dublin Array, Arklow Bank, Oriel, Mona, Morgan, Awel-y- Mor		
Ling (<i>Molva molva</i>)						NISA, Dublin Array, Oriel, Mona, Morgan				

30. The proportion of habitat affected by this impact of the CWP Project is expected to be representative of the other developments occurring in the area. This is particularly true for the other offshore wind developments which are the most likely screened-in projects to have interaction with offshore spawning and nursery areas, given that offshore wind farms are likely to be on a similar scale and have the same impacts (i.e., noise, habitat loss).
31. Coastal projects, including harbour developments, are less likely to impact spawning areas as these are typically located away from the coastline, and are not typically located within port or harbour areas. The temporary habitat loss or disturbance is a discrete impact that occurs over a relatively small spatial extent compared to the wider area over which all the developments are present, and, as such, the impact is considered negligible in the context of the wider availability of suitable habitat for all species. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact to the existing environment for each project, the magnitude does not increase.
32. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary habitat loss or disturbance will be **not significant**.
33. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary habitat loss or disturbance will be **not significant**.
34. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary habitat loss or disturbance will be **not significant**.

5.1.2 Cumulative Impact 2: Noise and vibration

35. As described in the impact assessment for the CWP Project alone, the effect of noise and vibration arising from construction-related activities, including piling, general construction noise and geophysical surveys, has the potential to impact all fish, turtles and shellfish (including eggs and larvae).
36. The noise and vibration impacts from all the aforementioned projects have the potential to contribute to a cumulative impact on fish, turtles and shellfish in the Irish Sea, with the following effects associated with discrete thresholds: mortality, recoverable injury, and temporary threshold shift (TTS; Popper et al., 2014). Key projects considered in the assessment of cumulative noise are however those that may include those activities that contribute to the greatest increases in underwater noise, notably impact piling or UXO clearance. This includes:
 - Dublin Array
 - Arklow Bank Phase 2
 - NISA Sea Array
 - Oriel
 - Mona
 - Morgan
 - Awel-y-Mor
 - Dublin Port Company MP2 Project
 - Dublin Port New Terminal building
 - Arklow Flood Relief Scheme
 - 3FM Project
37. Those developments that do not include impact piling or UXO clearance (expected to be the dredging and site investigation-related projects), are not considered to contribute to the cumulative impact at a level that may increase the magnitude of the effect of underwater noise. This is because any noise

from the activities will not propagate very far from the source as noise levels from these activities will not be as loud as those from unexploded ordinance clearance (UXO), for example. Additionally, coastal-related projects occur in shallow water and the sound will not travel as far. Site investigations that occur in deeper water will have a larger area of impact from sound, but the area of impact when considered with the wider availability of habitat, as well as mitigation put in place for marine mammals (such as ramp ups where applicable for equipment), is minimal.

38. The estimated distance over which each effect may act varies by hearing type and the associated thresholds. For the CWP Project, mortality represents the smallest area of impact, affecting receptors out to a distance of 2.2 km from piling for the most sensitive receptor. This impact distance, however, assumes no fleeing response in the receptors, which is considered highly precautionary. When fleeing receptors are considered, the distance from source over which mortal effects may be observed decreases to <100 m for the most noise-sensitive receptors.
39. When considered against overlapping spawning and nursery habitats, the largest mortality impact affects 0.17 % of haddock (*Melanogrammus aeglefinus*) spawning habitat and 0.12 % of cod (*Gadus morhua*) nursery habitat. The magnitude of impact was predicted to be very low, with the greatest predicted significance of **not significant**. Mortality impact ranges from the other developments are likely to be similar to those from the CWP Project as installation techniques and equipment used are likely to be similar, because the other offshore wind projects are of a similar scale, in comparable areas and completing the same activities.
40. Recoverable injury impacts may affect receptors out to a distance of 6.2 km for piling for the most sensitive receptor. This impact distance, however, assumes no fleeing response in the receptors, which is considered highly precautionary. When fleeing receptors are considered, the distance from source over which injury effects may be observed decreases to <100 m for the most noise-sensitive receptors.
41. When considered against overlapping spawning and nursery habitats, the largest injury impact affects 0.85 % of haddock spawning habitat and 0.30 % cod spawning habitat. The magnitude of impact was predicted to be very low, with the predicted significance of **not significant**. Recoverable injury impacts from the other developments are likely to be similar to those from the CWP Project, because the other offshore wind projects are of a similar scale, in comparable areas and completing the same activities.
42. TTS represents the largest level of impact, affecting receptors out to a distance of 32 km for piling for the most sensitive receptor. This impact distance, however, assumes no fleeing response in the receptors, which is considered highly precautionary. When fleeing receptors are considered, the distance from source over which TTS effects may be observed decreases to 31 km for the most noise-sensitive receptors.
43. When considered against overlapping spawning and nursery habitats, the largest TTS impact affects 23.14 % of whiting spawning habitat and 8.90% of haddock nursery habitat. The magnitude of impact was predicted to be very low to medium, with the greatest predicted significance of Minor to Moderate, which is **not significant**. TTS impacts from the other developments are likely to be similar to those from the CWP Project, because the other offshore wind projects are of a similar scale, in comparable areas and completing the same activities.
44. Piling is a temporary impact over the construction period. As such, although the percentage of overlap of a spawning area provides useful context, it does not take into account the short-term and temporary nature of the work compared to the duration of available spawning potential. As such, the proportion of spawning potential impacted has been calculated for the applicable species, with a maximum spawning potential impact of 1.69 % (whiting).
45. Considering the predicted impact ranges, not all developments will act additively at all thresholds. Mortality impacts are expected to act over relatively small spatial scales for all relevant developments, and therefore a limited effect is predicted across the cumulative projects considered. Given the wider

availability of habitat in the area and short-term nature of the impact, the magnitude of this impact is not considered to increase due to the cumulative effects of all projects considered. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact to the existing environment for each project, the magnitude does not increase. Mitigation (e.g., soft start piling, or other mitigation designed to clear the immediate area of greatest impact) will be undertaken for the CWP Project and is expected to be implemented by all other developments considered within this cumulative assessment. This will provide an opportunity for all receptors to move out of the areas of potential mortality and further reduce the potential impacts. As such, the cumulative impact of mortality effects arising from underwater noise is considered to be **not significant**.

46. Recoverable injury and TTS affect receptors over much larger areas, and thus areas of effect arising from multiple projects have the potential to overlap. This may increase the areas over which these effects are experienced by receptors. Despite affecting receptors over a potentially large area, these effects are recoverable and temporary, allowing recovery of receptors on cessation of the impacting activities. Considering the temporary nature of the effect, with recoverability expected very quickly following cessation of the impacting activities, the magnitude of the impact is not considered to increase due to the cumulative effects of all projects considered. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact to the existing environment for each project, the magnitude does not increase. Additionally, projects will be conducting works throughout different times of the year; therefore, it is unlikely that piling events will affect the same spawning habitats at the same times and as such there will be limited chance of overlapping spawning potential reduction.
47. As such, the cumulative impact of recoverable injury or TTS effects arising from underwater noise is considered to be minor to moderate, which is **not significant**.
48. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of noise- and vibration-related mortality, recoverable injury and TTS will be **not significant**.
49. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of noise and vibration related mortality, recoverable injury and TTS will be **not significant**.
50. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of noise and vibration related mortality, recoverable injury and TTS will be **not significant**.

5.1.3 Cumulative Impact 3: Temporary disturbance of the seabed leading to increases in SSC and associated deposition.

51. As described in the impact assessment for the CWP Project alone, the effect of temporary disturbance of the seabed leading to increases in SSC and associated deposition has the potential to impact mobile fish species with overlapping spawning and nursery grounds in the area, mobile fish species without spawning or nursery grounds in the area and shellfish.
52. The representative scenario is based upon the dredging / disposal and trenching works that will take place as part of the CWP Project. The greatest predicted impacts can be summarised as follows:
 - **Dredging / disposal** Modelled representative scenarios of dredge disposal activities within the array site indicated the predominant direction of travel for SSC plumes is eastward (away from shore). In one scenario, a maximum transient increase in SSC of 150 mg / L was predicted to travel a maximum of 4 km over c.10 days resulting in a cumulative sediment deposition thickness

of c. 6 cm. In another, a maximum increase of 100 mg / L was predicted to travel up to 6 km over c. 15 days, resulting in a cumulative sediment deposition thickness of c. 3 cm. Modelled representative scenarios of dredge disposal activities within the OECC predicted a maximum transient increase in SSC of 80 mg / L, travelling 4 km westward, resulting in a cumulative sediment deposition thickness of c. 2 cm, near the disposal location, and in a final scenario, a maximum increase in SSC of 50 mg / L, travelling a maximum of 5 km south eastward, resulting in a cumulative sediment deposition thickness of c. 4 cm, near the disposal location.

- **Trenching** A consequence of cable installation will be the liberation of sediment into suspension within the water column, just above the seabed. Jetting results in greater sediment suspension, introducing the potential for the distribution of greater volumes of material over a larger spatial area than other cable-laying techniques which may be employed during construction and thus is assessed as the representative scenario. This method involves fluidising the material to form a narrow trench into which the cable is laid.
 - Based upon the representative scenario, the predicted transport of sediment plumes generated during cable installation activities across the array site indicates that the finest sediments will potentially be transported eastward up to 10 km at an increase of 20 mg / L, resulting in a cumulative sediment deposition thickness of <1 cm, near the release location. Maximum SSC values of up to 40 mg / L were predicted to be transported up to 4 km eastward, resulting in a cumulative sediment deposition thickness of c. 1 cm near the release location. However, these plumes are transient and rapidly decreasing as sand-sized sediments deposit onto the bed and finer sediments are dispersed.
 - The predicted transport of sediment plumes generated during cable installation activities across the OECC was for a maximum increase in SSC of 50 mg / L being transported for up to 7 km eastward, resulting in a cumulative sediment deposition thickness of c. 2 cm, near the release location and southward, and a maximum increase in SSC of 80 mg / L being transported for <1 km eastward, resulting in a cumulative sediment deposition thickness of <1 cm, near the release location.
 - Therefore, the maximum thickness of the deposit on the seabed away from the trenching activities were predicted to be c. 2 cm; deposited sediments would be reworked and rapidly integrated into the prevailing sediment transport regime, and thus would have negligible impact on the prevailing environment. Consequently, enhanced SSC and the predicted deposition thickness would not be discernible above natural variation observed during storm events, with SSCs predicted, in the representative scenario, to reduce to baseline levels within c. 15 days following trenching operations.

53. While suspended sediments have the potential to cover a moderate area, these effects are temporary, allowing recovery of receptors within days of impacting activities. Additionally, as most species are highly mobile (and less mobile species are considered to be tolerant of SSC), species will be able to move outside of the affected area. The magnitude of impact was predicted to be low, with the predicted significance of **not significant**.

54. Of the relevant projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts are likely to be relatively similar to those predicted for the CWP Project, because the projects are either of a similar scale, in comparable areas or completing the same activities. While the rest (coastal developments and various surveys) have the potential to produce SSC, they will be on a significantly smaller scales when compared to the windfarm / dredging activities. For CWP, it was concluded that the sediment thickness will be <1 cm within the immediate vicinity followed by rapid natural dispersal and sediment movement to reduce to background levels within 15 days for the 1,428,150 m³ of material. While for the purposes of the assessment it is assumed that all

projects will occur simultaneously, it is highly unlikely that this will occur. However, the short duration of increased levels of SSC and rapid redistribution of sediments ensure there will not be change in the magnitude of the predicted impact from the cumulative impact of other developments. Additionally, given the distances among the projects and the lesser volume of material (in some cases; as per **Table 4**), the area over which the impacts occur is very large and the spread of the sediment is limited. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact to the existing environment for each project, the magnitude does not increase.

55. The other projects will impact a much smaller area due to their nature (being coastally situated or survey related) and do not involve dredge disposal. While some of the activities will have the likelihood of increasing SSC, the combination of smaller areas and highly dynamic marine environments ensures there will not be a change in the magnitude of the predicted impact. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact on the existing environment for each project, the magnitude does not increase.
56. Considering the temporary nature of the effect, with recoverability expected very quickly following cessation of the impacting activities, the magnitude of the impact is not considered to increase due to the cumulative effects of all projects considered. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact on the existing environment for each project, the magnitude does not increase.
57. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of the seabed leading to increases in SSC and associated deposition will be **not Significant**.
58. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of the seabed leading to increases in SSC and associated deposition will be **not significant**.
59. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of the seabed leading to increases in SSC and associated deposition will be **not significant**.

5.1.4 Cumulative Impact 4: Collision with Vessels

60. As described in the impact assessment for the CWP Project alone, the effect of collision with vessel events has the potential to impact two species: basking shark (*Cetorhinus maximus*) and leatherback turtle (*Dermochelys coriacea*).
61. It is highly likely that a proportion of vessels will be stationary or slow moving throughout construction activities for significant periods of time as a result of the nature of the construction activities, and where interaction with sensitive marine mammal and ornithology receptors is possible, measures will be introduced through the Ecological Vessel Management Plan (EVMP). This will minimise the risk of collisions through a reduction in the number of vessel routes, thereby minimising the area of potential overlap with receptors. In addition, the actual increase in vessel traffic moving around the site and to / from port to the site will occur over short periods of the offshore construction activity.
62. All vessels involved in the other projects will likely follow a vessel management plan, such as the one set up for CWP, which will outline transit routes and include information on marine mammals and other marine megafauna which may be in the area in order to minimise the risk of collisions. While the amount of vessel traffic does increase cumulatively with the other screened-in projects, when considered proportionally to the increased area over which the cumulative projects are based, the

magnitude is not considered to increase. Based upon this, it is concluded that the predicted category of magnitude will not change due to the cumulative effect of the different developments.

63. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of collision with vessels will be **not significant**.
64. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of collision with vessels will be **not significant**.
65. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of collision with vessels will be **not significant**.

5.1.5 Cumulative Impact 5: Accidental Pollution Events

66. As described in the impact assessment for the CWP Project alone, construction vessels and equipment can result in pollution events from substances such as grease, hydraulic oil, gear oil, nitrogen, transformer silicon / ester oil, diesel fuel, SF6, glycol / coolants, batteries and drill fluid. All such chemicals have the potential to cause harm to the aquatic environment; therefore, all species may be affected.
67. All vessels involved in the other projects will likely follow a Construction Environmental Management Plan (CEMP), such as the one set up for CWP, and will follow OSPAR, IMO and MARPOL guidelines, and industry best practices regarding pollution at sea. This includes provision for the storage of pollutants and identifies products suitable for use in the marine environment, rendering the occurrence of such an event highly unlikely. Based upon this, it is concluded that the predicted magnitude will not change due to the cumulative effect of the different developments.
68. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of accidental pollution events will be **not significant**.
69. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of accidental pollution events will be **not significant**.
70. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of accidental pollution events will be **not significant**.

5.1.6 Cumulative Impact 6: Invasive Non-Native Species

71. As described in the impact assessment for the CWP Project alone, there is the potential that Invasive Non-Native Species (INNS) could be introduced by construction-related activities, through methods such as the release of contaminated ship's ballast. Once introduced to the environment, INNS can quickly outcompete other species for resources, resulting in species decline, and therefore all species may be affected.
72. All vessels involved in the other projects will consider the mitigation and control of invasive species measures in accordance with European Regulations and line with International Maritime Organization guidance (IMO, 2019), and through the implementation of an offshore biosecurity plan. The associated standards and procedures will be incorporated by all vessels, rendering the occurrence of such an

event highly unlikely. Based upon this, it is concluded that the predicted magnitude will not change due to the cumulative effect of the different developments.

73. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of INNS will be **not significant**.
74. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of INNS will be **not significant**.
75. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of INNS will be **not significant**.

5.2 Operation and maintenance

5.2.1 Cumulative Impact 1: Long-term habitat loss

76. As described in the impact assessment for the CWP Project alone, the effect of habitat disturbance and long-term loss has the potential to impact mobile fish species with overlapping spawning and nursery grounds in the area, mobile fish species without spawning or nursery grounds in the area and shellfish.
77. The CWP Project offshore development area is approximately 168 km², with the area of long-term habitat loss / disturbance calculated at approximately 0.6 km², which is approximately 0.4 % of the project offshore development area. This area overlaps less than 0.01 % of the largest overlapping spawning and nursery ground (whiting), and the project-alone significance was determined to be slight / not significant.
78. Species established with both unaffected and cumulative impact potential under Cumulative Impact 1 remain the same for this impact.
79. The proportion of habitat affected by this impact by the CWP Project is expected to be representative of the other developments occurring in the area, particularly the other offshore wind developments, which are the most likely of those screened in to have interaction with offshore spawning and nursery areas. Coastal projects, including harbour developments, are less likely to impact spawning or nursery areas as these are typically located away from the coastline, and are not typically located within port or harbour areas. Projects screened in for surveys will not cause any long-term habitat loss and will result in minimal disturbance due to the discrete nature of the survey. Habitat disturbance and long-term loss is a discrete impact that occurs over a relatively small spatial extent compared to the wider area over which all the developments are present, and, as such, the impact is considered negligible in the context of the wider availability of suitable habitat for all species. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact on the existing environment for each project, the magnitude does not increase. Therefore, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of habitat disturbance and long-term loss will be **not significant**.
80. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of habitat disturbance and long-term loss will be **not significant**.
81. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of habitat disturbance and long-term loss will be **not significant**.

82. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of habitat disturbance and long-term loss will be **not significant**.

5.2.2 Cumulative Impact 2: Electromagnetic fields (EMF) from cables

83. As described in the impact assessment for the CWP Project alone, the effect of EMF exposure has the potential to impact all fish, turtle and shellfish species. While some species are considered more sensitive to EMF than others, the magnitude of the impact for sensitive was assessed to be low, with the highest significance being Moderate / Slight, which is **not significant**.
84. There is approximately 145.8 km of offshore export cable corridor (OECC) cable, 8.6 km of inter-connector cable and 139 km of inter-array cabling for the CWP Project, all of which has the potential to generate EMF. This is likely to be representative of the other three windfarm developments.
85. As the coastal or survey-related projects are not power-generating developments, there will be no associated EMF for any of these projects, and as such they will not contribute to the cumulative impact.
86. The presence of EMF may result in behavioural changes, such as attraction or avoidance of a discrete area or changes in normal behaviours such as foraging (Gill et al., 2009).
87. A study commissioned by the MMO (2014) evaluated the results of environmental data associated with post-consent monitoring of licence conditions of UK Round 1 and Round 2 OWFs, and some European sites. The report concluded that from the results of post-consent monitoring conducted to date, there is no evidence to suggest that EMF pose a significant risk to elasmobranchs at a site or population level, and little uncertainty remains (MMO, 2014). In a study on the elasmobranch response to EMF, it was determined that while elasmobranch species did respond to the presence of EMF from a sub-sea cable, species remained present in the vicinity of the cable regardless of EMPF presence (Gill et al., 2009).
88. In addition, the NPS EN-3 Renewable Energy Infrastructure (2001) and MMO (2014) both conclude that effects from EMF are not predicted to be significant for fish. No behavioural or physiological changes have been observed in shellfish below exposure levels of 200 μT (Scott et al., 2020), a value far higher than the predicted maximum arising from the CWP project. Additionally, the earth's magnetic field is typically between 22 μT and 67 μT (British Geological Survey, n. d.). The maximum level (**Plate 9-3**, 4.9 μT) is well below the background levels that all the receptors experience. Any effects on fish and turtle are anticipated to only occur within the immediate vicinity of the cable. While the overall area covered by EMF-producing cables between the windfarms will be large, assuming approximately the same lengths of cables, the effects of EMF occur over a small spatial scale when considered against the very large areas between projects. Given the low predicted levels, the burial of cables which will reduce EMF received by the receptors, and the expectation that equivalent levels of effect will be present at all other relevant developments, it is considered that there will be no meaningful change to the magnitude of effects at a cumulative level from EMF on fish, shellfish and turtle, which is considered to be very low. Therefore, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of EMF will be **not significant**.
89. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of EMF will be **not significant**.
90. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of EMF will be **not significant**.

91. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of EMF will be **not significant**.

5.2.3 Cumulative Impact 3: Operational noise

92. Projects likely to have levels of operational noise include the OWFs, dredging projects, vessel infrastructure-related projects (such as MP2 jetty development) and survey-related projects.
93. As described in the impact assessment for the CWP Project alone, the effect of noise and vibration has the potential to impact all fish, shellfish and turtles (including eggs and larvae) based on their hearing mechanisms. Unlike construction-related noise and vibration, no percussive piling or UXO clearance is occurring during this phase, hence the magnitude of effects are much reduced from that described during construction. The noise and vibration impact pathways are likely to include noise from vessels, noise from the operation of the turbines and geophysical survey noise.
94. In regard to vessel noise, it is already established that the CWP offshore development area contains a busy shipping route in and out of Dublin port; therefore, it is unlikely that operation / maintenance-related vessels for all projects will materially alter the level of vessel-related noise in the environment.
95. The operation of the wind turbine itself will produce noise; however, it has been established that turbines can act as fish-aggregating devices, offering new structures that can be used as habitats (Wilhelmsson, Malm and Öhman, 2006; Haberlin, Cohuo and Doyle, 2022). This indicates that the noise produced is such that fish are not affected and do not avoid the project infrastructure due to noise emissions.
96. The use of geophysical survey equipment is a common activity, with most vessels running some form of similar equipment (shipping / fishery). There is no evidence to suggest that geophysical survey noise affects fish or shellfish. As the survey equipment will be used on site-related infrastructure, the area affected will be restricted to this infrastructure, which is a minimal area within the general habitat. Additionally, such surveys will be of short duration. All use of this equipment will follow methods for marine mammals (see **Chapter 11 Marine Mammals**), which have inbuilt mitigation that will also mitigate the impacts on basking shark / turtle.
97. Based on the current literature to date, there is no evidence of mortality or population effects (such as reduced abundances) of fish or invertebrates following exposure to anthropogenic sound sources, such as those typical of survey work. Research on invertebrates provides evidence for low-frequency sound detection abilities, which may result in short-term behavioural responses in a number of marine invertebrate species (Roberts and Breithaupt, 2016; Carroll et al., 2017). In activities such as seismic surveys (not required for this site) that produce larger levels of generated noise, fish and shellfish will display physical responses, behavioural responses, and physiological responses. Physical responses include the potential of damage to hearing capabilities for fish, behavioural responses include startle behaviours (but no avoidance behaviour) and physiological responses include endocrinological stress (Carroll et al., 2017). While the predicted impacts from geophysical surveys are likely to be similar, the sound levels will be to a less than seismic, and, as such, responses displayed by receptors will occur to a lesser extent.
98. In regard to general maintenance noise, activities will occur at undetermined but likely sporadic intervals (days / weeks) across the 25-year operation period. Activities may occur more than once in any given area, although their frequency will likely be infrequent. As none of the general maintenance activities involve a percussive impact, the magnitude of noise will be significantly less than from construction. There is the potential that generated noise will result in short-term behavioural responses (i.e., fleeing the area), but this will occur over very small areas within the CWP offshore development area and will be temporary.

99. Due to the above factors, the magnitude of impact is considered very low and the impact is Slight / Not significant. Determining the cumulative effect of noise and vibration is difficult; each development will cover different areas that may have different species and different areas of spawning and nursery grounds.
100. As the other windfarm projects will be producing similar levels of operational noise, it is unlikely that this will have a cumulative effect as it occurs over such a small spatial extent that the impact is negligible considering the wider availability of suitable habitat. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact on the existing environment for each project, the magnitude does not increase. Therefore, it is concluded that the magnitude of the impact will not be meaningfully increased by the surrounding developments and that no significant effect will come from operational noise.
101. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of the operational noise will be **not significant**.
102. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of operational noise will be **not significant**.
103. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of operational noise will be **not significant**.

5.2.4 Cumulative Impact 4: Temporary disturbance of the seabed including associated increases in SSC and deposition.

104. As described in the impact assessment for the CWP Project alone, the effect of temporary disturbance of the seabed, leading to increases in SSC and associated deposition, has the potential to impact mobile fish species with overlapping spawning and nursery grounds in the area, mobile fish species without spawning or nursery grounds in the area and shellfish.
105. As this will be an 'as needed' activity, it is difficult to predict the levels of SSC that may come from such activities; however, it will be significantly less than that of construction as no dredging will occur during the operational phase (and similarly for the other windfarms projects).
106. For species with spawning and nursery habitat, the potential overlap of spawning or nursery areas is negligible. While suspended sediments have the potential to cover a moderate area, these effects are temporary, allowing recovery of receptors within days of impacting activities. Additionally, as most species are highly mobile (and less mobile species are considered to be tolerant of SSC), species will be able to move outside of the affected area. Considering the temporary nature of the effect, with recoverability expected very quickly following cessation of the impacting activities, the magnitude of the impact is not considered to increase meaningfully as a result of the cumulative effects of all projects considered. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact on the existing environment for each project, the magnitude does not increase. As such, the cumulative impact of temporary disturbance of the seabed leading to increases in SSC and associated deposition is considered to be slight, which is **not significant**.
107. The relevant projects include the offshore windfarms and dredging programmes. Therefore, the impacts are likely to be relatively similar to those predicted for the CWP Project. In the construction component, it was concluded that the sediment thickness will be <1 cm within the immediate vicinity, followed by rapid natural dispersal and sediment movement to reduce to background levels within 15 days. Any disturbance resulting in SSC is likely to be less significant than a dredging scenario. In addition to this, as it is highly unlikely that these impacts will be occurring within the exact same time

period, the rapid settling of SSC and dispersal of sediments mean there will be no change in the magnitude of the predicted impact.

108. The other projects, the coastal and survey-related projects, will impact a much smaller area due to their nature and do not involve dredge disposal. While activities will have the likelihood of increasing SSC, the combination of smaller areas and highly dynamic marine environments means there will not be a meaningful change in the magnitude of the predicted impact. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact on the existing environment for each project, the magnitude does not increase.
109. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of the seabed leading to increases in SSC and associated deposition will be **not significant**.
110. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of the seabed leading to increases in SSC and associated deposition will be **not significant**.
111. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of the seabed leading to increases in SSC and associated deposition will be **not significant**.

5.2.5 Cumulative Impact 5: Collision with vessels

112. As described in the impact assessment for the CWP Project alone, the effect of collision with vessel events has the potential to impact two species: basking shark and leatherback turtle.
113. It is highly likely that a proportion of vessels will be stationary or slow moving throughout construction activities for significant periods of time as a result of measures introduced through the EVMP. This will minimise the risk of collisions through reduction in the number of vessel routes, thereby minimising the area of potential overlap with receptors. In addition, the operation and maintenance phase for all relevant projects will include significantly fewer vessels as fewer activities will be occurring during this time, further reducing the magnitude of impact.
114. All vessels involved in the other projects will likely follow a vessel management plan, such as the one set up for CWP, which will outline transit routes and include information on marine mammals and other marine megafauna which may be in the area in order to minimise the risk of collisions. While the absolute area of affected habitat does increase, when considered proportionally to the areas of impact on the existing environment for each project, the magnitude does not increase. Based upon this, it is concluded that the predicted magnitude will not change due to the cumulative effect of the different developments.
115. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of collision with vessels will be **not significant**.
116. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of collision with vessels will be **not significant**.
117. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of temporary disturbance of collision with vessels will be **not significant**.

5.2.6 Cumulative Impact 6: Accidental Pollution Events

118. As described in the impact assessment for the CWP Project alone, operation and maintenance vessels and equipment can result in pollution events from substances such as grease, hydraulic oil, gear oil, nitrogen, transformer silicon / ester oil, diesel fuel, SF6, glycol / coolants, batteries and drill fluid. All such chemicals have the potential to cause harm to the aquatic environment; therefore, all species may be affected.
119. All vessels involved in the other projects will likely follow an Operational Environmental Management Plan (OEMP), such as the one set up for CWP, and will follow OSPAR, IMO and MARPOL guidelines, and industry best practices regarding pollution at sea. This includes provision for the storage of pollutants and identifies products suitable for use in the marine environment, rendering the occurrence of such an event highly unlikely. Based upon this, it is concluded that the predicted magnitude will not meaningfully change due to the cumulative effect of the different developments. Additionally, as there are likely to be fewer vessel movements involved in the operational / maintenance phase, the magnitude is further reduced.
120. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of accidental pollution events will be **not significant**.
121. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of accidental pollution events will be **not significant**.
122. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of accidental pollution events will be **not significant**.

5.2.7 Cumulative Impact 7: Invasive Non-Native Species

123. As described in the impact assessment for the CWP Project alone, there is the potential that Invasive Non-Native Species (INNS) could be introduced by construction-related activities, through methods such as the release of contaminated ship's ballast. Once introduced to the environment, INNS can quickly outcompete other species for resources, resulting in species decline, and therefore all species may be affected.
124. All vessels involved in the other projects will consider the mitigation and control of invasive species measures in line with European Regulations and International Maritime Organization guidance (IMO, 2019). The associated standards and procedures introduced by the implementation of the offshore biosecurity plan will be incorporated by all vessels, rendering the occurrence of such an event highly unlikely. Based upon this, it is concluded that the predicted magnitude will not meaningfully change due to the cumulative effect of the different developments. Additionally, as there are likely to be fewer vessel movements involved in the operational / maintenance phase, the magnitude is further reduced.
125. For the CWP project cumulative impact with Tier 1 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of INNS will be **not significant**.
126. For the CWP project cumulative impact with Tier 1 and Tier 2a projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of INNS will be **not significant**.

127. For the CWP project cumulative impact with Tier 1, Tier 2a, Tier 2b and Tier 3 projects, it is concluded that the magnitude of the impact will not be increased by the surrounding developments and that the cumulative effect of INNS will be **not significant**.

6 CEA summary

128. This CEA, which supports **Chapter 9: Fish, Shellfish and Turtle Ecology**, has assessed the potential cumulative effects on fish, turtles and shellfish from the construction and operation and maintenance phases of the CWP Project alongside other development.
129. In summary, the CEA for fish, shellfish and turtle ecology does not identify any significant cumulative effects resulting from the CWP Project alongside other development.

7 References

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